AN EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF COMPACTED CLAY/SAND MIXTURES

by

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ABSTRACT

Compacted clay/sand mixtures can be used as engineered fills when constructing earthen levees or embankment dams. They are also a design option available to engineers that are constructing liner systems or other types of impervious buffer zones for waste disposal projects. For geotechnical engineers that are designing these types of engineered fill systems, it is useful to have an understanding of the engineering behavior of these mixtures as a function of the soil mixture and compaction process that is utilized. This study investigated the effects of various soil mixtures and compaction conditions on the strength and compressibility characteristics of compacted clay/sand mixtures. The factors investigated include the: clay mineral type, clay content, dry unit weight, compaction moisture content, and compaction energy. To simulate the field compaction process, representative Proctor specimens were prepared for each of the clay/sand mixtures at low, standard, and modified Proctor compaction energy levels. Unconsolidated-undrained triaxial strength tests were conducted at various confining pressures on test specimens prepared from each of the compacted Proctor specimens. One dimensional compression tests were also performed on test specimens prepared from each of the compacted Proctor specimens, to determine the compressibility behavior of each of the compacted soil mixtures.

The experimental findings showed that the undrained strength of samples compacted at the same energy level decreased with increasing compaction moisture content. Additionally, the undrained strength increased with increasing confining pressure and compaction energy. The results also indicated that the angles of shearing resistance increased with decreasing moisture content, and were largest for specimens compacted at a very low water content with high compaction energy. The values of the cohesion intercept increased with increasing dry density, clay content, and plasticity of the clay fraction. Due to their differences in soil mineral characteristics and as-compacted soil fabric, kaolinite/sand mixtures exhibited higher ϕ values and lower *c* values than bentonite/sand mixtures at the same water content relative to the optimum water content. The values of Young's modulus measured in the triaxial test at 50% of the strength increased with clay content and were higher for dry-of-optimum specimens. The compression test results further showed that a large percentage of compression occurred tended to occur within the first minute of loading. The compaction moisture content was found to have a more significant effect on a given mixture's compressibility behavior for samples having a high clay content.

Chapter 1

INTRODUCTION

Compacted clay/sand mixtures are currently used as engineered fills when constructing earthen levees or embankment dams (e.g., Fukue et al. 1986). For larger embankment dams, their use is typically confined to construction of a low permeability dam core, which is often used in conjunction with an engineered soil filter (e.g., Jafari and Shafiee 2004). It is also feasible to use a mixture of highly plastic clay (e.g., bentonite) with sand to construct liner systems or other types of impervious buffer zones for waste disposal projects (e.g., Chapuis 1990). In these cases, the undrained shear strength and compressibility behavior of the engineered clay/sand mixtures are dependent upon the soil compaction process. For geotechnical engineers that are designing these types of engineered fill systems, it is useful to have an understanding of the undrained shear strength and compressibility behavior of these mixtures as a function of the compaction process and compaction energy that is used. A review of past studies has revealed that the majority of previous research in this area has focused on the behavior of pure sands or clays, while research on clay/sand mixtures has been very limited.

This particular study investigated the "short-term" laboratory undrained shear strength and compressibility characteristics of laboratory-compacted clay/sand mixtures. The "short-term" refers to the characteristics of the fill material that are present immediately after compaction, before environmental factors have an opportunity to alter the as-compacted condition of the soil. Two types of clay were studied to investigate the effect of different clay mineralogy: sodium bentonite and pulverized kaolin. Test samples were prepared by mixing Ottawa sand with clay at different clay proportions (15%, 25% and 50%). A laboratory impact compaction approach (Proctor-type compaction) was utilized to create larger samples, with compaction efforts being varied to achieve three distinct energy levels. The resulting Proctor samples were extruded and trimmed to create triaxial test specimens and oedometer test specimens. The as-compacted strength of each of the clay/sand mixtures was measured using unconsolidated-undrained triaxial tests that employed three levels of confining pressure to simulate a variety of embankment heights. The as-compacted compressibility characteristics of each of the clay/sand mixtures was measured using a series of one-dimensional incremental compression tests.

The ultimate purpose of this research was to obtain data which can be used by engineers to predict the compaction properties, laboratory undrained shear strength and compressibility characteristics of partially saturated compacted clay/sand mixtures at different compaction conditions (i.e. compaction energy, molding water content). This will make it easier for engineers to better design earthern levees, embankment dams, and containment barrier systems that utilize these mixtures in their construction. The "low energy" test results provide a useful indicator about the effect of undercompaction on the associated strength and compressibility behavior of a compacted soil. And finally, the test results that are presented herein also provide useful insight into the fundamental principles of soil behavior that affect the mechanical behavior of clay/sand mixtures.

Chapter 2

LITERATURE REVIEW

The objective of this chapter is to summarize and synthesize the arguments and ideas presented by previous researchers on the strength, stress-strain, and compressibility characteristics of compacted unsaturated soils. To understand these engineering properties of soil, a knowledge of the major factor affecting them, the fabric of compacted soil, is required. Accordingly, this literature review will have a significant focus on the fabric of partially saturated compacted soils.

In the subsequent sections, the following categories of previous research are discussed:

- The fabric of compacted fine-grained soil and granular soil
- Unconsolidated-undrained strength of compacted clays
- Stress-strain characteristics of compacted clays
- Compressibility characteristics of compacted clays

2.1 The Fabric of Compacted Fine-Grained Soil and Coarse-Grained Soil

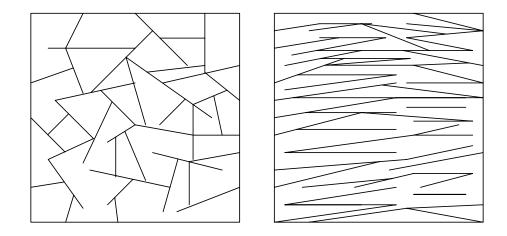
2.1.1 Fine-Grained Soil Fabric

"Fine-grained" soil particles are generally characterized as those being finer than 0.075 mm (e.g., ASTM D422-63; Holtz and Kovacs, 1981). Fine-grained soils are those soil mixtures where 50% or more of the particles (by dry mass) in a given sample are finer than 0.075 mm. Typically, the fine-grained portion of a soil mixture is comprised of both silt- and clay-sized particles. The relative cutoff between these two particle-size ranges is commonly referred to as the *clay fraction*, which is often assumed to be either a particle size of 0.005 mm (ASTM D422-63) or a particle size of 0.002 mm (Taylor, 1948). This cutoff in particle size is somewhat arbitrary, as the behavior of clay particles is more appropriately associated with their plasticity (Holtz and Kovacs, 1981).

The interaction between coarse grained, or "granular" soil particles is controlled by the forces that are applied at the particle-to-particle contacts. In contrast, clay particles are small enough that their behavior is significantly affected by the molecular-level interactions that occur between individual particles. When examining the molecular structure of an individual clay particle, it can be observed that clay particles have a negatively charged surface. When in contact with water, positive cations (normally Na⁺ together with their molecules of hydration water) are attracted onto this surface (Mitchell, 1976). Clay particles are then surrounded by a hydrosphere of adsorbed water, which contains soluble cations of different charges. These cations, called the exchangeable cations, balance the negative charges on the clay particles by forming a *diffuse double layer*. One effect of this diffuse double layer is that two clay particles will begin to repel each other when the double layer of each particle begins to overlap. In this way, the diffuse double layer controls both flocculation and dispersion. The smaller the clay particle size, the greater is the effect of the double layer.

One of the earliest theories of the arrangement of soil particles in a compacted clay soil was presented by Lambe (1958). This theory, often referred to as

the Gouy-Chapman theory, was used to explain the different arrangements of clay particles that were believed to exist in compacted clays. For clay soils compacted dry of optimum, the relatively small amount of water that is present yields a high concentration of electrolytes, which prevents the full development of the double layer of ions surrounding each clay particle. This double layer depression results in a low inter particle repulsion, which thereby leads to a tendency towards a *flocculated* soil structure, which has a low degree of clay particle orientation (Fig. 2.1a). As the compaction water content approaches optimum, the electrolyte concentration is reduced, which causes an expansion of the double layer that increases the repulsive forces between particles and which also increases the degree of particle orientation. Wet of optimum, a sufficient amount of water exists to develop double layers with repulsive forces that are great enough to result in a *dispersed* soil structure, which has a high degree of clay particle orientation (Fig. 2.1b). It should be noted that these general behavioral observations were made based on samples that were compacted using a kneading-type compaction process in the Harvard miniature compaction apparatus (Wilson, 1950).



(a) Flocculated



Figure 2.1. Theoretical Clay Microstructure

Seed and Chan (1959) discussed the effect of soil structure in compacted clays on shrinkage, swelling, swell pressures, stress-deformation characteristics, undrained strength, pore-water pressures, and effective strength characteristics. The increase of water content from dry to wet of optimum was believed to play an important role in producing an increased degree of particle orientation and clay particle dispersion, which then had a significant effect on the associated clay behavior. More specifically, samples compacted dry of optimum (which tended to have more flocculated structures) exhibited less shrinkage, greater swelling tendency, greater swell pressures, and steeper stress-strain curves than samples of the same soil that were compacted wet of optimum (which tended to have more dispersed structures).

Seed and Chan (1959) showed that the influence of structure on the undrained strength of compacted clay soils depends on the deformation criterion that is adopted. For undrained strengths that are determined at low strains (e.g., 5%), the

structure had a pronounced influence on the strength of compacted soils, with flocculated arrangements producing much higher strengths than dispersed arrangements. On the other hand, the structure had little or no influence on soil strength if a large strain failure criterion was used (e.g., 20 %). It should be noted that although soil structure may have a profound effect on the measured undrained strength, it appears to have almost no influence if the soil strength characteristics are instead determined in terms of effective stresses.

Seed and Chan (1959) conducted further tests on natural clay soils, validating the behavior proposed by Lambe's (1958) hypothesis on a wider array of clay soils. They also extended Lambe's hypothesis to encompass compaction methods which involved varying shear strains in the compaction process, including kneading compaction, impact compaction, vibratory compaction, and static compaction. For compacted clay soils, the shear strains that are applied during compaction were found to have a profound effect on the initial structure of the compacted soil, and its associated engineering behavior. For samples compacted dry of optimum, all of the aforementioned compaction methods produced no appreciable shear deformation in the soil, and consequently resulted in similar soil structures. Thus, the method of compaction had little effect on the strength of samples that were compacted dry of optimum.

For those samples that were compacted wet of optimum, the influence of the method of compaction was considerable. Those compaction methods which induced higher shearing strains during compaction produced a greater degree of dispersion and a higher degree of particle orientation. Therefore, for samples compacted at similar water contents and densities, those samples that were compacted wet of optimum using high strain-level compaction techniques (e.g., kneading compaction, impact compaction) exhibited more significant shrinkage and had lower undrained strengths than did those compaction methods which produced less shear deformation during compaction (e.g., vibratory compaction, static compaction). The effect of compaction method was more pronounced in the undrained strength test results if a small-strain failure criterion was used, and less if a large-strain failure criterion was used. When examining undrained strengths measured at small strain levels in the U-U triaxial test, it can be observed that the flocculated structure produced by low strain-level compaction techniques results in much higher strengths than the dispersed structure produced by high strain-level compaction techniques. However, for specimens subjected to shearing in the U-U triaxial test, the flocculated structure progressively changes to a dispersed arrangement as the strain level increases. As a result, at high strains in the U-U test, all samples at all water contents and densities had their fabrics reduced to a dispersed arrangement due to the shear strains that were applied. At high strains, only small differences were apparent for the undrained strengths that were measured in the U-U triaxial tests. Both initially flocculated samples and initially dispersed samples having the same compaction moisture content and initial dry density tended to exhibit approximately the same strength at high strain levels.

Compared to early studies in this area which used inferred or hypothesized mechanisms of behavior (e.g., Lambe, 1958; Seed and Chan, 1959), investigators in the 1960's and 1970's began to get a more accurate picture of the true structure of compacted soils through increasing use of electron microscopes. Sloane and Kell (1966) investigated the structure of compacted kaolin in a scanning electron

microscope study. They found little or no oriented fabric of individual particles. Instead, the kaolin flakes were arranged into packets regardless of the compaction method that was used. Wet of optimum, impact and kneading compaction produced a fabric that consisted of trajectories of parallel packets. Wet of optimum, static compaction produced a fabric with packets oriented normal to the compaction axis. However, at molding water content below optimum, all compaction methods produced randomly oriented packets. An increase in the orientation of parallel packets was observed with increasing water content for all compaction methods.

Diamond (1971) examined the microstructures of impact-compacted kaolinite and illite clays (after drying) using X-ray orientation determinations and scanning electron microscopy. He found dried clay that was compacted dry of optimum exhibited a domain structure with adjacent domains that were largely separated by micrometer-size interdomain voids. These domains were randomly oriented and touched each other only at peripheral points. Wet of optimum, domains were indistinct and had few interdomain voids. However, unlike Sloane and Kell, he found that only a small degree of preferred orientation normal to the compaction axis existed for both dry and wet of optimum samples.

Mitchell (1993) stated that the large shear strains that are induced by the compaction rammer in impact compaction (e.g., Proctor compaction) have profound effects on the fabric that is formed in the resulting compacted fine-grained soil. The compaction method and water content are two major factors that affect the formation of the resulting compacted soil structure. If the compaction hammer, tamper, or piston does not produce appreciable shear deformation in the soil, which usually occurs when the soil is compacted dry of optimum, there may be a general alignment of particles or

particle groups in the horizontal plane. If the soil is compacted wet of optimum, the hammer, tamper, or piston tends to penetrate the soil surface and produce larger shear strains, which leads to a greater alignment of particles along the failure surface. A folded or convoluted structure may result with repeated blows to the top of the soil layer.

2.1.2 Coarse-Grained Soil Fabric

Oda (1972a) defines the *fabric* of a granular soil as the spatial arrangement of particles and associated voids. In his study, Oda (1972a) investigated the spatial arrangement of granular particles using an optical microscope. Based on his test results, Oda made the following conclusions:

- The characteristics of the post-compaction fabric of granular materials (e.g., sand, gravel) are a function of both the shape of the individual grains in the matrix and the method of compaction.
- (2) The initial fabric of a sand has important influences on its mechanical properties, such as mobilized strength, dilatancy rate, and secant deformation modulus at 50% strength.
- (3) Sands which are composed of nonspheric particles have different fabric and mechanical anisotropy depending on the method of preparation.

In order to clarify the mechanism controlling the fabric reconstruction that occurs during the shear-induced deformation of a sand, Oda (1972b) performed a series of drained triaxial compression tests. He found that continuous reconstruction of the initial fabric occurs at increasing axial strain levels, which was attributed to both the sliding that occurs along unstable particle contacts among neighboring grain particles and the rotation of individual grains. These more recent studies have illustrated the importance of a compacted soil's macrostructure, rather than its microstructure, in governing the resulting behavior of a compacted soil. For fine-grained soils in particular, the structure of particle groups is now considered more important than the fabric and structure that occurs at an individual particle level (e.g., Sloane and Kell, 1966; Diamond, 1971). Various authors have referred to these important collections of particles as domains, packets, or aggregates.

In general, the arrangement of these particle groups has been found by a variety of researchers to vary from dry to wet of optimum. Dry of optimum, the particle groups are distinct and relatively strong. There is a considerable quantity of void space between the particle groups (e.g., Diamond, 1971). As the compaction water content increases, the particle groups become weaker and more deformable. As a result, the particle groups distort and squeeze closer to each other. Wet of optimum, the particle groups become much less distinct and form a more homogeneous mass.

At a constant water content, increases in compactive effort also change the arrangement of particle groups. As the compaction energy increases, particle groups become more broken, deformable, and the quantity of large pores is reduced.

The arrangement of the particle groups, size and distribution of pores and the water content in these pores are useful in analyses of engineering properties of compacted soils. Thus, the above discussion will be useful in understanding and explaining the strength, compressibility and stress-strain behavior trends in the data that is presented later in this thesis.

2.2 Unconsolidated-Undrained Strength of Compacted Clays

Rutledege (1947) performed one of the first comprehensive surveys on the undrained strength of compacted clays using a series of unconsolidated-undrained (U-U) triaxial tests. He found that the major factors that influence the U-U strength of compacted soils were the compaction water content, dry density, and minor principal stress in the triaxial test. Rutledge's (1947) results lead to the following conclusions:

- (1) The U-U strength of compacted clays decreased as the water content increased
- (2) The U-U strength of compacted clays increased as the dry density increased
- (3) The U-U strength of compacted clays increased as the minor principal stress increased, until the confining pressure became so high that the sample became fully saturated (or nearly fully saturated). This happened when the confining pressure was so high that the air in the sample voids dissolved in the water.

Holtz and Willard (1956) may have been the first to investigate the effect of gravel content on the shear strength of clayey gravel soils. They claimed that the angle of shearing resistance increased with the increasing gravel content, while at the same time the apparent cohesion decreased. The effect of the granular part of the mixture was predominant when the gravel fraction was greater than 50%.

Miller and Sowers (1957) used a series of U-U triaxial tests to investigate the effects of varying the proportions of coarse- and fine-grained soils on the strength of the resulting clay/sand mixtures. Various mixtures of clay (a low plasticity inorganic sandy clay) and sand were mixed ranging from 100 percent sand to 100 percent clay. The results revealed that the angle of shearing resistance stayed approximately the same until the fines content decreased to less than 33%. A sharp change occurred in the soil behavior for fines contents between 33% and 26%, where the angle of shearing resistance increased markedly and the cohesion decreased markedly.

Casagrande and Hirschfeld (1960, 1962) tested a silty clay soil compacted using kneading compaction to a constant dry unit weight, and reached a similar conclusion as Rutledge (1947). When the water content was very high and the sample was almost saturated, a small increment of additional pressure was all that was needed to dissolve the air in the pores. The failure envelope quickly became horizontal, and the ϕ approached zero. In this situation, further increases in confining pressure were taken up by the pore water and not the soil structure. As a result, the effective stress and strength stayed constant. For samples having a lower compaction water content, the failure envelope will continue to slope upward, as it is difficult to achieve 100% saturation, and significantly higher pressures are required compress the specimen voids enough to dissolve the air that is present in the specimen.

For samples that have a similar structure and compaction water content, undrained strength will increase with an increase in density (Seed and Chan, 1959). However, undrained strength may also decrease with increasing density at a constant water content, depending on the strength criterion that is adopted (Seed and Chan, 1959). Seed and Chan (1959) used a series of U-U triaxial compression tests on compacted (kneading) silty clay specimens to show that the undrained strength increased with increasing density if a failure criterion of 25% strain was adopted. On the other hand, if a failure criterion of 5% strain was utilized, the undrained strength increased with increasing density up to a point, and then decreased with further increases in density, as shown in Figure 2.2.

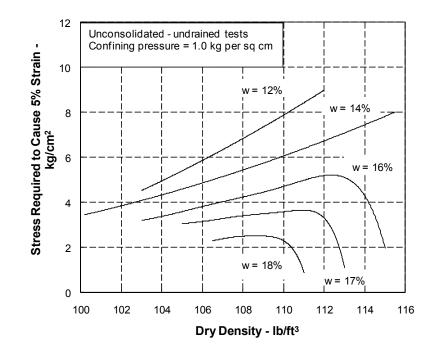


Figure 2.2. Relationship between Dry Density, Water Content, and Strength of a Compacted Silty Clay Specimen – Small Strain Failure Criterion Adopted (Developed after Seed and Chan, 1959)

Seed and Chan (1959) provided additional evidence on the importance of failure criterion. In their tests, kneading compaction was performed to prepare silty clay triaxial specimens, and the results from UU triaxial tests showed that the strength increased with density as long as the soil structure remained essentially the same, and as long as the undrained strength was determined at low strains. When significant changes in structure took place in the soil, the strength was significantly reduced despite the increase in density. However, if the undrained strength was determined at high strains, samples of silty clay having the same composition exhibited approximately equal strength whether the structure was flocculated or dispersed.

Consequently, for a given water content, the dry density and strength relationship showed no decrease in strength with increasing density (for strengths determined at high strain levels) (Figure 2.3). Seed and Chan pointed out that these behavioral observations likely do not apply to all soils. Some soils, such as a sandy clay, do not follow these considerations. In these soils, it is possible that the structure of the clay fraction that is compacted wet of optimum is considerably more dispersed than the structure of soil compacted dry of optimum. But the influence of the difference in structure is masked by other factors such as the high proportion of granular particles.

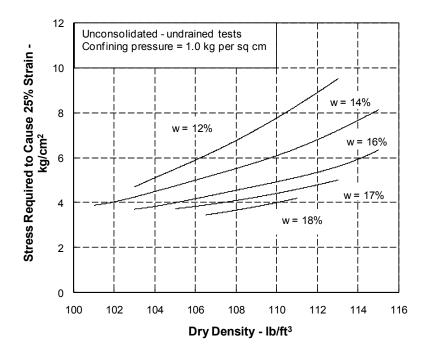


Figure 2.3. Relationship between Dry Density, Water Content, and Strength of a Compacted Silty Clay Specimen - Large Strain Failure Criterion Adopted (Developed from Seed and Chan, 1959)

Lee and Haley (1968) investigated the relative strength and deformation properties of a commercial kaolinite clay and a real silty clay compacted by kneading and static compaction. They found that in the U-U triaxial test, when samples were tested under very high confining pressures such as those that would be encountered in a high earth dam, even soils compacted at low water contents could become saturated. In general, all of the samples that were tested were observed to get stronger as the test confining pressure was increased, due to compression of the air voids. The samples that were compacted using static pressure were always stiffer and stronger than those samples that were compacted using kneading compaction. The samples that were compacted dry of optimum were stronger than samples of the same composition that were compacted wet of optimum.

Lambe (1961) and Olson and Langfelder (1965) showed the existence of highly negative pore water pressure in soils compacted dry of optimum. These negative pore water pressures would theoretically result in greater effective stress and hence greater strength. This explanation is typically given as the reason why dry of optimum samples are stronger than wet of optimum samples.

Yin (1999) examined the properties and behavior of Hong Kong marine deposits with different clay contents using a series of CU triaxial tests on compacted clay specimens. Test results indicated that the friction angle of Hong Kong marine deposits decreased with an increase in plasticity index. Young's modulus (E_{50}) values were observed to increase with increasing effective confining pressure, and decrease with increasing clay content.

2.3 Stress-Strain Characteristics of Compacted Clays

Seed and Chan (1959) used a series of UU triaxial tests to show the typical stress-strain behavior of silty clay specimens that had been prepared using kneading compaction. Samples having a higher water content, lower density, and dispersed soil structure tended to have a more "plastic" stress-strain behavior, typically reaching their ultimate strength at very high strains. On the dry side of optimum, as the compaction water content was decreased, the soil particles became more randomly oriented and the soil became more rigid. At very low water contents, the combined effect of randomly oriented soil particles and highly negative pore water pressures produced a steep stress-strain curve with very brittle characteristics. Similar results are seen in the stress-strain curves presented by Casagrande and Hirschfeld (1960, 1962). However, the stress-strain behavior is not the same for all compacted clay soils. Variations will depend on amount and type of clay proportion, dry unit weight, compaction method, water content and confining pressure (Seed and Chan, 1959).

Lee and Haley (1968) showed the stress-strain characteristics of a compacted kaolinite. They found that the wet of optimum kaolinite sample prepared by static compaction was considerably stronger, stiffer, and more brittle than the otherwise identical sample prepared by kneading compaction. Dry samples prepared by static compaction were considerably stronger and more brittle than the wet samples. The general shapes of the stress-strain curves for Higgins Clay (a real silty clay) were similar to those observed for the kaolinite specimens. The wet of optimum samples prepared by static compaction maintained their relatively high strength and brittleness compared to the wet samples prepared by kneading compaction. The samples prepared dry of optimum with static compaction were considerably stronger and more brittle than either of the wet samples. The samples with the flocculated structure

exhibited relatively high strengths and brittle stress-strain characteristics. As the confining pressure increased, the samples compressed and became denser under the high pressure. This compression caused the air in the voids to become dissolved in the water, which in turn led to an increase in the degree of saturation, producing an increase in plasticity. Therefore, as the confining pressure increased, the flocculated samples lost some of their brittle stress-strain characteristics. The samples with a dispersed structure maintained their relatively low strengths and plastic stress-strain behavior at all confining pressures.

Daniel and Olson (1974) collected stress-strain data from more than 200 unconsolidated-undrained triaxial tests on specimens of three compacted clays and developed analytical expression for the stress-strain properties of these compacted soils. Their analyses of the stress-strain curves from tests showed that the initial tangent modulus was an exponential function of confining pressure.

Mitchell (1993) stated that stress-strain characteristics of different soils ranged from very brittle for some quick clays, cemented soils, heavily overconsolidated clays, and dense sands, to very plastic and ductile for insensitive and remolded clays and loose sands.

2.4 Compressibility Characteristics of Compacted Clays

It is difficult to define the fundamental relationships which govern the compressibility of compacted and/or unsaturated soils under load. As a result, unlike strength and stress-strain behavior, the compressibility of compacted and/or unsaturated soils has been covered in only a minimal fashion in the engineering literature.

Wilson (1952) investigated the effect of compaction water content on the compressibility of a compacted clayey sand. The results from his tests indicated that the wet of optimum samples were approximately 30 percent more compressible than the samples compacted dry of optimum. Wilson attributed this to the higher pore water pressures that are generated in the wet of optimum samples during loading. Based on this observation, Wilson recommended that cohesive highway embankments should be compacted dry of optimum, in order to obtain lower volume compressibility.

Using data obtained by Woodsum (1951), Leonards (1952) examined the compressibility of a highly plastic clay. He found that the compressibility of the clay was affected by the confining pressure that was applied prior to contact with water. However, this effect was minimized by using higher compaction energies. The data showed that a compacted sample wetted in the oedometer at a low confining pressure will compress more than a sample of the same composition that is confined and wetted at a higher pressure. In light of this, due to the lower confining pressure in the submerged condition, Leonards concluded that a change in water content resulting from the submergence of a compacted highway or airport pavement fill will be more severe than a corresponding change resulting from capillary action.

Lambe (1958) attributed the compressibility behavior of compacted clays in large part to the particle rearrangement that occurs under application of a load. When the consolidation pressure was relatively low, for dry of optimum samples, more pressure was required to reorient the particles of the flocculated structure. Therefore, the compression that occurs will be greater for a wet of optimum sample during the load increment. On the other hand, for larger consolidation pressures, a dry of optimum sample will compress more due to particle reorientation and void collapse. However, when the particles in a compacted clay matrix are highly dispersed, the dry of optimum sample will experience essentially the same compression as the wet of optimum sample.

Wahls, et al (1966) summarized all the conclusions concerning the compressibility of compacted soils made by former researchers. They stated that the soil type was undoubtedly one of the major factors influencing the compressibility characteristics of a compacted soil, but additional factors such as the compaction method, molding water content, and degree of saturation also had significant effects on the compressibility characteristics.

Hodek and Lovell (1978) presented convincing evidence of a strong relationship between pore size distribution and the compressibility characteristics of a compacted clayey soil. They concluded that the dry of optimum samples consisted mostly of large pores. The clay aggregates in the samples compacted dry of optimum were typically observed to be shrunken, stiff, and brittle. However, in the wet of optimum samples, there were few large pores and many small ones. The clay aggregates in the wet of optimum samples were swollen, weak, and plastic. Therefore, the dry of optimum samples were more brittle, compressing just a little under low load pressures and a great amount under high load pressures. On the other hand, the wet of optimum samples showed opposite compressibility behavior, compressing more under low load pressures and less amount under high load pressures, as compared to the dry of optimum samples. This behavior was believed to be caused by the lack of large voids in the wet of optimum ssamples. Shroff and Shah (2003) stated that the flocculated structure developed on the dry side of optimum in compacted clays offers greater resistance to compression than the dispersed structure formed on the wet side. Consequently, soils on the wet side of optimum are generally more compressible. In general, the methods of compaction that have been utilized by various researchers to prepare the specimens have been shown to have a significant effect on the compressibility behavior. Methods which generate higher shear strains during compaction, such as kneading or impact compaction, produce greater dispersion and a higher degree of particle orientation, which yields a corresponding increase in compressibility under load. For those cases where the compaction rammer causes very large penetration deformations during compaction, the specimen compressibility tends to increase, which is believed to be caused by a breakdown of the soil's structure and a greater orientation of the particles during compaction.

Chapter 3

SOIL PROPERTIES AND SOIL PREPARATION TECHNIQUE

3.1 Soil Properties

3.1.1 Sand

The sand utilized in this study was Ottawa sand, which was purchased from ELE International, Inc. This sand conforms to the requirements for standard density testing sand outlined in ASTM D 1556-07, the Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method. To ensure that the sand that was used in this study remained consistent over time, sieve analysis tests were conducted on sand from each box of sand that was used (approximately every 22.7 kilograms), in general accordance with ASTM D 6913-04. Table 3.1 summarizes the results from these tests. The average coefficient of uniformity for this sand (C_u) is 1.97, and consequently this sand classifies as a poorly graded sand (SP) according to the Unified Soil Classification System (ASTM D 2487-06). Figure 3.1 presents the gradation distributions from each sieve test that was conducted on this sand, and it shows that the grain sizes of this sand are primarily in the range of "fine" to "medium" (0.075 mm < D < 2.0 mm). The specific gravity of this sand was measured as 2.65, in accordance with ASTM D 854-06. Detailed data sheets for the classification tests that were conducted on this sand can be found in Appendix A.

Test	Percent Passing (%)						-		
No	Sieve No.								C_c
110.	# 10	# 20	# 40	# 60	# 100	# 140	# 200		
1	100	100.0	26.5	0.9	0.2	0	0*	1.97	1.02
2	100	99.9	25.4	0.9	0.1	0*	0*	1.96	1.03
3	100	99.9	26.0	0.7	0.1	0.1	0.0	1.96	1.02
4	100	99.9	32.2	2.4	0.7	0.1	0.0	2.02	0.95
5	100	99.9	26.8	0.6	0.0	0.0	0.0	1.96	1.01
6	100	99.9	32.1	1.1	0.1	0.0	0.0	1.99	0.94
7	100	99.9	26.9	1.0	0.4	0.2	0.2	1.98	1.02
8	100	99.9	26.7	3.0	1.0	0.4	0.4	2.03	1.05
9	100	99.8	28.2	0.6	0*	0*	0*	1.97	0.99
10	100	99.7	25.2	0.6	0.0	0.0	0.0	1.96	1.03
11	100	99.9	24.2	0.2	0*	0*	0*	1.94	1.04
12	100	99.8	21.7	0.1	0.0	0.0	0	1.91	1.05
13	100	99.9	26.9	0.4	0.1	0.0	0	1.96	1.01
14	100	99.8	29.1	1.4	0.4	0.1	0	1.99	0.99
15	100	99.8	20.4	0.3	0.1	0.1	0.1	1.90	1.06
16	100	99.8	24.6	0.2	0.0	0.0	0	1.94	1.03
17	100	99.9	27.0	1.2	0.4	0.1	0.1	1.98	1.02
18	100	99.8	25.2	1.3	0.2	0.0	0	1.97	1.04
19	100	99.8	30.5	3.8	2.1	0.8	0.3	2.07	1.00
20	100	99.9	30.9	1.2	0.3	0.1	0*	1.99	0.96
Avg.	100	99.9	26.8	1.1	0.3	0.1	0.1	1.97	1.01
Stnd. Dev.	0.00	0.07	3.09	0.96	0.50	0.19	0.11	0.04	0.03

Table 3.1 Sieve Analysis Results from Tests Conducted on Ottawa Sand

*Note: Small negative values of percent passing (e.g., -0.1 %) that are shown in the raw data sheets were caused by small +/- errors in balance measurements. During the analysis of the raw measured data, any small negative balances were zeroed prior to reporting in Table 3.1, as they are unrealistic measurements in a test of this type, and reflect a clear testing error.

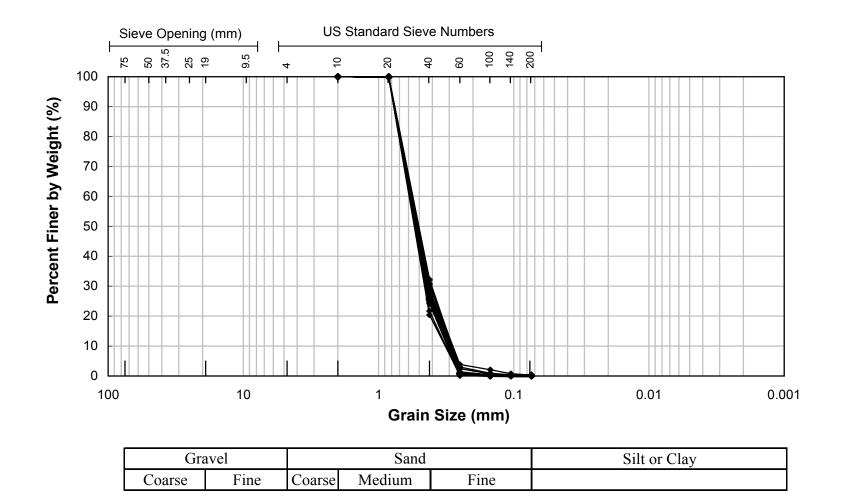


Figure 3.1. Grain Size Distributions of Ottawa Sand.

3.1.2 Clays

Two types of clays were used in this study, bentonite and kaolinite. The bentonite was General Purpose Granular sodium bentonite (GPG 30) from American Colloid Company, of Skokie, Illinois. The Kaolinite was Pulverized Kaolin, C.A.S No. 1332-58-7, Manufactured by the Feldspar Corporation in Edgar, Florida. The initial water content is about 7% for the air-dried bentonite, and is about 1% for the air-dried kaolinite.

Prior to compaction, strength, and compressibility testing, the Atterberg limits and specific gravities of the pure bentonite, the pure kaolinite, and the sand/clay mixtures that were used in this study were determined. Table 3.2 lists the Atterberg limits of the pure clays and sand/clay mixtures, which were measured according to ASTM D4318-05, The Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. Complete data sheets for Atterberg limit test of each soil are given in Appendix B.

Percent Clay in Mixture with Sand	Plastic Limit (%)	Liquid Limit (%)	Plasticity Index (%)
15% Bentonite	20	135	115
25% Bentonite	21	252	231
50% Bentonite	32	365	333
100% Bentonite	46	499	453
15% Kaolinite	12	20	8
25% Kaolinite	15	24	9
50% Kaolinite	24	39	15
100% Kaolinite	34	57	23

Table 3.2 Atterberg Limits of Clay/Sand Mixtures

Figures 3.2 and 3.3 show the Atterberg limits plotted versus the percent clay in the soil mixtures. Figure 3.2 shows that as the proportion of bentonite in the mixture increased, the liquid limit (LL) increased drastically while the plastic limit (PL) increased very little. As a result, the plasticity index (PI), which is the difference between the liquid limit and plastic limit, increased quickly as the proportion of bentonite in the mixture increased. Figure 3.3 shows that as the proportion of kaolinite in the mixture increased the liquid limit (LL) and the plastic limit (PL) increased gradually.

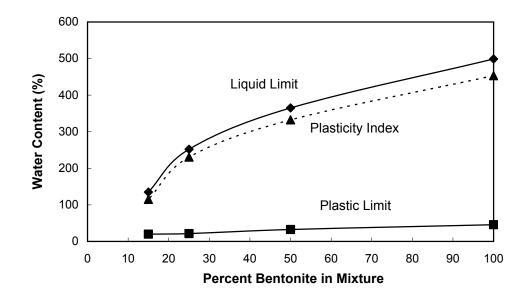


Figure 3.2. Liquid Limit, Plastic Limit, and Plasticity Index vs. % Bentonite.

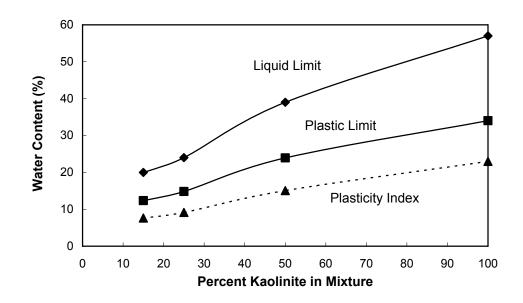


Figure 3.3. Liquid Limit, Plastic Limit, and Plasticity Index vs. % Kaolinite.

Table 3.3 lists the specific gravities for the sand and clays used in this study, which were determined using ASTM D 854-06, The Standard Test Method for Specific Gravity of Soil Solids by Water Pycnometer. Complete data sheets for specific gravity tests are given in Appendix C. The measured results for sand and kaolinite are near the values reported by Lambe and Whitman (1969), 2.65 for sand and 2.62-2.66 for kaolinite, respectively. The measured specific gravity of bentonite is within the range that has been reported by others: e.g., 2.5 (Daeman, 1997) to 2.74 (Akgun, 2006).

 Table 3.3 Specific Gravities of Sand and Clay

Soil	Sand	Kaolinite	Bentonite
Specific Gravity	2.65	2.60	2.62

The specific gravities of the sand/clay mixtures used in this study, G_{ssc} , were calculated from the following equation:

$$G_{ssc} = \frac{\left(\frac{100}{\alpha}\right)G_{sc}}{1 + \left(\frac{100 - \alpha}{\alpha}\right)\left(\frac{G_{sc}}{G_{ss}}\right)}$$
(3.1)

where α is the clay content (in %, with numbers ranging from 0 to 100), G_{sc} is the specific gravity of clay, and G_{ss} is the specific gravity of sand. The derivation of Equation 3.1 is provided in Appendix D. The specific gravity of each sand/clay mixture calculated using Equation 3.1 is shown in Table 3.4. The specific gravity of soil mixtures were used for calculating the void ratio and degree of saturation of test specimens.

Clay Content	Clay Used for Mixture			
(%)	Kaolinite	Bentonite		
15	2.64	2.65		
25	2.64	2.64		
50	2.62	2.63		

Table 3.4 Specific Gravity of Each Sand/Clay Mixture

3.2 Soil Classification of Pure Clay and Sand/Clay Mixtures

The pure clay and sand/clay mixtures were classified according to the Unified Soil Classification System (USCS) using ASTM D 2487-06, The Standard for Classification of Soils for Engineering Purposes. The kaolinite used in this study classifies as an elastic silt (MH). These results are consistent with the classification reported by Richter (1991), who utilized the same kaolinite for an independent study. It should be noted that the USCS classification of "MH" includes soil types such as micaceous, diatomaceous, fine sandy and silty soils, elastic silts, clays and silty clays (Holtz and Kovacs, 1981). Therefore, although the classification of this soil is as an elastic *silt*, its behavior will be clay-like in nature, as it is comprised primarily of clay particles. The bentonite used in this study classifies as a fat clay (CH). The corresponding USCS classifications of the different sand/clay mixtures utilized in this study are listed in Table 3.5.

Clay Content	Clay Used for	Clay Used for Mixture			
(%)	Kaolinite	Bentonite			
100	MH (elastic silt)	CH (fat clay)			
50	CL (sandy lean clay)	CH (sandy fat clay)			
25	SM (silty sand)	SC (clayey sand)			
15	SM (silty sand)	SC (clayey sand)			

Table 3.5 Unified Soil Classifications

3.3 Soil Preparation Approach

In order to prepare specimens for compaction testing, the powdered clay was added to the dry sand and the resulting soil was mixed using a 12-quart Hobart Countertop Mixer, Model HL-120 (Figure 3.4). According to ASTM D 698-00, approximately 2.3 kg of soil were needed for each compaction test, and consequently this amount was prepared each time that a compaction test was performed (Figure 3.5). To ensure even distribution of the sand and clay particles, the soil was mixed in a dry state for 5 minutes using a stirring speed of 59 revolutions per minute.



Figure 3.4. Hobart's Legacy Countertop Mixer.

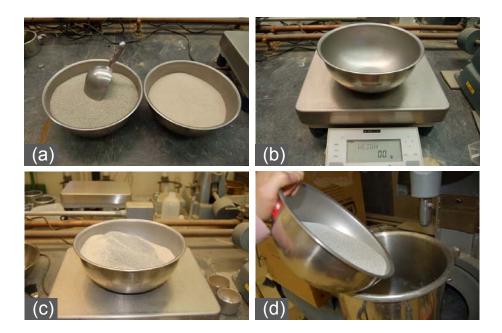


Figure 3.5. Mixing dry soil; (a) air-dried sand and bentonite, (b) with an empty bowl on the balance, press Re-Zero to zero the display, (c) as bentonite and sand is added to the bowl, the net weight is displayed, and (d) pouring the soil mixture into the mixer.

To prepare the soil specimens at the desired water content for each compaction test, it was necessary to adjust the water content of the sand/clay mixtures. The appropriate mass/volume of distilled water for each specimen was gradually added to the soil mixture using a squeeze bottle over the course of 5 minutes, while continuously mixing the soil at a mixer speed of 59 rpms. Figure 3.6 shows the procedure that was used to measure and add the distilled water. As hygroscopic water was retained in the pure clay minerals in their natural air-dried state, the amount of distilled water that was added to each "dry" soil mixture was calculated using the following equation:

$$M_w = M_t \times w_t - M_c \times w_c \tag{3.2}$$

where:

 M_w = mass of water needed M_t = mass of dry sand and clay M_c = mass of clay w_t = water content of soil mixture w_c = water content of air - dried clay

The air-dried water contents of the clays that were used in this study were measured as 7 % for the bentonite and 1 % for the kaolinite, under ambient air conditions in the University of Delaware geotechnical laboratory.

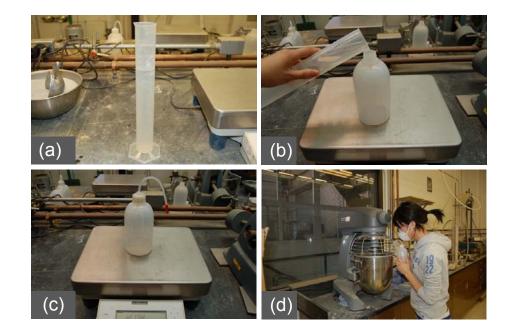


Figure 3.6. Adding distilled water; (a) measuring water with a graduated cylinder, (b) transferring water to a squeeze bottle, (c) measuring the exact weight of distilled water, and (d) squeezing water into the soil mixture. For mixtures containing high clay contents (e.g., 50%), the clay minerals have the tendency to aggregate during mixing, as shown in Figure 3.7. When this behavior was observed, a mortar and pestle were utilized to grind the aggregates to ensure a more uniform mixture (Figure 3.8). The grinding process was performed as quickly as possible to minimize the possibility of a change in water content of the soil during the grinding process. Figure 3.9 shows the appearance of a typical sand/clay mixture after grinding.



Figure 3.7. Soil Aggregate in Mixture with 50% Kaolinite.



Figure 3.8. Soil Aggregate Grinding.



Figure 3.9. Appearance of Sand/Clay Mixture after Grinding.

Upon completion of the mixture preparation process, each specimen was manually mixed one final time to ensure even distribution of water throughout and then placed in an airtight container and allowed to stand for more than 16 hours to more evenly distribute the water in the clay (in accordance with the recommendations made by ASTM D 698-00).

Chapter 4

COMPACTION TESTING OF CLAY/SAND MIXTURES

4.1 Compaction Tests on Clay/Sand Mixtures

The laboratory tests described in this chapter were conducted to measure the maximum dry unit weight ($\gamma_{d,max}$) and optimum water content (w_{opt}) of different clay/sand mixtures that were subjected to specific compactive efforts. The results from these tests are also useful for determining the relationship between the compaction water content and the resulting dry unit weight of the clay/sand mixtures that were tested. To investigate the influence of different compactive efforts, three compaction energy levels were chosen.

The highest compactive effort that was applied corresponded to that imposed by the modified Proctor (MP) compaction test (ASTM D1557-07), Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort. Following this test procedure, the soil was compacted into a 102 mm (4 in.) diameter mold in five equal layers with each layer receiving 25 blows from a 44.5 N (10.0 lbf.) rammer dropped from a height of 457 mm (18 in.). The total compaction energy that is applied during a modified Proctor compaction test is 2,700 kN-m/m³. Figure 4.1 is a photograph of the laboratory equipment required for conducting a modified Proctor test.



Figure 4.1. Modified Proctor Test Equipment

The intermediate compactive effort that was applied corresponded to that imposed by the standard Proctor (SP) compaction test (ASTM D698-00), Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort. Following this test procedure, the soil was compacted into a 102 mm (4 in.) diameter mold in three equal layers with each layer receiving 25 blows from a 24.4 N (5.5 lbf.) rammer dropped from a height of 305 mm (12 in.). The total compaction energy that is applied during a modified Proctor compaction test is 600 kN-m/m³. Figure 4.2 is a photograph of the laboratory equipment required for conducting a standard Proctor test.



Figure 4.2. Standard Proctor Test Equipment

The lowest compactive effort that was applied corresponded to that imposed by a "low-energy" (LE) compaction test procedure that was performed following the general approach utilized by the standard Proctor compaction test (the same mold, hammer and procedure) with only fifteen blows on each of the three layers (e.g., the same procedure that was followed by Daniel & Benson, 1990). The total compaction energy that is applied during this type of low-energy compaction test is 360 kN-m/m³. This "low energy" Proctor procedure is the same as the 15-blow compaction test described by the U.S. Army Corps of Engineers (1970). It is possible that on many projects, soil will be compacted at some locations in the field with energy levels that are less than those applied during the standard Proctor test. This low energy compaction test is expected to simulate poor quality compaction procedures that can occur in the field.

The test specifications for each energy level are summarized in Table 4.1.

Test Series	Diameter of Mold	Height of Hammer Drop	Number of Layers	Weight of Hammer	Number of Blows per Layer	Compaction Energy
	mm/in.	mm/in.		N/lbf.		kN-m/m ³
Modified Proctor	102/4	457/18	5	44.5/10	25	2,700
Standard Proctor	102/4	305/12	3	24.4/5.5	25	600
Low Energy Proctor	102/4	305/12	3	24.4/5.5	15	360

Table 4.1 Specifications for Proctor Tests

As discussed in Chapter 3, tests were conducted on prepared clay/sand mixtures having both bentonite and kaolinite as the clay mineral in the mixture. For each type of clay, soil samples with clay contents of 15%, 25%, and 50% were prepared and tested to examine the effect of clay content on the mixtures' compaction characteristics. For each clay/sand mixture (for both clay mineral types), a number of compaction test specimens (varying between 5 and 13) were prepared over a range of water contents from 4% dry of optimum to 4% wet of optimum at each energy level. Complete data sheets for Proctor compaction test of each specimen are given in Appendix E.

As the resulting matrix of test specimens was quite large, each sample was assigned an identification name for tracking purposes; each of these names provides useful information about each test specimen and its corresponding compaction conditions. Firstly, each sample was assigned a letter to signify at which energy level it was compacted: M, S, and L stood for modified Proctor, standard Proctor, and low energy Proctor respectively. Next, a number (15, 25, or 50) was then assigned to indicate the clay proportion in the soil mixture. Lastly, a K or B was assigned to signify which kind of clay was tested.

4.1.1 Compaction test results for kaolinite/sand mixtures

The dry unit weight-water content relationships for the kaolinite/sand mixtures are presented in Figures 4.3 and 4.4. In addition, each of these figures shows 60, 80, and 100% saturation curves, which were drawn using the average value of the specific gravity of the three kaolinite/sand mixtures (2.63). The compaction curves that are shown, as well as the maximum dry unit weight $[\gamma_{d,max} (kN/m^3)]$ and optimum water content $[w_{opt} (\%)]$ values for the data set of compaction curves, were determined by regression of the measured data with a third-order polynomial equation of the following form (Howell et al., 1997):

$$\gamma_{d,\max} = Aw_c^3 + Bw_c^2 + Cw_c + D$$
(4.1)

The values of the degree of saturation (S_r) at $\gamma_{d,max}$ and w_{opt} of almost all the kaolinite/sand mixtures are in the 60-90% range.

Figure 4.3 shows the effect of compaction energy on the compaction characteristics for mixtures containing the same proportion of kaolinite. As expected, for the same soil mixture, the maximum dry unit weight increased and the optimum water content decreased as the compaction energy was increased.

Figure 4.4 was prepared using the same compaction test results, to show the influence of kaolinite content on the compaction characteristics. The compaction data indicate that for samples compacted at the same energy level, the maximum dry unit weight increased first as the kaolinite content increased from 15% to 25%, and then decreased as the kaolinite content increased to 50%. However, the optimum water content increased continuously as the clay fraction increased.

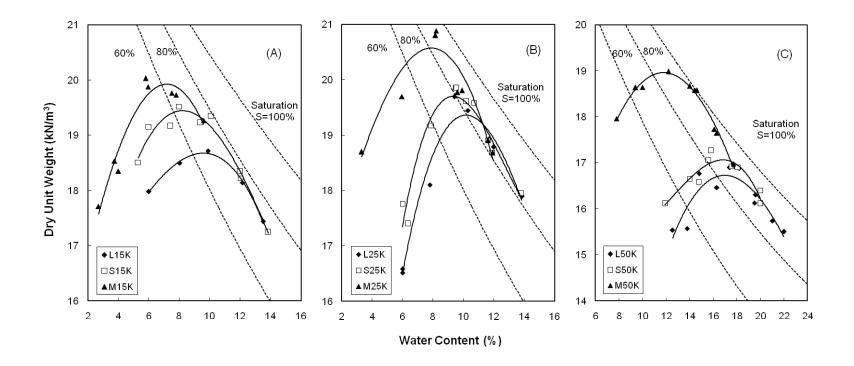


Figure 4.3. Compaction Curves of Kaolinite/Sand Mixtures (A) 15% Kaolinite, (B) 25% Kaolinite, (C) 50% Kaolinite

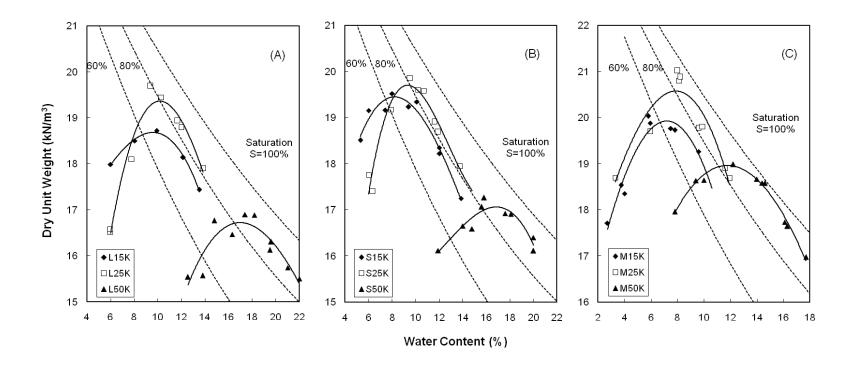


Figure 4.4. Compaction Curves of Kaolinite/Sand Mixtures (A) Low Energy Proctor, (B) Standard Proctor, (C) Modified Proctor

The optimum water contents and corresponding maximum dry unit weights that were determined for each of the kaolinite/sand mixtures that were tested are summarized in Table 4.2.

Kaolinite Content –	Low Energy Proctor		Standard Proctor		Modified Proctor	
(%)	W _{opt} (%)	$\gamma_{d,\max}$ (kN/m ³)	W _{opt} (%)	$\gamma_{d,\max}$ (kN/m ³)	W _{opt} (%)	$\gamma_{d, \max}$ (kN/m ³)
15	9.6	18.7	8.2	19.4	7.2	19.9
25	10.2	19.4	9.3	19.7	7.9	20.6
50	17	16.7	16.8	17.1	11.8	19

 Table 4.2 Soil Properties of Kaolinite/Sand Mixtures

Figure 4.5 is a semi-log plot that shows the relationship between the maximum dry unit weight and the compaction energy that is associated with each of the compaction tests shown in Table 4.2. Logarithmic regression analysis yielded an excellent fit with the measured data, with the coefficients of determination (\mathbb{R}^2 values) ranging from 0.87 to 1, with an average of 0.95. The semi-log regression line of the mixture containing 25% kaolinite is above the 15% kaolinite line, which in turn is above the 50% kaolinite line. It means that as the kaolinite content increased from 15% to 25%, the maximum dry unit weight of the soil mixture first increased and then decreased as the kaolinite content increased to 50% by weight. The mixture with 25% kaolinite content has the largest maximum dry unit weight. As expected, for the same soil mixture, the maximum dry unit weight increased with increasing compaction

effort. For specimens compacted using the low energy Proctor method, the difference between specimens with high kaolinite content and specimen with lower kaolinite content is quite large. However, this difference became smaller as the compactive effort was increased. In other words, a high compactive effort reduces the difference in maximum dry unit weight between mixtures of varying kaolinite content.

In a similar fashion, Figure 4.6 shows the semi-log relationship between the optimum water content and the compaction energy that is associated with each compaction test. Logarithmic regression analysis yielded equations with R^2 values ranging from 0.87 to 0.98, with an average of 0.93. As expected, the optimum water content increases as the kaolinite content is increased. It also decreases as the compactive effort is increased.

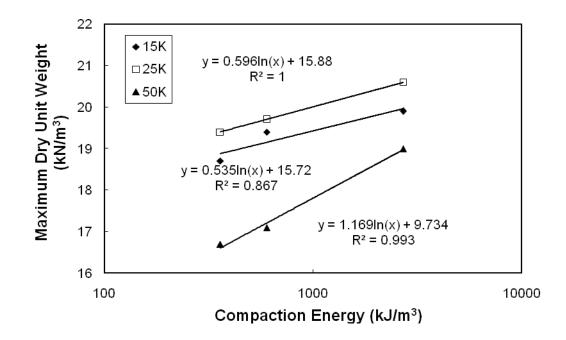


Figure 4.5. Semi-log relationships between $\gamma_{d, max}$ and *E* (kaolinite/sand mixtures)

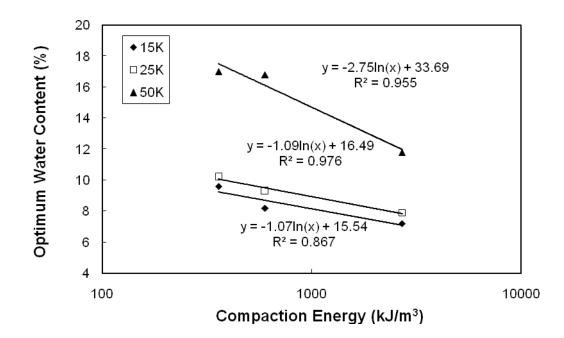


Figure 4.6. Semi-log relationships between w_{opt} and E (kaolinite/sand mixtures)

4.1.2 Compaction Test Results for Bentonite/Sand Mixtures

Figure 4.7 shows the dry unit weight-water content relationships for the bentonite/sand mixtures, together with 60, 80, and 100% saturation curves. These saturation curves were drawn using the average value of the specific gravity of the three bentonite/sand mixtures (2.64). As mentioned previously, the compaction curves were drawn by curve fitting a third-order polynomial to each data set. The values of the degree of saturation (S_r) at $\gamma_{d,max}$ and w_{opt} of all the bentonite/sand mixtures are in the 70-85% range. These results are in good agreement with the results shown in Ito (2008). Figure 4.7 shows the effect of compaction energy on the compaction characteristics for mixtures containing the same proportion of bentonite.

For the same soil mixture, the maximum dry unit weight increased and the optimum water content decreased as the compaction energy was increased.

Figure 4.8 was prepared using the same compaction test results, to show the influence of bentonite content for mixtures compacted with the same compaction energy. The compaction data indicate that for samples compacted at the same energy level, the dry unit weight decreased and the optimum water content increased as the percentage of bentonite in the mixtures increased.

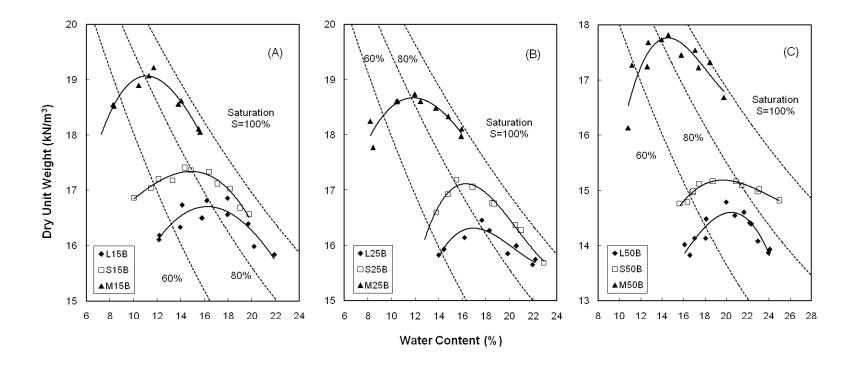


Figure 4.7. Compaction Curves of Bentonite/Sand Mixtures (A) 15% Bentonite, (B) 25% Bentonite, (C) 50% Bentonite

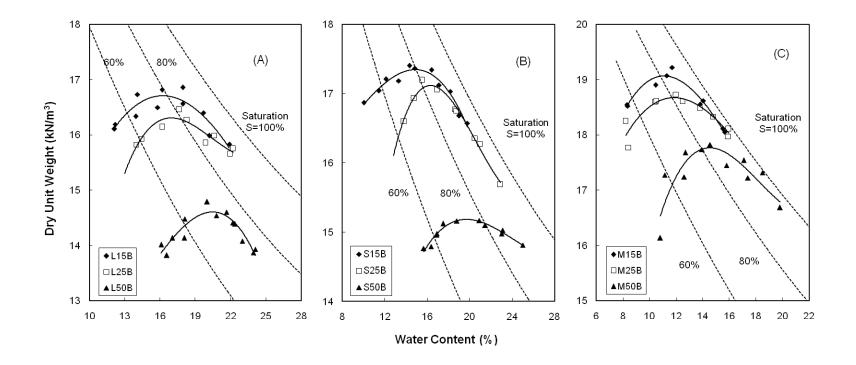


Figure 4.8. Compaction Curves of Bentonite/Sand Mixtures (A) Low Energy Proctor, (B) Standard Proctor, (C) Modified Proctor

The optimum water contents and corresponding maximum dry unit weights that were determined for each of the bentonite/sand mixtures that were tested are summarized in Table 4.3.

Bentonit e Content –	Low Energy Proctor		Standard Proctor		Modified Proctor	
(%)	W _{opt} (%)	$\gamma_{d,\max}$ (kN/m ³)	W _{opt} (%)	$\gamma_{d,\max}$ (kN/m ³)	W _{opt} (%)	$\gamma_{d, \max}$ (kN/m ³))
15	16.2	16.7	15	17.3	11.1	19.1
25	17	16.3	16.1	17.2	11.8	18.7
50	20.5	14.6	19.7	15.2	14.5	17.8

Table 4.3 Soil Properties of Bentonite/Sand Mixtures

Figure 4.9 is a semi-log plot that shows the relationship between the maximum dry unit weight and the compaction energy that is associated with each of the compaction tests shown in Table 4.3. Logarithmic regression analysis yielded an excellent fit with the measured data, with R^2 values ranging from 0.98 to 1, with an average of 0.99. As was observed with the kaolinite/sand mixtures, the maximum dry unit weight of the bentonite/sand mixtures increased with increasing compaction effort. However, unlike the kaolinite/sand mixtures, the maximum dry unit weight of the bentonite/sand mixtures compaction with increasing bentonite content.

Figure 4.10 shows the semi-log relationship between w_{opt} and E for the bentonite/sand mixtures. Logarithmic regression analysis again yielded an excellent fit with the measured data, with R² values ranging from 0.98 to 1, with an average of 0.99. As expected, the optimum water content increased as bentonite content increased, while it decreased with increasing compaction effort.

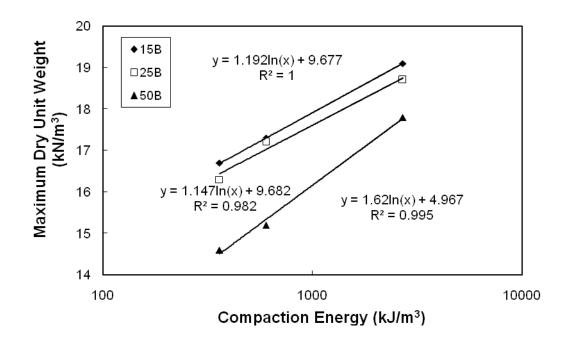


Figure 4.9. Linear relationships between $\gamma_{d, \max}$ and *E* (bentonite/sand mixtures)

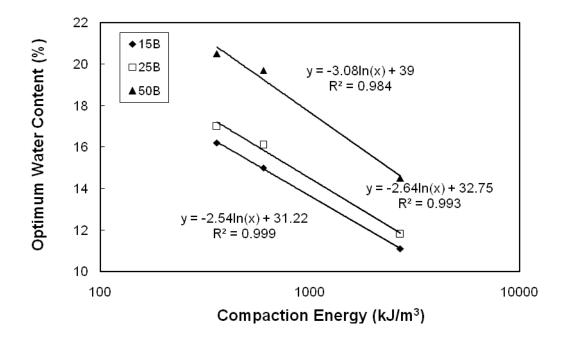


Figure 4.10. Linear relationships between wopt and E (bentonite/sand mixtures)

4.2 Summary of Compaction Test Results

This chapter describes a series of compaction tests that were conducted to determine the relationship between compaction water content and the resulting dry unit weight of the soil, for three different compactive efforts. The resulting compaction curves were also used to determine the optimum water content and maximum dry density values for the three compaction energies that were used. In addition to these important curves and values, the following conclusions were also reached as a result of the compaction tests that were performed:

- (1) A semi-logarithmic relationship exists between the maximum dry unit weight and the compaction energy for both kaolinite/sand and bentonite/sand mixtures. Logarithmic regression analysis yielded R² values ranging from 0.87 to 0.99 for kaolinite and 0.98 to 1 for bentonite.
- (2) A semi-logarithmic relationship also exists between the optimum water content and the compaction energy for both clay/sand mixtures. Logarithmic regression analysis yielded R² values ranging from 0.87 to 0.96 for kaolinite and 0.97 to 1 for bentonite.
- (3) For the kaolinite/sand mixtures, at all compaction energy levels, the maximum dry unit weight was observed for the 25% kaolinite mixture. However, this was not true for the bentonite/sand mixtures, which exhibited a consistent trend of decreasing dry unit weight as the bentonite content increased.
- (4) Higher compactive efforts minimize the difference in maximum dry unit weight between mixtures containing different clay contents.

Chapter 5

UU TRIAXIAL TESTING OF CLAY/SAND MIXTURES

5.1 Experimental Procedure

5.1.1 Specimen Preparation

At each combination of clay/sand mixture type (kaolinite, bentonite), clay mix proportion (15%, 25%, 50%), compaction method (low energy, standard proctor, modified proctor), and water content, three triaxial specimens were prepared from each compacted Proctor specimen. Sharpened, thin-walled stainless steel tubes were utilized for sampling from the Proctor mold (Figure 5.1). The sampling tubes that were used had the following dimensions: 160.0 mm (6.3 in.) long, 35.6 mm (1.4 in.) inside diameter, and a wall thickness of 1.5 mm (0.058 in.). During sampling, approximately half of the sampling tube would be pushed into the soil.



Figure 5.1. Sampling Tube



Figure 5.2. Sharpened Edge of Sampling Tube

In order to create triaxial specimens from a completed Proctor mold specimen, three sampling tubes were first placed on top of the compacted soil which was still in the Proctor mold, as shown in Figure 5.3a. To minimize sample disturbance, the sampling tubes were then pushed into the soil at a controlled speed (0.2 in./min). After the desired depth had been reached, the soil was extruded from the compaction mold together with all three sampling tubes using a hydraulic jack. Appropriately sized triaxial specimens were extruded from the sampling tubes using a close-fitting piston driven by a hydraulic jack and then sealed with plastic wrap to avoid changes in moisture content (Figure 5.4). The initial diameter of the specimen is equal to the inside diameter of the tube. Therefore, specimens obtained by tube sampling could be tested in the triaxial device without trimming, except for cutting the ends of the specimen to ensure appropriate specimen height. The specimen dimensions for each triaxial specimen before testing were approximately 35.5 mm (1.4 in.) in diameter and 71.1 mm (2.8 in.) in height.

After end cutting, the specimen was ready for setup in the triaxial chamber for UU triaxial testing. Because no drainage is allowed during a UU test, impermeable plastic plates were placed on the top and bottom of the specimen (ASTM D 2850). The plastic plates have the same diameter as the soil specimen. The specimen was then carefully encased in membranes. Two thin Trojan prophylactic membranes were installed using a membrane expander (Figure 5.5), and were sealed to the cap and base by four rubber "O" rings (Figure 5.6). O-rings at the top and bottom of the triaxial chamber were greased with silicon grease, and the triaxial test chamber was tightly sealed.

During the whole sampling and installation procedure, the soil specimen was handled extremely carefully in order to minimize disturbance and prevent any changes in moisture content.

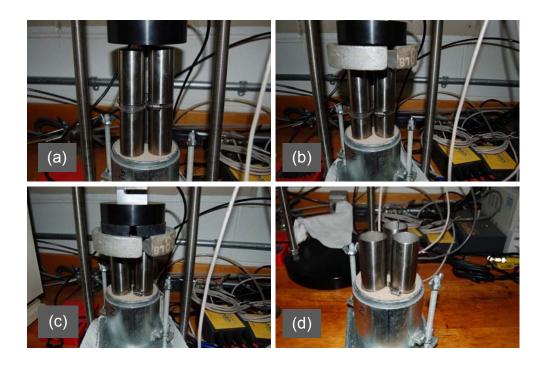
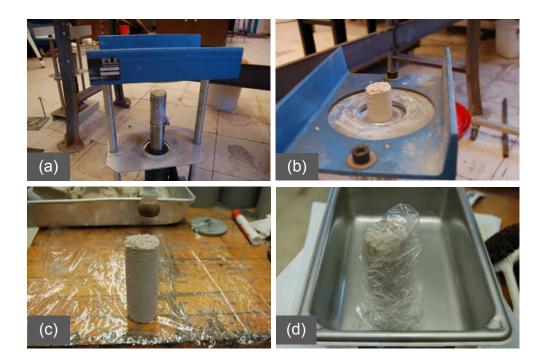


Figure 5.3. Sampling Procedure; (a) placing sampling tubes on top of the soil, (b) pushing sampling tubes into the soil, (c) attainment of the desired sampling depth, and (d) Proctor mold ready for extrusion.



5.4. Sampling Procedure; (a) placing tube on the close fitting piston, (b) extruding specimen out of the tube, (c) specimen extruded out of the tube, (d) sealing with plastic wrap.



Figure 5.5. Membranes Installed with an Expander



Figure 5.6. Specimen Encased in Membranes and Sealed with "O" Rings

In a few cases where the soil in the Proctor mold was very stiff, the sampling procedure that was used caused a loosening of the soil. Alternatively, some densification occurred for those specimens which were initially very loose. In order to investigate the effect of disturbance caused by the tube sampling procedure that was used, changes in density were checked as an indicator of disturbance. The average value of percent densification for all 206 samples that were prepared using the sampling tube approach was 4.3%. All observed densification values were less than 12%, and 83% of the values were less than 5%.

To compare sampling disturbance effects of the tube sampling method that was utilized with the more traditional hand-based wire saw trimming method, 18 specimens were prepared using a sample trimmer, as shown in Figure 5.7. The average value of percent densification for all samples prepared using the wire saw trimming method was 5%. All values were less than 13%, and 78% of the values were less than 5%. The results for each sample preparation method are summarized in Table 5.1; analysis of these numbers shows that the tube sampling method is more reliable and less time consuming than the wire saw trimming method.

Sampling Method	Approximate Preparation Time (min/specimen)	Average Densification (%)	Maximum Densification (%)	Specimens with measured Densification ≤ 5% (%)
Wire Saw	60	5	13	78
Tube	15	4.3	12	83

Table 5.1 Comparison of Two Sampling Method



Figure 5.7. Trimming the specimen using the wire saw trimming method

Figure 5.8 provides a comparison of triaxial specimen density with the ascompacted soil density. As can be observed, the sampling process does have an effect on the initial state of the triaxial specimens. However, as shown for the bentonite specimens (both in Figure 5.8 and in Table 5.1), this effect can be even more pronounced for specimens that are prepared using traditional trimming methods.

Differences between triaxial specimens and the Proctor specimen can also be attributed to the smaller sample size. As demonstrated by Gau and Olson (1971), density variations occur throughout a mass of soil compacted in a Proctor mold. These are averaged out for the entire Proctor specimen. However, the sub-sampling that is performed to create small triaxial specimens may consequently yield more highly variable specimen densities, as a specimen can be taken from an area of local variation.

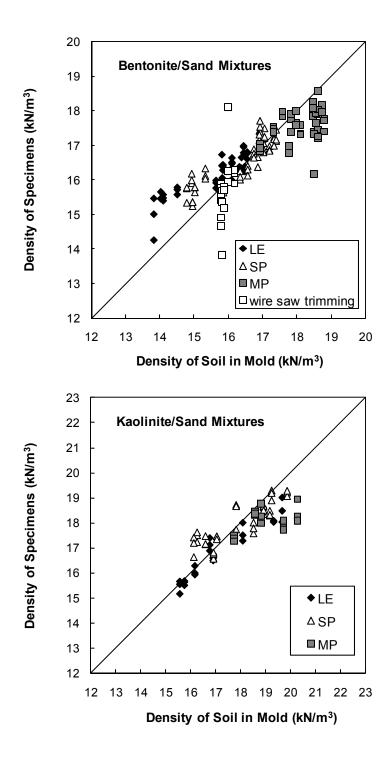


Figure 5.8. Comparison of Triaxial Specimen Density and As-Compacted Soil Density

5.1.2 UU Triaxial Test Procedure

The triaxial compression tests were conducted in accordance with ASTM D 2850-03a, Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils. After placing the triaxial chamber with a prepared specimen in place in the load frame, the chamber was filled with tap water. The specimen was then subjected to a cell pressure, and axially loaded to failure. For each Proctor mold, triaxial specimens were prepared and tested at confining pressures of 69, 138 and 276 kPa (10, 20 and 40 psi). The axial load was applied using a computer-based servomotor system, in conjunction with a strain-controlled approach to loading.

After application of the confining pressure, 10 minutes were allowed for the specimen to stabilize and equilibrate prior to application of the axial load. During the shearing stage, the triaxial specimen was subjected to axial displacements at a strain rate of 1%/minute, and the corresponding load on the specimen was recorded. For each specimen, shearing was continued until an axial strain of 15% was achieved. Because all of the tests were of the unconsolidated-undrained variety, the overall specimen water contents at failure were believed to be approximately the same as the specimen water content after compaction (although localized water content redistribution likely occurred in the specimens during shear). At the completion of the test, the cell was drained and the sample removed for water content determination.

Because the axial load-measuring device is located outside of the triaxial chamber, the chamber pressure produces an upward force on the piston that will thrust against the axial loading device. Therefore, the axial loading-measuring device was adjusted to compensate for piston friction and thrust using the following equation: Piston Force = Chamber Pressure × Cross - Sectional Area of Piston = Chamber Pressure × $\frac{1}{4}\pi D^2$

Where:

D = diameter of piston, which was 12.7 mm (0.5 in.)

5.1.3 Correction for Membrane Effects

According to ASTM D 2850-03a, the following equation was used to correct the principal stress difference for the effect of the membrane:

$$\Delta(\sigma_1 - \sigma_3) = 4E_m t_m \varepsilon_1 / D$$

Where:

 $\Delta(\sigma_1 - \sigma_3)$ = correction to be subtracted from the measured principal stress difference,

D = diameter of specimen,

 E_m = Young's modulus for the membrane material which was 1.39 MPa,

 t_m = thickness of membranes which was 0.14 mm for two layers of

membranes,

$$\varepsilon_1$$
 = axial strain.

5.2 Results and Discussion of Results

As mentioned previously in Chapter 4, the resulting matrix of test specimens was quite large, and for clarity it was necessary to assign each sample a name based on its compaction conditions and confining pressure. Firstly, each sample was assigned a letter to signify at which energy level it was compacted: M, S, and L stand for modified Proctor, standard Proctor, and low energy Proctor, respectively. Secondly, a number (15, 25, or 50) was assigned to indicate the clay proportion in the soil mixture. Thirdly, a K or B was assigned to signify the type of clay mineral that was tested. Fourthly, a number accompanying this letter was used to define the water content with negative numbers corresponding to dry of optimum, zero meaning at the optimum, and positive numbers signifying wet of optimum. Finally, the triaxial test confining pressure was denoted by the letter C and a number enclosed in parentheses and placed after the first four symbols. For example, a Standard Proctor specimen containing 15% bentonite compacted 2% dry of optimum and tested at 69 kPa would appear as S15B(-2)C(69).

5.2.1 Unconsolidated-Undrained Shear Strength

Complete data sheets for each UU triaxial test are given in Appendix F. The results of the unconsolidated-undrained triaxial tests are summarized in Table 5.2. Complete replication of the tests at all compaction levels and water contents were planned, although not all were carried out because some samples failed during the sampling procedure.

The relationship between strength, water content, dry unit weight and clay mineral may vary greatly depending on the manner in which the strength is determined, and this in turn will depend on the purpose for which the relationship is being used. For example, in pavement design tests, the strength index of a soil is usually determined at relatively low strains, e.g., on the order of 5% (Seed and Chan, 1959). On the other hand, engineers concerned with testing soil for foundation studies or earth dam design would like to determine strength at larger strains (Seed and Chan, 1959). For the UU tests that were conducted here, *failure* was defined as the maximum deviator stress occurring in the range of 0-15% axial strain. At failure, the points $p_f = (\sigma_1 + \sigma_3)/2$ are plotted vs. $q_f = (\sigma_1 - \sigma_3)/2$ in Figures 5.9 through 5.13. Failure lines (K_f lines) were drawn through these points using linear least squares regression analysis. The failure lines for the bentonite/sand samples compacted at different energy levels are presented in Figures 5.9 through 5.11. The failure lines for the kaolinite/sand samples are presented in Figures 5.12 and 5.13, which show much the same behavior as the bentonite/sand mixtures. It should be noted that the results from the tests on the 15% kaolinite/sand mixtures are not shown because these specimens all failed during the sampling procedure.

As can be seen in Figures 5.9 through 5.13, the strength decreases with increasing water content for all samples. On the other hand, the strength increases with increasing confining pressure and compactive effort. The failure lines for Low Energy and Standard Proctor specimens at the highest water content are often close to horizontal, especially for the Low Energy specimens. These samples are almost saturated; any increase in confining pressure merely increases the pore water pressure but has little effect on the associated soil strength. However, exceptions are seen at the Modified Proctor energy level. The failure lines of the highest water content for this energy level do not reach a horizontal position in Figures 5.9 to 5.13. These samples are stiffer and stronger and require higher confining pressure to induce a nearly saturated condition.

The effect of confining pressure on strength is more obvious for samples at lower water contents. This is because these samples are partially saturated soils, which are more susceptible to change in void ratio as confining pressure is applied, due to compression of air voids (even under "unconsolidated" conditions where drainage cannot occur). As the void ratio decreases, the soil shear strength increases; this is why specimens compacted dry of optimum exhibit the largest gains in strength with increases in confining pressure.

Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)
L15-B(-4)-C1	212.2	L25-B(+1)-C1	223.7	L50-B(+3)-C1	274.5
L15-B(-4)-C2	305.8	L25-B(+1)-C2	252.3	L50-B(+3)-C2	344.2
L15-B(-4)-C3	453.7	L25-B(+1)-C3	301.5	L50-B(+3)-C3	366.9
L15-B(-2)-C1	200.4	L25-B(+3)-C1	185.9	L50-B(+4)-C1	287.5
L15-B(-2)-C2	277.6	L25-B(+3)-C2	213.5	L50-B(+4)-C2	291.9
L15-B(-2)-C3	442.9	L25-B(+3)-C3	247.9	L50-B(+4)-C3	328.3
L15-B(0)-C1	201.7	L25-B(+5)-C1	150.9	S15-B(-5)-C1	241.9
L15-B(0)-C2	254.7	L25-B(+5)-C2	160.9	S15-B(-5)-C2	326.4
L15-B(0)-C3	424.1	L25-B(+5)-C3	174.0	S15-B(-5)-C3	587.8
(0) 00		(0) 00			
L15-B(+2)-C1	202.1	L50-B(-4)-C1	386.5	S15-B(-3)-C1	225.1
L15-B(+2)-C2	244.3	L50-B(-4)-C2	470.0	S15-B(-3)-C2	279.9
L15-B(+2)-C3	356.9	L50-B(-4)-C3	602.0	S15-B(-3)-C3	532.3
L15-B(+4)-C1	151.4	L50-B(-2)-C1	432.9	S15-B(-1)-C1	211.4
L15-B(+4)-C2	180.4	L50-B(-2)-C2	447.8	S15-B(-1)-C2	358.7
L15-B(+4)-C3	210.2	L50-B(-2)-C3	610.5	S15-B(-1)-C3	502.1
L15-B(+5)-C1	76.3	L50-B(-1)-C1	417.3	S15-B(+1)-C1	220.5
L15-B(+5)-C2	94.0	L50-B(-1)-C2	470.4	S15-B(+1)-C2	270.0
L15-B(+5)-C3	102.1	L50-B(-1)-C3	550.3	S15-B(+1)-C3	395.7
L25-B(-3)-C1	262.5	L50-B(0)-C1	372.6	S15-B(+3)-C1	195.0
L25-B(-3)-C2	305.9	L50-B(0)-C2	425.3	S15-B(+3)-C1 S15-B(+3)-C2	230.1
L25-B(-3)-C3	498.1	L50-B(0)-C2	469.6	S15-B(+3)-C3	318.1
220 2(0) 00	100.1	200 2(0) 00	100.0		0.0.1
L25-B(-1)-C1	252.2	L50-B(+2)-C1	356.2	S15-B(+5)-C1	121.2
L25-B(-1)-C2	283.4	L50-B(+2)-C2	378.9	S15-B(+5)-C2	145.3
L25-B(-1)-C3	389.8	L50-B(+2)-C3	425.8	S15-B(+5)-C3	185.8

Table 5.2 Deviator Stress Values

Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)
S25-B(-4)-C1	311.7	S50-B(0)-C1	517.7	M25-B(-4)-C1	467.2
S25-B(-4)-C2	379.3	S50-B(0)-C2	549.6	M25-B(-4)-C2	672.1
S25-B(-4)-C3	576.1	S50-B(0)-C3	599.3	M25-B(-4)-C3	879.7
S25-B(-2)-C1	294.1	S50-B(+1)-C1	421.8	M25-B(-2)-C1	566.4
S25-B(-2)-C2	366.8	S50-B(+1)-C2	475.6	M25-B(-2)-C2	576.3
S25-B(-2)-C3	501.1	S50-B(+1)-C3	475.4	M25-B(-2)-C3	832.7
S25-B(0)-C1	230.0	S50-B(+3)-C1	348.6	M25-B(0)-C1	430.9
S25-B(0)-C2	286.0	S50-B(+3)-C2	338.3	M25-B(0)-C2	528.1
S25-B(0)-C3	352.0	S50-B(+3)-C3	379.4	M25-B(0)-C3	674.5
S25-B(+2)-C1	157.0	S50-B(+6)-C1	234.5	M25-B(+2)-C1	392.1
S25-B(+2)-C2	208.0	S50-B(+6)-C2	267.0	M25-B(+2)-C2	400.1
S25-B(+2)-C3	220.0	S50-B(+6)-C3	271.8	M25-B(+2)-C3	542.6
S25-B(+4)-C1	109.2	M15-B(-1)-C1	278.0	M25-B(+4)-C1	277.2
S25-B(+4)-C2	123.7	M15-B(-1)-C2	377.3	M25-B(+4)-C2	277.4
S25-B(+4)-C3	135.5	M15-B(-1)-C3	695.8	M25-B(+4)-C3	458.3
S25-B(+6)-C1	90.2	M15-B(+1)-C1	257.8	M50-B(-1)-C1	1051.6
S25-B(+6)-C2	95.8	M15-B(+1)-C2	477.0	M50-B(-1)-C2	1180.3
S25-B(+6)-C3	122.7	M15-B(+1)-C3	670.6	M50-B(-1)-C3	1295.6
S50-B(-3)-C1	522.8	M15-B(+3)-C1	299.8	M50-B(+2)-C1	1079.3
S50-B(-3)-C2	559.8	M15-B(+3)-C2	338.2	M50-B(+2)-C2	996.7
S50-B(-3)-C3	767.1	M15-B(+3)-C3	590.7	M50-B(+2)-C3	1232.6
S50-B(-2)-C1	523.0	M15-B(+5)-C1	189.5	M50-B(+4)-C1	646.7
S50-B(-2)-C2	619.2	M15-B(+5)-C2	304.7	M50-B(+4)-C2	713.3
S50-B(-2)-C3	729.5	M15-B(+5)-C3	337.2	M50-B(+4)-C3	762.3

Table 5.2 (continued)

Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)	Test Number	Max. Deviator Stress (kPa)
M50-B(+5)-C1	508.4	L50-K(+4)-C1	32.3	S50-K(+3)-C1	45.2
M50-B(+5)-C2	561.8	L50-K(+4)-C2	29.8	S50-K(+3)-C2	41.6
M50-B(+5)-C3	583.6	L50-K(+4)-C3	35.3	S50-K(+3)-C3	57.5
L25-K(-2)-C1	295.0	S25-K(-2)-C1	394.9	M25-K(0)-C1	240.2
L25-K(-2)-C2	404.0	S25-K(-2)-C2	475.6	M25-K(0)-C2	212.3
L25-K(-2)-C3	660.9	S25-K(-2)-C3	750.3	M25-K(0)-C3	688.6
L25-K(0)-C1	156.5	S25-K(0)-C1	211.6	M25-K(+2)-C1	122.7
L25-K(0)-C2	328.5	S25-K(0)-C2	256.3	M25-K(+2)-C2	216.1
L25-K(0)-C3	377.0	S25-K(0)-C3	355.2	M25-K(+2)-C3	468.8
L25-K(+2)-C1	60.0	S25-K(+2)-C1	59.0	M50-K(0)-C1	1132.3
L25-K(+2)-C2	75.8	S25-K(+2)-C2	77.3	M50-K(0)-C2	1203.5
L25-K(+2)-C3	116.8	S25-K(+2)-C3	113.1	M50-K(0)-C3	1553.7
L50-K(-4)-C1	470.7	S50-K(-5)-C1	598.40	M50-K(+2)-C1	576.1
L50-K(-4)-C2	575.9	S50-K(-5)-C2	797.60	M50-K(+2)-C2	643.7
L50-K(-4)-C3	767.9	S50-K(-5)-C3	1110.20	M50-K(+2)-C3	714.7
L50-K(-2)-C1	362.2	S50-K(-3)-C1	536.3	M50-K(+4)-C1	223.7
L50-K(-2)-C2	503.4	S50-K(-3)-C2	549.4	M50-K(+4)-C2	230.8
L50-K(-2)-C3	558.1	S50-K(-3)-C3	848.1	M50-K(+4)-C3	228.6
L50-K(0)-C1	104.6	S50-K(-2)-C1	309.2		
L50-K(0)-C2	132.1	S50-K(-2)-C2	312.0		
L50-K(0)-C3	141.9	S50-K(-2)-C3	358.8		
L50-K(+2)-C1	49.8	S50-K(+1)-C1	113.8		
L50-K(+2)-C2	53.0	S50-K(+1)-C2	122.1		
L50-K(+2)-C3	53.6	S50-K(+1)-C3	132.3		

Table 5.2 (continued)

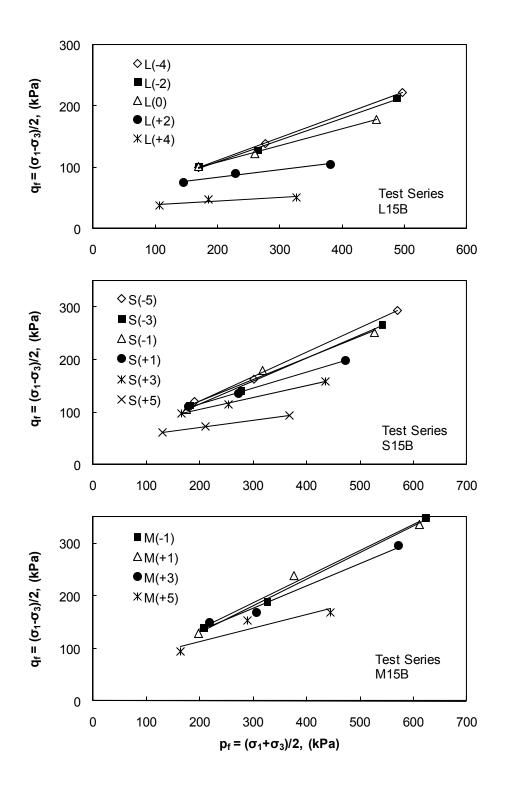


Figure 5.9. qf vs. pf Failure Plots with Failure Lines for Test Series B15

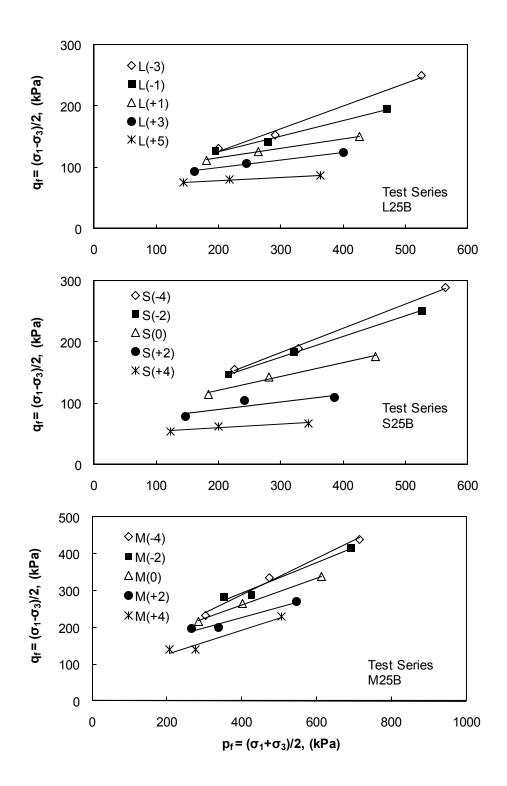


Figure 5.10. qf vs. pf Failure Plots with Failure Lines for Test Series B25

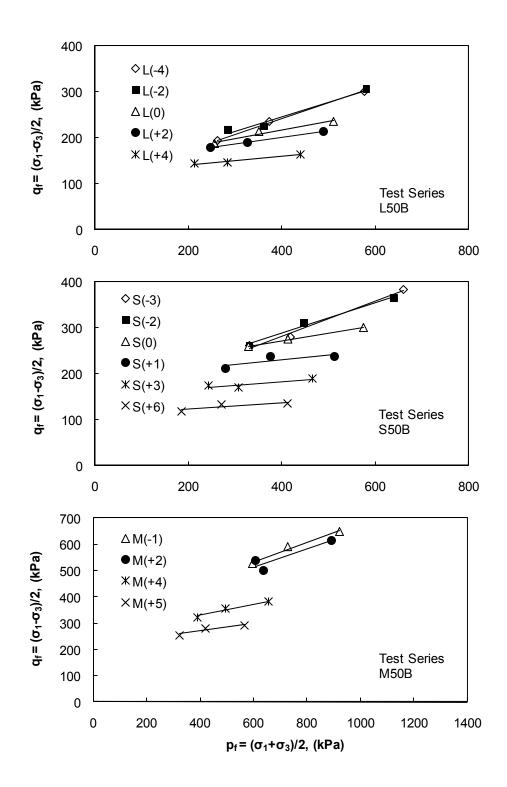


Figure 5.11. qf vs. pf Failure Plots with Failure Lines for Test Series B50

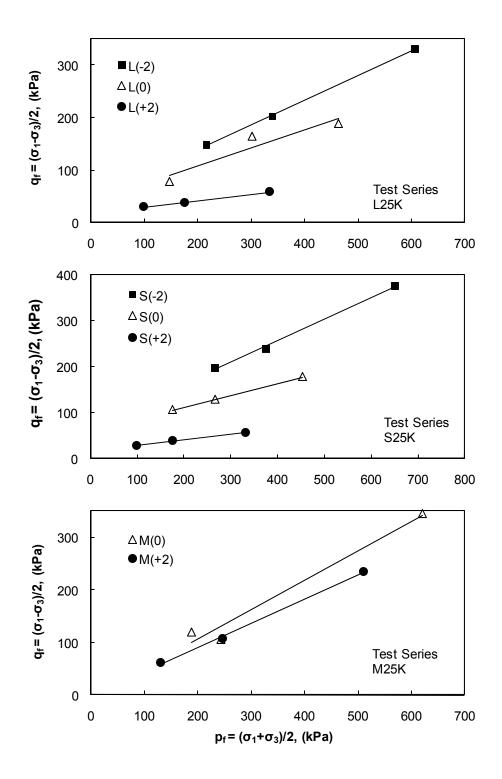


Figure 5.12. qf vs. pf Failure Plots with Failure Lines for Test Series K25

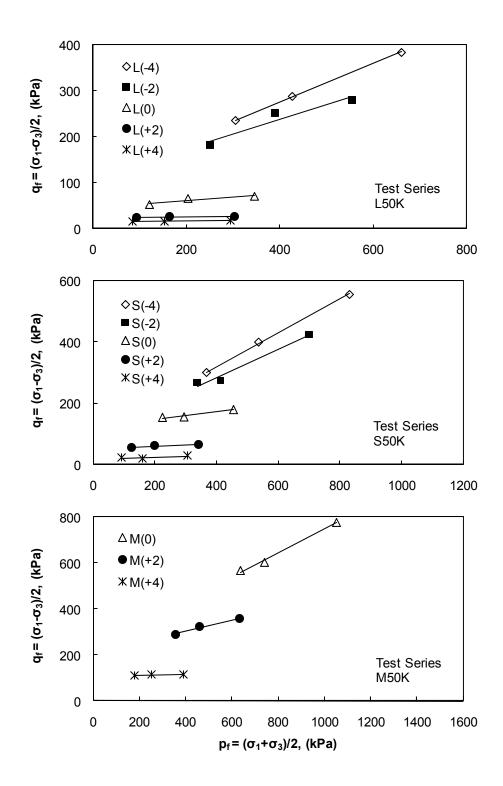


Figure 5.13. qf vs. pf Failure Plots with Failure Lines for Test Series K50

The effect of clay content and test confining pressure on the strengths measured for the bentonite/sand mixtures are shown more clearly in Figures 5.14 to 5.16. Each figure is for a separate nominal energy level. The change in maximum deviator stress under the influence of changing bentonite content is apparent. For a given compaction effort, increasing the clay proportion increases the maximum deviator stress of the soil mixture. Samples containing 50% bentonite have a maximum deviator stress that is considerably higher than those containing 15% and 25% bentonite. However, exceptions are seen at the highest confining pressure (C3 = 276 kPa), for which the compressive strength for samples containing 15% bentonite overlaps with those containing 25% bentonite. This is true at each nominal energy level. On the wet side of optimum the slopes of the trend lines are much the same and nearly coincide, regardless of the confining pressure. This is a consequence of the soil's nearly saturated condition. As the compaction water content decreases from the optimum, the slopes of the trend lines tend to diverge.

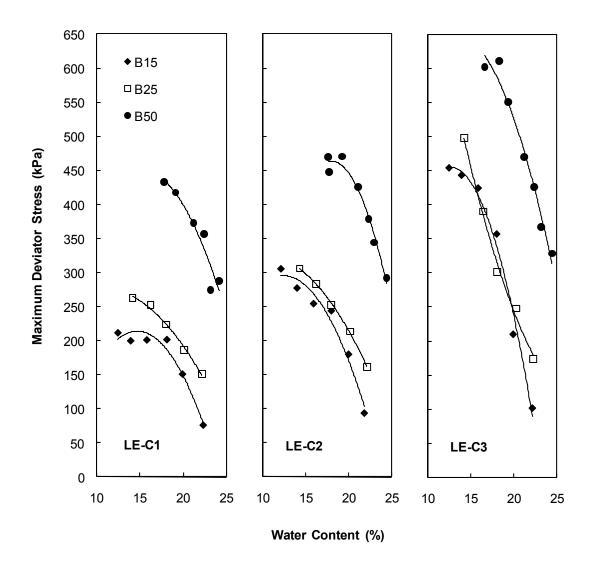


Figure 5.14. Maximum Deviator Stress of Bentonite/Sand Mixtures Compacted Using the Low Energy Proctor Method

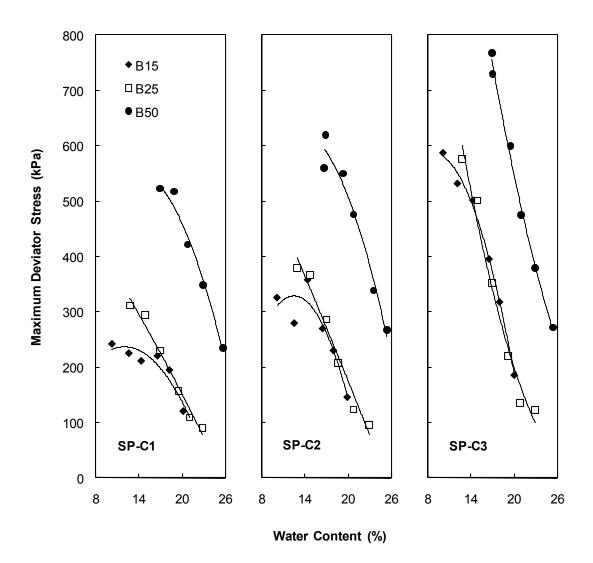


Figure 5.15. Maximum Deviator Stress of Bentonite/Sand Mixtures Compacted Using the Standard Proctor Method

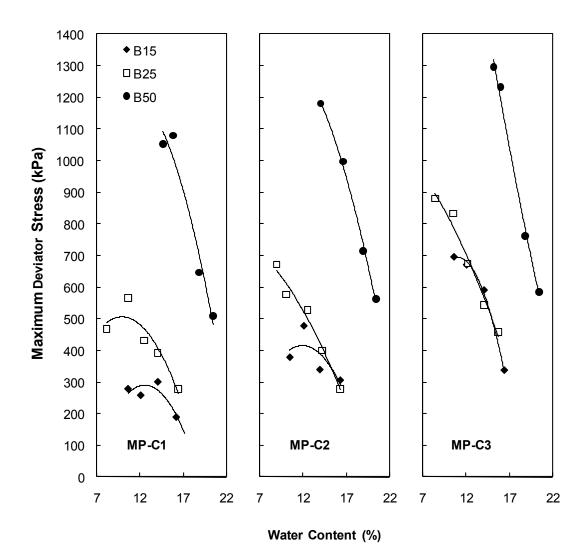


Figure 5.16. Maximum Deviator Stress of Bentonite/Sand Mixtures Compacted Using the Modified Proctor Method

The kaolinite/sand specimens that were tested exhibited much the same behavior as the bentonite/sand specimens, i.e., at the same water content, as the clay content increases, the maximum deviator stress increases. To better describe the effect of different clay minerals on the measured maximum deviator stresses, the test results from the kaolinite/sand mixtures were plotted together with the bentonite/sand mixtures in Figures 5.17 to 5.19. The effect of increasing water content on strength is more pronounced for the kaolinite/sand mixtures than for the bentonite/sand mixtures. At a water content 4% dry of optimum, the kaolinite/sand mixtures have a much higher strength than the bentonite/sand mixtures at the same clay content. The addition of a small amount of water produced a much sharper drop in the maximum deviator stress for the kaolinite/sand specimens. The change is so rapid that at 4% wet of optimum, the maximum deviator stress of the kaolinite/sand mixture has values that are relatively close to zero.

The bentonite utilized in this research study was comprised principally of the clay mineral montmorillonite (> 90% by mass, American Colloid Company, 1995). Compared to kaolinite, montmorillonite has a much smaller crystal size and a much larger specific surface. The relative sizes of kaolinite and montmorillonite and their specific surface are shown in Table 5.3 (Yong and Warkentin, 1975). Montmorillonite crystals have a stronger attraction for water, and have the tendency to adsorb much more water when forming a water layer surrounding each crystal. For the kaolinite/sand specimens, a water content that is 4% wet of optimum is very close to their liquid limit, while for bentonite/sand mixtures, a water content that is 4% wet of optimum is far from their liquid limit. For the kaolinite/sand mixtures, the addition of a small amount of water expands the water layer around the particles, which increases the repulsion between particles and gives a higher degree of dispersion and a lower strength for the resulting specimens that are prepared. However, the addition of this amount of water doesn't have nearly the same effect on the bentonite/sand mixtures.

Mineral	Typical Thickness (nm)	Typical Diameter (nm)	Specific Surface (km²/kg)
Montmorillonite	3	100-1000	0.8
Kaolinite	50-2000	300-4000	0.015

Table 5.3 Relative Sizes and Specific Surfaces of Clay Minerals (after Yong and Warkentin, 1975)

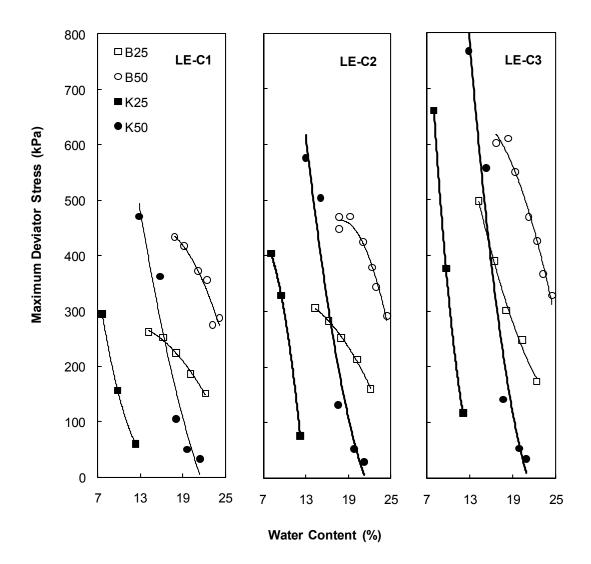


Figure 5.17. Maximum Deviator Stress of Clay/Sand Mixtures Compacted Using the Low Energy Proctor Method

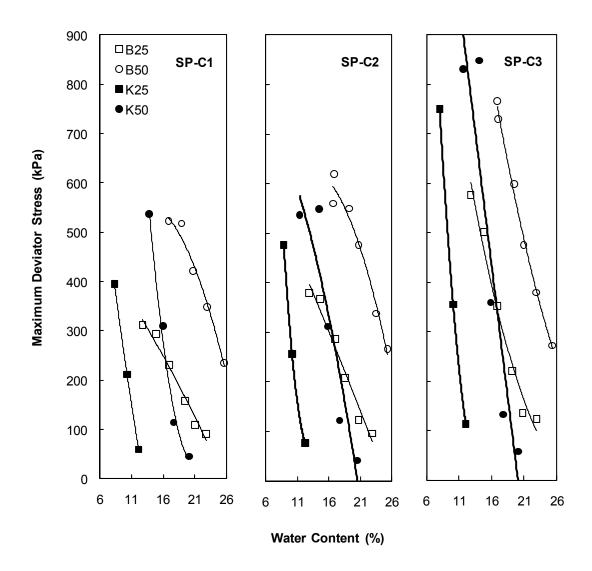


Figure 5.18. Maximum Deviator Stress of Clay/Sand Mixtures Compacted Using the Standard Proctor Method

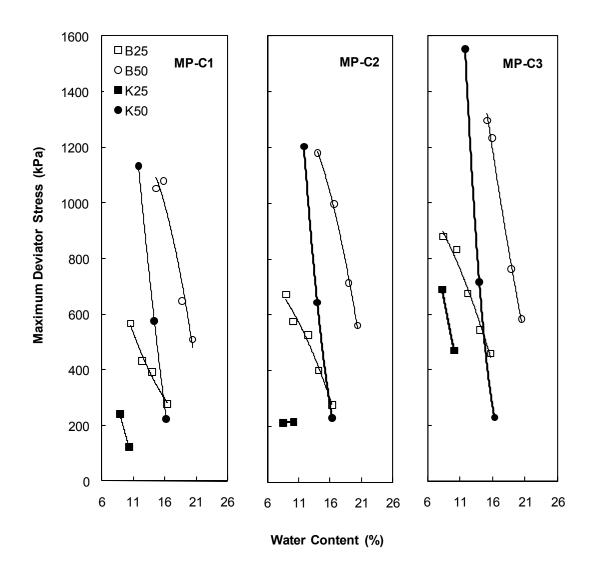


Figure 5.19. Maximum Deviator Stress of Clay/Sand Mixtures Compacted Using the Modified Proctor Method

5.2.2 Stress-Strain Behavior

Stress-strain curves from UU tests on bentonite/sand specimens at confining pressures up to 276 kPa are shown in Figure 5.20 to 5.28. For most of the specimens that were tested, there was strain hardening over the entire range of strains in the test rather than a definitive peak in the deviator stress.

The stress-strain curves of samples compacted dry-of-optimum are considerably steeper and more brittle than the curves of wet-of-optimum samples. From the relative position of these curves in each figure, it is evident that the dry-ofoptimum specimens are stiffer, stronger and more brittle than their wet-of-optimum counterparts. The wet-of-optimum specimens have a greater tendency to exhibit increases in strength at very high strain levels. One possible mechanism to explain this behavior is capillarity (Carrier 2000). Samples at lower water content will tend to have a more highly negative pore water pressure, which in turn causes higher effective stresses between soil particles, and a greater specimen strength. Lambe and Whitman (1979) state that for a given compactive effort and dry density, the soil structure in compacted clays tends to be more flocculated for compaction on the dry side of optimum and more dispersive on the wet side. In general, for two specimens of the same clay at the same void ratio, an element of flocculated soil has a higher strength than the same element of soil in a dispersed state. As described herein, similar strength behavior as what has been observed for compacted clays is also observed for soils that contain an intermediate level of clayey fines, but that do not classify as "true" clays.

The stress-strain behavior of soils in the UU test also depends on the confining pressure that is used. As shown in Figures 5.20 to 5.28, the steepness of the initial portion of the stress-strain curves and the strength values both increase as the

confining pressure employed in the tests increases. The effect of increased confining pressure is more pronounced in the dry-of-optimum samples, especially the samples at the lowest water content. For these samples, the strength continues to increase with increasing confining pressure. Due to the air in the voids, the higher confining pressure was able to compress the samples so that they became denser, producing an increase in undrained strength. On the other hand, the increase in confining pressure had very little effect on the wet-of-optimum samples.

Increases in confining pressure were also shown to lead to an increase in plasticity, as can be observed for M50B(-1) in Fig. 5.28. At a confining pressure of 69 kPa, the sample quickly reached its maximum deviator stress, failing in a brittle manner at an axial strain of 4%. However, at a confining pressure of 276 kPa, the failure strain was about 10%, and the strength did not reduce suddenly after reaching the peak condition.

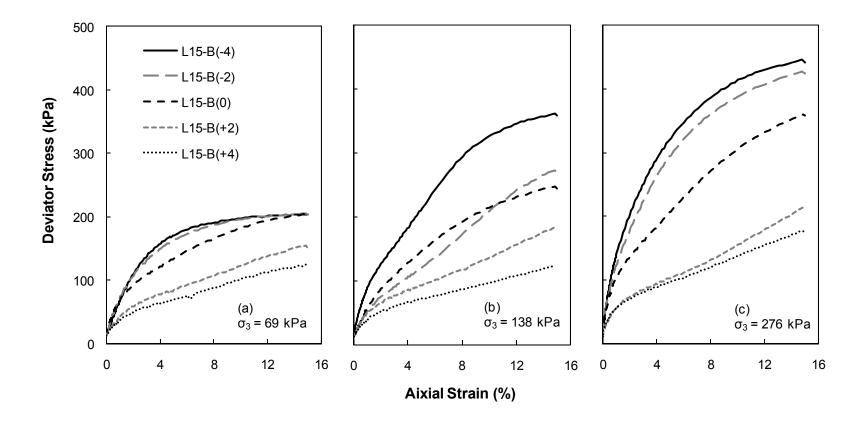


Figure 5.20. Stress-Strain Curves for Tests on Low Energy Proctor Compacted 15% Bentonite/Sand Specimens

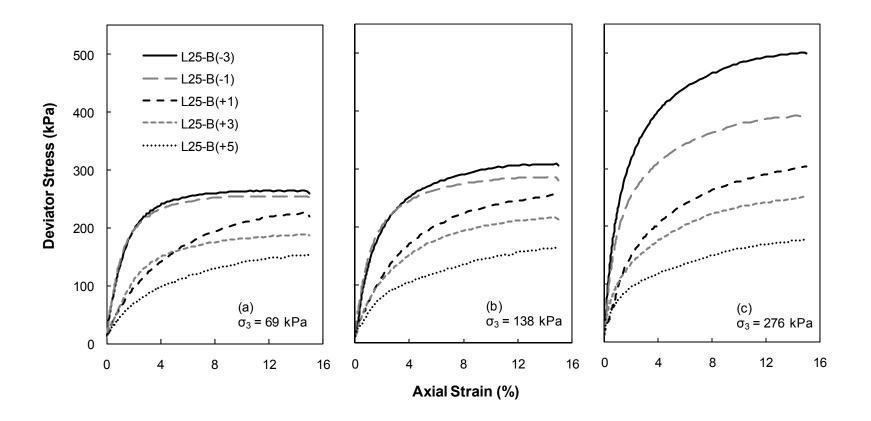


Figure 5.21. Stress-Strain Curves for Tests on Low Energy Proctor Compacted 25% Bentonite/Sand Specimens

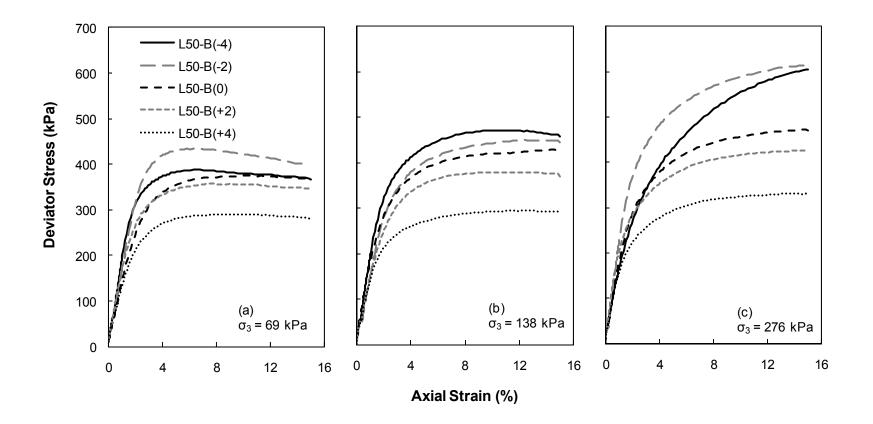


Figure 5.22. Stress-Strain Curves for Tests on Low Energy Proctor Compacted 50% Bentonite/Sand Specimens

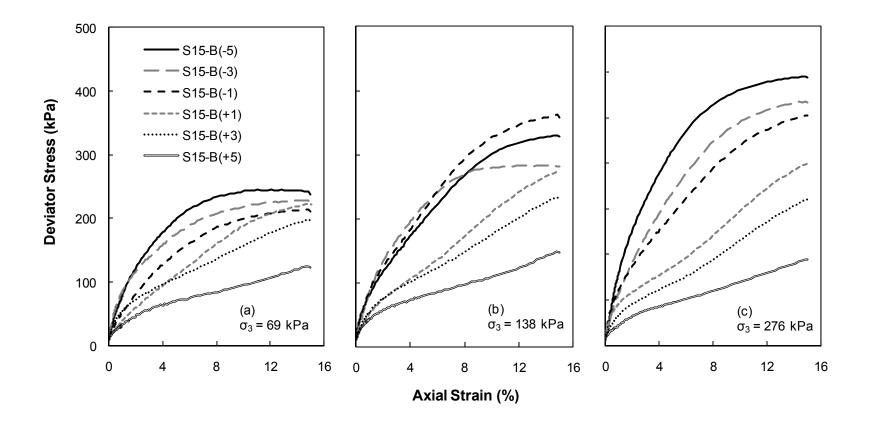


Figure 5.23. Stress-Strain Curves for Tests on Standard Proctor Compacted 15% Bentonite/Sand Specimens

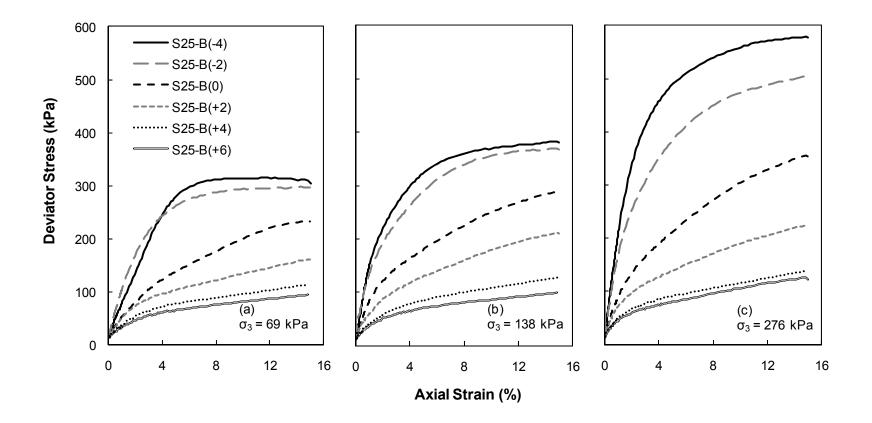


Figure 5.24. Stress-Strain Curves for Tests on Standard Proctor Compacted 25% Bentonite/Sand Specimens

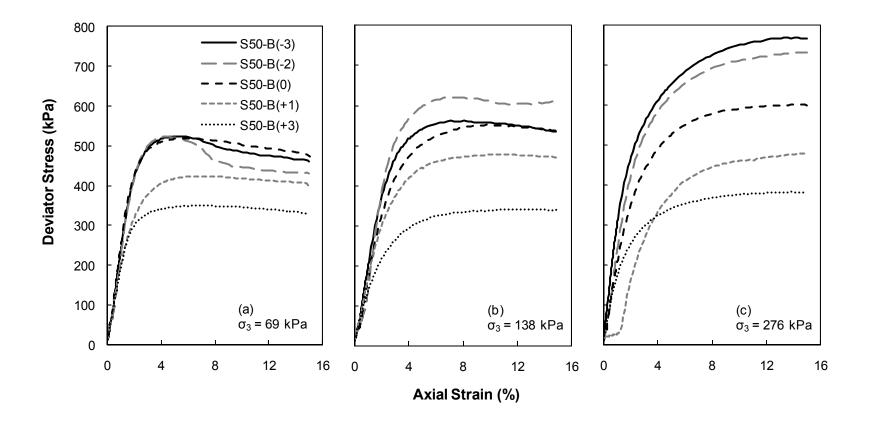


Figure 5.25. Stress-Strain Curves for Tests on Standard Proctor Compacted 50% Bentonite/Sand Specimens

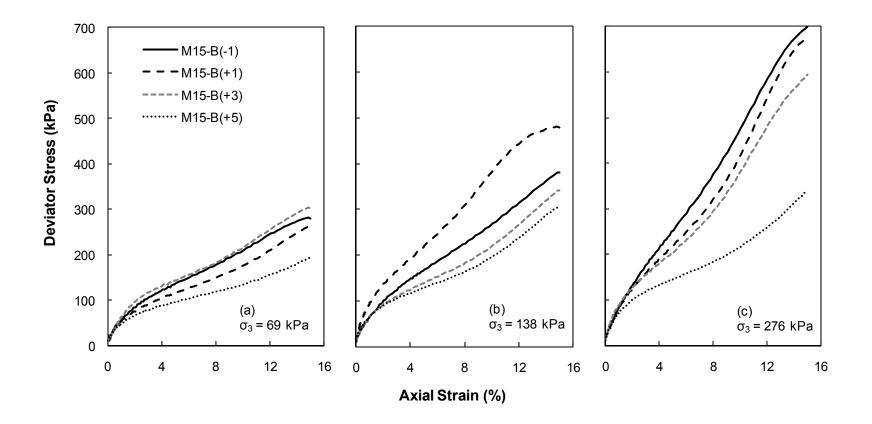


Figure 5.26. Stress-Strain Curves for Tests on Modified Proctor Compacted 15% Bentonite/Sand Specimens

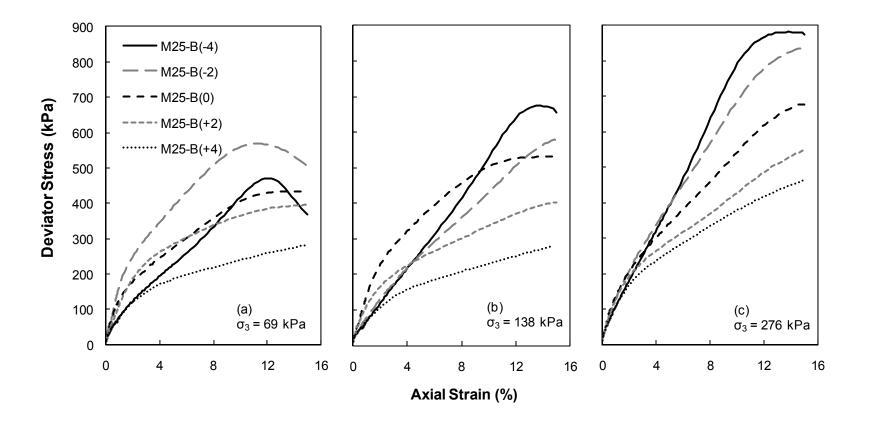


Figure 5.27. Stress-Strain Curves for Tests on Modified Proctor Compacted 25% Bentonite/Sand Specimens

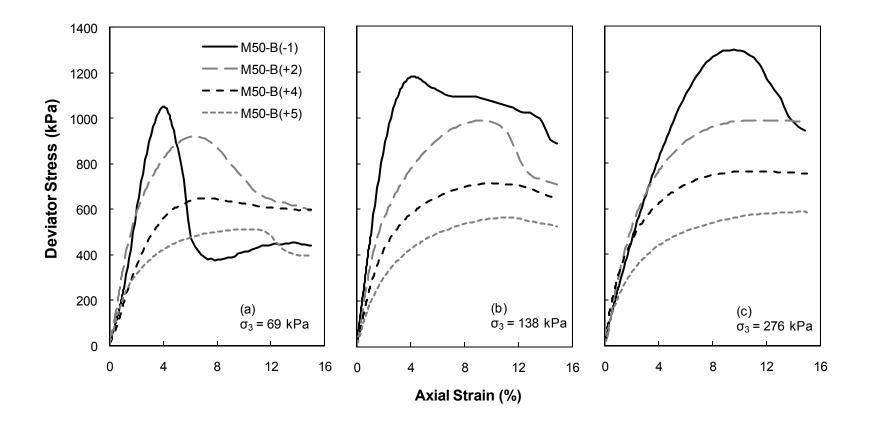


Figure 5.28. Stress-Strain Curves for Tests on Modified Proctor Compacted 50% Bentonite/Sand Specimens

Typical stress-strain curves from UU tests on bentonite/sand mixtures at confinement level 1 (69 kPa) are shown in Figures 5.29 to 5.31. The effect of clay content on the stress-strain behavior of the bentonite/sand specimens is shown more clearly in these figures. The relative shapes and positions of the curves for specimens tested at confinement level 2 (138 kPa) and level 3 (276 kPa) are similar to those observed in these figures, and are consequently not shown here. Each figure is for a separate nominal compactive effort. These data show that the specimens containing 50% bentonite are apparently stiffer, stronger and more brittle than specimens containing less bentonite. Definite peaks are seen in specimens containing 50% bentonite. These specimens developed a very steep stress-strain curve at the beginning of the test, and reached the maximum deviator stress at low strains. In contrast, specimens containing a lower bentonite proportion developed much flatter stress-strain curves.

The method of failure also presents an insight into the relative behavior that was observed for specimens prepared with different percentages of clay. All the specimens that contained less than 50% bentonite failed via a bulging-type mechanism. On the other hand, almost all the specimens containing 50% bentonite tested at confinement level 1 and level 2 failed on a well defined shear plane with a relatively small amount of bulging. For the specimens containing 50% bentonite, as confining pressure increased to confinement level 3, the specimens became more plastic, yielded more during the test, and typically failed via a bulging mechanism. For mixtures containing less than 50% bentonite, a high concentration of sand particles produced grain-to-grain contact and a large amount of voids among the sand particles (Figure 5.32). This type of soil matrix tended to deform by compressing voids or reorienting particles during shear, over a large portion of the specimen. As the clay content increased, the degree of void-filling by the clay also increased, which in some cases even caused the sand particles to float in a matrix of clay (Figure 5.33). At this point, specimens had a preference for developing a single shear plane. Figure 5.34 presents a picture of specimen M50-B(-1)-C1, which failed by a brittle-type failure mechanism. One of the specimens that failed by bulging, M25-B(-2)-C1, is shown in Figure 5.35.

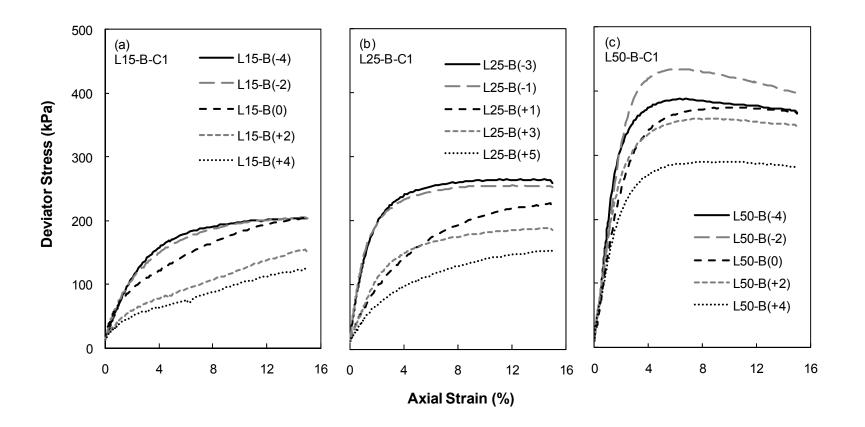


Figure 5.29. Stress-Strain Curves for Tests on Low Energy Proctor Compacted Bentonite/Sand Specimens at Confinement Level 1

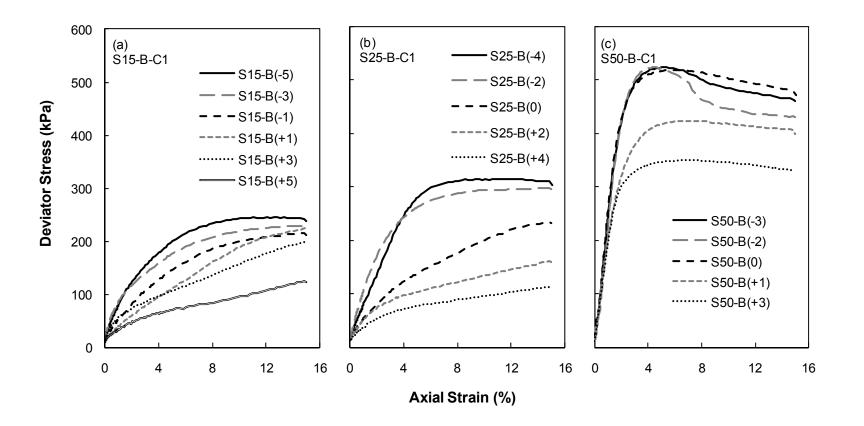


Figure 5.30. Stress-Strain Curves for Tests on Standard Proctor Compacted Bentonite/Sand Specimens at Confinement Level 1

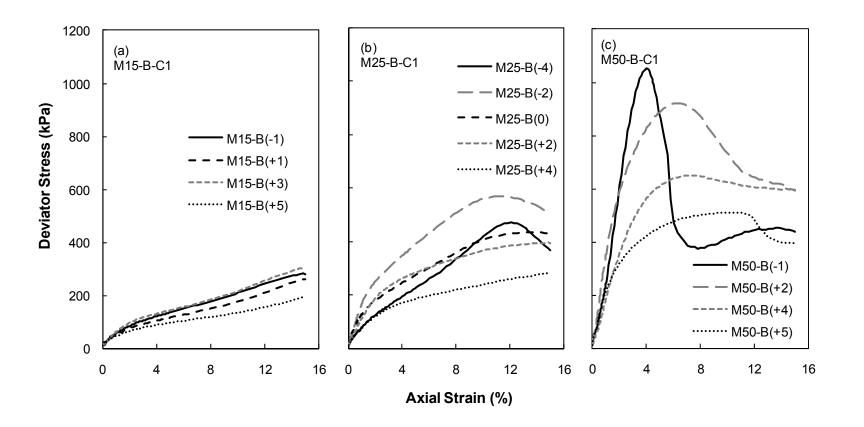


Figure 5.31. Stress-Strain Curves for Tests on Modified Proctor Compacted Bentonite/Sand Specimens at Confinement Level 1



Figure 5.32. Photograph of specimen S15-B(+1)-C1

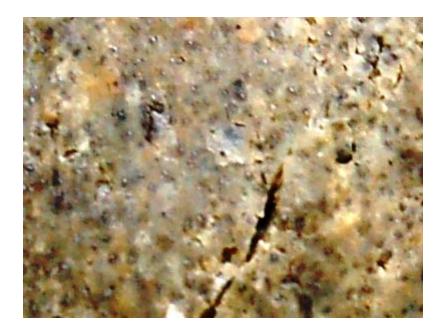


Figure 5.33. Photograph of specimen S50-B(+1)-C1

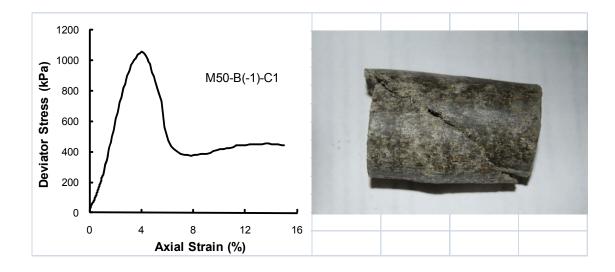


Figure 5.34. A Brittle-Type Failure: Specimen M50-B(-1)-C1

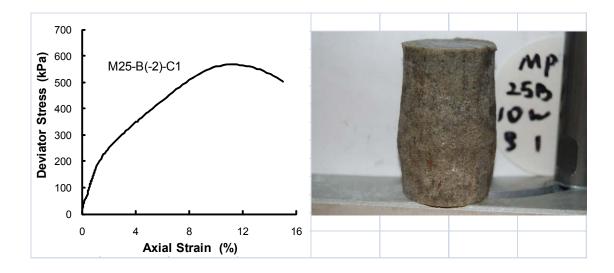


Figure 5.35. A Bulging-Type Failure: Specimen M25-B(-2)-C1

Stress-stain curves from UU triaxial tests on kaolinite/sand mixtures are shown in Figures 5.36 to 5.41. As mentioned previously, the results from tests on 15% kaolinite/sand mixtures are not shown due to sample failure during the UU specimen preparation process. The relative shapes of these stress-strain curves are similar to those observed for the bentonite/sand mixtures (Figure 5.20 to 5.28). The specimens compacted dry-of-optimum are considerably stronger, stiffer and more brittle than the otherwise identical specimens compacted wet-of-optimum. Unlike the bentonite/sand mixtures, the differences in undrained strength between dry-ofoptimum specimens and wet-of-optimum specimens are quite large. As the compaction water content increased, the undrained strength dropped drastically and the stress-strain curves became quite flat.

Increasing the UU test confining pressure had very little (if any) effect on the specimens that had been prepared wet-of-optimum. The specimens compacted wet-of-optimum maintained their considerably low strengths and plastic stress-stain behavior at all confining pressures. The dry-of-optimum specimens maintained their relatively high strengths. However, as the confining pressure increased, the dry-ofoptimum specimens lost some of their brittle stress-strain characteristics.

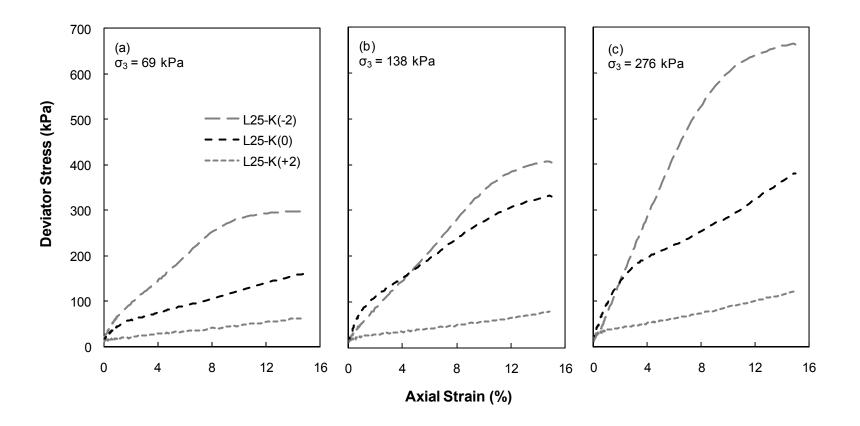


Figure 5.36. Stress-Strain Curves for Tests on Low Energy Proctor Compacted 25% Kaolinite/Sand Specimens

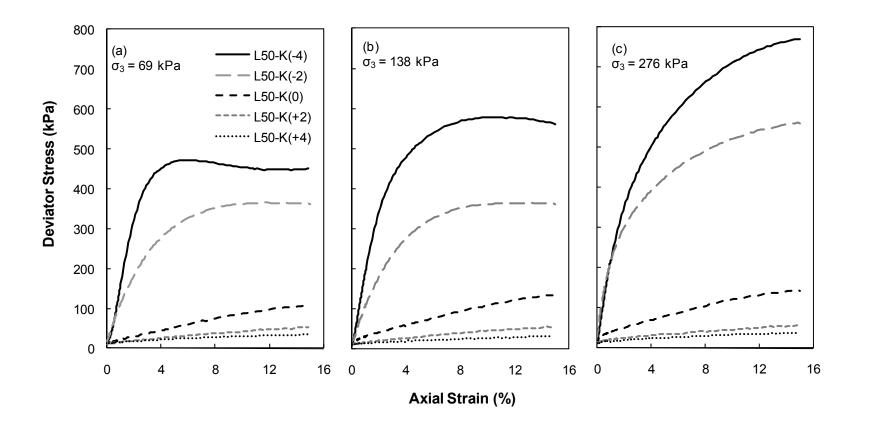


Figure 5.37. Stress-Strain Curves for Tests on Low Energy Proctor Compacted 50% Kaolinite/Sand Specimens

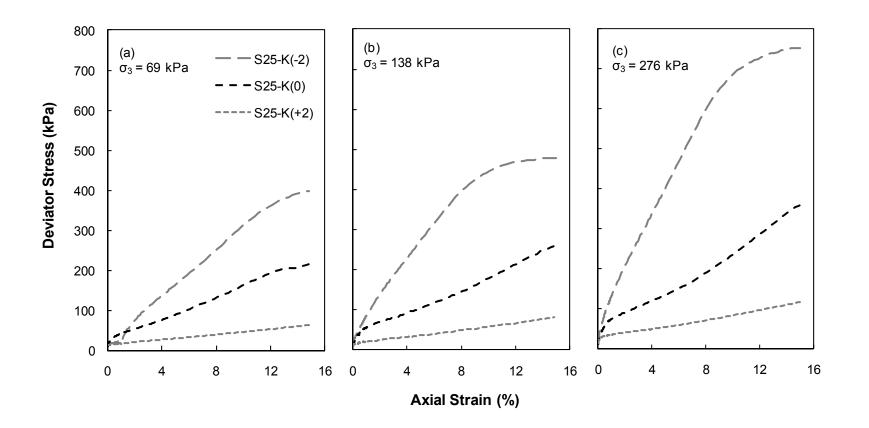


Figure 5.38. Stress-Strain Curves for Tests on Standard Proctor Compacted 25% Kaolinite/Sand Specimens

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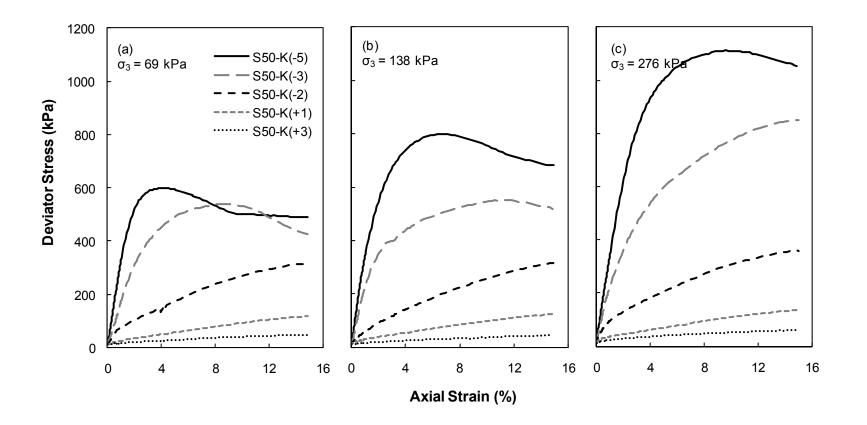


Figure 5.39. Stress-Strain Curves for Tests on Standard Proctor Compacted 50% Kaolinite/Sand Specimens

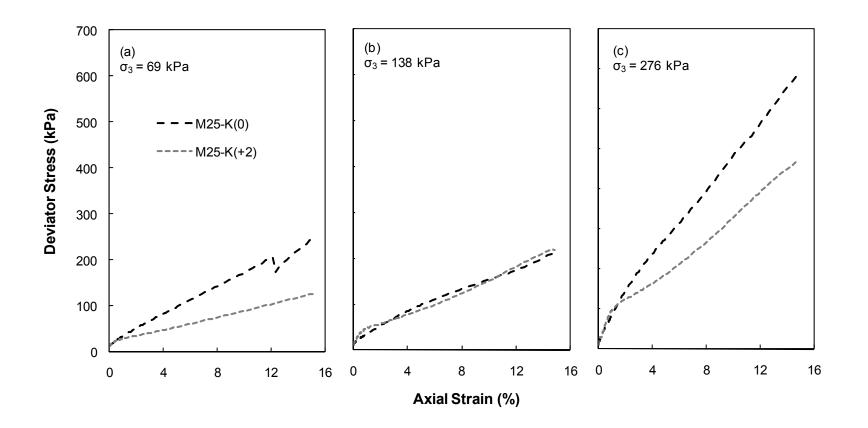


Figure 5.40. Stress-Strain Curves for Tests on Modified Proctor Compacted 25% Kaolinite/Sand Specimens

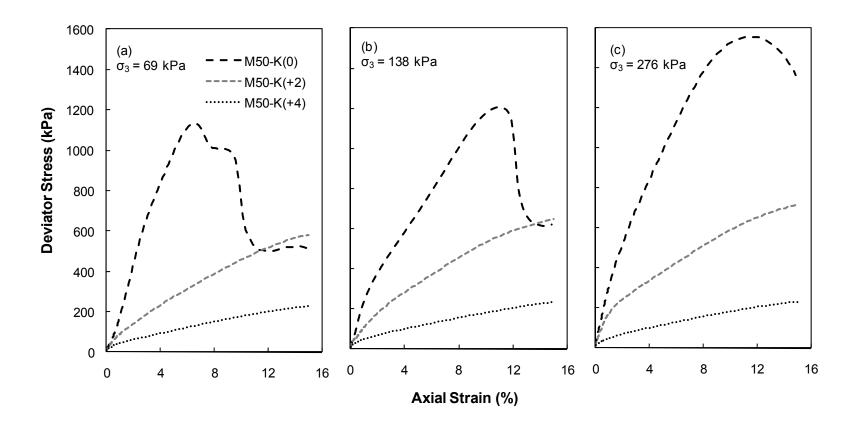


Figure 5.41. Stress-Strain Curves for Tests on Modified Proctor Compacted 50% Kaolinite/Sand Specimens

5.2.3 Undrained Strength Parameters

The K_f failure envelopes for the soil mixtures that were tested (Figures 5.9 to 5.13) exhibited relatively linear behavior over the range of confining pressures that were used in the UU tests. The values of the Mohr-Coulomb strength parameters c and ϕ were evaluated using the procedure recommended by Duncan et al. (1980), which is illustrated in Figure 5.42. At failure, the values of $p_f = (\sigma_1 + \sigma_3)/2$ are plotted vs. $q_f = (\sigma_1 - \sigma_3)/2$. Failure lines (K_f lines) were drawn through these points using linear least squares regression analysis.

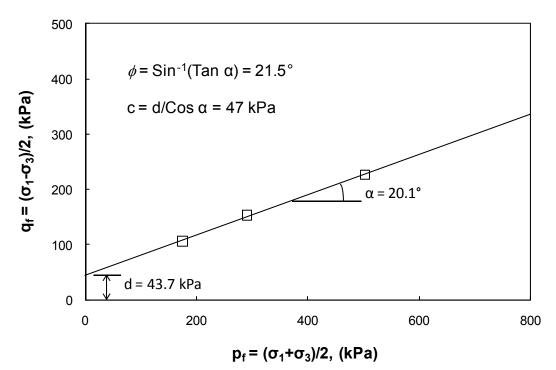


Figure 5.42. Kf line for UU-Triaxial Tests on Bentonite/Sand Specimen (Data from L15-B(-4))

The primary advantage of this method is that it is simpler to fit the "best" straight line through a series of points (which can be done using linear regression) than it is to draw the ideal Mohr-Coulomb failure envelope tangent to a series of circles which do not have a common tangent. To use this method, values of *c* and ϕ are calculated from the slope and intercept of the K_f line using the equations shown in Fig. 5.42. The resulting values of the Mohr-Coulomb strength parameters *c* and ϕ for all the soils that were tested are listed in Table 5.4.

Soil Number	Proctor Mold Water Content (%)	Proctor Mold Dry Unit Weight (kN/m ³)	<i>c</i> (kPa)	ϕ (degrees)		
L15-B(-4)	12.1	16.1	47	21.5		
L15-B(-2)	13.9	16.3	39.9	21.7		
L15-B(0)	15.8	16.5	40.1	20.8		
L15-B(+2)	17.9	16.6	54.9	16		
L15-B(+4)	19.7	16.4	60.3	6.9		
L15-B(+5)	21.1	15.8	34.1	3.1		
L25-B(-3)	14.0	15.8	55.7	21.9		
L25-B(-1)	16.1	16.1	76.5	14.7		
L25-B(+1)	17.6	16.5	85	9.1		
L25-B(+3)	19.9	15.9	74.1	7.3		
L25-B(+5)	22.0	15.7	68.5	3		
	16.6	14	112.4	19.9		
L50-B(-4)		• •				
L50-B(-2)	18.3	14.4	125.6	18.4		
L50-B(-1)	19.2	14.5	147.5	13.9		
L50-B(0)	20.8	14.5	145	10.6		
L50-B(+2)	22.2	14.4	143.9	8.3		
L50-B(+3)	23.3	14.1	109	10.1		
L50-B(+4)	24	13.8	122.4	5.4		

 Table 5.4 Mohr-Coulomb Strength Parameters

Table 5.4 (continued)

Soil Number	Proctor Mold Water Content (%)	Proctor Mold Dry Unit Weight (kN/m ³)	c (kPa)	ϕ (degrees)		
S15-B(-5)	10	16.9	33.5	27.5		
S15-B(-3)	12.3	17.2	30	25.9		
S15-B(-1)	14.3	17.4	44.1	24		
S15-B(+1)	16.3	17.3	57.8	17.5		
S15-B(+3)	18.2	17	59.7	13.4		
S15-B(+5)	19.8	16.6	44.1	7.7		
S25-B(-4)	12.6	16	70.1	23.2		
S25-B(-2)	14.8	16.9	80.3	19.4		
S25-B(0)	16.9	17.1	78.3	12.9		
S25-B(+2)	18.7	16.8	65.8	7.2		
S25-B(+4)	20.5	16.4	48.8	3.3		
S50-B(-3)	16.4	14.9	139	22.6		
S50-B(-2)	16.9	15	166	19.2		
S50-B(0)	19.5	15.1	212	9.4		
S50-B(+1)	20.3	15.2	188.3	6.1		
S50-B(+3)	23.1	15	150.9	4.6		
S50-B(+6)	25.3	14.8	107.2	4.4		
M15-B(-1)	10.5	19	33.3	30.6		
M15-B(+1)	12.1	19	44.5	29.7		
M15-B(+3)	13.8	18.6	53.4	25.3		
M15-B(+5)	15.8	18	63.6	14.9		
M25-B(-4)	8.4	18	104.1	29.6		
M25-B(-2)	10.4	18.6	138	24.6		
M25-B(0)	12.0	18.7	121.5	21.6		
M25-B(+2)	13.8	18.5	118.8	16.5		
M25-B(+4)	15.9	18	64	19.1		
M50-B(-1)	13.7	17.7	337.6	21.4		
M50-B(+2)	16.2	17.6	325	20.3		
M50-B(+4)	18.5	17.2	250.2	12.3		
M50-B(+5)	19.9	16.7	213.8	8.4		

Soil Number	Proctor Mold Water Content (%)	Proctor Mold Dry Unit Weight (kN/m ³)	c (kPa)	ϕ (degrees)			
L25-K(-2)			49.9	28.1			
L25-K(0)	9.4	19.3	40.8	20.3			
L25-K(+2)	11.4	19.2	17.4	7			
L50-K(-4)	12.6	15.5	120.1	24.6			
L50-K(-2)	14.8	16.8	117.3	18.5			
L50-K(0)	17.3	16.9	45.9	4.4			
L50-K(+2)	19.5	16.1	24.5	0.5			
L50-K(+4)	21	15.7	14.6	0.5			
S25-K(-2)	7.9	19.3	76.9	28			
S25-K(0)	10.0	19.6	62.1	15			
S25-K(+2)	11.7	19	18.3	6.6			
S50-K(-5)	11.4	16.1	118.7	33.4			
S50-K(-3)	14.0	16.7	115.2	27.1			
S50-K(-2)	15.1	17.9	127.3	6.5			
S50-K(+1)	17.6	16.9	52	2.4			
S50-K(+3)	19.8	16.1	19.9	1.7			
M25-K(0)	8.2	20.6	24.6	31.3			
M25-K(+2)	9.7	20.2	-	27.2			
M50-K(0)	12.2	19	268.4	31.1			
M50-K(+2)	14.0	18.7	209.5	13.8			
M50-K(+4)	15.8	17.7	111.3	0.5			

The variations in cohesion as a function of water content for each soil mixture are shown in Figures 5.43 to 5.45. Each figure is for a separate nominal energy level. As expected, the cohesion generally increased with increasing clay content. The cohesion also increased with increasing compactive effort. For specimens with higher clay contents, the cohesion increased considerably as the

compactive effort was increased to that applied by the Modified Proctor procedure. In contrast, for specimens with lower clay contents, the cohesion increased only slightly as the compactive effort increased. For specimens compacted using the low energy Proctor method, the difference in cohesion values between specimens with high clay content and lower clay content is quite small. However, the samples developed markedly different cohesion when compacted using the modified Proctor method. In other words, a low compactive effort reduces the difference in cohesion between mixtures of varying clay content. At the same clay content, the bentonite/sand specimens tend to exhibit higher cohesion values than the kaolinite/sand specimens.

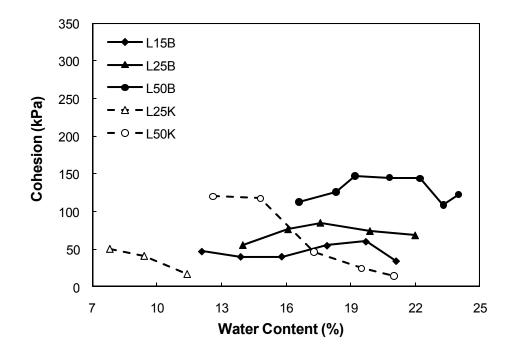


Figure 5.43. Cohesion of Low Energy Proctor Compacted Clay/Sand Specimens

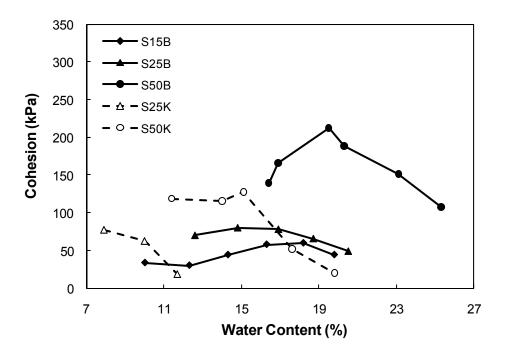


Figure 5.44. Cohesion of Standard Proctor Compacted Clay/Sand Specimens

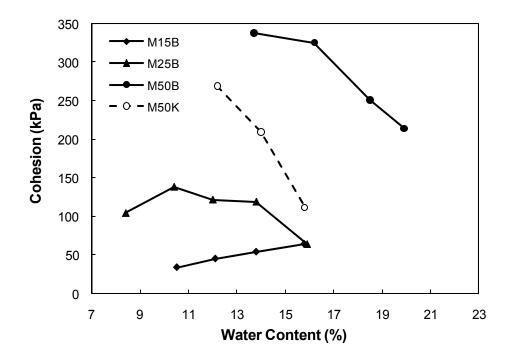


Figure 5.45. Cohesion of Modified Proctor Compacted Clay/Sand Specimens

If the total stress friction angles are plotted against the corresponding compaction water content values, it can be seen that there is a second-order polynomial correlation between the measured friction angle and compaction water content for each soil mixture that is compacted at a given energy level. Figures 5.46 to 5.50 indicate that the w% values are highly correlated with ϕ . Water contents corresponding to 5, 10, 15, 20, 25, and 30 degree friction angles are determined from these second-order polynomial equations and are summarized in Table 5.5. To be more accurate, only those values of water content within the tested range were calculated.

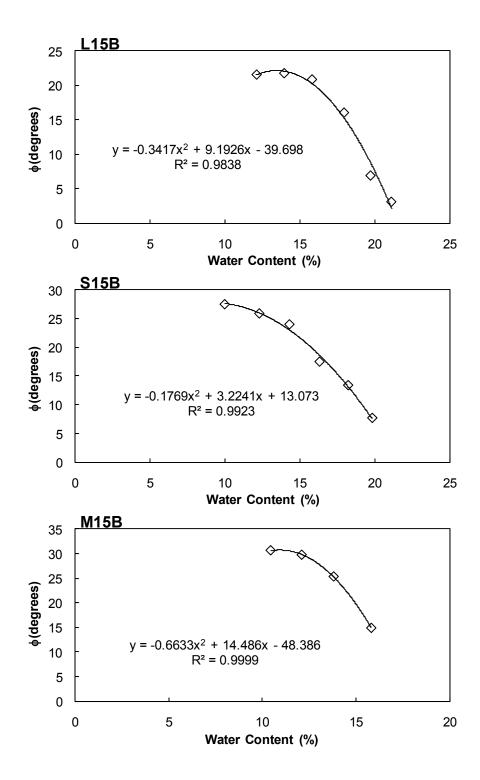


Figure 5.46. Relationship between ϕ and w% (15B)

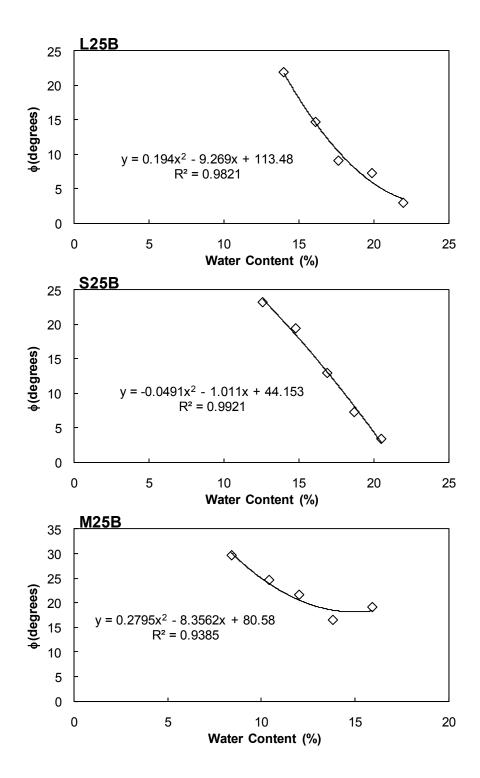


Figure 5.47. Relationship between ϕ and w% (25B)

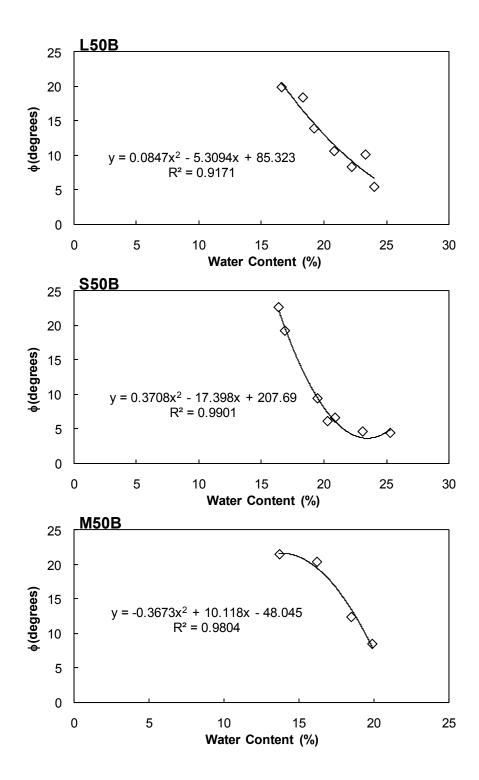


Figure 5.48. Relationship between ϕ and w% (50B)

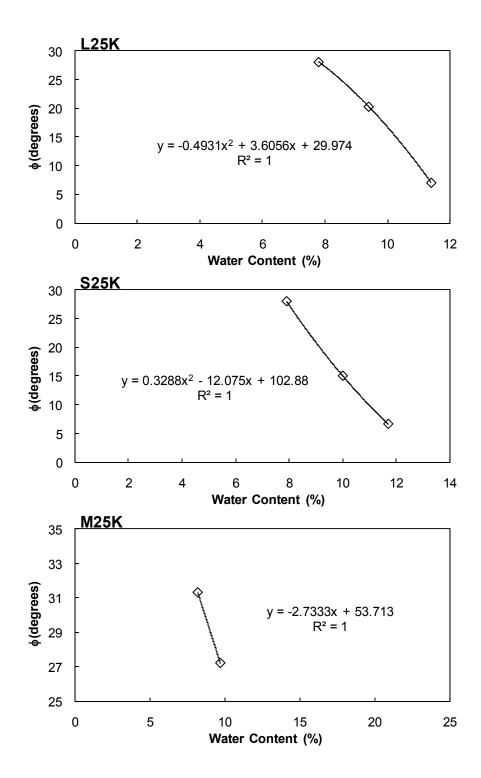


Figure 5.49. Relationship between ϕ and w% (25K)

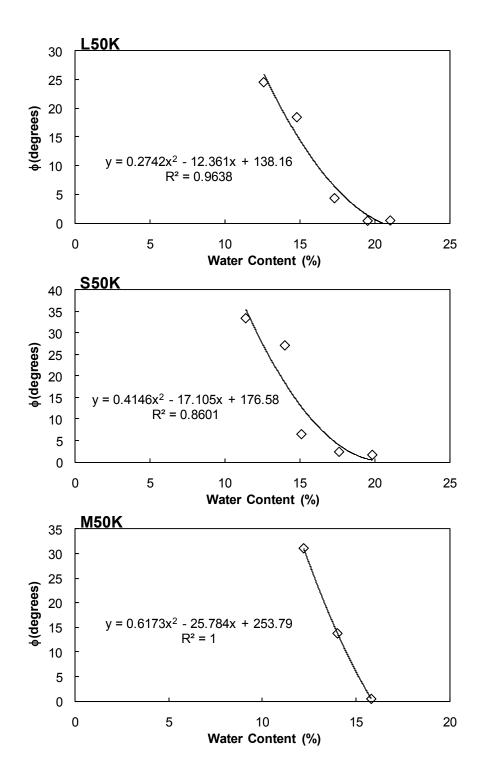


Figure 5.50. Relationship between ϕ and w% (50K)

<i>∳</i> (degrees)							Wate	er Conte	nt (%)						
	L15B	S15B	M15B	L25B	S25B	M25B	L50B	S50B	M50B	L25K	S25K	M25K	L50K	S50K	M50K
35	-	-	-	-	-	-	-	-	-	-	-	6.8	-	12.2	11.9
30	-	9.0	11.5	-	10.3	7.8	-	-	-	7.4	7.6	8.7	-	12.4	12.3
25	11.1	12.7	14.2	13.7	12.4	10.9	-	-	-	8.5	8.3	-	13.0	12.9	12.8
20	15.2	15.7	15.6	14.4	14.4	13.4	16.9	16.0	15.4	9.5	9.1	-	13.8	13.6	13.3
15	18.2	17.9	15.8	15.8	16.3	15.3	19.3	16.3	17.9	10.3	10.0	-	14.9	14.5	13.9
10	20.0	19.3	-	17.9	18.1	-	21.8	18.7	19.5	11.0	11.0	-	16.4	15.7	14.5
5	20.7	19.8	-	20.7	19.8	-	24.2	22.9	20.0	11.6	12.1	-	18.1	17.2	15.2
0	-	-	-	-	-	-	-	-	-	-	-	-	20.1	18.9	15.9

 Table 5.5 Water Content Values Calculated Using Second-Order Polynomial Regression Equations

In order to examine the relationship between compaction density, compaction water content, and the values of the undrained strength parameters c and ϕ , the UU test results are shown in the form of contours of c and ϕ in Figures 5.51 to 5.55. The cohesion (c) point locations are presented directly as measured from the test results. Cohesion trendlines were drawn through these point locations using linear interpolation and judgment. The friction angle (ϕ) point locations shown in Figures 5.51 to 5.55 are also presented directly as measured from the test results. In order to draw the friction angle contours, a slightly more sophisticated approach was utilized: For a given even-numbered total stress friction angle, the corresponding value of water content that corresponds to each contour point was calculated from the regression equations shown in Figures 5.46 to 5.50; the corresponding results are summarized in Table 5.5. The value of density that corresponds to each even-numbered ϕ was then calculated using Equation 4.1 in Chapter 4. Insufficient test data are available for the 25% kaolinite/sand mixture; thus, only the available values of cohesion are plotted in Figure 5.54 for this soil mixture.

On the basis of the results shown in Figures 5.51 to 5.55, it is possible to draw a number of conclusions:

(1) The values of cohesion increase with increasing dry unit weight, and are largest for specimens compacted at water contents near optimum with high compactive effort. However, exceptions are seen for modified Proctor compacted 15% bentonite/sand specimens, which exhibit different trends in behavior than the low energy Proctor and standard Proctor specimens. One possible explanation for this behavior may be the disturbance that occurs during sampling (Duncan et al. 1980). Referring to Figure 5.8, the dry unit

weights of modified Proctor compacted 15% bentonite/sand specimens were decreased markedly due to sampling disturbance. The 50% bentonite/sand specimens developed the largest values of cohesion due to their higher clay content.

- (2) The values of ϕ increased with decreasing water content, and are largest for specimens compacted at very low water content with high compactive effort. The kaolinite/sand mixtures exhibited higher friction angles than what was observed for the bentonite/sand mixtures.
- (3) The results of these tests indicate that the shear strength of compacted clay/sand mixtures under unconsolidated-undrained test conditions may vary widely depending on the compaction dry unit weight and water content. Previous studies have shown that the method of compaction may also have an important influence on the behavior of compacted soils (e.g., Seed, 1959, Mitchell and Chan, 1960). It is therefore desirable that samples that are used for determining parameters in this situation should be compacted using procedures similar to those used in the field, and it is essential that they should be compacted to the same dry unit weight, and at the same water content as the soil in the field.

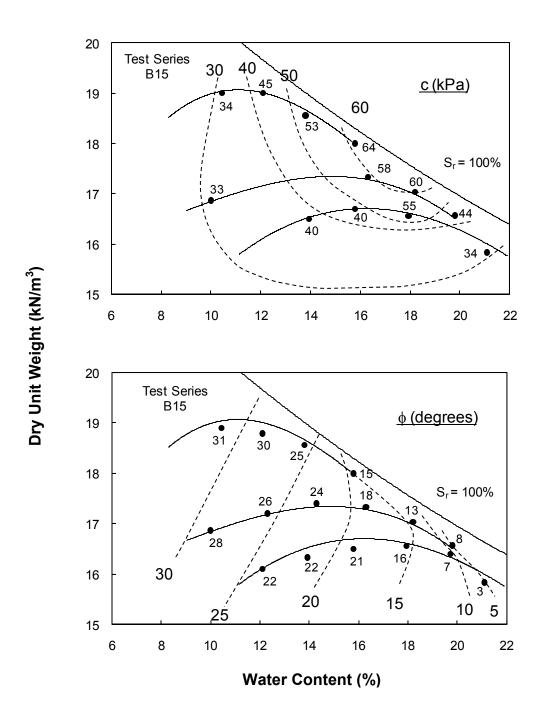


Figure 5.51. Strength Parameters for Compacted 15% Bentonite/Sand Specimens

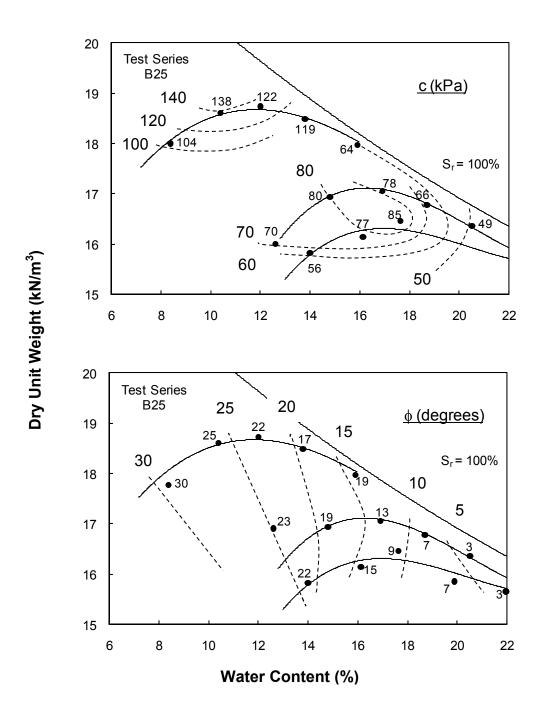


Figure 5.52. Strength Parameters for Compacted 25% Bentonite/Sand Specimens

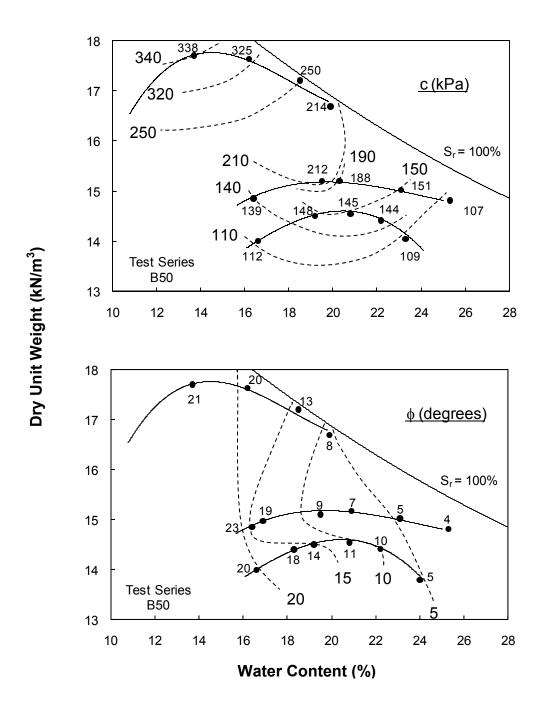


Figure 5.53. Strength Parameters for Compacted 50% Bentonite/Sand Specimens

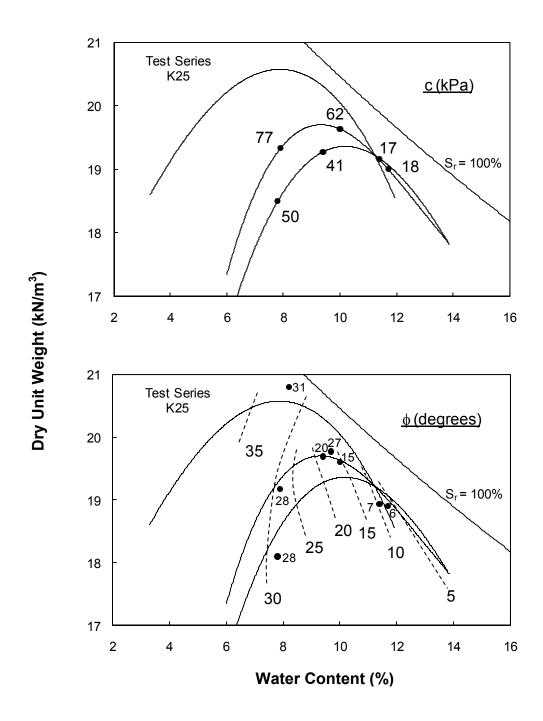


Figure 5.54. Strength Parameters for Compacted 25% Kaolinite/Sand Specimens

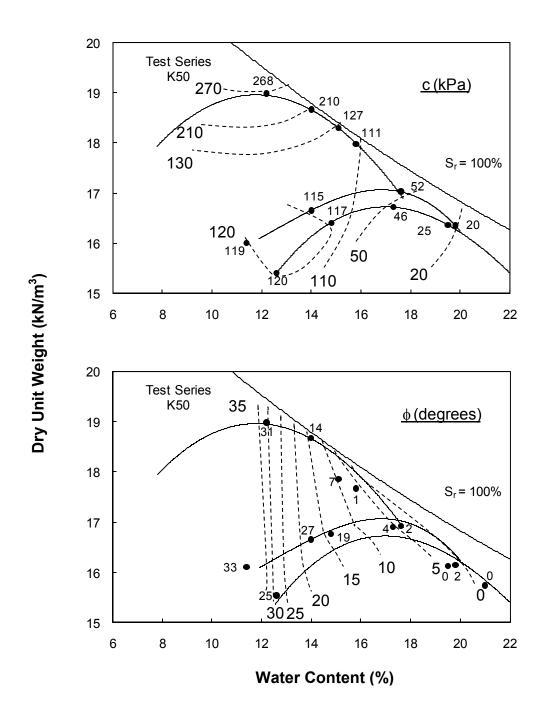


Figure 5.55. Strength Parameters for Compacted 50% Kaolinite/Sand Specimens

5.2.4 Secant Modulus

Strain-dependent soil stiffness is an important pre-failure property that controls soil deformations. To compare the deformation properties of different clay/sand mixtures that were tested in the UU triaxial, the secant modulus at 50% shear strength, E_{50} , is used here. It is common to infer the stiffness of soil specimens from measurements of the secant modulus E_{50} (e.g., Wiebe et al., 1998). The values of E_{50} calculated for each specimen are given in Table 5.6. Plots of E_{50} versus σ_3 are presented in Figure 5.56 for bentonite/sand mixtures and in Figure 5.57 for kaolinite/sand mixtures. From these plots it is clear that at the same compaction energy level, E_{50} increases with clay content. Specimens compacted dry-of-optimum are stiffer than specimens compacted wet-of-optimum at the same energy level.

Table 5.6 *E*₅₀

Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)
L15-B(-4)-C1	6011	L25-B(+1)-C1	4284	L50-B(+3)-C1	10932
L15-B(-4)-C2	7913	L25-B(+1)-C2	5468	L50-B(+3)-C2	13598
L15-B(-4)-C3	9394	L25-B(+1)-C3	7348	L50-B(+3)-C3	13469
L15-B(-2)-C1	5671	L25-B(+3)-C1	5917	L50-B(+4)-C1	12986
L15-B(-2)-C2	5251	L25-B(+3)-C2	5481	L50-B(+4)-C2	14212
L15-B(-2)-C3	9311	L25-B(+3)-C3	7698	L50-B(+4)-C3	15475
L15-B(0)-C1	5719	L25-B(+5)-C1	3182	S15-B(-5)-C1	6164
L15-B(0)-C2	5034	L25-B(+5)-C2	3885	S15-B(-5)-C2	4443
L15-B(0)-C3	7677	L25-B(+5)-C3	5281	S15-B(-5)-C3	11285
L15-B(+2)-C1	3887	L50-B(-4)-C1	19326	S15-B(-3)-C1	6090
L15-B(+2)-C2	3273	L50-B(-4)-C2	18929	S15-B(-3)-C2	6393
L15-B(+2)-C3	4699	L50-B(-4)-C3	12535	S15-B(-3)-C3	10207
L15-B(+4)-C1	1980	L50-B(-2)-C1	16977	S15-B(-1)-C1	3556
L15-B(+4)-C2	1909	L50-B(-2)-C2	14927	S15-B(-1)-C2	4611
L15-B(+4)-C3	1954	L50-B(-2)-C3	21110	S15-B(-1)-C3	6261
L15-B(+5)-C1	1794	L50-B(-1)-C1	22320	S15-B(+1)-C1	2188
L15-B(+5)-C2	1584	L50-B(-1)-C2	16515	S15-B(+1)-C2	2256
L15-B(+5)-C3	1555	L50-B(-1)-C3	16404	S15-B(+1)-C3	3138
L25-B(-3)-C1	13906	L50-B(0)-C1	13645	S15-B(+3)-C1	2305
L25-B(-3)-C2	12503	L50-B(0)-C2	17099	S15-B(+3)-C2	2158
L25-B(-3)-C3	21251	L50-B(0)-C3	16659	S15-B(+3)-C3	2429
L25-B(-1)-C1	15576	L50-B(+2)-C1	16725	S15-B(+5)-C1	1735
L25-B(-1)-C2	15407	L50-B(+2)-C2	14156	S15-B(+5)-C2	1793
L25-B(-1)-C3	17900	L50-B(+2)-C3	19857	S15-B(+5)-C3	1868

Table 5.6	(continued)
1 4010 010	(commaca)

Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)
S25-B(-4)-C1	6638	S50-B(0)-C1	25460	M25-B(-4)-C1	4439
S25-B(-4)-C2	12661	S50-B(0)-C2	17042	M25-B(-4)-C2	5175
S25-B(-4)-C3	18701	S50-B(0)-C3	18683	M25-B(-4)-C3	7789
S25-B(-2)-C1	9081	S50-B(+1)-C1	19936	M25-B(-2)-C1	1072
S25-B(-2)-C2	10122	S50-B(+1)-C2	16345	M25-B(-2)-C2	4860
S25-B(-2)-C3	12704	S50-B(+1)-C3	8854	M25-B(-2)-C3	7741
S25-B(0)-C1	3198	S50-B(+3)-C1	19593	M25-B(0)-C1	7041
S25-B(0)-C2	4923	S50-B(+3)-C2	12638	M25-B(0)-C2	9985
S25-B(0)-C3	5118	S50-B(+3)-C3	16411	M25-B(0)-C3	6915
S25-B(+2)-C1	3223	S50-B(+6)-C1	5637	M25-B(+2)-C1	8986
S25-B(+2)-C2	3450	S50-B(+6)-C2	7580	M25-B(+2)-C2	6629
S25-B(+2)-C3	4046	S50-B(+6)-C3	11893	M25-B(+2)-C3	6384
S25-B(+4)-C1	2511	M15-B(-1)-C1	2638	M25-B(+4)-C1	5258
S25-B(+4)-C2	2632	M15-B(-1)-C2	3063	M25-B(+4)-C2	4494
S25-B(+4)-C3	3245	M15-B(-1)-C3	4685	M25-B(+4)-C3	6093
S25-B(+6)-C1	2175	M15-B(+1)-C1	2031	M50-B(-1)-C1	29104
S25-B(+6)-C2	2569	M15-B(+1)-C2	4149	M50-B(-1)-C2	4685
S25-B(+6)-C3	2735	M15-B(+1)-C3	3983	M50-B(-1)-C3	2179
S50-B(-3)-C1	24065	M15-B(+3)-C1	2655	M50-B(+2)-C1	3067
S50-B(-3)-C2	19761	M15-B(+3)-C2	2318	M50-B(+2)-C2	3051
S50-B(-3)-C3	27432	M15-B(+3)-C3	3655	M50-B(+2)-C3	23384
S50-B(-2)-C1	22811	M15-B(+5)-C1	1893	M50-B(+4)-C1	1786
S50-B(-2)-C2	18938	M15-B(+5)-C2	2102	M50-B(+4)-C2	2353
S50-B(-2)-C3	22474	M15-B(+5)-C3	2416	M50-B(+4)-C3	2705

Table 5.6	(continued)
1 abic 5.0	(continucu)

Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)	Test Number	<i>E</i> ₅₀ (kPa)
M50-B(+5)-C1	19067	L50-K(+4)-C1	1614	S50-K(+3)-C1	754
M50-B(+5)-C2	15741	L50-K(+4)-C2	1697	S50-K(+3)-C2	752
M50-B(+5)-C3	17426	L50-K(+4)-C3	1604	S50-K(+3)-C3	1392
L25-K(-2)-C1	3559	S25-K(-2)-C1	3144	M25-K(0)-C1	1833
L25-K(-2)-C2	3482	S25-K(-2)-C2	5629	M25-K(0)-C2	-
L25-K(-2)-C3	7050	S25-K(-2)-C3	8165	M25-K(0)-C3	5088
L25-K(0)-C1	1715	S25-K(0)-C1	1656	M25-K(+2)-C1	972
L25-K(0)-C2	3543	S25-K(0)-C2	1837	M25-K(+2)-C2	1566
L25-K(0)-C3	5145	S25-K(0)-C3	2368	M25-K(+2)-C3	3401
L25-K(+2)-C1	593	S25-K(+2)-C1	552	M50-K(0)-C1	22463
L25-K(+2)-C2	738	S25-K(+2)-C2	640	M50-K(0)-C2	14439
L25-K(+2)-C3	1057	S25-K(+2)-C3	1016	M50-K(0)-C3	21803
L50-K(-4)-C1	16193	S50-K(-5)-C1	33457	M50-K(+2)-C1	5370
L50-K(-4)-C2	18447	S50-K(-5)-C2	32141	M50-K(+2)-C2	6563
L50-K(-4)-C3	16130	S50-K(-5)-C3	32103	M50-K(+2)-C3	8009
L50-K(-2)-C1	9041	S50-K(-3)-C1	16493	M50-K(+4)-C1	2084
L50-K(-2)-C2	17633	S50-K(-3)-C2	20657	M50-K(+4)-C2	2210
L50-K(-2)-C3	16439	S50-K(-3)-C3	16426	M50-K(+4)-C3	2317
L50-K(0)-C1	1034	S50-K(-2)-C1	3547		
L50-K(0)-C2	1396	S50-K(-2)-C2	3318		
L50-K(0)-C3	1678	S50-K(-2)-C3	4545		
L50-K(+2)-C1	636	S50-K(+1)-C1	1096		
L50-K(+2)-C2	726	S50-K(+1)-C2	1247		
L50-K(+2)-C3	929	S50-K(+1)-C3	1416		

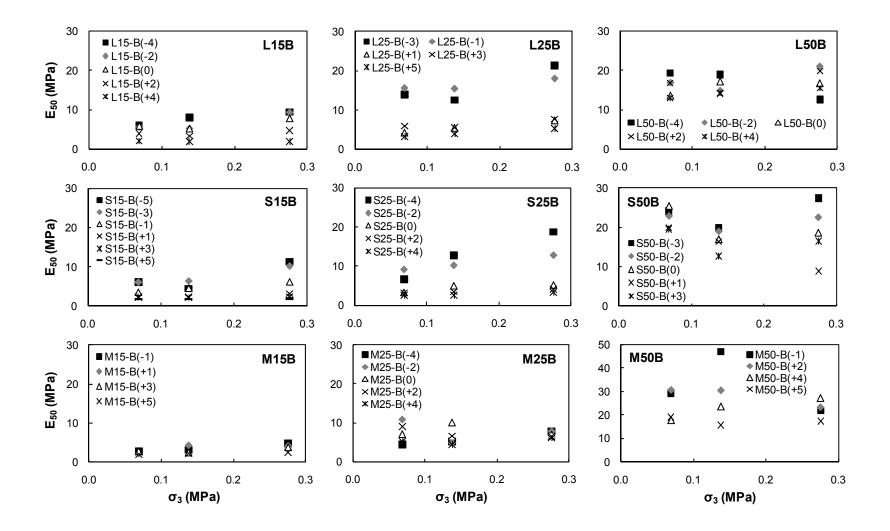


Figure 5.56. Relationship between E₅₀, Water Content, and Clay Content for Bentonite/Sand Specimens

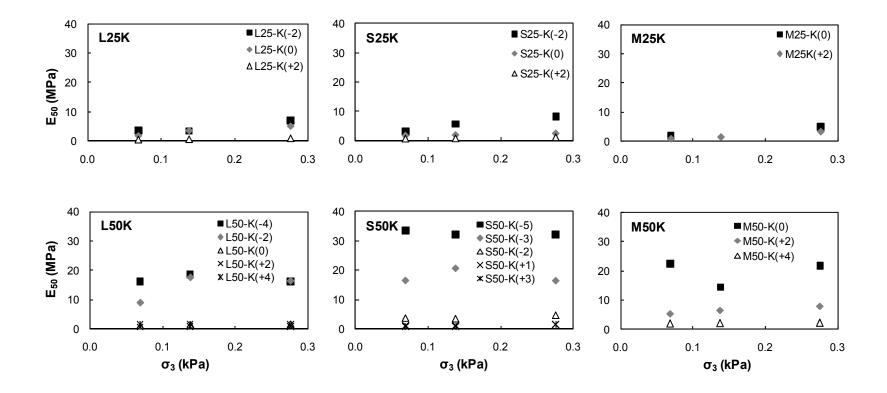


Figure 5.57. Relationship between E₅₀, Water Content, and Clay Content for Kaolinite/Sand Specimens

5.3 Summary of UU Triaxial test results

In this chapter the influence of clay/sand mix proportion, compaction moisture content, compaction energy, clay mineral type, and confining pressure on the strength and stress-strain characteristics of clay/sand materials was investigated using the UU Triaxial test. The test data support the following conclusions:

- (1) It appears that for clay/sand specimens compacted at the same energy level and with the same clay content, the undrained strength decreases with increasing compaction moisture content and that variations in water content have a larger influence on kaolinite/sand specimens than they do on bentonite/sand specimens. On the other hand, the undrained strength increases with increasing confining pressure and compactive effort.
- (2) At the same compaction energy level, dry-of-optimum specimens are stiffer, stronger and more brittle than wet-of-optimum specimens. In contrast, specimens containing a smaller amount of clay appear to be less stiff, weaker and less brittle than samples with a high clay content.
- (3) At the same clay/sand mix proportion, the values of ϕ increase with decreasing water content and are largest for specimens compacted at a very low water content with high compactive effort. Kaolinite/sand specimens exhibit higher ϕ values than what was observed for bentonite/sand specimens at the same water content relative to the optimum water content (e.g., $w_{opt} + 2\%$).
- (4) The values of the cohesion intercept (c) increase with increasing dry unit weight, and are largest for specimens compacted at water contents near optimum with a high compactive effort. The values of c also increase with

increasing clay content. Bentonite/sand specimens exhibit higher *c* values than kaolinite/sand specimens.

(5) The values of E_{50} increase with clay content and are higher for dry-ofoptimum specimens than wet-of-optimum specimens.

Chapter 6

ONE-DIMENSIONAL COMPRESSION TESTING OF CLAY/SAND MIXTURES

For compacted clay/sand mixtures, it is generally assumed that the coarser fraction of the mixture imparts relatively high density, high shear strength, and low compressibility, and the finer fraction fills the available pore space, further helping to achieve a high density and ensuring a low permeability (Jafari and Shafiee 2004). This type of behavior is ideal for certain high-strength/low-permeability applications, and consequently compacted clay/sand mixtures are commonly used as engineered fills when constructing embankment dams (Jafari and Shafiee 2004). They are also widely used as engineered barriers to construct liner systems for radioactive waste disposal facilities (Chapuis 1990). Yet, our understanding of the mechanics of compacted soils, which are by their nature partially saturated, lags far behind our understanding of saturated soil behavior. In addition, only limited experimental data have been reported in the literature that can be used to quantify the effect of the type and percentage of fines, compacted, unsaturated clay/sand mixtures.

In the one-dimensional compression tests described in this chapter, specimens were subjected to pressures up to 1300 kPa to examine the settlement characteristics of compacted unsaturated soils. The pressure-deformation relationship of the compacted unsaturated bentonite/sand specimens were compared with the compacted kaolinite/sand specimens. The effects of initial compaction conditions,

clay mineralogy, and the vertical pressure on the compressibility of clay/sand mixtures are investigated.

6.1 Specimen Preparation

One compression specimen was produced from each compacted Proctor specimen, as shown in Figure 6.1. The compression specimens were prepared using a trimming turntable and a brass trimming ring, 63.5 mm (2.5 in.) in diameter and 20 mm (0.79 in.) in height (Figure 6.1a). Complete perimeter cuts were made to gradually reduce the specimen diameter until it reached the inside diameter of the consolidation ring (Figure 6.1b). As the trimming progressed, each specimen was carefully inserted into the consolidation ring using only minimal force. This trimming process was continued until a mid-height condition in the compaction mold was reached; the goal of this process was to ensure that each compression specimen was taken from the middle of the Proctor compaction specimen. Once the compression specimen was completely contained within the trimming ring, a straight knife with a sharp cutting edge was utilized for trimming the top and bottom of the specimen to prevent intrusion of the soil particles into the pores of the porous stones placed on both sides of the specimen (Figure 6.1d).

Figure 6.2 provides a comparison of compression test specimen density with the as-compacted soil density from the corresponding Proctor mold. As can be observed, the trimming procedure has a slight effect on the initial state of the compression test specimens.

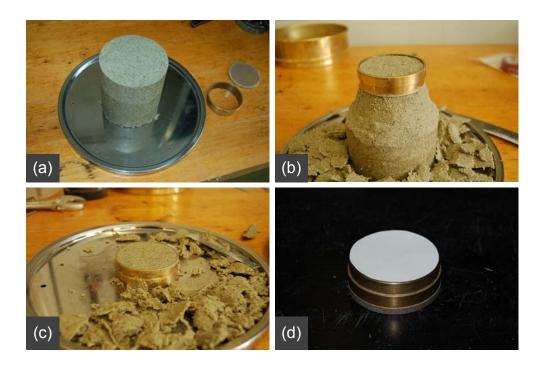


Figure 6.1. Compression specimen preparation procedure; (a) placing the compacted Proctor sample on a turntable, (b) trimming specimen into the consolidation ring, (c) trimming the top and bottom of the specimen flush with the consolidation ring, (d) placing filter papers on the top and bottom of the specimen.

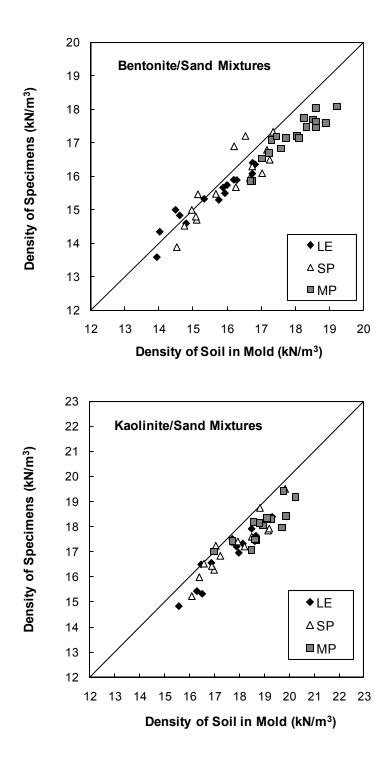


Figure 6.2. Comparison of Compression Test Specimen Density and As-Compacted Soil Density from the Corresponding Proctor Mold

6.2 One-Dimensional Compression Test Procedure

The one-dimensional compression tests described in this chapter were intended to evaluate the compressibility of samples at the molding moisture content in a compacted field situation. Consequently, the compression tests were performed without soaking or otherwise wetting the samples during the test. Specimens were tested in standard fixed-ring consolidometers, manufactured by ELE International, Model No. EI25-0479 (Figure 6.3). A brass consolidation ring with an internal diameter of 63.5 mm (2.5 inch) and a height of 20 mm (0.79 inch) was utilized during each test (Figure 6.3a). Each compression test specimen was trimmed into the consolidation ring following the procedure described in the previous section, and the ring and specimen were placed into the consolidation load frame. After placement of the top loading platen and loading ball, the vertical deflection dial gauge was adjusted and fixed into position to give a proper dial reading under application of load (Figure 6.3c). A loading frame that utilizes a lever arm-weight type loading system was used to compress the test specimens (Figure 6.3d). During each test, compressive displacements were measured with a dial gauge having a 0.0001 inch precision. A load-increment ratio of unity was adopted, in accordance with ASTM D 2435-04, Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading. Each specimen was loaded in stages to a maximum of 1300 kPa. The total loading duration for each load step was selected to be 20 minutes. Deformation data were collected at time intervals of 0.1, 0.25, 0.5, 1, 2, 4, 8, 15, and 20 minutes using an automated data acquisition system.

The final specimen water content was determined by oven-drying at 110 °C for 24 hours. Complete data sheets for each compression test are given in Appendix G.

6.3 Calibration

Flexibility of the test apparatus under load was investigated by setting a hard steel specimen in the consolidometer and loading it as in the test. The deformation was measured and recorded for each load step. It was found that the calibration correction exceeded 5% of the measured deformation in tests. Based on the pressure-deformation characteristic of the apparatus, the measured deformation at each loading step was consequently corrected in accordance with ASTM D 2435-04.

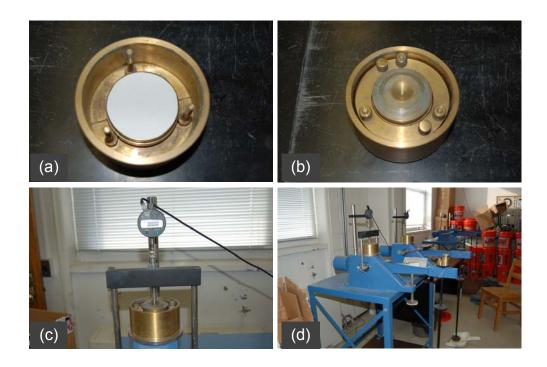


Figure 6.3. Compression test setup procedure; (a) placing the specimen and consolidation ring into a consolidation cell, (b) placing the metal jacket over the consolidation ring to center it in the consolidation cell, (c) placing the consolidation cell on a loading frame with the dial gauge properly adjusted, (d) starting the compression test.

6.4 Results and Discussion of Results

6.4.1 Time-Compression Behaviour

Typical time-compression behaviour of bentonite/sand specimens compacted at their respective optimum water contents are shown in Figures 6.4 through 6.12. Typical time-compression behavior of kaolinite/sand specimens compacted at their respective optimum water contents are shown in Figures 6.13 through 6.21. For each load increment shown, a large amount of compression occurred within the first minute of loading, followed by very little compression in subsequent minutes. Yoshimi (1958) attributed this initial rapid compression to the extremely rapid dissipation of excess pore air pressure, as well as the initial compression of the pore air and soil skeleton. The time-compression behavior for specimens compacted at other water contents were found to be generally similar to that of specimens compacted at the optimum water content (as shown in Appendix G). For comparison purposes, the one-dimensional compression test results of bentonite/sand specimens compacted at their respective optimum water contents are summarized in Figure 6.22, and the test results of kaolinite/sand specimens are summarized in Figure 6.23. The test results clearly show that the compressibility of the compacted specimens was greatly affected by the compactive effort that was applied, which is not surprising, as the compactive effort has a significant effect on the resulting specimen density. At the same clay/sand mix proportion, the soil compressibility decreased as the compactive effort increased, with the lowest compressibility being observed for specimens that were compacted at the Modified Proctor energy level.

All the Low Energy Proctor and Standard Proctor compacted 50% bentonite/sand (Figures 6.10, 6.11) and kaolinite/sand (Figures 6.19, 6.20) specimens exhibited "critical pressure" behavior (Wallace, 1973), which can be characterized by a sudden increase in deformation that occurs when the applied pressure passes beyond a certain value. At low applied pressures, the compressibility of the Low Energy Proctor and Standard Proctor compacted 50% bentonite/sand mixture was quite low, even lower than the 15% bentonite/sand mixture and 25% bentonite/sand mixture. However, when the applied pressure exceeded a certain "critical pressure" the compressibility of the soil became very high. This was also true for Low Energy Proctor and Standard Proctor compacted 50% kaolinite/sand mixtures. The compressibility of the Low Energy Proctor and Standard Proctor compacted 50% kaolinite/sand mixtures. The compressibility of the Low Energy Proctor and Standard Proctor compacted 50% kaolinite/sand mixtures that are compacted at the same energy level and subjected to pressures exceeding the critical pressure.

For both the 50% bentonite/sand and 50% kaolinite/sand mixtures, the observed "critical pressure" was around 300 kPa. Gradwell and Birrell (1954) report values of critical pressure ranging from 105-259 kPa for a wide range of volcanic clays. Vargas (1953) reports that for residual clays in Southern Brazil, the magnitude of the critical pressures are widely scattered between 57 and 431 kPa. Sowers (1963) shows that for residual soils in the south-eastern US the values are between 96 and 527 kPa. These diverse results, which all correspond to the observed sudden increase in compressibility of natural soils, show that the values of critical pressure that were measured for compacted clay/sand mixtures have the same order of magnitude as what has been observed for natural clay soils.

The fabric of the 50% clay/sand mixtures are composed of clay as the main body with sand floating in the clay matrix (Shafiee et al., 2008). In the low consolidation pressure range, the initially randomly oriented clay particles produced a high resistance to deformation. As the consolidation pressure increased, the strains that occurred under load produced a higher degree of particle orientation which lead to a lower resistance to deformation and a higher compressibility (Seed and Chan, 1959). At lower clay contents, the soil structure was composed of a primarily sand soil skeleton that contained clay particles trapped in the intergranular void spaces between the sand particles (Thevanayagam and Mohan, 2000). Consequently, the compression behavior of these lower clay content mixtures was mainly controlled by the interaction that occurred between the sand grains. At higher strain levels, the initial fabric can be restructured by sliding along the unstable contacts, and by rotation of individual particles. Thus, there is no obvious sudden increase in compressibility for mixtures that have a lower clay percentage. As higher compaction energies (e.g., the Modified Proctor level), the samples' densities increased significantly, which lead to a marked decrease in compressibility. This may be the reason why the Modified Proctor compacted clay/sand specimens didn't exhibit "critical pressure" behavior; the current range of applied pressures may be less than what is required for this behavior to occur.

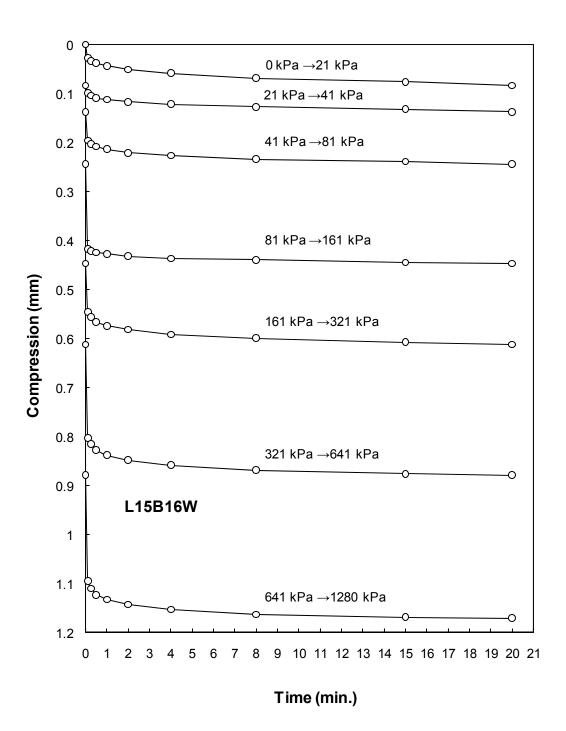


Figure 6.4. Compression vs. Time (L15B16W)

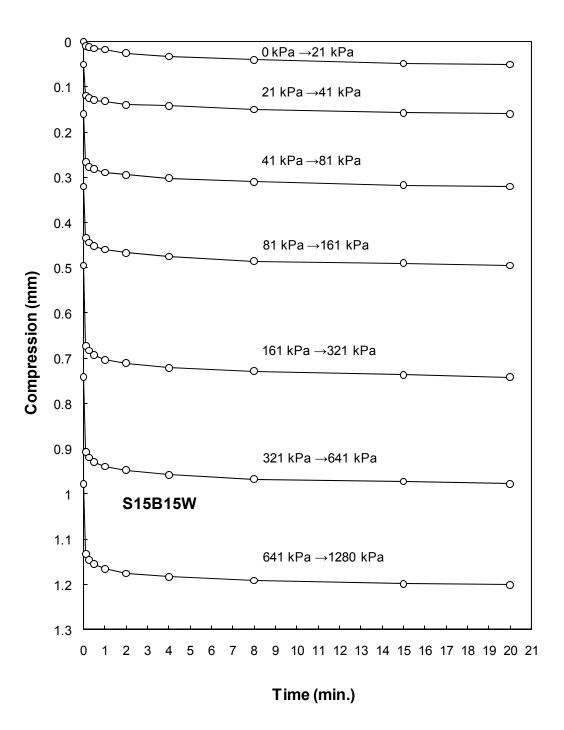


Figure 6.5. Compression vs. Time (S15B15W)

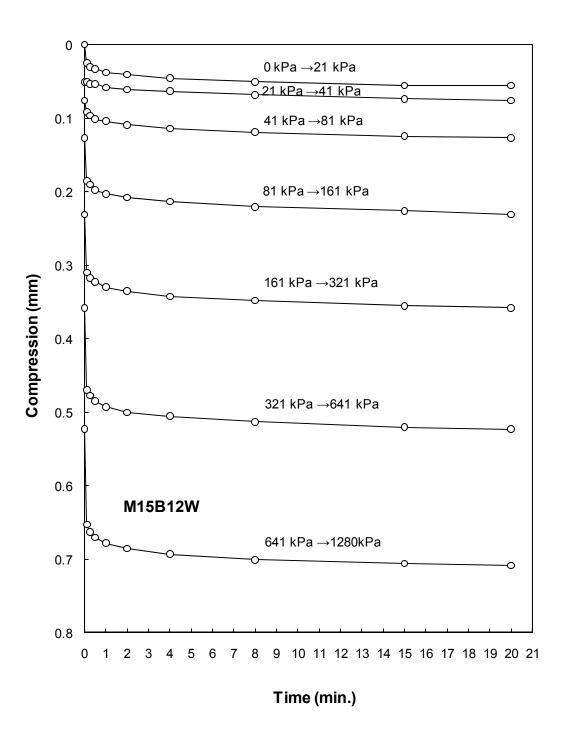


Figure 6.6. Compression vs. Time (M15B12W)

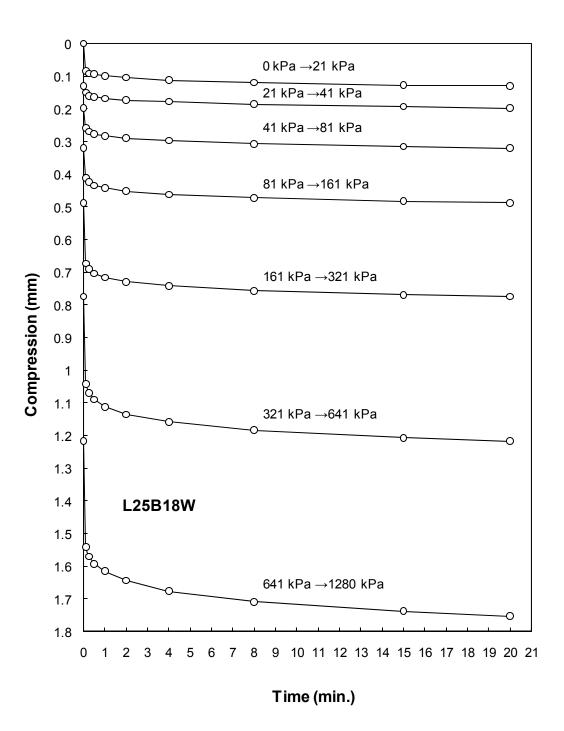


Figure 6.7. Compression vs. Time (L25B18W)

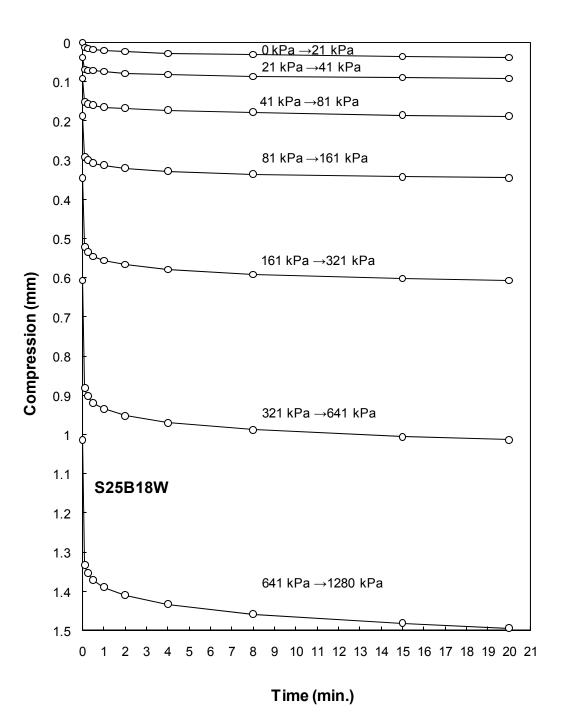


Figure 6.8. Compression vs. Time (S25B18W)

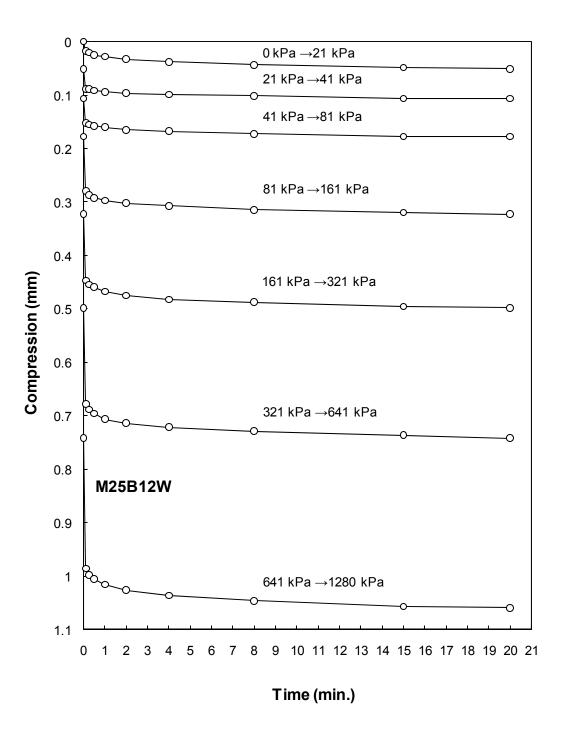


Figure 6.9. Compression vs. Time (M25B12W)

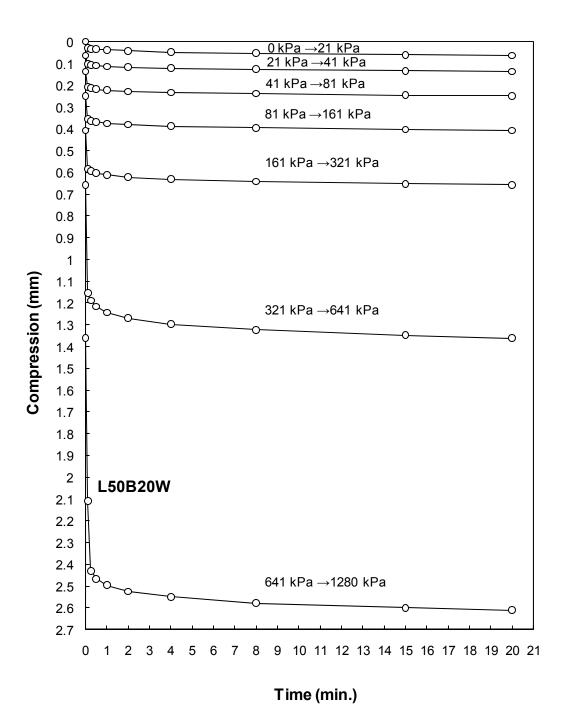


Figure 6.10. Compression vs. Time (L50B20W)

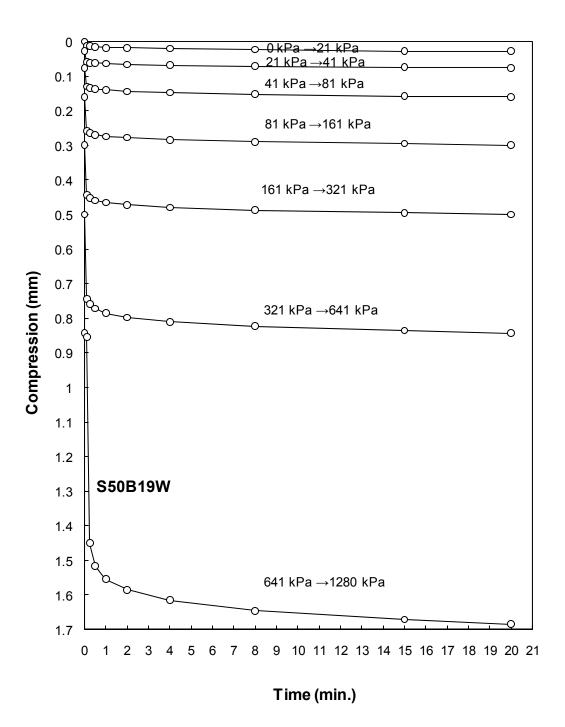


Figure 6.11. Compression vs. Time (S50B19W)

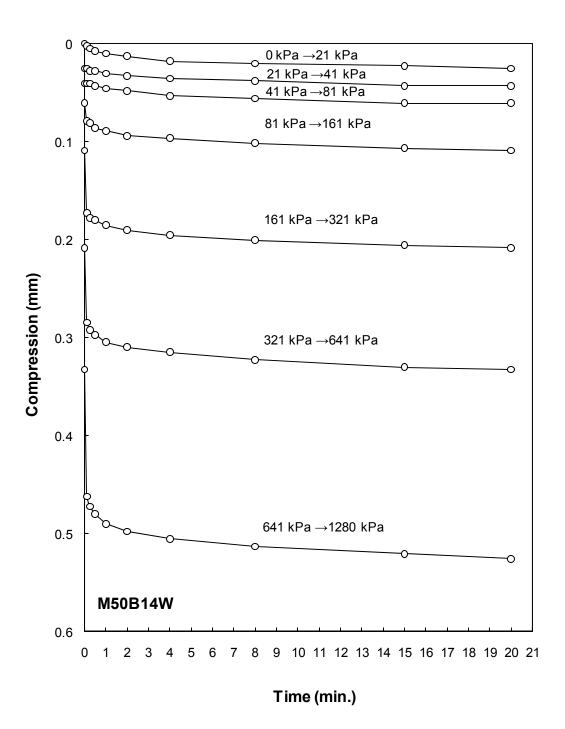


Figure 6.12. Compression vs. Time (M50B14W)

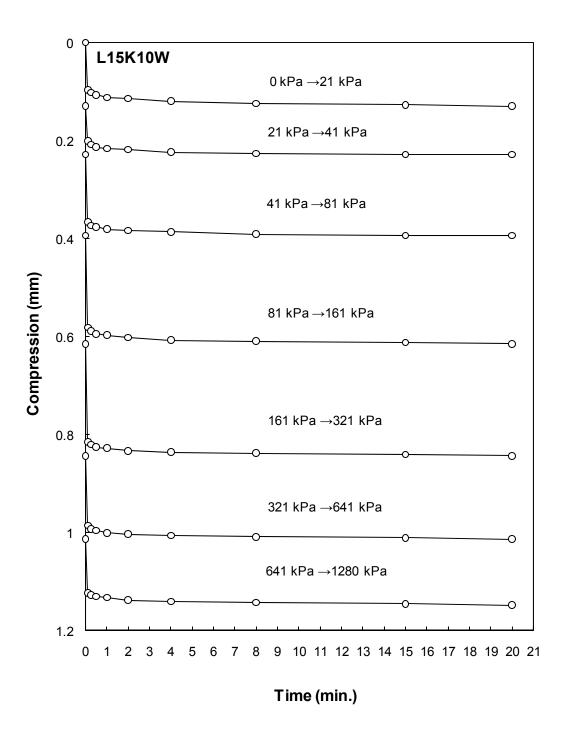


Figure 6.13. Compression vs. Time (L15K10W)

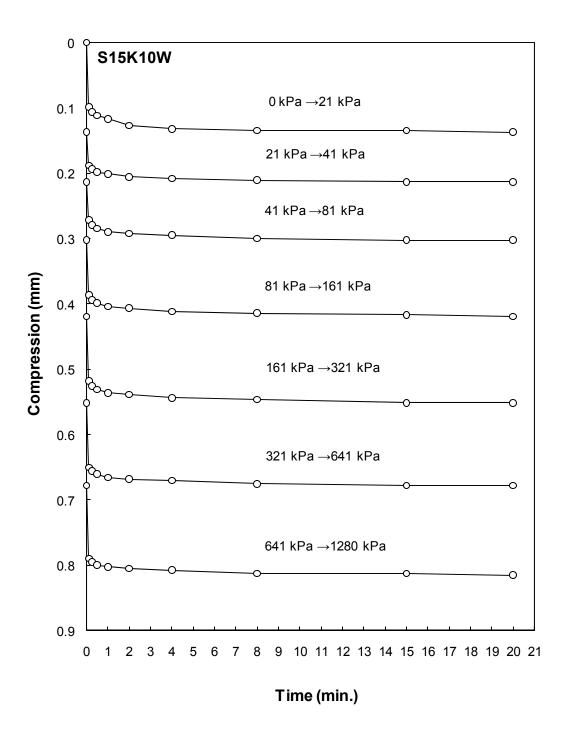


Figure 6.14. Compression vs. Time (S15K10W)

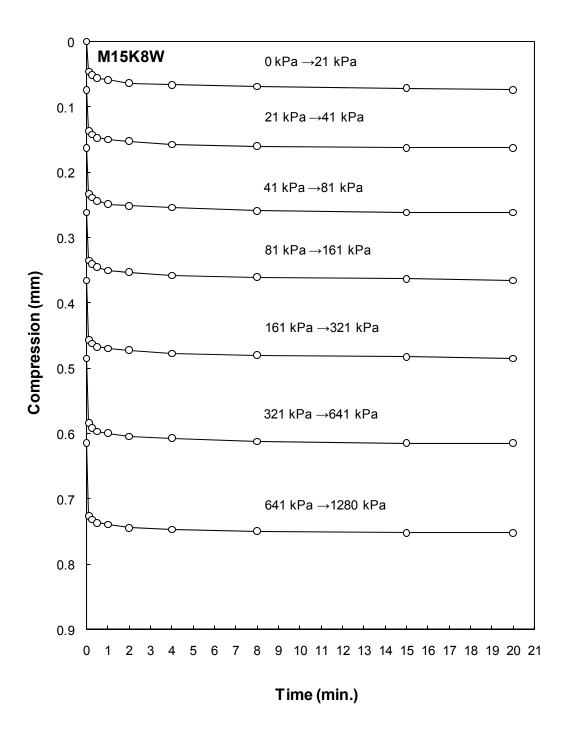


Figure 6.15. Compression vs. Time (M15K8W)

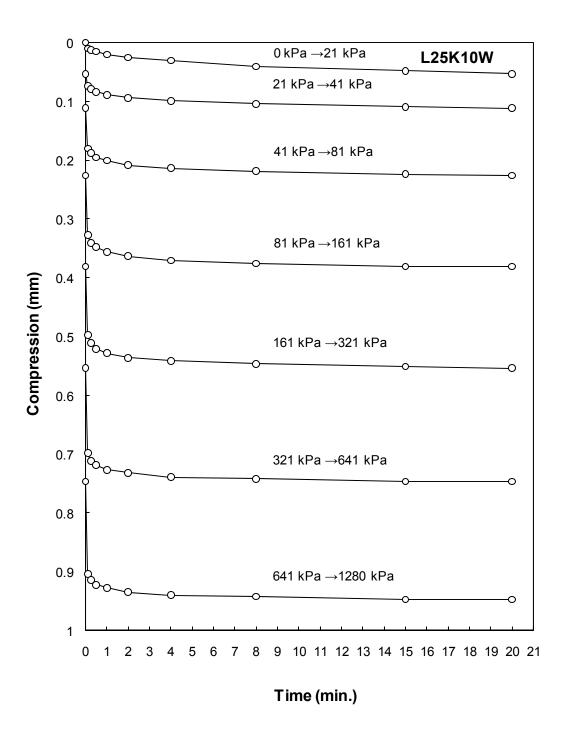


Figure 6.16. Compression vs. Time (L25K10W)

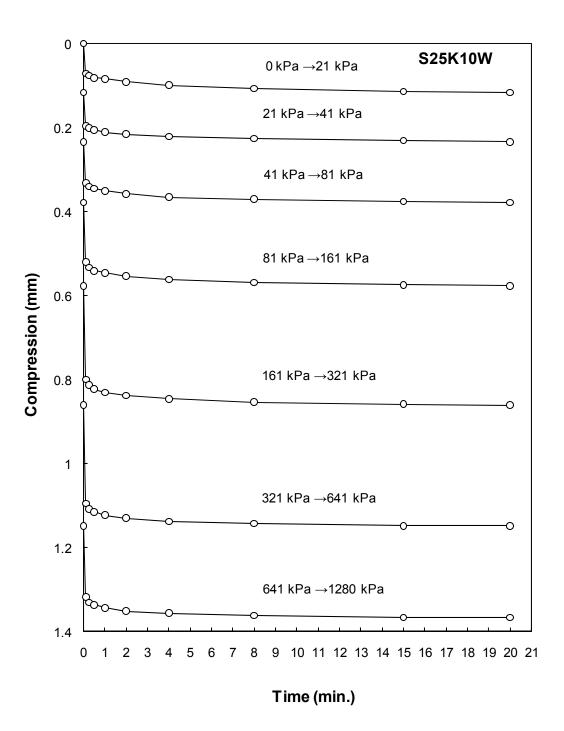


Figure 6.17. Compression vs. Time (S25K10W)

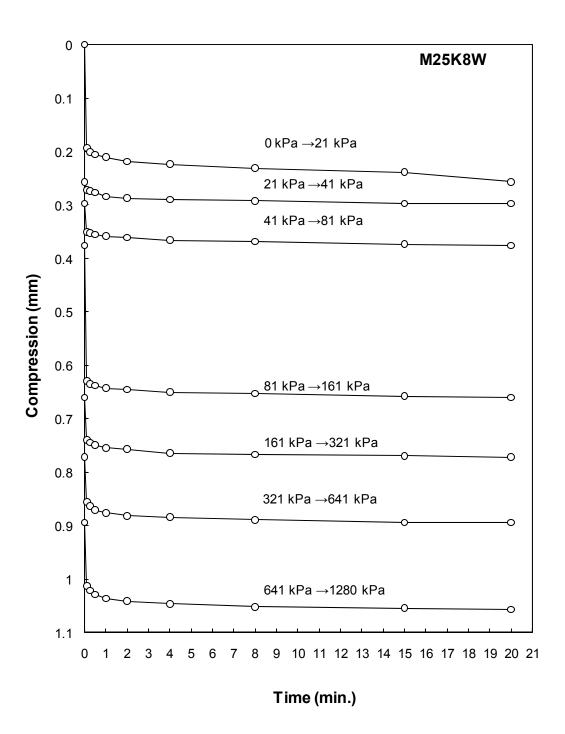


Figure 6.18. Compression vs. Time (M25K8W)

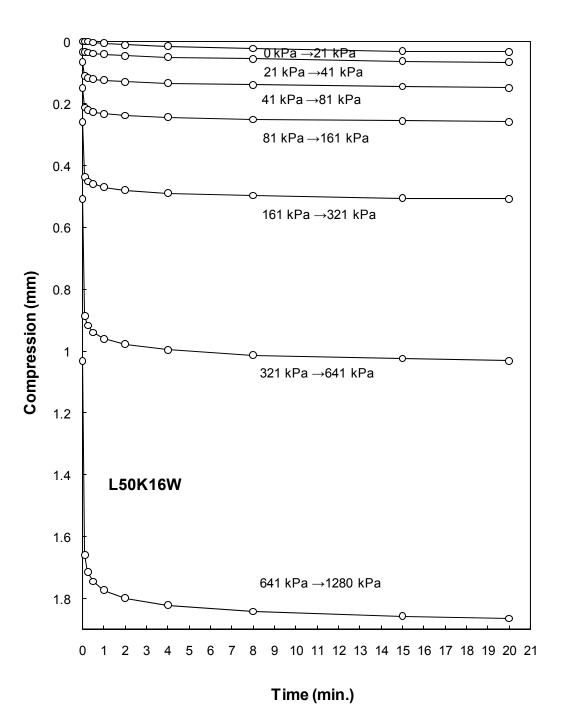


Figure 6.19. Compression vs. Time (L50K16W)

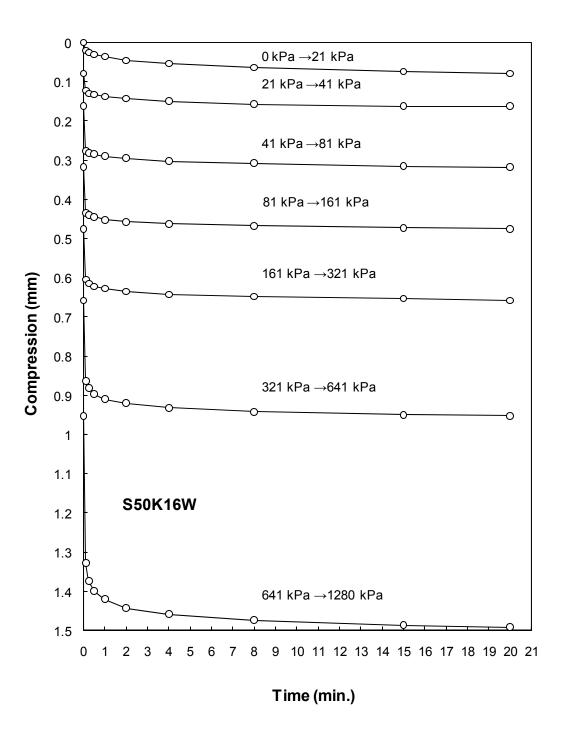


Figure 6.20. Compression vs. Time (S50K16W)

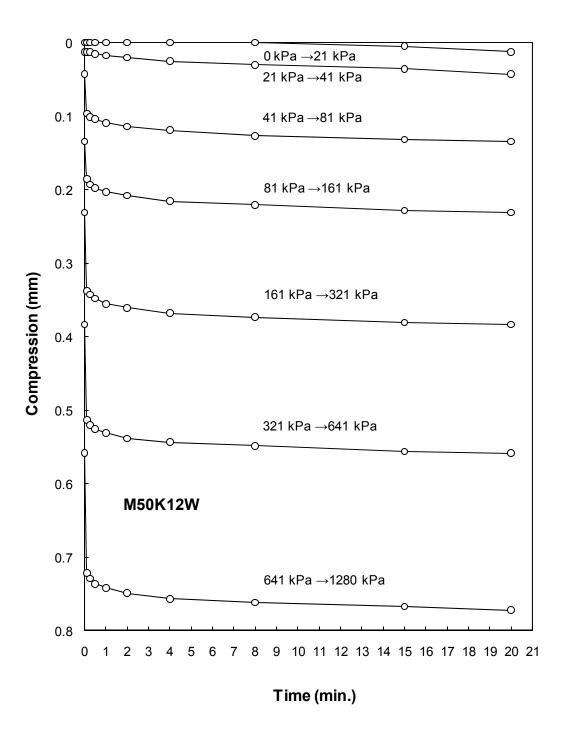


Figure 6.21. Compression vs. Time (M50K12W)

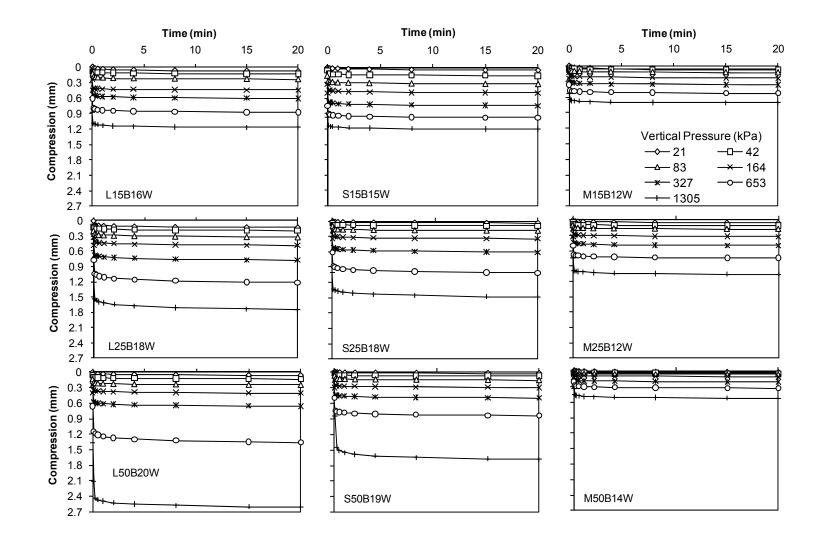


Figure 6.22. Typical Plots of Time-Compression for Bentonite/Sand Specimens Compacted at wopt

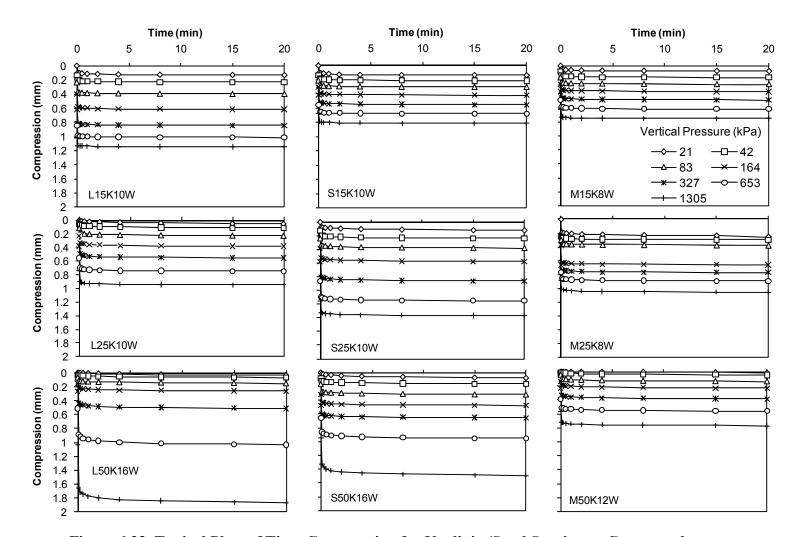


Figure 6.23. Typical Plots of Time-Compression for Kaolinite/Sand Specimens Compacted at wopt

6.4.2 ε_v versus log σ_v Curves

To more clearly illustrate the effects of clay proportion, clay mineralogy, water content, and compactive effort on the compressibility of clay/sand mixtures, the oedometer test data are replotted as vertical strain (ε_v) versus vertical applied stress (σ_v) in Figures 6.24-6.29. Each figure is for a separate nominal energy level, and the applied stress is plotted on a logarithmic-scale axis.

Figures 6.24-6.26 present the ε_v vs σ_v curves that were measured for the bentonite/sand mixtures. These figures demonstrate that, at a given compaction energy level, the compressibility decreased as the sand content increased. However, this decrease in compressibility became relatively insignificant at higher levels of compactive effort. At the Modified Proctor energy level, samples with varying sand content exhibited almost the same degree of compressibility. As mentioned previously, the compactive effort also had a significant influence on the observed compressibility. At the same clay/sand mix proportion, the soil became less compressible as the compactive effort increased. The compaction water content was found to be important for samples with a high clay content, and relatively unimportant for samples having a low clay content. As can be observed from Figures 6.24-6.26, soils having a higher clay content that were compacted wet-of-optimum underwent significantly more compression than those with a lower clay content. Final vertical strains for samples containing a higher percentage of clay exhibited significant scatter. Conversely, the final vertical strains for samples having a low clay proportion exhibited a narrower band of results.

Figures 6.27-6.29 show the compressibility behavior that was observed for the kaolinite/sand mixtures. From these figures, it can be seen that the kaolinite/sand mixtures exhibited almost the same general trends in compressibility behavior as the bentonite/sand mixtures.

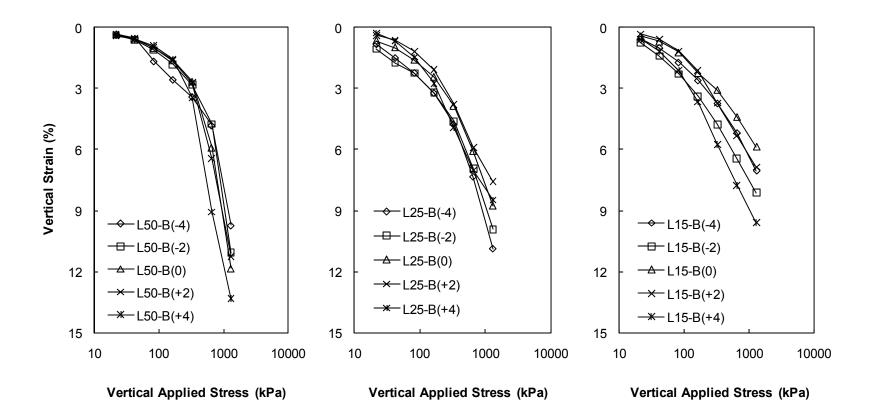


Figure 6.24. Vertical Strain versus Vertical Applied Stress for Low Energy Compacted Bentonite/Sand Mixtures

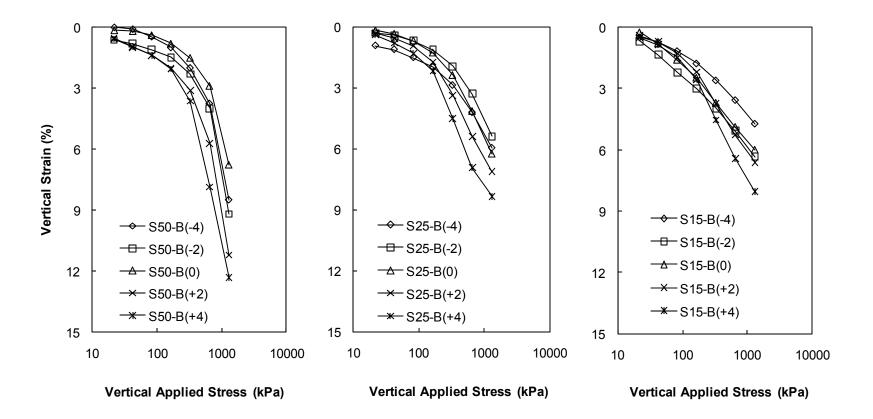


Figure 6.25. Vertical Strain versus Vertical Applied Stress for Standard Proctor Compacted Bentonite/Sand Mixtures

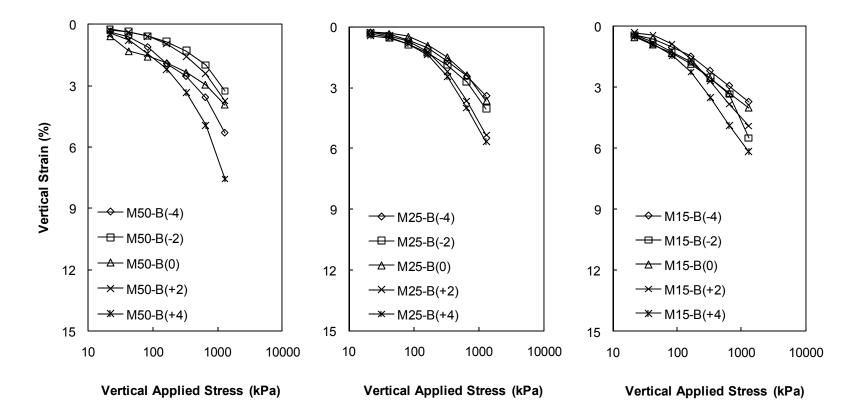


Figure 6.26. Vertical Strain versus Vertical Applied Stress for Modified Proctor Compacted Bentonite/Sand Mixtures

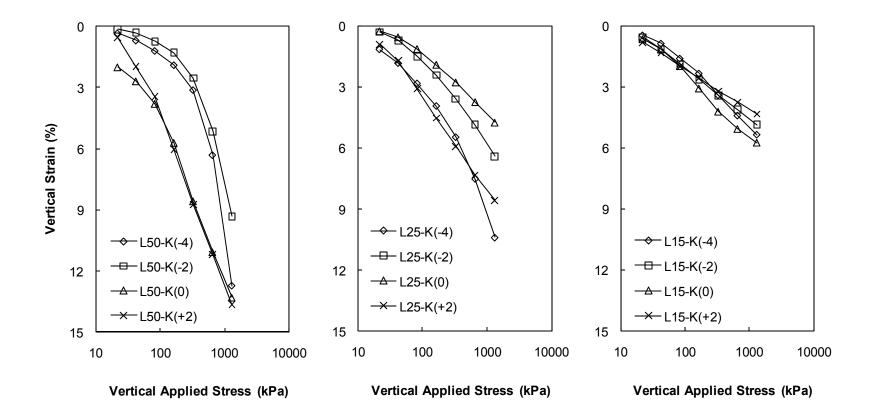


Figure 6.27. Vertical Strain versus Vertical Applied Stress for Low Energy Compacted Kaolinite/Sand Mixtures

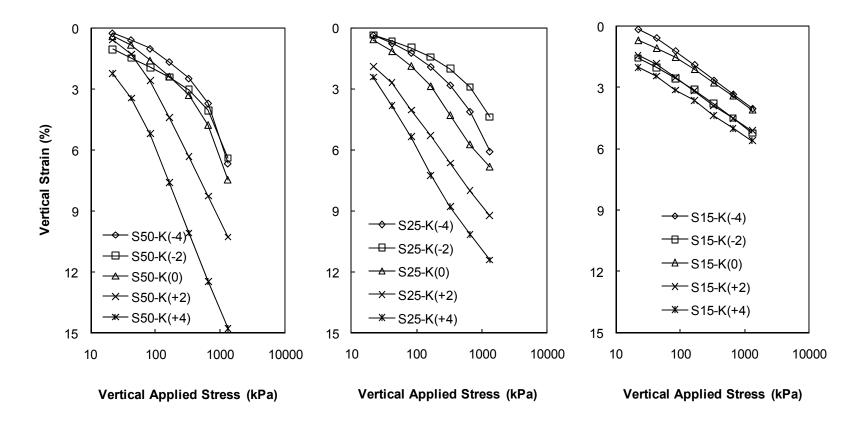


Figure 6.28. Vertical Strain versus Vertical Applied Stress for Standard Proctor Compacted Kaolinite/Sand Mixtures

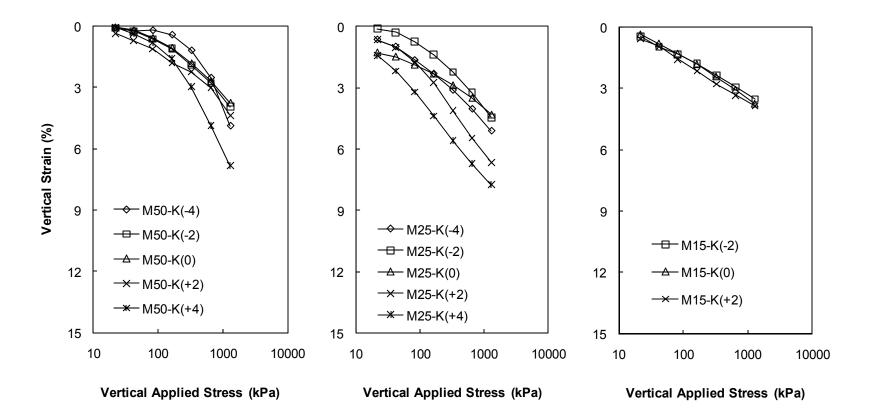


Figure 6.29. Vertical Strain versus Vertical Applied Stress for Modified Proctor Compacted Kaolinite/Sand Mixtures

6.5 Summary of One-Dimensional Test Results

This chapter describes a series of 1-D compression tests that were conducted to determine the relationship between compaction condition (compaction moisture content, compactive effort, clay mineral type, and clay/sand mix proportion) and the compressibility behavior of clay/sand mixtures. The following conclusions were drawn from the tests that were conducted:

- (1) The 50% clay/sand samples compacted at either the Low Energy Proctor or Standard Proctor energy level exhibited a "critical pressure"-type behavior, which was characterized by a sudden increase in compressibility when the applied pressure passed beyond a certain point.
- (2) For each of the clay/sand mixtures, at a given compaction energy level, the compressibility decreased as the percentage of sand in the mixture increased. The effect of changes in sand content on the compressibility behavior was reduced at higher levels of compactive effort (e.g., the Modified Proctor compaction energy level).
- (3) Increases in compactive effort led to an increase in soil density, which in turn resulted in a decrease in soil compressibility.
- (4) The compaction water content was found to have a significant effect for samples with a high clay content, and was observed to be relatively unimportant for samples with a low clay content.

Chapter 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

This thesis examines the undrained strength, stress-strain, and compressibility behavior of compacted clay/sand mixtures containing various clay proportions. A laboratory impact compaction approach (Proctor-type compaction) was used to prepare both the triaxial test specimens and the one-dimensional compression test specimens that were utilized in this study, with three different compaction energy levels being utilized during specimen preparation. A detailed explanation of the experimental apparatus and procedures that were utilized is presented herein. The experimental results of this study lead to the following important conclusions:

- (6) A semi-logarithmic relationship exists between the maximum dry unit weight and the compaction energy for both kaolinite/sand and bentonite/sand mixtures. Logarithmic regression analysis yielded R² values ranging from 0.87 to 0.99 for kaolinite and 0.98 to 1 for bentonite.
- (7) A semi-logarithmic relationship also exists between the optimum water content and the compaction energy for both clay/sand mixtures. Logarithmic regression analysis yielded R² values ranging from 0.87 to 0.96 for kaolinite and 0.97 to 1 for bentonite.
- (8) For the kaolinite/sand mixtures, at all compaction energy levels, the maximum dry unit weight was observed to occur for the 25% kaolinite mixture. However, this was not true for the bentonite/sand mixtures, which

exhibited a consistent trend of decreasing dry unit weight as the bentonite content increased.

- (9) Higher compactive efforts minimize the difference in maximum dry unit weight between mixtures containing different clay contents.
- (10) It appears that for clay/sand specimens compacted at the same energy level and with the same clay content, the undrained strength determined in unconsolidated undrained (UU) triaxial tests at the maximum deviator stress decreases with increasing compaction moisture content. Variations in water content have a larger influence on the undrained strength of kaolinite/sand specimens than they do on bentonite/sand specimens. In general, for both of the clay minerals that were examined in this study, the UU triaxial undrained strength increases with increasing confining pressure and compactive effort.
- (11) At the same compaction energy level, dry-of-optimum UU triaxial specimens are stiffer, stronger and more brittle than wet-of-optimum specimens. In contrast, specimens containing a smaller amount of clay appear to be less stiff, weaker and less brittle than samples with a high clay content.
- (12) At the same clay/sand mix proportion, the values of ϕ measured in the UU triaxial device increase with decreasing water content and are largest for specimens compacted at a very low water content with high compactive effort. Kaolinite/sand specimens exhibit higher ϕ values than what was observed for bentonite/sand specimens at the same water content relative to the optimum water content (e.g., $w_{opt} + 2\%$).
- (13) The values of the cohesion intercept (c) measured in the UU triaxial device increase with increasing dry unit weight, and are largest for specimens compacted at water contents near optimum with a high compactive effort.

The values of c also increase with increasing clay content. Bentonite/sand specimens exhibited higher c values than kaolinite/sand specimens.

- (14) The values of the secant modulus measured at 50% shear strength in the UU triaxial device (E_{50}) increase with clay content and are higher for dry-of-optimum specimens than wet-of-optimum specimens.
- (15) The 50% clay/sand samples compacted at either the Low Energy Proctor or Standard Proctor energy level exhibited a "critical pressure"-type behavior in the one-dimensional compressibility tests that were conducted, which was characterized by a sudden increase in compressibility when the applied pressure passed beyond a certain point.
- (16) For each of the clay/sand mixtures, at a given compaction energy level, the one-dimensional compressibility decreased as the percentage of sand in the mixture increased. The effect of changes in sand content on the compressibility behavior was reduced at higher levels of compactive effort (e.g., the Modified Proctor compaction energy level).
- (17) Increases in compactive effort led to an increase in soil density, which in turn resulted in a decrease in one-dimensional soil compressibility.
- (18) The compaction water content was found to have a significant effect on the one-dimensional compressibility behavior of samples with a high clay content, and was observed to be relatively unimportant for samples with a low clay content.

7.2 Recommendations for Future Research

Compaction conditions in the field are different than those in the laboratory.
 Therefore, if the results of this study are to be of the most value for prediction

of field behavior, these results should be correlated with similar tests on field compacted soil.

- (2) Laboratory studies that focus on the effects of different methods of compaction (e.g., static, impact, kneading, and vibratory compaction) on the resulting strength and compressibility behavior of compacted clay/sand mixtures may also prove useful.
- (3) The influence of wetting induced collapse settlement and swell behavior resulting from postconstruction increases in moisture content from precipitation, capillary water, and flooding, should be examined.

APPENDIX A

SAND SIEVE ANALYSIS

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 20				
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass o	f Sample, (g):		153.4	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan	1								
3.36	No.6								
2.38	No.8								
2.00	No.10	731.5	731.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	629.5	629.7	0.2	0.13	0.13	99.87		
0.59	No.30								
0.42	No.40	375.0	480.8	105.8	68.97	68.97	30.90		
0.297	No.50								
0.250	No.60	371.5	417.0	45.5	29.66	29.66	1.24		
0.210	No.70								
0.149	No.100	509.9	511.3	1.4	0.91	0.91	0.33		
0.105	No.140	306.0	306.4	0.4	0.26	0.26	0.07		
0.074	No.200	334.4	334.6	0.2	0.13	0.13	-0.07		
Pan	I	373.3	373.3	0.0	0.00	0.00	-0.07		
Total Dry Weig	ht in grams			153.5					
Percent Lost (-)	/ Gained(+)			0.07					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	19		
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		172.4	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan	l								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	408.9	409.3	0.4	0.23	0.23	99.77		
0.59	No.30								
0.42	No.40	340.2	459.7	119.5	69.32	69.32	30.45		
0.297	No.50								
0.250	No.60	316.0	361.9	45.9	26.62	26.62	3.83		
0.210	No.70								
0.149	No.100	308.0	311.0	3.0	1.74	1.74	2.09		
0.105	No.140	486.9	489.2	2.3	1.33	1.33	0.75		
0.074	No.200	292.6	293.4	0.8	0.46	0.46	0.29		
Pan		374.6	375.1	0.5	0.29	0.29	0.00		
Total Dry Weig	ht in grams			172.4					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	eving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 18				
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass o	f Sample, (g):		169.6	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasl	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan									
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.1	409.4	0.3	0.18	0.18	99.82		
0.59	No.30								
0.42	No.40	340.8	467.4	126.6	74.65	74.65	25.18		
0.297	No.50								
0.250	No.60	316.1	356.6	40.5	23.88	23.88	1.30		
0.210	No.70								
0.149	No.100	308.1	309.9	1.8	1.06	1.06	0.24		
0.105	No.140	486.9	487.3	0.4	0.24	0.24	0.00		
0.074	No.200	292.6	292.6	0.0	0.00	0.00	0.00		
Pan		374.5	374.5	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			169.6					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set Si	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	17		
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass o	f Sample, (g):		173.9	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasl	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Par	l								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.1	409.3	0.2	0.12	0.12	99.88		
0.59	No.30								
0.42	No.40	340.4	467.1	126.7	72.86	72.86	27.03		
0.297	No.50								
0.250	No.60	316.0	360.9	44.9	25.82	25.82	1.21		
0.210	No.70								
0.149	No.100	308.1	309.5	1.4	0.81	0.81	0.40		
0.105	No.140	486.9	487.4	0.5	0.29	0.29	0.12		
0.074	No.200	292.6	292.7	0.1	0.06	0.06	0.06		
Par	1	374.5	374.7	0.2	0.12	0.12	-0.06		
Total Dry Weig	ht in grams			174.0					
Percent Lost (-)	/ Gained(+)			0.06					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	16		
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		179.1	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan	1								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.1	409.5	0.4	0.22	0.22	99.78		
0.59	No.30								
0.42	No.40	340.3	475.0	134.7	75.21	75.21	24.57		
0.297	No.50								
0.250	No.60	316.0	359.6	43.6	24.34	24.34	0.22		
0.210	No.70								
0.149	No.100	308.0	308.4	0.4	0.22	0.22	0.00		
0.105	No.140	486.9	486.9	0.0	0.00	0.00	0.00		
0.074	No.200	292.6	292.6	0.0	0.00	0.00	0.00		
Pan	I	374.5	374.5	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			179.1					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 15				
Soak Time:	-	D	ispersing Age	nt/Apparatus:	pparatus: N/A Sieve Time: 10 m				
Total Dry Mass o	f Sample, (g):		178	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasl	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Par	1								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.3	409.7	0.4	0.22	0.22	99.78		
0.59	No.30								
0.42	No.40	340.5	481.8	141.3	79.38	79.38	20.39		
0.297	No.50								
0.250	No.60	316.2	351.9	35.7	20.06	20.06	0.34		
0.210	No.70								
0.149	No.100	308.0	308.5	0.5	0.28	0.28	0.06		
0.105	No.140	487.0	487.0	0.0	0.00	0.00	0.06		
0.074	No.200	292.6	292.6	0.0	0.00	0.00	0.06		
Par	I	374.5	374.5	0.0	0.00	0.00	0.06		
Total Dry Weig	ht in grams			177.9					
Percent Lost (-)	/ Gained(+)			-0.06					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Air-Dried Sample No.: 14			
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		160	Sepa	rating Sieve:	N/A			
Total Dry Mass at	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan									
3.36	No.6								
2.38	No.8								
2.00	No.10	451.5	451.5	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.3	409.6	0.3	0.19	0.19	99.81		
0.59	No.30								
0.42	No.40	339.7	452.8	113.1	70.69	70.69	29.13		
0.297	No.50								
0.250	No.60	316.1	360.5	44.4	27.75	27.75	1.38		
0.210	No.70								
0.149	No.100	308.0	309.6	1.6	1.00	1.00	0.37		
0.105	No.140	487.0	487.5	0.5	0.31	0.31	0.06		
0.074	No.200	292.6	292.7	0.1	0.06	0.06	0.00		
Pan		374.6	374.6	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			160.0					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set Si	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 13				
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		175.1	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan	1								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.6	451.6	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.6	409.8	0.2	0.11	0.11	99.89		
0.59	No.30								
0.42	No.40	340.0	467.8	127.8	72.99	72.99	26.90		
0.297	No.50								
0.250	No.60	316.2	362.6	46.4	26.50	26.50	0.40		
0.210	No.70								
0.149	No.100	308.0	308.6	0.6	0.34	0.34	0.06		
0.105	No.140	487.0	487.1	0.1	0.06	0.06	0.00		
0.074	No.200	292.7	292.7	0.0	0.00	0.00	0.00		
Pan	I	374.6	374.6	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			175.1					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	eving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 12				
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		181.6	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasl	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan									
3.36	No.6								
2.38	No.8								
2.00	No.10	451.6	451.6	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	409.6	410.0	0.4	0.22	0.22	99.78		
0.59	No.30								
0.42	No.40	339.7	481.5	141.8	78.08	78.08	21.70		
0.297	No.50								
0.250	No.60	316.3	355.5	39.2	21.59	21.59	0.11		
0.210	No.70								
0.149	No.100	308.0	308.2	0.2	0.11	0.11	0.00		
0.105	No.140	486.9	486.9	0.0	0.00	0.00	0.00		
0.074	No.200	292.7	292.7	0.0	0.00	0.00	0.00		
Pan		374.6	374.6	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			181.6					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 11				
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	f Sample, (g):		165.1	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan	1								
3.36	No.6								
2.38	No.8								
2.00	No.10	451.6	451.6	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	410.6	410.8	0.2	0.12	0.12	99.88		
0.59	No.30								
0.42	No.40	339.9	464.9	125.0	75.71	75.71	24.17		
0.297	No.50								
0.250	No.60	316.3	355.8	39.5	23.92	23.92	0.24		
0.210	No.70								
0.149	No.100	308.1	308.7	0.6	0.36	0.36	-0.12		
0.105	No.140	487.0	487.2	0.2	0.12	0.12	-0.24		
0.074	No.200	292.7	292.7	0.0	0.00	0.00	-0.24		
Pan	I	374.6	374.6	0.0	0.00	0.00	-0.24		
Total Dry Weig	ht in grams			165.5					
Percent Lost (-)	/ Gained(+)			0.24					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	ed Sample No.: 10			
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass of	Sample, (g):	141.5 Sepa			rating Sieve:	N/A			
Total Dry Mass af	iter #200 wash	n, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.	č	Ŭ	Ŭ,					
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan									
3.36	No.6								
2.38	No.8								
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	629.5	629.9	0.4	0.28	0.28	99.72		
0.59	No.30								
0.42	No.40	374.7	480.2	105.5	74.56	74.56	25.16		
0.297	No.50								
0.250	No.60	371.5	406.3	34.8	24.59	24.59	0.57		
0.210	No.70								
0.149	No.100	509.8	510.6	0.8	0.57	0.57	0.00		
0.105	No.140	306.0	306.0	0.0	0.00	0.00	0.00		
0.074	No.200	334.4	334.4	0.0	0.00	0.00	0.00		
Pan		373.3	373.3	0.0	0.00	0.00	0.00		
Total Dry Weig	ht in grams			141.5					
Percent Lost (-)	/ Gained(+)			0.00					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures								
V-M Class:	Light tan med	dium to fine s	and		Sieve Set:	Single-Set S	ieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried Sample No.: 9				
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min		
Total Dry Mass o	f Sample, (g):		163.9	Sepa	rating Sieve:	N/A			
Total Dry Mass a	fter #200 wasl	h, (g):	-		Tested by:	Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	g):	-	Started:	2/27/2009	Finished:	2/27/2009		
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer		
76.20	3-in.								
50.80	2-in.								
38.10	1-1/2-in.								
25.40	1-in.								
19.10	3/4-in.								
12.70	1/2-in.								
9.52	3/8-in.								
6.35	No.3								
4.76	No.4								
Pan									
3.36	No.6								
2.38	No.8								
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00		
1.19	No.16								
0.84	No.20	629.4	629.8	0.4	0.24	0.24	99.76		
0.59	No.30								
0.42	No.40	375.3	492.6	117.3	71.57	71.57	28.19		
0.297	No.50								
0.250	No.60	371.6	416.9	45.3	27.64	27.64	0.55		
0.210	No.70								
0.149	No.100	509.9	510.9	1.0	0.61	0.61	-0.06		
0.105	No.140	306.1	306.2	0.1	0.06	0.06	-0.12		
0.074	No.200	334.4	334.4	0.0	0.00	0.00	-0.12		
Pan		373.3	373.3	0.0	0.00	0.00	-0.12		
Total Dry Weig	ht in grams			164.1					
Percent Lost (-)	/ Gained(+)			0.12					

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures							
V-M Class:	Light tan med	dium to fine sand Sieve Set: Single-Set Sieving						
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	8	
Soak Time:	- Dispersing Age			nt/Apparatus:	N/A	Sieve Time:	10 min	
Total Dry Mass of	f Sample, (g):		178.8	Sepa	rating Sieve:	N/A		
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by: Yueru Chen			
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009	
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer	
76.20	3-in.							
50.80	2-in.							
38.10	1-1/2-in.							
25.40	1-in.							
19.10	3/4-in.							
12.70	1/2-in.							
9.52	3/8-in.							
6.35	No.3							
4.76	No.4							
Pan								
3.36	No.6							
2.38	No.8							
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00	
1.19	No.16							
0.84	No.20	629.6	629.8	0.2	0.11	0.11	99.89	
0.59	No.30							
0.42	No.40	375.1	505.9	130.8	73.15	73.15	26.73	
0.297	No.50							
0.250	No.60	371.5	414.0	42.5	23.77	23.77	2.96	
0.210	No.70							
0.149	No.100	509.9	513.5	3.6	2.01	2.01	0.95	
0.105	No.140	306.1	307.1	1.0	0.56	0.56	0.39	
0.074	No.200	334.6	334.6	0.0	0.00	0.00	0.39	
Pan		373.3	373.3	0.0	0.00	0.00	0.39	
Total Dry Weig	ht in grams			178.1				
Percent Lost (-)	/ Gained(+)			-0.39				

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures							
V-M Class:	Light tan med	dium to fine sand Sieve Set: Single-Set Sieving						
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	7	
Soak Time:	- Dispersing Age			nt/Apparatus:	N/A	Sieve Time:	10 min	
Total Dry Mass of	f Sample, (g):		165	Sepa	rating Sieve:	N/A		
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by: Yueru Chen			
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009	
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent	
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer	
76.20	3-in.							
50.80	2-in.							
38.10	1-1/2-in.							
25.40	1-in.							
19.10	3/4-in.							
12.70	1/2-in.							
9.52	3/8-in.							
6.35	No.3							
4.76	No.4							
Pan								
3.36	No.6							
2.38	No.8							
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00	
1.19	No.16							
0.84	No.20	629.6	629.7	0.1	0.06	0.06	99.94	
0.59	No.30							
0.42	No.40	374.6	495.2	120.6	73.09	73.09	26.85	
0.297	No.50							
0.250	No.60	371.5	414.1	42.6	25.82	25.82	1.03	
0.210	No.70							
0.149	No.100	509.9	510.9	1.0	0.61	0.61	0.42	
0.105	No.140	306.1	306.4	0.3	0.18	0.18	0.24	
0.074	No.200	334.4	334.5	0.1	0.06	0.06	0.18	
Pan		373.3	373.3	0.0	0.00	0.00	0.18	
Total Dry Weight in grams				164.7				
Percent Lost (-)	/ Gained(+)			-0.18				

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures						
V-M Class:	Light tan med	dium to fine sand Sieve Set: Single-Set Sieving					
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	6
Soak Time:	- Dispersing Ager			nt/Apparatus:	N/A	Sieve Time:	10 min
Total Dry Mass of	f Sample, (g):		168.2	Sepa	rating Sieve:	N/A	
Total Dry Mass af	fter #200 wash	n, (g):	-		Tested by:	Yueru Chen	
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer
76.20	3-in.		Ŭ,				
50.80	2-in.						
38.10	1-1/2-in.						
25.40	1-in.						
19.10	3/4-in.						
12.70	1/2-in.						
9.52	3/8-in.						
6.35	No.3						
4.76	No.4						
Pan							
3.36	No.6						
2.38	No.8						
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00
1.19	No.16						
0.84	No.20	629.5	629.7	0.2	0.12	0.12	99.88
0.59	No.30						
0.42	No.40	374.8	488.9	114.1	67.84	67.84	32.05
0.297	No.50						
0.250	No.60	371.5	423.5	52.0	30.92	30.92	1.13
0.210	No.70						
0.149	No.100	509.9	511.6	1.7	1.01	1.01	0.12
0.105	No.140	306.1	306.3	0.2	0.12	0.12	0.00
0.074	No.200	334.5	334.5	0.0	0.00	0.00	0.00
Pan		373.3	373.3	0.0	0.00	0.00	0.00
Total Dry Weig	ht in grams			168.2			
Percent Lost (-) / Gained(+)				0.00			

Project:	An experimental investigation of the behavior of compacted clay/sand mixtures							
V-M Class:	Light tan med	dium to fine sand Sieve Set: Single-Set Sieving						
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	5	
Soak Time:	- Dispersing Age			nt/Apparatus:	N/A	Sieve Time:	10 min	
Total Dry Mass of	f Sample, (g):		171.8	Sepa	rating Sieve:	N/A		
Total Dry Mass at	fter #200 wasł	n, (g):	-		Tested by: Yueru Chen			
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009	
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained Percent		
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer	
76.20	3-in.							
50.80	2-in.							
38.10	1-1/2-in.							
25.40	1-in.							
19.10	3/4-in.							
12.70	1/2-in.							
9.52	3/8-in.							
6.35	No.3							
4.76	No.4							
Pan								
3.36	No.6							
2.38	No.8							
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00	
1.19	No.16							
0.84	No.20	629.5	629.7	0.2	0.12	0.12	99.88	
0.59	No.30							
0.42	No.40	374.6	500.2	125.6	73.11	73.11	26.78	
0.297	No.50							
0.250	No.60	371.5	416.5	45.0	26.19	26.19	0.58	
0.210	No.70							
0.149	No.100	510.0	511.0	1.0	0.58	0.58	0.00	
0.105	No.140	306.1	306.1	0.0	0.00	0.00	0.00	
0.074	No.200	334.5	334.5	0.0	0.00	0.00	0.00	
Pan		373.3	373.3	0.0	0.00	0.00	0.00	
Total Dry Weig	ht in grams			171.8				
Percent Lost (-) / Gained(+)				0.00				

Project:	An experime	ntal investigat	ion of the beh	avior of comp	or of compacted clay/sand mixtures			
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	eving	
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	4	
Soak Time:	-	D	spersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min	
Total Dry Mass of	f Sample, (g):		160.5	Sepa	rating Sieve:	N/A		
Total Dry Mass a	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen		
Total Dry Mass >	No.4 Sieve (g	ı):	-	Started:	2/27/2009	Finished:	2/27/2009	
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent	
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer	
76.20	3-in.							
50.80	2-in.							
38.10	1-1/2-in.							
25.40	1-in.							
19.10	3/4-in.							
12.70	1/2-in.							
9.52	3/8-in.							
6.35	No.3							
4.76	No.4							
Pan								
3.36	No.6							
2.38	No.8							
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00	
1.19	No.16							
0.84	No.20	629.6	629.7	0.1	0.06	0.06	99.94	
0.59	No.30							
0.42	No.40	374.6	483.3	108.7	67.73	67.73	32.21	
0.297	No.50							
0.250	No.60	371.5	419.3	47.8	29.78	29.78	2.43	
0.210	No.70							
0.149	No.100	510.0	512.8	2.8	1.74	1.74	0.69	
0.105	No.140	306.1	307.1	1.0	0.62	0.62	0.06	
0.074	No.200	334.5	334.6	0.1	0.06	0.06	0.00	
Pan		373.3	373.3	0.0	0.00	0.00	0.00	
Total Dry Weig	ht in grams			160.5				
Percent Lost (-)	/ Gained(+)			0.00				

Project:	An experimer	ntal investigat	tion of the beh	avior of comp	mpacted clay/sand mixtures			
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	ieving	
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	3	
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min	
Total Dry Mass of	f Sample, (g):		183.7	Sepa	rating Sieve:	N/A		
Total Dry Mass at	fter #200 wasł	n, (g):	-		Tested by:	Yueru Chen		
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009	
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent	
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer	
76.20	3-in.	-	-					
50.80	2-in.							
38.10	1-1/2-in.							
25.40	1-in.							
19.10	3/4-in.							
12.70	1/2-in.							
9.52	3/8-in.							
6.35	No.3							
4.76	No.4							
Pan								
3.36	No.6							
2.38	No.8							
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00	
1.19	No.16							
0.84	No.20	629.7	629.9	0.2	0.11	0.11	99.89	
0.59	No.30							
0.42	No.40	374.6	510.3	135.7	73.87	73.87	26.02	
0.297	No.50							
0.250	No.60	371.6	418.2	46.6	25.37	25.37	0.65	
0.210	No.70							
0.149	No.100	510.0	511.0	1.0	0.54	0.54	0.11	
0.105	No.140	306.2	306.3	0.1	0.05	0.05	0.05	
0.074	No.200	334.4	334.5	0.1	0.05	0.05	0.00	
Pan		373.3	373.3	0.0	0.00	0.00	0.00	
Total Dry Weig	ht in grams			183.7				
Percent Lost (-)	/ Gained(+)			0.00				

Project:	An experimer	ntal investigat	tion of the beh	avior of comp	acted clay/sa	nd mixtures	
V-M Class:	Light tan med	lium to fine s	and		Sieve Set:	Single-Set S	ieving
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	1
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min
Total Dry Mass of	f Sample, (g):		201.6	Sepa	rating Sieve:	N/A	
Total Dry Mass at	fter #200 wash	n, (g):	-		Tested by:	Yueru Chen	
Total Dry Mass >	No.4 Sieve (g):	-	Started:	2/27/2009	Finished:	2/27/2009
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer
76.20	3-in.						
50.80	2-in.						
38.10	1-1/2-in.						
25.40	1-in.						
19.10	3/4-in.						
12.70	1/2-in.						
9.52	3/8-in.						
6.35	No.3						
4.76	No.4						
Pan							
3.36	No.6						
2.38	No.8						
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00
1.19	No.16						
0.84	No.20	629.9	630.0	0.1	0.05	0.05	99.95
0.59	No.30						
0.42	No.40	374.7	522.8	148.1	73.46	73.46	26.49
0.297	No.50						
0.250	No.60	371.5	423.0	51.5	25.55	25.55	0.94
0.210	No.70						
0.149	No.100	510.3	511.9	1.6	0.79	0.79	0.15
0.105	No.140	306.3	306.6	0.3	0.15	0.15	0.00
0.074	No.200	334.4	334.6	0.2	0.10	0.10	-0.10
Pan		380.0	380.1	0.1	0.05	0.05	-0.15
Total Dry Weig	ht in grams			201.9			
Percent Lost (-)	/ Gained(+)			0.15			

Project:	An experimental investigation of the behavior of com				pacted clay/sand mixtures		
V-M Class:	Light tan med	dium to fine s	and		Sieve Set: Single-Set Sieving		
Method:	В		Sampling Pro	cedure Used:	Air-Dried	Sample No.:	2
Soak Time:	-	D	ispersing Age	nt/Apparatus:	N/A	Sieve Time:	10 min
Total Dry Mass o	f Sample, (g):		156.5	Sepa	arating Sieve:	N/A	
Total Dry Mass after #200 wash, (g): -				Tested by:	Yueru Chen		
Total Dry Mass >	No.4 Sieve (g	g):	-	Started:	2/27/2009	Finished:	2/27/2009
Sieve Openings	U.S.	Pan	Soil+Pan	Soil	Percent	Retained	Percent
(mm)	Standard	Weight	Weight	Weight	Partial	Total	Finer
76.20	3-in.						
50.80	2-in.						
38.10	1-1/2-in.						
25.40	1-in.						
19.10	3/4-in.						1
12.70	1/2-in.						1
9.52	3/8-in.						
6.35	No.3						
4.76	No.4						
Par) 						
3.36	No.6						
2.38	No.8						
2.00	No.10	731.6	731.6	0.0	0.00	0.00	100.00
1.19	No.16						
0.84	No.20	629.8	629.9	0.1	0.06	0.06	99.94
0.59	No.30						
0.42	No.40	375.3	492.0	116.7	74.57	74.57	25.37
0.297	No.50						
0.250	No.60	371.4	409.7	38.3	24.47	24.47	0.89
0.210	No.70						
0.149	No.100	510.1	511.4	1.3	0.83	0.83	0.06
0.105	No.140	306.2	306.5	0.3	0.19	0.19	-0.13
0.074	No.200	334.5	334.5	0.0	0.00	0.00	-0.13
Par	1	380.2	380.2	0.0	0.00	0.00	-0.13
Total Dry Weig	ht in grams			156.7			
Percent Lost (-)	/ Gained(+)			0.13			

APPENDIX B

ATTERBERG LIMIT

Sample: Bentonite		Location:	N/A	Mi	xing Water:	Distilled
Specimen Type: Air-dried				Tested By:	Yueru Cher	
Liquid Limit Determintatior)					
Sample No.	1	2	3	4	5	
Can No.	majid	4	31	1	121	
Wt. of can (g)	28.66	28.71	28.37	28.07	30.94	
Wt. of can + wet soil (g)	51.5	45.71	44.99	47.77	49.47	
Wt. of can + dry soil (g)	32.45	31.59	31.15	31.28	33.95	
Wt. of dry soil (g)	3.79	2.88	2.78	3.21	3.01	
Wt. of water (g)	19.05	14.12	13.84	16.49	15.52	
Water Content (%)	502.64	490.28	497.84	513.71	515.61	
No. of Drops	24	32	24	15	15	
Plastic Limit Determination	\			Testing F	quipment Us	sed
Sample No.	1	2				
Can No.	FJ-3	405	Plastic L	imit:	Hand Rolled > Mechanical Device	
Wt. of can (g)	39.4	38.1	┨┠───		Manual 2	
Wt. of can + wet soil (g)	45.5	44.1	Liquid Li	mit: Mechanical		
Wt. of can + dry soil (g)	43.6	42.2	┨┖────		INIEC	lianicai
	43.0		ł	То	st Method	
Wt. of dry soil (g) Wt. of water (g)	4.2	4.1 1.9	A	X	B	
Water Content (%)	45.2	46.3			рагаtion M	lethod
Plastic limit	-	40.3 16	Wet	X	Dry	lethou
	-	10	Wei	^	Diy	
550	uid Limit				-	d Limit 199
530 510 490	y .	= -31.76ln(x) R ² = 0.96				ic Limit 46
A 470					4	c Index 53 rd Deviation
450 10	Number o	f Drops		100	0	.55

Sample: 50%bentonite &	50% sand	Location:	N/A	Mi	xing Water:	Distilled	
Specimen Type: Air-dried		Date:	10/15/2009		Tested By:	Yueru C	hei
Liquid Limit Determintatior	`						
Sample No.	1	2	3	4			
Can No.	FJ-3	Y-1	FJ-1	410			
Wt. of can (g)	29.06	28.37	28.1	28.4			
Wt. of can + wet soil (g)	43.22	42.98	39.2	44.6			
Wt. of can + dry soil (g)	31.99	31.61	30.51	31.78			
Wt. of dry soil (g)	2.93	3.24	2.41	3.38			
Wt. of water (g)	11.23	11.37	8.69	12.82			
Water Content (%)	383.28	350.93	360.58	379.29			
No. of Drops	20	30	26	21			
	20	00	20	21			
Plastic Limit Determination	1			Testing Ed	quipment Us	sed	
Sample No.	1	2	Diactic Li		Han	d Rolled	Х
Can No.	405	404	Plastic Li	mit:	Mechanica	I Device	
Wt. of can (g)	38.1	38.94	L i av si al L i a	- 14.	Manual		Х
Wt. of can + wet soil (g)	45.28	45.62	Liquid Lin	Mechanical			
Wt. of can + dry soil (g)	43.5	44			-	-	
Wt. of dry soil (g)	5.4	5.06		Tes	t Method		
Wt. of water (g)	1.78	1.62	А	Х	В		
Water Content (%)	33.0	32.0	Sp	becimen pr	eparation M	ethod	
Plastic limit	3	32	Wet	X	Dry		
400 380 0060 000 000 000 000 000 000 000 000	y=-	81.74ln(x) + R ² = 0.995			Plast Plasti Plasti	d Limit 365 ic Limit 32 ic Index 333 candard iation	
320 1 0	Number	of Drops		100	_	.47	

pecimen Type: Air-dried Date: 10/22/2009 Tested By: Yueru Che Liquid Limit Determination Sample No. 1 2 3 4	ample: 25%bentonite &	75% sand	Location:		Mi	xing Water: Distilled	
Sample No. 1 2 3 4 Can No. 4 FJ-5 46 201 Wt. of can (g) 28.72 28.04 28.89 28.88 Wt. of can (g) 28.72 28.04 28.89 28.88 Wt. of can + dry soil (g) 32.52 31.89 31.99 33.18 Wt. of can + dry soil (g) 32.52 31.89 31.99 33.18 Wt. of an + dry soil (g) 38.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 1 No. of Drops 34 26 21 20 20 Plastic Limit Determination 232.37 251.43 263.23 260.47 1 No. of Drops 34 26 21 20 20 Plastic Limit Determination 20 38.94 39.94 39.94 Wt. of can + dry soil (g) 45.81 46.5 46.5 47.85 48 9.90 Wt. of dry soil (g) 6.35 6.23 7.84 9.90 9.91 9.91 9.91 <	pecimen Type: Air-dried		Date:	10/22/2009		Tested By: Yueru Che	
Sample No. 1 2 3 4 Can No. 4 FJ-5 46 201 Wt. of can (g) 28.72 28.04 28.89 28.88 Wt. of can + wet soil (g) 41.35 41.57 40.15 44.38 Wt. of can + wet soil (g) 32.52 31.89 31.99 33.18 Wt. of dry soil (g) 32.52 31.89 31.99 33.18 Wt. of dry soil (g) 3.8 3.85 3.1 4.3 Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination Testing Equipment Used Manual 2 Sample No. 1 2 Manual 3 Wt. of can (g) 38.09 38.94 Mechanical Wt. of dry soil (g) 6.35 6.23 Mechanical Wt. of water (g) 1.37 1.33 A X B Specimen preparation Method Wet X Dry I	Liquid Limit Determintation	1					
Wt. of can (g) 28.72 28.04 28.89 28.88 Wt. of can + wet soil (g) 41.35 41.57 40.15 44.38 Wt. of can + dry soil (g) 32.52 31.89 31.99 33.18 Wt. of dry soil (g) 3.8 3.85 3.1 4.3 Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination Testing Equipment Used Sample No. 1 2 Wt. of can (g) 38.09 38.94 Wt. of can + wet soil (g) 43.7 1.37 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 21 Vet X Dry Specimen preparation Method Wet Wet X Dry Vi. of water (g) 9 9 9 280	•	1	2	3	4		
Wt. of can + wet soil (g) 41.35 41.57 40.15 44.38 Wt. of can + dry soil (g) 32.52 31.89 31.99 33.18 Wt. of dry soil (g) 3.8 3.85 3.1 4.3 Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination 1 2 20 1 Sample No. 1 2 1 20 1 Plastic Limit Determination 5 44.5 1 1 1 Wt. of can (g) 38.09 38.94 1 1 1 1 Wt. of can + dry soil (g) 44.44 45.17 Mechanical 1 <t< td=""><td>Can No.</td><td>4</td><td>FJ-5</td><td>46</td><td>201</td><td></td></t<>	Can No.	4	FJ-5	46	201		
Wt. of can + dry soil (g) 32.52 31.89 31.99 33.18 Wt. of dry soil (g) 3.8 3.85 3.1 4.3 Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 20 Plastic Limit Determination 38.09 38.94 46.5 404 $Mechanical Device$ Wt. of can (g) 38.09 38.94 46.5 $Mechanical Device$ $Manual Y$ Wt. of dry soil (g) 6.35 6.23 $Mechanical$ $Mechanical$ Wt. of water (g) 1.37 1.33 A X B Water Content (%) 21.6 21.3 $Method$ A X B 300 280 $y = -57.9ln(x) + 437.91$ $R^2 = 0.9599$ <td< td=""><td>Wt. of can (g)</td><td>28.72</td><td>28.04</td><td>28.89</td><td>28.88</td><td></td></td<>	Wt. of can (g)	28.72	28.04	28.89	28.88		
Wt. of dry soil (g) 3.8 3.85 3.1 4.3 Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination	Wt. of can + wet soil (g)	41.35	41.57	40.15	44.38		
Wt. of water (g) 8.83 9.68 8.16 11.2 Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination 1 2 20 1 Can No. 405 404 405 404 Wt. of can (g) 38.09 38.94 26 21 20 Wt. of can + wet soil (g) 45.81 46.5 46.5 404 45.17 Wt. of dry soil (g) 6.35 6.23 Test Method Manual) Wt. of water (g) 1.37 1.33 X B Specimen preparation Method Wet X Dry Dry Itiquid Limit 252 Plastic Limit 252 Value y = -57.9ln(x) + 437.91 R ² = 0.9599 Plastic Limit 252 Plastic Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic Limit 21 Wet X Dry Dry Plastic Limit 21 Plastic Limit 21 300 <td>Wt. of can + dry soil (g)</td> <td>32.52</td> <td>31.89</td> <td>31.99</td> <td>33.18</td> <td></td>	Wt. of can + dry soil (g)	32.52	31.89	31.99	33.18		
Water Content (%) 232.37 251.43 263.23 260.47 No. of Drops 34 26 21 20 Plastic Limit Determination 1 2 20 Hand Rolled 2 Sample No. 1 2 20 Hand Rolled 2 Can No. 405 404 Hand Rolled 2 Mechanical Device Wt. of can (g) 38.09 38.94 Hand Rolled 2 Mechanical Device Wt. of can + wet soil (g) 45.81 46.5 Hand Rolled 2 Mechanical Period Wt. of can + dry soil (g) 6.35 6.23 Test Method Mechanical Wt. of water (g) 1.37 1.33 Specimen preparation Method Wt of water (g) 21.6 21.3 Specimen preparation Method Plastic limit 21 Wet X Dry Liquid Limit Chart 300 y=-57.9ln(x) + 437.91 Plastic Limit 21 Plastic Limit 21 y=-57.9ln(x) + 437.91 Plastic Limit 21 Plastic Limit 21 Plastic Limit 21	Wt. of dry soil (g)	3.8	3.85	3.1	4.3		
No. of Drops 34 26 21 20 Plastic Limit Determination Sample No. 1 2 Plastic Limit Equipment Used Can No. 405 404 Plastic Limit: Hand Rolled Plastic Limit: Wt. of can (g) 38.09 38.94 46.5 Mechanical Device Liquid Limit: Manual 2 Wt. of can + wet soil (g) 44.84 45.17 Mechanical Mechanical Wt. of an + dry soil (g) 6.35 6.23 Mechanical Mechanical Wt. of water (g) 1.37 1.33 Specimen preparation Method Method Vater Content (%) 21.6 21.3 Specimen preparation Method Wet X Dry Liquid Limit Chart 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic Limit 21 Value y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic Limit 21 Plastic Limit Chart y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic Index 231	Wt. of water (g)	8.83	9.68	8.16	11.2		
Plastic Limit DeterminationSample No.12Can No.405404Wt. of can (g)38.0938.94Wt. of can + wet soil (g)45.8146.5Wt. of can + dry soil (g)44.4445.17Wt. of dry soil (g)6.356.23Wt. of water (g)1.371.33Water Content (%)21.621.3Plastic limit21Liquid Limit ChartSpecimen preparation MethodWetXDryLiquid Limit Chart300 280 9y = -57.9ln(x) + 437.91 R ² = 0.9599Liquid Limit ChartLiquid Limit Chart21Liquid Limit ChartJastic limit21Liquid Limit Chart20Liquid Limit ChartJastic limit21Liquid Limit Chart300 	Water Content (%)	232.37	251.43	263.23	260.47		
Sample No. 1 2 Can No. 405 404 Wt. of can (g) 38.09 38.94 Wt. of can + wet soil (g) 45.81 46.5 Wt. of can + dry soil (g) 6.35 6.23 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 Specimen preparation Method Wet X Dry Liquid Limit Chart Liquid Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit Liquid Limit 252 Plastic limit 21 Plastic Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic limit 21 Plastic Limit 21 92/20 Plastic limit 21 Plastic Limit 21	No. of Drops	34	26	21	20		
Sample No. 1 2 Can No. 405 404 Wt. of can (g) 38.09 38.94 Wt. of can + wet soil (g) 45.81 46.5 Wt. of can + dry soil (g) 6.35 6.23 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 Specimen preparation Method Wet X Dry Liquid Limit Chart Liquid Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit Liquid Limit 252 Plastic limit 21 Plastic Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic limit 21 Plastic Limit 21 92/20 Plastic limit 21 Plastic Limit 21	Plastic Limit Determination)			Testing Eq	auipment Used	
Can No.405404Wt. of can (g)38.0938.94Wt. of can + wet soil (g)45.8146.5Wt. of can + dry soil (g)6.356.23Wt. of dry soil (g)6.356.23Wt. of water (g)1.371.33Water Content (%)21.621.3Plastic limit21Liquid Limit Chart300 $y = -57.9 \ln(x) + 437.91$ 280 $y = -57.9 \ln(x) + 437.91$ 300 $y = -57.9 \ln(x) + 437.91$ 280 $y = -57.9 \ln(x) + 437.91$ 300 $y = -57.9 \ln(x) + 437.91$ 280 $y = -57.9 \ln(x) + 437.91$ 300 $y = -57.9 \ln(x) + 437.91$ 280 $y = -57.9 \ln(x) + 437.91$ 300 $y = -57.9 \ln(x) + 437.91$ 280 $y = -57.9 \ln(x) + 437.91$ 300 $y = -57.9 \ln(x) + 437.91$ 100 <t< td=""><td></td><td></td><td>2</td><td></td><td>•</td><td></td></t<>			2		•		
Wt. of can (g) 38.09 38.94 Wt. of can + wet soil (g) 45.81 46.5 Wt. of can + dry soil (g) 6.35 6.23 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 X B Liquid Limit Chart 300 y = -57.9ln(x) + 437.91 Test Method 280 y = -57.9ln(x) + 437.91 Plastic Limit 252 Plastic Limit 21 Plastic Limit 21 Liquid Limit Chart 300 y = -57.9ln(x) + 437.91 Plastic Limit 252 Plastic Limit 21 Plastic Limit 21 Plastic Limit 300 y = -57.9ln(x) + 437.91 Plastic Limit 21 Plastic Index 231 Plastic Index 231 Plastic Index 231 PL Standard	•	-	_	Plastic Lir	nit:		
Wt. of can + wet soil (g) 45.81 46.5 Wt. of can + dry soil (g) 44.44 45.17 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 Specimen preparation Method Wet X Dry Liquid Limit Chart Liquid Limit 252 90 9 -57.9ln(x) + 437.91 80 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 92 9 9 9 9 9 9 9 9 9 9 9 9 9 9		38.09	38.94			Manual	
Wt. of can + dry soil (g) 44.44 45.17 Wt. of dry soil (g) 6.35 6.23 Wt. of water (g) 1.37 1.33 Water Content (%) 21.6 21.3 Plastic limit 21 Liquid Limit Chart300 280Liquid Limit Chart 300 280 $y = -57.9ln(x) + 437.91$ $R^2 = 0.9599$ Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 2120Plastic Index 231Plastic Index 231	(0)	45.81	46.5	Liquid Lin	mit: Mechanical		
Wt. of dry soil (g)6.356.23Wt. of water (g)1.371.33Water Content (%)21.621.3Plastic limit21Specimen preparation MethodWetXDryLiquid Limit Chart $y = -57.9 ln(x) + 437.91$ $R^2 = 0.9599$ Plastic Limit280 $y = -57.9 ln(x) + 437.91$ Plastic Limit210Plastic Limit21021121121221321321402150		44.44	45.17				
Wt. of water (g)1.371.33Water Content (%)21.621.3Plastic limit21Liquid Limit Chart300 280 280 $y = -57.9 ln(x) + 437.91$ $R^2 = 0.9599$ Liquid Limit Chart300 280 280 $y = -57.9 ln(x) + 437.91$ $R^2 = 0.9599$ Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Limit 21Plastic Index 231PL Standard	· · · · · · ·	6.35	6.23		Tes	t Method	
Water Content (%)21.621.3Specimen preparation MethodPlastic limit21WetXDryLiquid Limit Chart300 280 280 $y = -57.9 ln(x) + 437.91$ $R^2 = 0.9599$ Liquid Limit 252 Plastic Limit 219 240 $y = 220$ 9 $y = 220$ Plastic Index 231			1.33	А	Х	В	
Plastic limit 21 Wet X Dry Liquid Limit Chart Image: Chart Chart Image: Chart Chart Chart Image: Chart C		21.6	21.3	Sp	ecimen pr	eparation Method	
$\begin{array}{c} 300\\ 280\\ \hline \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & $	Plastic limit		21		-	ri r	
	300 280 (%) 600 (%) 200 200 200 200 200 200 200 200 200 20		/ = -57.9ln(x)			252 Plastic Limit 21 Plastic Index 231	

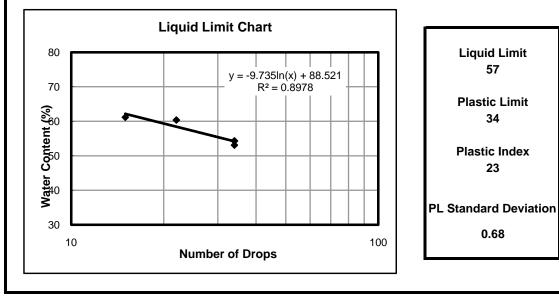
Sample: 15%bentonite &	85% sand	Location:	N/A	Miz	xing Water: D		
Specimen Type: Air-dried		Date:	11/2/2009		Tested By: Y	'ueru Cl	he
Liquid Limit Determintation)						
Sample No.	1	2	3		Г		
Can No.	209	31	59				
Wt. of can (g)	28.17	28.36	28.33				
Wt. of can + wet soil (g)	39.39	40.02	41.47				
Wt. of can + dry soil (g)	32.88	33.31	33.95				
Wt. of dry soil (g)	4.71	4.95	5.62				
Wt. of water (g)	6.51	6.71	7.52		1		
Water Content (%)	138.22	135.56	133.81		1		
No. of Drops	20	26	28				
·							
Plastic Limit Determination				Testing Ec	quipment Use		
Sample No.	1	2	Plastic Li	mit:		Rolled	>
Can No.	46	31			Mechanical		
Wt. of can (g)	39.17	38.44	Liquid Lir	nit:			>
Wt. of can + wet soil (g)	46.09	45.9			Mech	anical	
Wt. of can + dry soil (g)	44.91	44.7					
Wt. of dry soil (g)	5.74	6.26		1	t Method		
Wt. of water (g)	1.18	1.2	A	Х	В		
Water Content (%)	20.6	19.2		1	eparation Met	thod	
Plastic limit	2	20	Wet	Х	Dry		
	luid Limit	Chart			Linuid	1	
150 145 🔄 40		y = -12.81ln(R ² = 0.			Liquid 13 Plastic 20	5 Limit	
(5,40) 130 130 125	~~				Plastic Index 115 PL Standard		
≥ ¹²⁰ 120 10	Number o	of Drops		100	PL Star Devia 0.6	tion	

DEPARTMENT OF UNIVERSITY Atterberg Li	OF DEL	AWARE	E - GEOTI	ECHNIC	AL LAB	
Project Name: An experin	nental inve	stigation of	the behavior	of compact	ted clay/sand mixtures	
Sample: Kaolinite		Location:	N/A	Mi	xing Water: Distilled	
Specimen Type: Air-dried		Date:	9/22/2009		Tested By: Yueru Chen	
Liquid Limit Determintation Sample No.	1	2	3	4		
Can No. Wt. of can (g)	59 28.32	410 28.42	B-14 29.08	FJ-1 28.07		
Wt. of can + wet soil (g)	34.06	38.54	36.98	36.23		
Wt. of can + dry soil (g)	31.9	34.7	34.2	33.4		
Wt. of dry soil (g)	3.58	6.28	5.12	5.33		
Wt. of water (g)	2.16	3.84	2.78	2.83		
Water Content (%)	60.34	61.15	54.30	53.10		
No. of Drops	o. of Drops 22 15 34 34					
Plastic Limit Determination)		1	Testing E	quipment Used	
Sample No.	1	2	Diactia I	imiti	Hand Rolled X	

Plastic Limit Determination						
Sample No.	1	2				
Can No.	405	404				
Wt. of can (g)	38.1	38.9				
Wt. of can + wet soil (g)	44.7	47.3				
Wt. of can + dry soil (g)	43	45.2				
Wt. of dry soil (g)	4.9	6.3				
Wt. of water (g)	1.7	2.1				
Water Content (%)	34.7	33.3				
Plastic limit	3	34				

Testing Equipment Used					
Plastic Limit:	Hand Rolled	Х			
	Mechanical Device				
Liquid Limit:	Manual	Х			
Liquid Limit:	Mechanical				

Test Method								
A X B								
Specimen preparation Method								
Wet X Dry								



ample: 50% kaolinite & 5	0% sand	Location:	N/A	Μ	ixing Water:	Distilled
pecimen Type: Air-dried		Date:	11/4/2009		Tested By:	Yueru Che
Liquid Limit Determintation)					
Sample No.	1	2	3			
Can No.	2010	201	FJ-5			
Wt. of can (g)	28.63	28.9	28.06			
Wt. of can + wet soil (g)	38.43	41.74	40.84			
Wt. of can + dry soil (g)	35.63	38.16	37.33			
Wt. of dry soil (g)	7	9.26	9.27			
Wt. of water (g)	2.8	3.58	3.51			
Water Content (%)	40.00	38.66	37.86			
No. of Drops	18	27	32			
Plastic Limit Determination				Tocting	Equipment U	sod
Sample No.	1	2		resurg		d Rolled X
Can No.	404	405	Plastic L	imit:	Mechanica	
Wt. of can (g)	38.95	38.1			WECHAINC	Manual X
Wt. of can + wet soil (g)	46.27	46.88	Liquid Li	mit:	Mo	chanical
	-	40.00			IVIE	chanical
Wt. of can + dry soil (g)	44.86			Ta	at Mathad	
Wt. of dry soil (g)	5.91	7.08			st Method	1
Wt. of water (g)	1.41		A	X	B	lathad
Water Content (%) Plastic limit	23.9	24.0			reparation N	
Plastic limit		24	Wet	Х	Dry	
Lia	uid Limit	Chart				
LIQ		Chart				
50					-	id Limit
45		v = -3.7ln()	x) + 50.731			39
45			0.9932			
₹ 0					Plast	ic Limit
1 (C						24
j i 35						
00000000000000000000000000000000000000					Plast	ic Index
						15
Mater 5						
					PL Standa	ard Deviatio
00					1	
10				100).08

Atterberg Limits Determination: ASTM D 4318 - 05

Sample: 25% kaolinite & 7	5% sand	Location:	N/A	M	ixing Water:	Distilled
Specimen Type: Air-dried		Date:	11/5/2009		Tested By:	Yueru Cher
Liquid Limit Determintation)					
Sample No.	1	2	3	4		
Can No.	59	211	FJ-3	4		
Wt. of can (g)	28.34	28.18	29.06	28.74		
Wt. of can + wet soil (g)	40.89	41.03	42.36	44.42		
Wt. of can + dry soil (g)	38.43	38.4	39.9	41.46		
Wt. of dry soil (g)	10.09	10.22	10.84	12.72		
Wt. of water (g)	2.46	2.63	2.46	2.96		
Water Content (%)	24.38	25.73	22.69	23.27		
No. of Drops	25	16	34	27		
			1		·	l
Plastic Limit Determination	1	0		I esting E	quipment Us	
Sample No.	1	2	Plastic L	imit:		d Rolled X
Can No.	31	46	┨┠────		Mechanica	
Wt. of can (g)	38.44	39.16	Liquid Li	mit:		Manual X
Wt. of can + wet soil (g)	45.72	47.82			Med	hanical
Wt. of can + dry soil (g)	44.78	46.7	l .			
Wt. of dry soil (g)	6.34	7.54			st Method	
Wt. of water (g)	0.94	1.12	A	Х	В	
Water Content (%)	14.8	14.9			reparation M	ethod
Plastic limit		15	Wet	Х	Dry	
50 	uid Limit	Chart			Liqui	d Limit
Water Content (%) 00		v = -4.116ln(x R ² = 0.5) + 37.207 5529		Plast	24 ic Limit 15 c Index
Nater Cq					PL Standa	9

100 Number of Drops

0.01

0

10

Sample: 15% kaolinite & 8 Specimen Type: Air-dried	5% sand	Location:	N/A 11/6/2009	M	ixing Water: I Tested By: `	
specimen Type. All-uneu		Dale.	11/0/2003		Testeu Dy.	
Liquid Limit Determintation						
Sample No.	1	2	3			
Can No.	209	59	211			
Wt. of can (g)	28.17	28.33	28.17			
Wt. of can + wet soil (g)	38.22	41.79	40.79			
Wt. of can + dry soil (g)	36.61	39.48	38.5			
Wt. of dry soil (g)	8.44	11.15	10.33			
Wt. of water (g)	1.61	2.31	2.29			
Water Content (%)	19.08	20.72	22.17			
No. of Drops	32	20	15			
Plastic Limit Determination				Testing E	quipment Us	
Sample No.	1	2	Plastic L	imit	Hand Rolled	
Can No.	31	46			Mechanical	Device
Wt. of can (g)	38.42	39.14	Liquid L	imit		Manual X
Wt. of can + wet soil (g)	47.28	45.44		innit.	Mech	nanical
Wt. of can + dry soil (g)	46.3	44.75				
Wt. of dry soil (g)	7.88	5.61		Te	st Method	
Wt. of water (g)	0.98	0.69	Α	Х	В	
Water Content (%)	12.4	12.3	S	Specimen p	reparation Me	ethod
Plastic limit		2	Wet	Х	Dry	
Mater Content (%) 00 00 00 00 00 00 00 00 00 00 00 00 00	y	chart / = -4.101ln(> R ² = 0.9	<pre><) + 33.209 9912</pre>		2 Plastic 1 Plastic	d Limit 20 c Limit 2 c Index 8 d Deviation
0 1 0	Number o	f Drons		100		07

APPENDIX C

SPECIFIC GRAVITY

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING UNIVERSITY OF DELAWARE - GEOTECHNICAL LAB Specific Gravity of Soil Solids: ASTM D 854 - 06

Project Name: An experimental investigation o	t the behavior of compac	cted clay/sand	mixtures			
Sample Description: Light tan poorly graded m	edium to fine sand (SP)	Date: 11/12/2009				
Percent Passing No. 4 Sieve: 100% Metho	od Used: A	Tested By:	Yueru Cher			
		1	1			
Specimen No.	1	2	3			
Wt. of empty, clean pycnometer (g)	91.37	92.02	92.51			
Wt. of pycnometer + water (g)	340.44	341.14	341.39			
Wt. of pycnometer + dry soil + water (g)	377.82	378.40	378.81			
Pan No.	1	2	3			
Wt. of pan (g)	156.76	159.90	156.77			
Wt. of Pan + dry soil	216.80	219.73	216.76			
Wt. of dry soil (g)	60.04	59.83	59.99			
Temperature (°C)	23.9	24.0	24.0			
Temperature Coefficient (K)	0.99912	0.99909	0.99909			
G _s at test temperature (G _t)	2.65	2.65	2.66			
G _s at 20°C (G _{20°C})	2.65	2.65	2.66			
Average G _s		2.65				
Standard Deviation		0.0036				

Equation Used:

$$G_{t} = \frac{\rho_{s}}{\rho_{w,t}} = \frac{M_{s}}{\left(M_{pw,t} - \left(M_{pw,t} - M_{s}\right)\right)}$$

$$G_{20^{\circ}C} = K \times G_t$$

Note:

A vacuum was used to deair the soil slurry. The pycnometer was periodically (every 20 minutes) agitated under vacuum for 2 hours, and was then allowed to stand overnight under constant vacuum.

DEPARTMENT OF CIVIL UNIVERSITY OF D Specific Gravity	ELAWARE	- GEOTECI	HNICAL L	AB
Project Name: An experimental investi	gation of the beh	avior of compa	cted clay/sanc	I mixtures
Sample Description: Bentonite	<u> </u>		Date:	12/2/2009
Percent Passing No. 4 Sieve: 100%	Method Used:	А	Tested By:	Yueru Chen
Specimen No.		1	2	3
Wt. of empty, clean pycnometer (g)		92.61	91.37	91.37
Wt. of pycnometer + water (g)		345.42	344.18	344.24
Wt. of pycnometer + dry soil + water (g	g)	354.38	353.26	356.08
Pan No.		3	2	4
Wt. of pan (g)		159.76	156.69	159.72
Wt. of Pan + dry soil		174.25	171.36	178.90
Wt. of dry soil (g)		14.49	14.67	19.18
Temperature (°C)		23.0	23.1	23.9
Temperature Coefficient (K)		0.99933	0.99931	0.99912
G_s at test temperature (G_t)		2.62	2.62	2.61
G _s at 20°C (G _{20°C})		2.6185	2.6225	2.6108
Average G _s			2.62	
Standard Deviation			0.0049	

Equation Used:

Note:

$$G_{t} = \frac{\rho_{s}}{\rho_{w,t}} = \frac{M_{s}}{\left(M_{pw,t} - \left(M_{pws,t} - M_{s}\right)\right)}$$

 $G_{20^{\circ}C} = K \times G_t$

A vacuum was used to deair the soil slurry. The pycnometer was periodically (every 20 minutes) agitated under vacuum for 2 hours. A solution of sodium hexametaphosphate was used to disperse the sample, at the rate of 40 g of sodium hexametaphosphate/liter of solution. To avoid forming highly viscous fluid during the deairing process, the amount of soil solids being tested was less than the mass recommended by ASTM.

DEPARTMENT OF CIVIL UNIVERSITY OF DI				
Specific Gravity Project Name: An experimental investig				
Sample Description: Kaolinite		roompa	1	11/17/2009
Percent Passing No. 4 Sieve: 100%	Method Used: A			Yueru Chen
Specimen No.		1	2	3
Wt. of empty, clean pycnometer (g)		1.37	92.02	92.51
Wt. of pycnometer + water (g)	-	0.13	340.68	341.3
Wt. of pycnometer + dry soil + water (g)) 36	1.61	362.04	361.37
Pan No.		1	2	3
Wt. of pan (g)	15	6.73	159.72	156.72
Wt. of Pan + dry soil	19	1.57	194.41	189.30
Wt. of dry soil (g)	3.	4.84	34.69	32.58
Temperature (°C)	2	7.1	27.1	26.9
Temperature Coefficient (K)	0.9	9828	0.99828	0.99833
G_s at test temperature (G_t)		.61	2.60	2.60
G _s at 20°C (G _{20°C})	2.0	6033	2.5979	2.6000
Average G _s			2.60	1
Standard Deviation			0.0022	

Equation Used:

$$G_{t} = \frac{\rho_{s}}{\rho_{w,t}} = \frac{M_{s}}{(M_{pw,t} - (M_{pws,t} - M_{s}))}$$

$$G_{20^{\circ}C} = K \times G_t$$

Note:

A vacuum was used to deair the soil slurry. The pycnometer was periodically (every 20 minutes) agitated under vacuum for 2 hours, and was then allowed to stand overnight under constant vacuum. Air bubbles accumulated at the top of the water surface of the pycnometer. One possible source of error in the test is the effect of the air bubbles on the volume measurements.

APPENDIX D

DERIVATION OF THE EQUATION FOR CALCULATING THE SPECIFIC GRAVITY OF SAND/CLAY MIXTURES

W, W_{clay} , and W_{sand} represent the weights of sand/clay mixture, clay and sand respectively. *V*, V_{clay} , and V_{sand} represent the volumes of sand/clay mixture, clay, and sand respectively. The particle densities of clay, ρ_{clay} (g/cm3), sand, ρ_{sand} (g/cm3), and the clay content, α (%) are expressed in the following equations:

$$\rho_{clay} = \frac{W_{clay}}{V_{clay}}$$

$$\rho_{sand} = \frac{W_{sand}}{V_{sand}}$$

$$\alpha = \frac{W_{clay}}{W_{sand} + W_{clay}} \times 100$$
(C - 1)

Equation (B-1) can be rewritten as

$$W_{sand} = \frac{W_{clay}}{\frac{\alpha}{100}} - W_{clay} = W_{clay} \left(\frac{100}{\alpha} - 1\right) = W_{clay} \left(\frac{100 - \alpha}{\alpha}\right)$$
(C - 2)

Since,
$$\rho_{cs} = \frac{W}{V} = \frac{W_{clay} + W_{sand}}{V_{clay} + V_{sand}} = \frac{\left(\frac{W_{clay}}{W_{sand}}\right) + 1}{\left(\frac{V_{clay}}{W_{sand}}\right) + \left(\frac{V_{sand}}{W_{sand}}\right)} = \frac{\left(\frac{W_{clay}}{W_{sand}}\right) + 1}{\left(\frac{W_{clay}}{W_{sand}}\right) + \left(\frac{W_{clay}}{W_{sand}}\right) + \left$$

From equation (B-2), $\frac{W_{clay}}{W_{sand}} = \frac{\alpha}{100 - \alpha}$

Therefore,

$$\rho_{cs} = \frac{\left(\frac{\alpha}{100 - \alpha}\right) + 1}{\left(\frac{\alpha}{100 - \alpha}\right) \left(\frac{1}{\rho_{clay}}\right) + \left(\frac{1}{\rho_{sand}}\right)}$$
$$\rho_{cs} = \frac{\rho_{clay} + \left(\frac{100 - \alpha}{\alpha}\right) \rho_{clay}}{1 + \left(\frac{100 - \alpha}{\alpha}\right) \left(\frac{\rho_{clay}}{\rho_{sand}}\right)}$$

$$\rho_{cs} = \frac{\left(\frac{100}{\alpha}\right)\rho_{clay}}{1 + \left(\frac{100 - \alpha}{\alpha}\right)\left(\frac{\rho_{clay}}{\rho_{sand}}\right)}$$

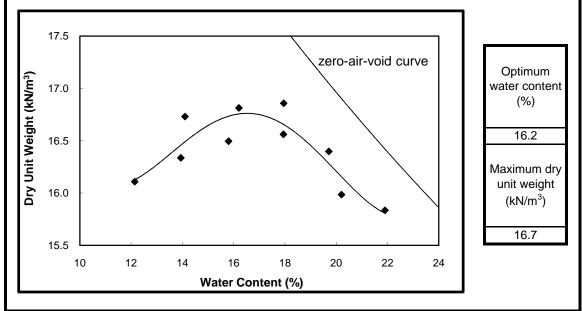
Since
$$G_s = \frac{\rho_{cs}}{\rho_w}$$
,
For $\rho_w = 1 g / cm^3$,
 $G_s = \rho_{cs} = \frac{\left(\frac{100}{\alpha}\right)\rho_{clay}}{1 + \left(\frac{100 - \alpha}{\alpha}\right)\left(\frac{\rho_{clay}}{\rho_{sand}}\right)}$
(C-3)

The specific gravity for each sand/clay mixture is Chapter 3 was calculated from equation (C-3).

APPENDIX E

PROCTOR COMPATION TEST DATA

Project Name: A	n experin	nental inv	estigatic/	on of the	behavior	of comp	acted cla	y/sand n	nixtures	
Method Used: A		Preparat	ion Meth	od Used	:	Moist	Ram	imer:	Ma	nual
Material Description:	L15B			Oversize	Fraction	:		0%	G _s :	2.65
Location: N/A		٦	ested B	/:	Yueru	Chen	Test	Date:	9/15/	2009
Determination of dry	unit we	eight								
Specimen No.	1	2	3	4	5	6	7	8	9	10
Water content, w%	12.1	13.9	14.1	15.8	16.2	17.9	18.0	19.7	20.2	21.9
Mold volume (cm ³)	940.7	937.2	937.2	937.2	940.7	940.7	937.2	940.7	937.2	937.2
Wt. of mold (g)	4226.7	4213.5	4232.0	4213.7	4227.3	4226.6	4217.2	4226.6	4217.1	4213.4
Wt. of mold + soil (g)	5959.0	5991.6	6055.7	6038.5	6100.8	6099.7	6116.7	6109.0	6052.6	6057.4
Wt. of wet soil (g)	1732.3	1778.1	1823.7	1824.8	1873.5	1873.1	1899.5	1882.4	1835.5	1844.0
Wet density (g/cm ³)	1.8	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Dry density (g/cm ³)	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6
Wet unit weight (kN/m ³)	18.1	18.6	19.1	19.1	19.5	19.5	19.9	19.6	19.2	19.3
Dry unit weight (kN/m ³)	16.1	16.3	16.7	16.5	16.8	16.6	16.9	16.4	16.0	15.8
Determination of zero-a	ir-void	curve								
Water content, w%	18.0	20.0	22.0	24.0	26.0					
Dry density (g/cm ³)	1.8	1.7	1.7	1.6	1.6					
Dry unit weight (kN/m ³)	17.6	17.0	16.4	15.9	15.4					



Low Energy Proctor Test

/lethod Use	ed: A	Pre	paration I	Method U	sed:	Moist	Ram	mer:	Mai	nual	
/laterial De	scription:	L25B			Oversize	Fraction:	0%		G _s :	2.64	
ocation:	N/A		Tested By: Yueru Chen Test Da						8/21/200	9	
Determin	nation of dry	unit we	ight								
Specime	en No.	1	2	3	4	5	6	7	8	9	
Water co	ntent, w%	14.0	14.5	16.2	17.6	18.3	19.9	20.6	22.0	22.2	
Mold volu	ume (cm ³)	937.2	940.7	943.8	942.9	942.9	937.2	942.9	942.9	937.2	
Wt. of mo	old (g)	4213.5	4227.1	4217.1	4207.7	4207.8	4213.5	4207.7	4207.8	4213.	
Wt. of mc	old + soil (g)	5937.0	5975.2	6021.9	6068.5	6058.4	6029.2	6061.2	6042.8	6051.9	
Wt. of we	et soil (g)	1723.5	1748.1	1804.8	1860.8	1850.6	1815.7	1853.5	1835.0	1838.4	
Wet dens	sity (g/cm ³)	1.8	1.9	1.9	2.0	2.0	1.9	2.0	1.9	2.0	
Dry densi	ity (g/cm ³)	1.6	1.6	1.6	1.7	1.7	1.6	1.6	1.6	1.6	
Wet unit	weight (kN/m ³)	18.0	18.2	18.8	19.4	19.3	19.0	19.3	19.1	19.2	
Dry unit v	veight (kN/m ³)	15.8	15.9	16.1	16.5	16.3	15.9	16.0	15.7	15.7	
Determina	ation of zero-a	ir-void c	urve								
Water co	ntent, w%	18.0	20.0	22.0	24.0						
Dry densi	ity (g/cm ³)	1.8	1.7	1.7	1.6						
Dry unit v	veight (kN/m ³)	17.5	16.9	16.4	15.8						
17.0			70	ro-air-v		20					
16.5 16.0 16.0 15.5	-	Zero-air-void curve Optimum wat content (%)									
16.0 16.0	•				•	•			1 Maxim		

18

Water Content (%)

20

22

24

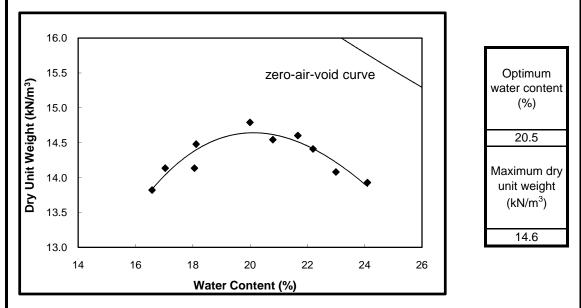
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14

16

Project Name:	: Ai	An experimental investigation of the behavior of compacted clay/sand mixtures									
Method Used:	А		F	Preparati	on Metho	od Used:	Moist	R	Rammer:	Manual	
Material Desc	ription:	L50B			С	versize l	Fraction:	0%		G _s :	2.63
Location:	N/A			Te	sted By:	Yueru C	hen	Te	est Date:	9/18/200)9
Determina	tion of dry	unit we	eight								
Specimen I	No.	1	2	3	4	5	6	7	8	9	10
Water conte	ent, w%	16.6	17.0	18.1	18.1	20.0	20.8	21.7	22.2	23.0	24.1
Mold volum	e (cm ³)	942.9	937.2	942.9	942.9	940.7	937.2	943.8	942.9	940.7	943.8
Wt. of mold	(g)	4207.8	4213.7	4207.9	4208.0	4227.2	4212.7	4217.4	4207.6	4225.8	4199.7
Wt. of mold	+ soil (g)	5756.6	5794.2	5812.0	5851.8	5929.2	5890.9	5926.6	5900.1	5886.7	5862.9
Wt. of wet s	oil (g)	1548.8	1580.5	1604.1	1643.8	1702.0	1678.2	1709.2	1692.5	1660.9	1663.2
Wet density	(g/cm ³)	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Dry density	(g/cm ³)	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.4	1.4
Wet unit we	ight (kN/m ³)	16.1	16.5	16.7	17.1	17.7	17.6	17.8	17.6	17.3	17.3
Dry unit wei	ght (kN/m ³)	13.8	14.1	14.1	14.5	14.8	14.5	14.6	14.4	14.1	13.9
Determinati	on of zero-a	ir-void	curve								
Water conte	ent, w%	20.0	22.0	24.0	26.0	28.0					
Dry density	(g/cm ³)	1.7	1.7	1.6	1.6	1.5					
Dry unit wei	ght (kN/m ³)	16.9	16.3	15.8	15.3	14.8					



Meth	nod Use	d: A		F	Preparati	on Metho	od Used:	Moist	F	Rammer:	Manual		
Mate	erial Des	cription:	S15B			0	versize l	Fraction:	0%		G _s :	2.65	
Loca	ation:	N/A			Te	sted By:	Yueru C	hen	Te	est Date:	e: 1/26/2009		
Det	ermin	ation of dry	unit we	eight									
S	pecimer	n No.	1	2	3	4	5	6	7	8	9	10	
W	ater con	itent, w%	10.0	12.1	13.3	14.3	14.9	16.4	17.1	18.2	19.0	19.8	
M	old volu	me (cm ³)	940.7	943.8	940.7	940.7	940.7	942.9	940.7	943.8	942.9	940.7	
W	t. of mol	d (g)	4227.1	4217.3	4227.5	4227.3	4227.2	4208.0	4227.5	4217.2	4205.0	4227.0	
W	t. of mol	d + soil (g)	6006.9	6073.4	6094.3	6135.1	6139.5	6148.1	6149.5	6153.4	6112.9	6130.4	
W	t. of wet	soil (g)	1779.8	1856.1	1866.8	1907.8	1912.3	1940.1	1922.0	1936.2	1907.9	1903.4	
W	et densi	ty (g/cm ³)	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	
Dr	ry densit	y (g/cm ³)	1.7	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	
W	et unit w	/eight (kN/m ³)	18.6	19.3	19.5	19.9	19.9	20.2	20.0	20.1	19.8	19.8	
Dr	ry unit w	eight (kN/m ³)	16.9	17.2	17.2	17.4	17.4	17.3	17.1	17.0	16.7	16.6	
Det	ermina	tion of zero-a	ir-void	curve									
W	ater con	itent, w%	16.0	18.0	20.0	22.0	24.0						
Dr	ry densit	y (g/cm ³)	1.9	1.8	1.7	1.7	1.6						
Dr	ry unit w	eight (kN/m ³)	18.2	17.6	17.0	16.4	15.9						
	18.0												
	47.5	-		zero-a	air-void ◆ ◆	curve		X			water of	mum conten %)	
(kN/m³)	17.5		•					\mathbf{X}					
Dry Unit Weight (kN/m ³)	17.5		•	•		•	\	\backslash			1	ļ	

Water Content (%)

16

18

20

22

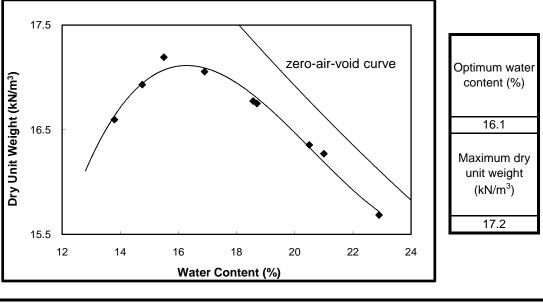
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12

14

on: I/A n of dry w% m ³) bil (g)	S25B unit we 1 13.8 940.7 4225.4			Oversize Yueru Cl 4 16.9	hen 5		est Date: 7	-	2.64 9
n of dry w% m ³)	1 13.8 940.7	ight 2 14.8	3 15.5	4	5				
w% m ³)	1 13.8 940.7	2 14.8	15.5		-	6	7	8	9
m ³)	13.8 940.7	14.8	15.5		-	6	7	8	9
m ³)	940.7			16.9	10.0				1
,		940.7	937.2		18.6	18.7	20.5	21.0	22.9
oil (g)	4225.4			940.7	940.7	942.9	942.9	942.9	940.7
oil (g)		4227.3	4213.2	4227.2	4227.3	4205.4	4208.1	4205.0	4227.2
	6036.5	6090.5	6110.2	6139.1	6134.5	6116.5	6102.4	6097.3	6075.8
g)	1811.1	1863.2	1897.0	1911.9	1907.2	1911.1	1894.3	1892.3	1848.6
cm ³)	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
m³)	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.6
(kN/m ³)	18.9	19.4	19.9	19.9	19.9	19.9	19.7	19.7	19.3
(kN/m ³)	16.6	16.9	17.2	17.1	16.8	16.8	16.4	16.3	15.7
of zero-a	ir-void c	urve							
w%	18.0	20.0	22.0	24.0					
:m ³)	1.8	1.7	1.7	1.6					
(kN/m ³)	17.5	16.9	16.4	15.8					
	•	•	•	zero-	air-void	curve		conte	nt (%)
	(kN/m ³) (kN/m ³)	m ³) 1.7 (kN/m ³) 18.9 (kN/m ³) 16.6 of zero-air-void c w% 18.0 rm ³) 1.8	m ³) 1.7 1.7 (kN/m ³) 18.9 19.4 (kN/m ³) 16.6 16.9 of zero-air-void curve w% 18.0 20.0 m ³) 1.8 1.7	xm ³) 1.7 1.7 1.8 (kN/m ³) 18.9 19.4 19.9 (kN/m ³) 16.6 16.9 17.2 of zero-air-void curve w% 18.0 20.0 22.0 xm ³) 1.8 1.7 1.7	m ³) 1.7 1.7 1.8 1.7 (kN/m ³) 18.9 19.4 19.9 19.9 (kN/m ³) 16.6 16.9 17.2 17.1 of zero-air-void curve w% 18.0 20.0 22.0 24.0 m ³) 1.8 1.7 1.7 1.6 (kN/m ³) 17.5 16.9 16.4 15.8	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	m ³) 1.7 1.7 1.8 1.7 1.7 1.7 (kN/m ³) 18.9 19.4 19.9 19.9 19.9 19.9 (kN/m ³) 16.6 16.9 17.2 17.1 16.8 16.8 of zero-air-void curve w% 18.0 20.0 22.0 24.0	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	m ³) 1.7 1.7 1.8 1.7 1.6 1.3 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.6 <th< td=""></th<>



lethod Use	d: A		F	Preparati	on Metho	d Used:	Moist	F	Rammer:	Manual	
laterial Des	cription:	S50B			0	versize F	raction:	0%		G _s :	2.63
ocation:	N/A			Те	sted By:	Yueru C	hen	Te	est Date:	10/18/2009	
Determina	ation of dry	unit we	eight								
Specimer	n No.	1	2	3	4	5	6	7	8	9	10
Water con	tent, w%	15.7	16.4	16.9	17.5	18.8	20.9	21.5	23.0	23.1	25.0
Mold volur	me (cm ³)	940.7	940.7	937.2	942.9	942.9	940.7	940.7	942.9	940.7	937.2
Wt. of mol	d (g)	4227.4	4227.4	4213.8	4208.0	4208.0	4225.8	4227.2	4208.0	4225.7	4213.
Wt. of mol	d + soil (g)	5864.8	5878.0	5886.4	5915.7	5938.5	5984.2	5985.4	5978.6	5999.5	5982.
Wt. of wet	soil (g)	1637.4	1650.6	1672.6	1707.7	1730.5	1758.4	1758.2	1770.6	1773.8	1768.
Wet densi	ty (g/cm ³)	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
Dry densit	y (g/cm ³)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Wet unit w	veight (kN/m ³)	17.1	17.2	17.5	17.8	18.0	18.3	18.3	18.4	18.5	18.5
Dry unit w	eight (kN/m ³)	14.8	14.8	15.0	15.1	15.2	15.2	15.1	15.0	15.0	14.8
Determina	tion of zero-a	ir-void	curve								
Water con	tent, w%	20.0	22.0	24.0	26.0	28.0					
Dry densit	y (g/cm ³)	1.7	1.7	1.6	1.6	1.5					
Dry unit w	eight (kN/m ³)	16.9	16.3	15.8	15.3	14.8					
16.0				zero-a	ir-void (curve				Optir	mum
15.5 tuber 15.0 tuber	-	*	-		•••	*				water o (%	conter

20

Water Content (%)

22

24

26

14.0 └ 14

16

18

Meth	ect Name: A	An experin		-	on Metho				ammer:			
Mate	erial Description:	M15B			0	versize F	raction:	0%		G _s :	2.65	
Loca	ation: N/A			Te	sted By:	Yueru C	hen	Te	est Date:	: 9/18/2009		
Det	termination of dry	unit we	eight									
S	Specimen No.	1	2	3	4	5	6	7	8	9	10	
W	/ater content, w%	8.3	8.4	10.2	10.5	11.3	11.7	13.8	14.1	15.5	15.7	
M	lold volume (cm ³)	937.2	940.7	937.2	937.2	943.8	937.2	937.2	940.7	940.7	937.2	
W	/t. of mold (g)	4213.3	4227.5	4213.3	4217.1	4216.5	4217.2	4213.3	4227.1	4226.4	4214.	
W	/t. of mold + soil (g)	6132.3	6152.0	6173.2	6211.3	6258.9	6268.3	6230.5	6263.3	6232.2	6209.	
W	/t. of wet soil (g)	1919.0	1924.5	1959.9	1994.2	2042.4	2051.1	2017.2	2036.2	2005.8	1994.	
W	/et density (g/cm ³)	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	
Dry density (g/cm ³)		1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.8	
Wet unit weight (kN/m ³)		20.1	20.1	20.5	20.9	21.2	21.5	21.1	21.2	20.9	20.9	
Dr	ry unit weight (kN/m ³)	18.5	18.52	18.6	18.9	19.1	19.2	18.56	18.62	18.11	18.1	
Det	ermination of zero-	air-void	curve									
W	/ater content, w%	10.0	12.0	14.0	16.0	18.0						
Dr	ry density (g/cm ³)	2.1	2.0	1.9	1.9	1.8						
Dr	ry unit weight (kN/m ³)	20.5	19.7	18.9	18.2	17.6						
			<u></u>	.		11.0						
	20.0											
kN/m ³)	20.0 19.5 19.0			•		zero-air	-void c	urve		water o	mum conter %)	
Dry Unit Weight (kN/m³)	19.5		•	•	2		-void c	urve		water o (% 11 Maxim	conter %)	

12

Water Content (%)

14

16

18

17.0 6

8

10

Material Descrip Location: Determinati Specimen No Water conten Mold volume Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	N/A ion of dry lo. (cm ³) g) + soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	M25B unit we 1 8.2 940.7 4227.4 6120.8 1893.4 2.0 1.9 19.7	2 8.4 940.7 4226.2 6074.1 1847.9 2.0 1.8	ad By: 3 10.4 940.7 4226.5 6196.6 1970.1 2.1	4 10.5 942.9 4207.8 6185.1 1977.3 2.1		6 12.5 942.9 4205.2 6216.8 2011.6	Test 7 13.8 940.7 4226.0 6242.8	% Date: 8 14.8 942.9 4205.4 6228.2 2022.8	10/2/ 9 15.9 937.2 4212.9 6203.2	2.64 (2009 10 15.95 937.15 4216.9 6222.4
Determinati Specimen No Water conten Mold volume Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	ion of dry io. t, w% (cm ³) g) + soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	1 8.2 940.7 4227.4 6120.8 1893.4 2.0 1.9	2 8.4 940.7 4226.2 6074.1 1847.9 2.0 1.8	3 10.4 940.7 4226.5 6196.6 1970.1 2.1	4 10.5 942.9 4207.8 6185.1 1977.3	5 12.0 937.2 4213.1 6217.1 2004.0	12.5 942.9 4205.2 6216.8	7 13.8 940.7 4226.0 6242.8	8 14.8 942.9 4205.4 6228.2	9 15.9 937.2 4212.9 6203.2	10 15.95 937.15 4216.9
Specimen New Water content Mold volume Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	lo. (cm ³) g) ⊢ soil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	1 8.2 940.7 4227.4 6120.8 1893.4 2.0 1.9	2 8.4 940.7 4226.2 6074.1 1847.9 2.0 1.8	10.4 940.7 4226.5 6196.6 1970.1 2.1	10.5 942.9 4207.8 6185.1 1977.3	12.0 937.2 4213.1 6217.1 2004.0	12.5 942.9 4205.2 6216.8	13.8 940.7 4226.0 6242.8	14.8 942.9 4205.4 6228.2	15.9 937.2 4212.9 6203.2	15.95 937.15 4216.9
Water conten Mold volume Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	nt, w% (cm ³) g) ⊦ soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	8.2 940.7 4227.4 6120.8 1893.4 2.0 1.9	8.4 940.7 4226.2 6074.1 1847.9 2.0 1.8	10.4 940.7 4226.5 6196.6 1970.1 2.1	10.5 942.9 4207.8 6185.1 1977.3	12.0 937.2 4213.1 6217.1 2004.0	12.5 942.9 4205.2 6216.8	13.8 940.7 4226.0 6242.8	14.8 942.9 4205.4 6228.2	15.9 937.2 4212.9 6203.2	15.95 937.15 4216.9
Mold volume Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	(cm ³) g) ⊢ soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	940.7 4227.4 6120.8 1893.4 2.0 1.9	940.7 4226.2 6074.1 1847.9 2.0 1.8	940.7 4226.5 6196.6 1970.1 2.1	942.9 4207.8 6185.1 1977.3	937.2 4213.1 6217.1 2004.0	942.9 4205.2 6216.8	940.7 4226.0 6242.8	942.9 4205.4 6228.2	937.2 4212.9 6203.2	937.15 4216.9
Wt. of mold (Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	g) ⊢ soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	4227.4 6120.8 1893.4 2.0 1.9	4226.2 6074.1 1847.9 2.0 1.8	4226.5 6196.6 1970.1 2.1	4207.8 6185.1 1977.3	4213.1 6217.1 2004.0	4205.2 6216.8	4226.0 6242.8	4205.4 6228.2	4212.9 6203.2	4216.9
Wt. of mold + Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	+ soil (g) iil (g) (g/cm ³) g/cm ³) ght (kN/m ³)	6120.8 1893.4 2.0 1.9	6074.1 1847.9 2.0 1.8	6196.6 1970.1 2.1	6185.1 1977.3	6217.1 2004.0	6216.8	6242.8	6228.2	6203.2	
Wt. of wet so Wet density (Dry density (Wet unit weig Dry unit weig	(g/cm ³) g/cm ³) ght (kN/m ³)	1893.4 2.0 1.9	1847.9 2.0 1.8	1970.1 2.1	1977.3	2004.0					6222.4
Wet density (Dry density (Wet unit weig Dry unit weig	(g/cm ³) g/cm ³) ght (kN/m ³)	2.0 1.9	2.0 1.8	2.1			2011.6	2016.8	2022.8		
Dry density (g Wet unit weig Dry unit weig	g/cm ³) ght (kN/m ³)	1.9	1.8		2.1	21			2022.0	1990.3	2006
Wet unit weig Dry unit weig	ght (kN/m ³)		-	4.0		2.1	2.1	2.1	2.1	2.1	2.14
Dry unit weig		19.7		1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.85
	ht (kN/m ³)		19.3	20.5	20.6	21.0	20.9	21.0	21.0	20.8	20.99
Determinatio		18.2	17.8	18.6	18.6	18.7	18.6	18.5	18.3	18.0	18.11
	on of zero-a	ir-void (curve								
Water conten	nt, w%	12.0	14.0	16.0	18.0						
Dry density (g/cm ³)	2.0	1.9	1.9	1.8						
Dry unit weig	ht (kN/m ³)	19.6	18.9	18.2	17.5						
19.0 [(KN/m ³) 18.5 - 18.0 -	•		•	•		zero-a	ir-void	curve		water o (%	%) .8

12

Water Content (%)

14

16

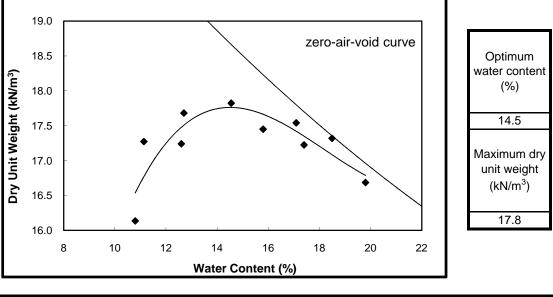
18

17.5 L

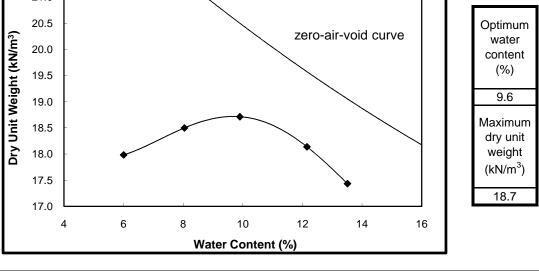
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10

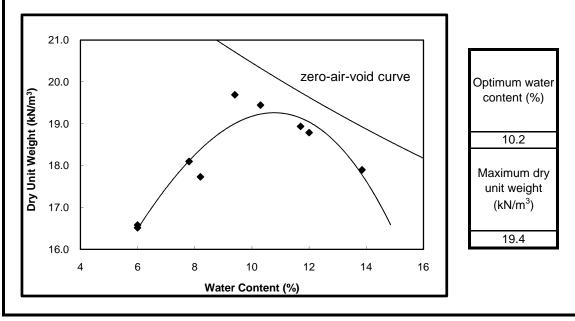
Meth	nod Used:	А		Preparat	ion Meth	od Used	:	Moist	Ram	mer:	Mai	nual
Mate	erial Descrip	tion:	M50B		(Oversize	Fraction	:		0%	G _s :	2.63
Loca	ation:	N/A		Т	ested By	/:	Yueru Chen		Test Date:		10/7/2009	
Det	erminatio	on of dry	unit we	eight								
S	pecimen No).	1	2	3	4	5	6	7	8	9	10
W	ater content	., w%	10.8	11.1	12.6	12.7	14.6	15.8	17.1	17.4	18.5	19.8
M	old volume ((cm ³)	942.9	940.7	940.7	940.7	937.2	940.7	940.7	937.2	937.2	940.7
W	Wt. of mold (g) Wt. of mold + soil (g) Wt. of wet soil (g) Wet density (g/cm ³)		4207.7	4226.0	4227.1	4225.7	4213.2	4227.6	4226.3	4217.2	4213.0	4219.6
W	Wt. of mold + soil (g)		5926.0	6066.9	6088.7	6136.5	6163.5	6165.3	6195.7	6148.9	6173.2	6136.5
W	Wt. of wet soil (g)		1718.3	1840.9	1861.6	1910.8	1950.3	1937.7	1969.4	1931.7	1960.2	1916.9
Wet density (g/cm ³)		1.8	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	
Dr	ry density (g	/cm ³)	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7
W	Wet unit weight (kN/m ³)		17.9	19.2	19.4	19.9	20.4	20.2	20.5	20.2	20.5	20.0
Dr	ry unit weigh	nt (kN/m ³)	16.1	17.3	17.2	17.7	17.8	17.4	17.5	17.2	17.3	16.7
Dete	erminatior	n of zero-a	ir-void	curve								
W	ater conte	nt, w%	12.0	14.0	16.0	18.0	20.0	22.0				
D	ry density ((g/cm ³)	2.0	1.9	1.9	1.8	1.7	1.7				
D	ry unit weig	ght (kN/m ³)	19.6	18.9	18.2	17.5	16.9	16.3				
N/m ³)	19.0 18.5 18.0						zero-ai	r-void d	curve		Optir water c (%	
eight (kN/m ³)	17.5 -			•	•	•					14	.5



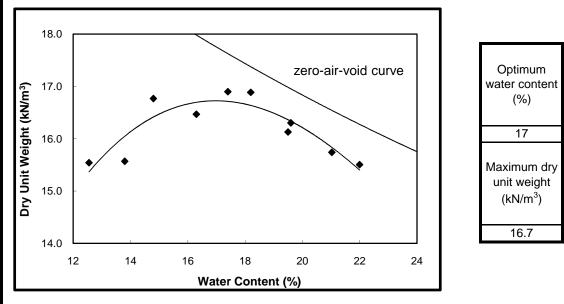
Aethod Used: Aaterial Desci			Prenaration I	Method Used:	Moiet	Rammer:	Monual
		L15K		size Fraction:			2.64
ocation:	N/A	LINK		Yueru Chen	078	Test Date:	
	tion of dry u	nit weight	Toolog Dy:			Tool Date:	2,0,2000
Specimen I		1	2	3	4	5	
Water conte	ent, w%	6.0	8.0	9.9	12.2	13.5	
Mold volum	e (cm ³)	942.9	940.7	937.2	942.9	942.9	
Wt. of mold	(g)	4205.4	4227.5	4227.5	4205.4	4205.4	
Wt. of mold	+ soil (g)	6037.7	6144.1	6192.2	6160.7	6107.6	
Wt. of wet s	oil (g)	1832.3	1916.6	1964.7	1955.3	1902.2	
Wet density	(g/cm ³)	1.9	2.0	2.1	2.1	2.0	
Dry density	(g/cm ³)	1.8	1.9	1.9	1.8	1.8	
Wet unit we	ight (kN/m ³)	19.1	20.0	20.6	20.3	19.8	
Dry unit wei	ght (kN/m ³)	18.0	18.5	18.7	18.1	17.4	
Determinati	on of zero-air	-void curve					
Water conte	ent, w%	8.0	10.0	12.0	14.0	16.0	
Dry density	(g/cm ³)	2.2	2.1	2.0	1.9	1.9	
Dry unit wei	ght (kN/m ³)	21.3	20.5	19.6	18.9	18.2	



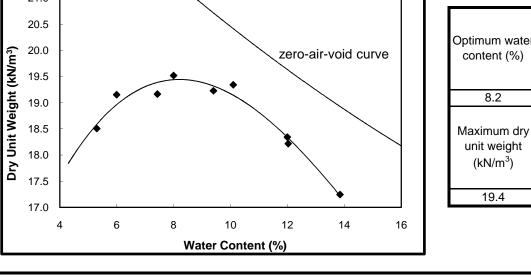
Project Name: An experimental investigation of the behavior of compacted clay/sand mixtures Method Used: Preparation Method Used: Rammer: Manual А Moist Material Description: L25K Oversize Fraction: 0% G_s: 2.64 N/A Tested By: Yueru Chen Test Date: 2/10/2009 Location: Determination of dry unit weight Specimen No. 3 4 5 6 7 8 9 1 2 11.7 Water content, w% 6.0 6.0 7.8 8.2 9.4 10.3 12 13.85 Mold volume (cm³) 940.7 937.2 940.7 940.9 937.2 937.15 937.15 937.15 940.74 Wt. of mold (g) 4227.5 4214.0 4227.2 4205.4 4213.9 4205.4 4214.0 4205.4 4227.5 Wt. of mold + soil (g) 5906.3 5892.9 6098.2 6045.4 6271.8 6254.2 6234.6 6215.5 6181.5 Wt. of wet soil (g) 1678.8 1678.9 1840.0 2057.9 1954 1871.0 2049 2021 2010 Wet density (g/cm³) 1.8 1.8 2.0 2.0 2.2 2.19 2.16 2.14 2.08 1.7 1.7 1.8 1.8 2.0 1.98 1.93 1.92 1.82 Dry density (g/cm³) Wet unit weight (kN/m³) 17.5 17.6 19.5 19.2 21.5 21.45 21.15 21.04 20.38 Dry unit weight (kN/m³) 16.5 16.6 18.1 17.7 19.7 19.44 18.94 18.79 17.90 Determination of zero-air-void curve Water content, w% 8.0 10.0 12.0 14.0 16.0 Dry density (g/cm³) 2.2 2.1 2.0 1.9 1.9 18.2 Dry unit weight (kN/m³) 21.3 20.5 19.6 18.9



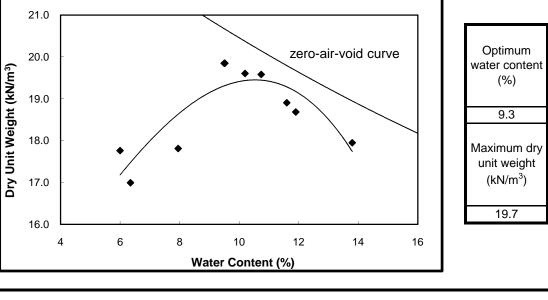
Project Name: An experimental investigation of the behavior of compacted clay/sand mixtures											
Method Used: A	1		F	Preparati	on Metho	od Used:	Moist	F	Rammer:	Manual	
Material Descripti	on:	L50K			С	versize l	Fraction:	0%		G _s :	2.62
Location: N	J/A			Те	sted By:	Yueru C	hen	Te	est Date:	2/11/200)9
Determinatio	n of dry	unit we	eight								
Specimen No.		1	2	3	4	5	6	7	8	9	10
Water content,	w%	12.55	13.80	14.80	16.30	17.40	18.20	19.50	19.60	21.03	22.00
Mold volume (c	m ³)	940.7	940.7	940.7	940.7	940.7	942.9	940.7	940.7	942.9	940.7
Wt. of mold (g)		4227.1	4227.5	4227.2	4227.5	4227.1	4205.4	4227.4	4227.5	4207.7	4227.5
Wt. of mold + soil (g)		5904.5	5926.6	6073.0	6063.9	6129.5	6123.6	6075.5	6097.3	6038.9	6041.5
Wt. of wet soil (g)		1677.4	1699.1	1845.8	1836.4	1902.4	1918.2	1848.1	1869.8	1831.2	1814.0
Wet density (g/	cm ³)	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9
Dry density (g/c	;m ³)	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.7	1.6	1.6
Wet unit weight	(kN/m ³)	17.5	17.7	19.2	19.1	19.8	20.0	19.3	19.5	19.1	18.9
Dry unit weight	(kN/m ³)	15.5	15.6	16.8	16.5	16.9	16.9	16.1	16.3	15.7	15.5
Determination	of zero-a	ir-void	curve								
Water content,	w%	16.0	18.0	20.0	22.0	24.0					
Dry density (g/c	2m ³)	1.8	1.8	1.7	1.7	1.6					
Dry unit weight	(kN/m ³)	18.1	17.4	16.8	16.3	15.8					



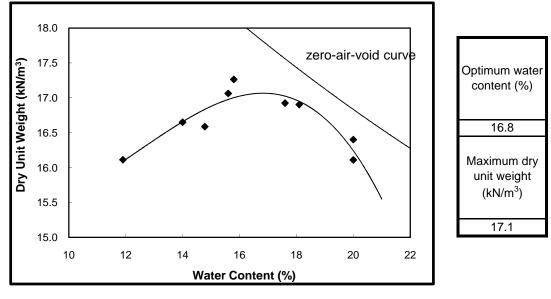
								Rammer: Manual			
laterial Description:	S15K			Oversize	Fraction:	0%		G _s :	2.64		
ocation: N/A		Τe	ested By:	Yueru Cl	nen	T	est Date:	1/26/2009			
Determination of dry	unit we	ight									
Specimen No.	1	2	3	4	5	6	7	8	9		
Water content, w%	5.3	6.0	7.4	8.0	9.4	10.1	12.0	12.0	13.9		
Mold volume (cm ³)	942.9	937.2	942.9	937.2	942.9	942.9	942.9	940.7	942.9		
Wt. of mold (g)	4205.4	4213.8	4205.4	4213.9	4205.4	4207.8	4205.4	4227.3	4205.		
Wt. of mold + soil (g)	6078.5	6153.3	6184.4	6227.9	6227.3	6254.7	6167.2	6197.5	6092.		
Wt. of wet soil (g)	1873.1	1939.5	1979.0	2014.0	2021.9	2046.9	1961.8	1970.2	1887.		
Wet density (g/cm ³)	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0		
Dry density (g/cm ³)	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8		
Wet unit weight (kN/m ³)	20.3	20.6	21.1	21.0	21.3	20.4	20.5	19.6			
Dry unit weight (kN/m ³)	18.5	19.2	19.2	19.5	19.2	19.3	18.2	18.3	17.2		
etermination of zero-a	ir-void c	urve									
Water content, w%	10.0	12.0	14.0	16.0							
Dry density (g/cm ³)	2.2	2.1	2.0	1.9	1.9						
Dry unit weight (kN/m ³)	21.3	20.5	19.6	18.9	18.2						
21.0 20.5 20.0 19.5 19.0 18.5	•		•	zero-a	ir-void c	curve		Optimu conte	nt (%		



Met	hod Us	ed: A		Pre	paration	Method	d Used:	Moist	Ram	mer:	Mar	nual
Mat	erial De	escription:	S25K		Overs	size Fra	ction:		0'	%	G _s :	2.64
Loc	ation:	N/A		Tested By:			Yueru Chen		Test Date:		1/23/2009	
Det	termin	ation of dry	unit we	eight								
S	Specime	n No.	1	2	3	4	5	6	7	8	9	10
W	/ater cor	ntent, w%	6.0	6.4	8.0	9.5	9.5	10.2	10.7	11.6	11.9	13.8
М	old volu	me (cm ³)	937.2	942.9	942.9	940.7	942.9	937.2	943.8	942.9	940.7	942.9
Wt. of mold (g)			4214.0	4205.4	4205.4	4227.0	4205.4	4214.1	4216.5	4205.4	4227.3	4205.4
Wt. of mold + soil (g)		6012.6	5942.6	6053.6	6311.1	6295.0	6278.0	6302.7	6233.3	6232.4	6168.8	
W	/t. of wet	t soil (g)	1798.6	1737.2	1848.2	2084.1	2089.6	2063.9	2086.2	2027.9	2005.1	1963.4
Wet density (g/cm ³)			1.9	1.8	2.0	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Dry density (g/cm ³)		1.8	1.7	1.8	2.0	2.0	2.0	2.0	1.9	1.9	1.8	
Wet unit weight (kN/m ³)		18.8	18.1	19.2	21.7	21.7	21.6	21.7	21.1	20.9	20.4	
D	ry unit w	veight (kN/m ³)	17.8	17.0	17.8	19.8	19.9	19.6	19.6	18.9	18.7	17.9
Det	ermina	tion of zero-a	ir-void	curve								
Ν	/ater co	ontent, w%	8.0	10.0	12.0	14.0	16.0					
D	ry dens	sity (g/cm ³)	2.2	2.1	2.0	1.9	1.9					
D	ry unit	weight (kN/m ³)	21.3	20.5	19.6	18.9	18.2					
Weight (kN/m ³)	21.0 20.0 19.0	-			•	Ze	ero-air-v	void cur	rve		Optin water c (%	content

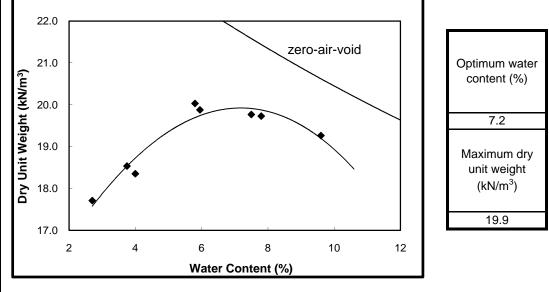


Project Name: An	experime	ntal inves	tigation o	f the beha	avior of co	ompacted	clay/san	d mixtures	S
Method Used: A	Pre	paration I	Method U	sed:	Moist	Ram	mer:	Ma	nual
Material Description:	S50K	Oversize Fract				0	%	G _s :	2.62
Location: N/A		Tested By: Yueru Chen				Test	Date:	1/29/2009	
Determination of dry	unit we	ight							
Specimen No.	1	2	3	4	5	6	7	8	9
Water content, w%	11.9	14.0	14.8	15.6	15.8	17.6	18.1	20.0	20.0
Mold volume (cm ³)	942.9	937.2	942.9	942.9	940.7	940.7	942.9	942.9	937.2
Wt. of mold (g)	4205.4	4214.0	4205.4	4205.4	4227.2	4227.2	4205.4	4205.4	4214.0
Wt. of mold + soil (g)	5938.4	6027.3	6035.3	6101.3	6144.3	6135.8	6124.3	6097.1	6060.8
Wt. of wet soil (g)	1733.0	1813.3	1829.9	1895.9	1917.1	1908.6	1918.9	1891.7	1846.8
Wet density (g/cm ³)	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Dry density (g/cm ³)	1.6	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.6
Wet unit weight (kN/m ³)	18.0	19.0	19.0	19.7	20.0	19.9	20.0	19.7	19.3
Dry unit weight (kN/m ³)	16.1	16.7	16.6	17.1	17.3	16.9	16.9	16.4	16.1
Determination of zero-a	ir-void c	urve							
Water content, w%	14.0	16.0	18.0	20.0	22.0				
Dry density (g/cm ³)	1.9	1.8	1.8	1.7	1.7				
Dry unit weight (kN/m ³)	18.8	18.1	17.4	16.8	16.3				



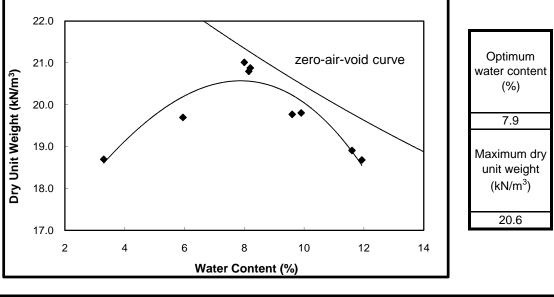
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING UNIVERSITY OF DELAWARE - GEOTECHNICAL LAB Modified Proctor Test: ASTM D 1557

Method Used: A	Pr	eparation I	Method Us	ed:	Moist	Ram	imer:	Manual
Material Description:	M15K		Oversize	Fraction:		0%	G _s :	2.64
Location: N/A	Teste	ed By:	Yueru Ch	en	Test	Date:	1/30/	/2009
Determination of dry	unit wei	ght						
Specimen No.	1	2	3	4	5	6	7	8
Water content, w%	2.7	3.8	4.0	5.8	6.0	7.5	7.8	9.6
Mold volume (cm ³)	942.9	942.9	937.2	940.7	940.7	937.2	940.7	940.7
Wt. of mold (g)	4205.4	4205.2	4213.6	4227.1	4227.8	4213.7	4227.5	4227.5
Wt. of mold + soil (g)	5953.6	6053.5	6036.8	6259.4	6247.4	6243.5	6266.9	6252.2
Wt. of wet soil (g)	1748.2	1848.3	1823.2	2032.3	2019.6	2029.8	2039.4	2024.7
Wet density (g/cm ³)	1.9	2.0	1.9	2.2	2.1	2.2	2.2	2.2
Dry density (g/cm ³)	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0
Wet unit weight (kN/m ³)	18.2	19.2	19.1	21.2	21.1	21.2	21.3	21.1
Dry unit weight (kN/m ³)	17.7	18.53	18.4	20.0	19.9	19.8	19.73	19.3
Determination of zero-a	air-void cu	urve						
Water content, w%	4.0	6.0	8.0	10.0	12.0			
Dry density (g/cm ³)	2.4	2.3	2.2	2.1	2.0			
Dry unit weight (kN/m ³)	23.4	22.3	21.3	20.5	19.6			



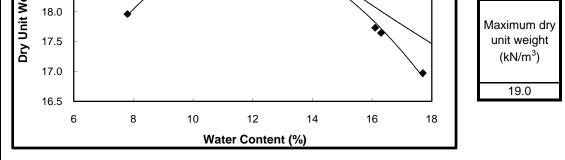
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING UNIVERSITY OF DELAWARE - GEOTECHNICAL LAB Modified Proctor Test: ASTM D 1557

	od Used: A		Preparat	ion Meth	od Used		Moist	Ram	mer:	Mar	nual
	erial Description:	M25K		Over	rsize Fra	ction:		0'	%	G _s :	2.64
.oca	tion: N/A		Teste	ed By:	Yueru C	hen		Test	Date:	1/29/	2009
Det	ermination of dry	unit we	eight								
S	pecimen No.	1	2	3	4	5	6	7	8	9	
Wa	ater content, w%	3.3	6.0	8.0	8.2	8.2	9.6	9.9	11.6	11.9	
Mo	old volume (cm ³)	942.9	937.2	937.2	940.7	940.7	940.7	937.2	942.9	937.2	
Wt	t. of mold (g)	4205.4	4213.7	4213.7	4225.5	4227.2	4228.3	4213.8	4205.3	4213.6	
Wt	t. of mold + soil (g)	6061.8	6207.3	6381.8	6382.7	6393.8	6306.2	6293.2	6233.6	6211.1	
Wt	t. of wet soil (g)	1856.4	1993.6	2168.1	2157.2	2166.6	2077.9	2079.4	2028.3	1997.5	
We	et density (g/cm ³)	2.0	2.1	2.3	2.3	2.3	2.2	2.2	2.2	2.1	
Dr	y density (g/cm ³)	1.9	2.0	2.1	2.1	2.1	2.0	2.0	1.9	1.9	
We	et unit weight (kN/m ³)	19.3	20.9	22.7	22.5	22.6	21.7	21.8	21.1	20.9	
Dr	y unit weight (kN/m ³)	18.7	19.7	21.0	20.8	20.9	19.8	19.8	18.9	18.7	
Dete	ermination of zero-a	ir-void	curve								
Wa	ater content, w%	6.0	8.0	10.0	12.0	14.0					
Dr	y density (g/cm ³)	2.3	2.2	2.1	2.0	1.9					
Dr	y unit weight (kN/m ³)	22.3	21.3	20.5	19.6	18.9					



DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING UNIVERSITY OF DELAWARE - GEOTECHNICAL LAB Modified Proctor Test: ASTM D 1557

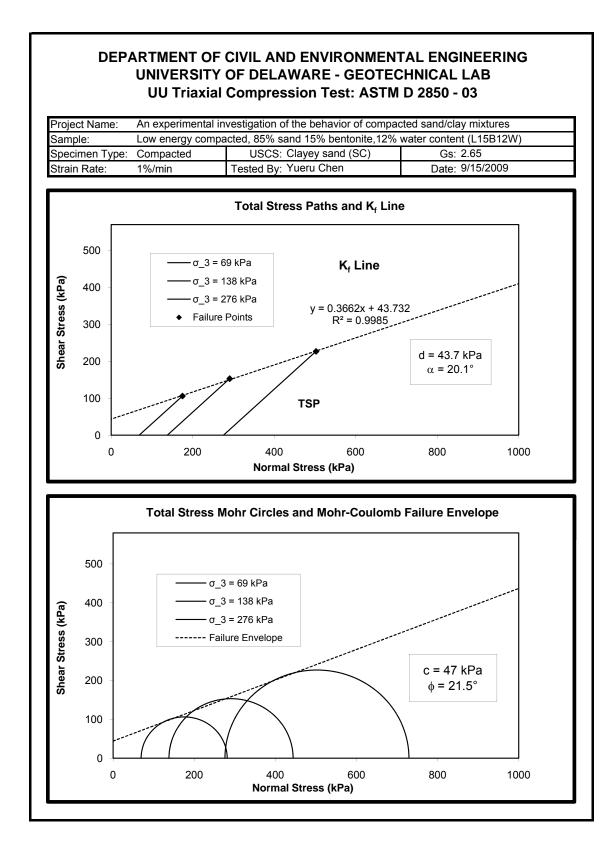
Alethod Used: A			Preparat	ion Meth	od Used		Moist	Ram	mer:	Mar	nual
Aaterial Descriptio	n:	M50K		(Oversize	Fraction	:		0%	G _s :	2.62
ocation: N/	/A		Т	ested By	/:	Yueru	Chen	Test	Date:	2/2/2	2009
Determination	of dry	unit we	eight								
Specimen No.		1	2	3	4	5	6	7	8	9	
Water content, w	v%	7.8	9.4	10.0	12.2	14.0	14.4	16.1	16.3	17.7	
Mold volume (cn	n ³)	942.9	940.7	940.7	940.7	937.2	942.9	942.9	937.2	940.7	
Wt. of mold (g)		4205.3	4227.3	4227.5	4227.0	4213.7	4205.4	4205.8	4213.9	4227.5	
Wt. of mold + so	il (g)	6066.2	6182.4	6193.9	6269.4	6246.5	6248.5	6184.4	6174.2	6143.4	
Wt. of wet soil (g	1)	1860.9	1955.1	1966.4	2042.4	2032.8	2043.1	1978.6	1960.3	1915.9	
Wet density (g/c	m³)	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	
Dry density (g/cr	m ³)	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.7	
Wet unit weight	(kN/m ³)	19.4	20.4	20.5	21.3	21.3	21.3	20.6	20.5	20.0	
Dry unit weight (kN/m³)	18.0	18.6	18.6	19.0	18.7	18.6	17.7	17.6	17.0	
Determination of	of zero-a	ir-void (curve								
Water content,	w%	10.0	12.0	14.0	16.0	18.0	20.0	22.0			
Dry density (g/	'cm ³)	2.1	2.0	1.9	1.8	1.8	1.7	1.7			
Dry unit weight	t (kN/m ³)	20.4	19.6	18.8	18.1	17.5	16.9	16.3			
20.0 19.5 19.0 19.0 18.5 18.0 18.0 17.5			•	•	zer	o-air-vo	bid curv	re		Optir water c (%	conte 6)
10.0 17.5	•							\searrow		Maxim unit w	



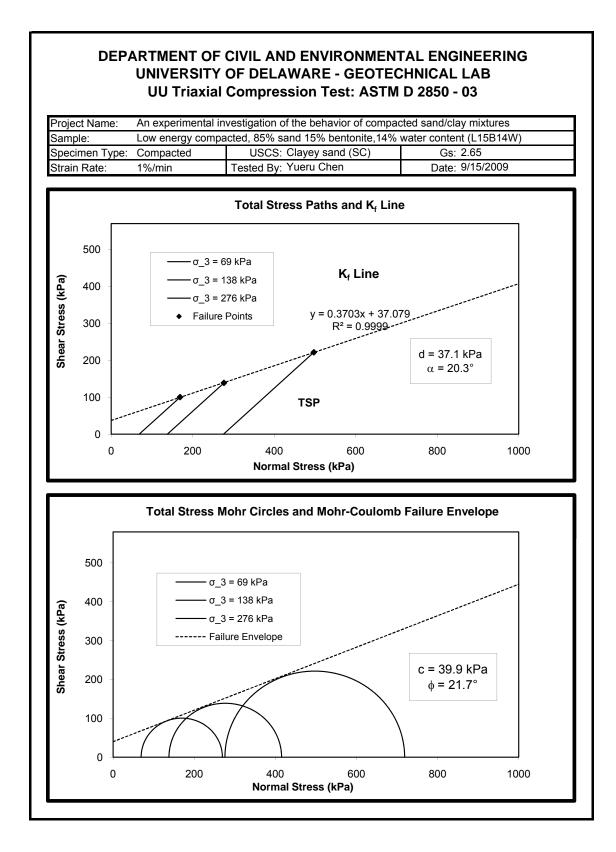
APPENDIX F

UU TRIAXIAL DATA

	An experimental ir						
	Low energy comp						/)
Specimen Type:			Clayey sand			2.65	
Strain Rate:	1%/min	Tested By:	Yueru Chen		Date:	9/15/2009	
			Trimming			Specimen	
Sampl	le No.	1	2	3	1	2	3
Tin No.		4	FJ-5	46	201	209	31
Wt. of Tin (g)		28.7	28.0	28.9	28.9	28.2	28.4
Wt. of Tin + Wet	soil (g)	119.6	93.2	147.6	161.1	156.9	155.8
Wt. of Tin + Dry	soil (g)	109.7	86.1	134.9	146.5	143.0	141.7
Wt. of Dry Soil (g)	81.0	58.1	106.0	117.6	114.8	113.3
Wt. of Water (g)		9.9	7.1	12.7	14.6	13.9	14.1
Water Content (,	12.2	12.2	12.0	12.4	12.1	12.4
Average Water (Content (%)		12.1			12.3	
Samp	le No.	1	2	3	- 8		
Cell Pressure (k		68.95	137.90	275.79			
Average Height,	,	7.12	7.09	7.09			2
Average Diamet	()	3.56	3.52	3.53			15
Dry Unit Weight	-	16.32	16.30	15.99	1.00		112
Initial Void ratio		0.59	0.60	0.63	1.1	S. C. L.	12
Saturation (%)		0.55	0.54	0.53	84		3
Strain at Failure	(%)	14.06	14.81	14.83			
Max Deviator St	ress (kPa)	215.3	309.1	457.0			12-
Membrane Corre	ection (kPa)	3.1	3.3	3.3	6	23 200	
Corrected Devia	tor Stress (kPa)	212.2	305.8	453.7	E.	100 100	
Corrected Major	Stress (kPa)	281.1	443.7	729.5			
500 400 300	UU Triaxial - Str	= 276 kPa	:urve = 138 kPa				123
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 6 Axial S	σ ₃ 9 Strain (%)	= 69 kPa 12	15			154

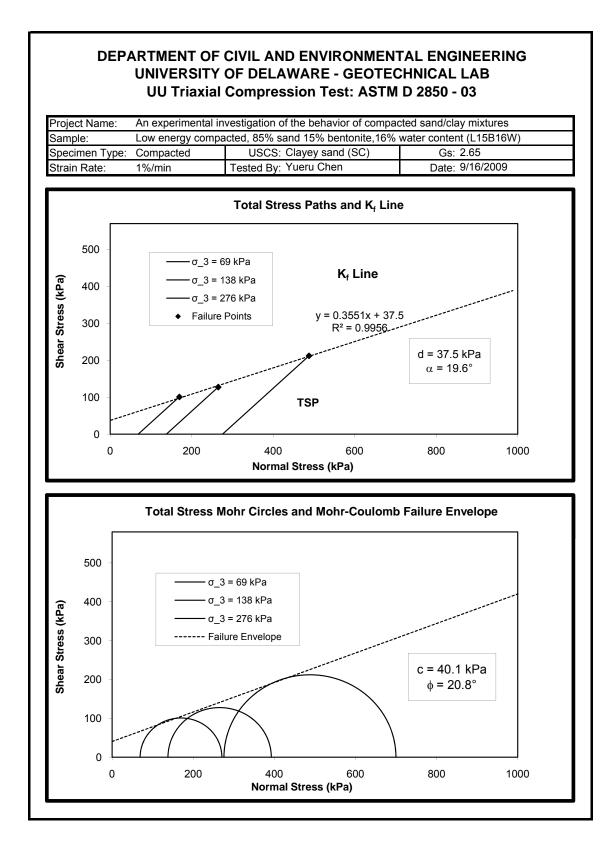


Project Name: An experimental i	nvestigation of	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Low energy comp				water conte	nt (L15B14W	/)
Specimen Type: Compacted	USCS:	Clayey sand	I (SC)	Gs:	2.65	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	9/15/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	ь В-19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil (g)	143.2	102.9	108.2	158.6	159.2	160.9
Wt. of Tin + Dry soil (g)	129.2	93.7	98.4	142.6	143.1	144.7
Wt. of Dry Soil (g)	100.70	65.80	70.30	115.2	115.1	116.5
Wt. of Water (g)	14.00	9.20	9.80	16.0	16.1	16.2
Water Content (%)	13.90	13.98	13.94	13.9	14.0	13.9
Average Water Content (%)		13.9			13.9	
		1		1 m	Service in the	
Sample No.	1	2	3	12		1.
Cell Pressure (kPa)	68.95	137.90	275.79			4
Average Height, L (cm)	7.11	7.10	7.15	100		15
Average Diameter, D (cm)	3.52	3.52	3.54	100	1 3 3	2
Dry Unit Weight (kN/m ³)	16.32	16.37	16.24		22.1	14
Initial Void ratio	0.59	0.59	0.60		A CONTRACT	S
Saturation (%)	0.62	0.63	0.61	13		-
Strain at Failure (%)	14.33	14.58	14.81	140		and the second
Max Deviator Stress (kPa) Membrane Correction (kPa)	203.6 3.2	280.9 3.2	446.1 3.3	- Constant	A start	-
Corrected Deviator Stress (kPa)	200.4	277.6	442.9	line	and the second second	2
Corrected Major Stress (kPa)	269.4	415.5	718.7	100	Sec. Se	11
300 - 200 -	276 kPa	= 138 kPa				140
100 0 0 3 6 Axial	σ ₃ = 9 Strain (%)	= 69 kPa 12	15			/5/ /4/ S1

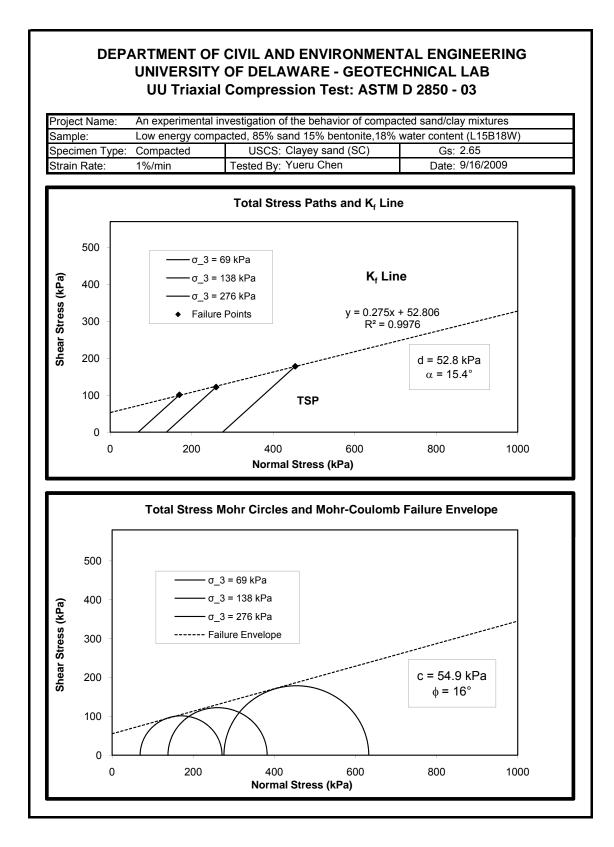


Project Name: Sample:	An experimental in Low energy comp	-					
Sample. Specimen Type:			Clayey sand			2.65	v)
Strain Rate:	1%/min		Yueru Cher			9/16/2009	
	170/1111	rootou by:	1 4014 0110		Date.	0,10,2000	
Som	nple No.		Trimming			Specimen	
San	ipie No.	1	2	3	1	2	3
Tin No.		4	FJ-5	46	201	209	31
Wt. of Tin (g)		28.7	28.0	28.9	28.9	28.2	28.4
Wt. of Tin + W		151.6	146.6	127.9	164.1	161.5	164.4
Wt. of Tin + D		134.9	130.2	114.4	145.7	143.2	145.8
Wt. of Dry Soi		106.2	102.2	85.5	116.8	115.0	117.4
Wt. of Water (16.7	16.4	13.5	18.4	18.3	18.6
Water Conten		15.7	16.0	15.8	15.8	15.9	15.8
Average Wate	r Content (%)		15.9			15.8	
San	nple No.	1	2	3	1	NEWS THE	
Cell Pressure		68.95	137.90	275.79			6
Average Heigl		7.07	7.10	7.10			15
Average Diam	, ,	3.55	3.53	3.52			16
Dry Unit Weig	â	16.38	16.24	16.71			
Initial Void rati		0.59	0.60	0.56	100		5
Saturation (%)		0.71	0.70	0.76			
Strain at Failu	re (%)	14.83	14.84	14.81		经闭制 开	
Max Deviator		204.9	258.0	427.4	1		100
Membrane Co		3.3	3.3	3.3	-	the second second	
	viator Stress (kPa)	201.7	254.7	424.1	100		
Corrected Maj	or Stress (kPa)	270.6	392.6	699.9			15
500 400 - 300 -	UU Triaxial - Str $\sigma_3 =$	276 kPa	urve = 138 kPa				5
200 Deviator 2 100 0 0	3 6		= 69 kPa 12	15			1569

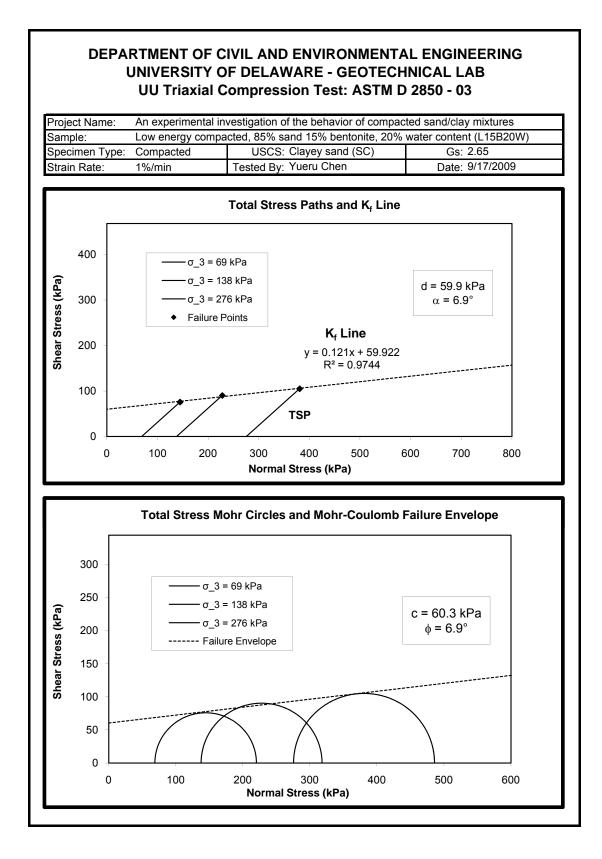
Notes: Membrane correction according to ASTM D 2850-03a: $\Delta(\sigma_1 - \sigma_3) = 4E_m t_m \varepsilon_1 / D \qquad E_m = 1.39 MPa \ ; t_m = 0.14 mm$



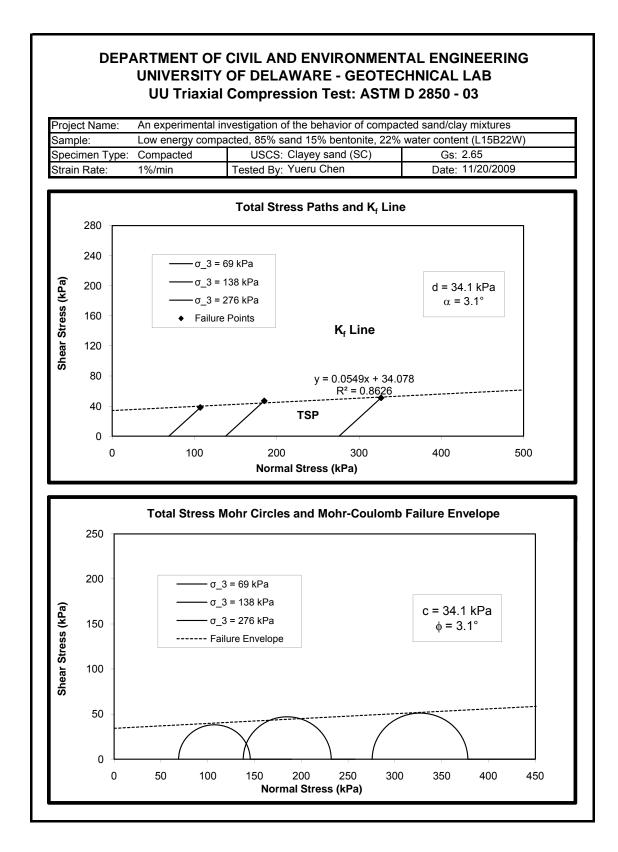
Project Name: An experimental						
Sample: Low energy com	7			water conter	nt (L15B18W	/)
Specimen Type: Compacted		Clayey sand			2.65	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	9/16/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	B-19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil (g)	158.9	108.0	102.4	167.9	166.4	165.8
Wt. of Tin + Dry soil (g)	139.0	95.9	91.2	146.4	145.3	144.8
Wt. of Dry Soil (g)	110.5	68.0	63.1	119.0	117.3	116.6
Wt. of Water (g)	19.9	12.1	11.2	21.5	21.1	21.0
Water Content (%)	18.0	17.8	17.7	18.1	18.0	18.0
Average Water Content (%)		17.9			18.0	~
Sample No.	1	2	3		CONCEPT OF	
Cell Pressure (kPa)	68.95	137.90	275.79			1
Average Height, L (cm)	7.10	7.09	7.09			E
Average Diameter, D (cm)	3.54	3.51	3.52			2
Dry Unit Weight (kN/m ³)	16.75	16.80	16.59		9.801	18
Initial Void ratio	0.55	0.55	0.57			10
Saturation (%)	0.87	0.87	0.84			>
Strain at Failure (%)	14.80	14.81	14.83	100		
Max Deviator Stress (kPa)	205.4	247.5	360.2	2.4		1
Membrane Correction (kPa)	3.3	3.3	3.3		the state	
Corrected Deviator Stress (kPa)	202.1	244.3	356.9			1
Corrected Major Stress (kPa)	271.1	382.2	632.7			
UU Triaxial - St 400 300 - 200 -	₅ ₃ = 276 kPa	Eurve = 138 kPa				ちょう
	-	= 69 kPa				うろう
0 3 6 Axial	9 Strain (%)	12	15	1	** · · · ·	1



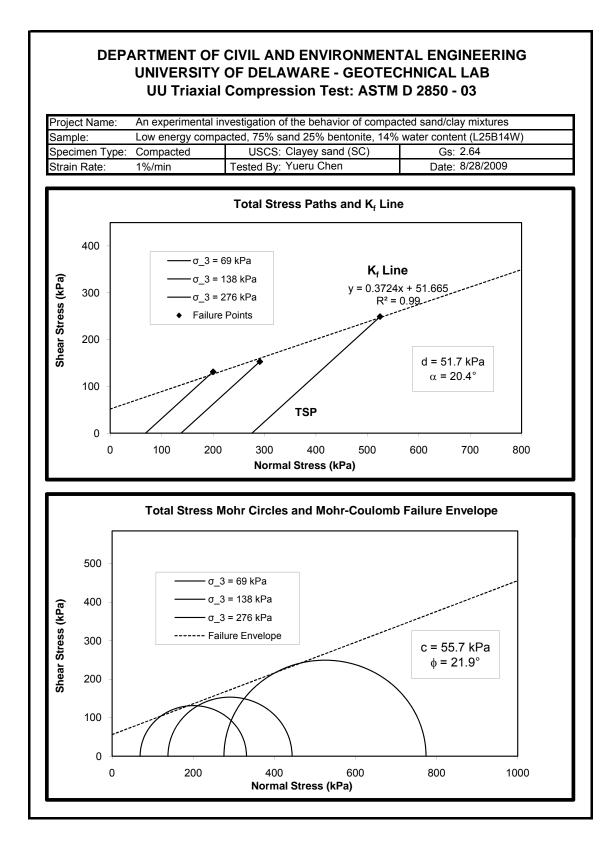
1	al investigation of				,	
	mpacted, 85% s					/)
Specimen Type: Compacted		Clayey sand			2.65	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	9/17/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.2	28.4
Wt. of Tin + Wet soil (g)	103.5	124.0	156.2	169.5	168.6	168.0
Wt. of Tin + Dry soil (g)	91.2	108.2	135.2	146.2	145.2	144.8
Wt. of Dry Soil (g)	62.5	80.2	106.3	117.3	117.0	116.4
Wt. of Water (g)	12.3	15.8	21.0	23.3	23.4	23.2
Water Content (%)	19.7	19.7	19.8	19.9	20.0	19.9
Average Water Content (%)		19.7		-	19.9	-
Sample No.	1	2	3			
Cell Pressure (kPa)	68.95	137.90	275.79	1000		1
Average Height, L (cm)	7.12	7.14	7.13			151
Average Diameter, D (cm)	3.55	3.54	3.50			
Dry Unit Weight (kN/m ³)	16.32	16.33	16.64			201
Initial Void ratio	0.59	0.59	0.56			0
Saturation (%)	0.89	0.90	0.94	5.0		,
Strain at Failure (%)	14.84	14.80	14.83	100		
Max Deviator Stress (kPa)	154.7	183.7	213.4			1000
Membrane Correction (kPa)	3.3	3.3	3.3	100	The man	
Corrected Deviator Stress (kPa	a) 151.4	180.4	210.2			
Corrected Major Stress (kPa)	220.3	318.3	485.9			A.F
UU Triaxial - 250 200 - 150 - 100 -	Stress-Strain C $\sigma_3 = 276 \text{ kPa}$	Surve $\sigma_3 = 12$	A A			20
	6 9	σ ₃ = 69 kPa 12				150
Ах	ial Strain (%)					-



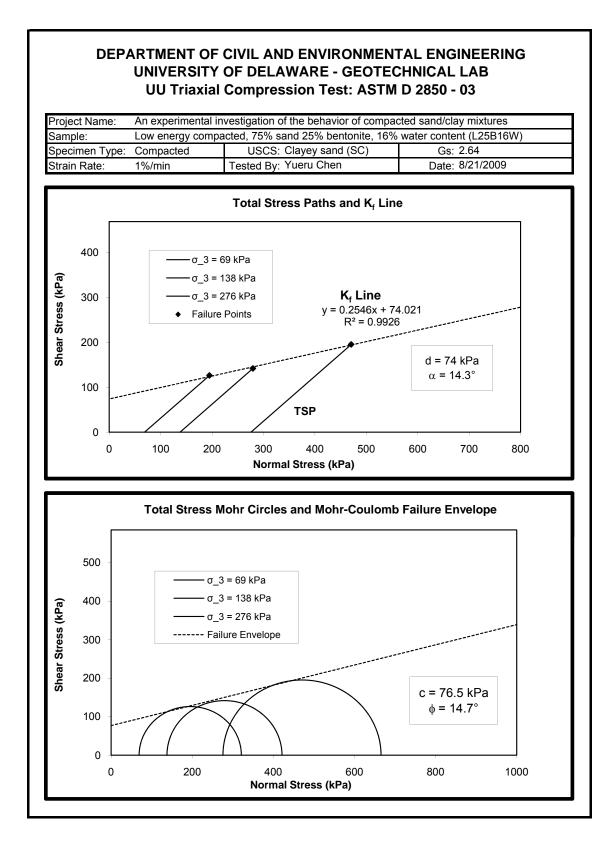
Project Name: An experimental ir	nvestigation of	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Low energy compa	acted, 85% s	and 15% ber	ntonite, 22%	water conte	nt (L15B22W	/)
Specimen Type: Compacted	USCS:	Clayey sand	I (SC)	Gs:	2.65	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	11/20/2009	
	1	- ···				
Sample No.	4	Trimming 2	2	4	Specimen 2	0
Tin No.	1	∠ FJ-3	3 211	1 B-19	2 101	3
Wt. of Tin (g)	209	29.1	211	в-19 27.4	-	28.2
Wt. of Tin + Wet soil (g)	28.2		-		28.0	-
Wt. of Tin + Dry soil (g)	129.4 112.0	127.7 110.3	121.3 105.1	162.0 137.5	164.7 140.2	163.2 138.7
Wt. of Dry Soil (g)	83.8	81.2	76.9	137.5	140.2	136.7
Wt. of Water (g)	17.4	17.4	76.9 16.2	24.5	24.5	24.5
Water Content (%)	20.8	21.4	21.1	22.3	21.8	24.3
Average Water Content (%)	20.0	21.4	21.1	22.0	21.0	~~~~
Average water content (70)		21.1		- 4	22.1	
Sample No.	1	2	3	6		
Cell Pressure (kPa)	68.95	137.90	275.79			12
Average Height, L (cm)	7.10	7.10	7.09		1. 1. 1.	150
Average Diameter, D (cm)	3.50	3.52	3.53		AL STA	0.77
Dry Unit Weight (kN/m ³)	15.81	15.93	15.62	5.0		12
Initial Void ratio	0.64	0.63	0.66			SI
Saturation (%)	0.92	0.92	0.88			-
Strain at Failure (%)	14.59	14.83	15.00		1 and	
Max Deviator Stress (kPa)	79.6	97.3	105.4			a second and
Membrane Correction (kPa)	3.2	3.3	3.3	(Arra		11
Corrected Deviator Stress (kPa)	76.3	94.0	102.1	and the second		20
Corrected Major Stress (kPa)	145.3	231.9	377.9	100		150
UU Triaxial - Stro	ess-Strain C = 276 kPa	Surve $\sigma_3 = 138 \text{ kP}$				ST
Deriator Stress (KB) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	σ ₃ =	= 69 kPa				151
0 3 6 Axial S	9 Strain (%)	12	15			



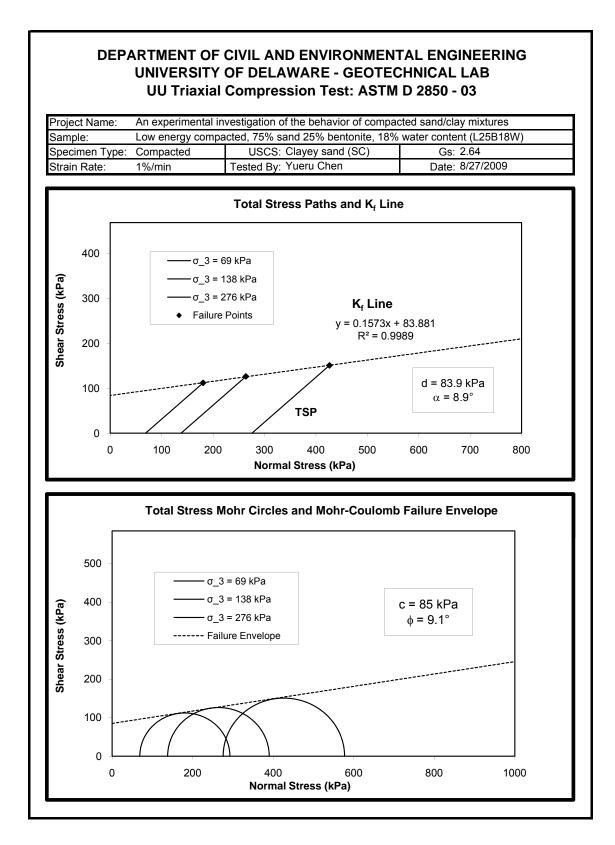
Project Name: An experimental	investigation o	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Low energy com						/)
Specimen Type: Compacted		Clayey sand			2.64	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/28/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	7
Wt. of Tin (g)	28.7	28	28.9	28.9	28.1	28.3
Wt. of Tin + Wet soil (g)	83.1	102.5	110.2	162.1	158.2	164.0
Wt. of Tin + Dry soil (g)	76.4	93.3	100.3	145.6	141.9	147.1
Wt. of Dry Soil (g)	47.70	65.30	71.40	116.7	113.8	118.8
Wt. of Water (g)	6.70	9.20	9.90	16.5	16.3	16.9
Water Content (%)	14.05	14.09	13.87	14.1	14.3	14.2
Average Water Content (%)		14.0			14.2	
Sample No.	1	2	3	12	Martine Th	
Cell Pressure (kPa)	68.95	137.90	275.79		No. M.	
Average Height, L (cm)	7.12	7.13	7.13			25
Average Diameter, D (cm)	3.53	3.53	3.53		14日13月	1/11
Dry Unit Weight (kN/m ³)	16.40	15.98	16.72	62		
Initial Void ratio	0.58	0.62	0.55			51
Saturation (%)	0.64	0.61	0.68			
Strain at Failure (%)	11.10	14.86	14.57			A DOMESTIC
Max Deviator Stress (kPa)	265.0	309.2	501.3	-		
Membrane Correction (kPa)	2.4	3.3	3.2	100	A COLORADO	
Corrected Deviator Stress (kPa)	262.5	305.9	498.1	- B		1
Corrected Major Stress (kPa)	331.5	443.8	773.9			25
UU Triaxial - St	$\sigma_3 = 2$	276 kPa 38 kPa				ST
	σ ₃ = 6 9 Strain (%)	39 kPa 12	15			34457



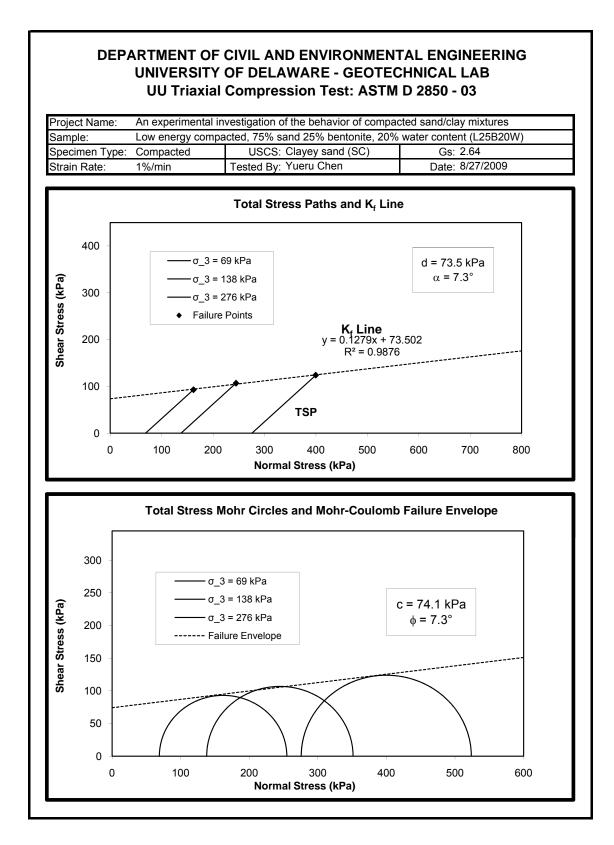
		nvestigation c					
		acted, 75% s					/)
Specimen Type: Com			Clayey sand	· · ·		2.64	
Strain Rate: 1%/n	nin	Tested By:	Yueru Chen		Date:	8/21/2009	
		1	Trimming			Specimen	
Sample No		1	2	3	1	2	3
Tin No.		B8	213	1	ь В-19	101	7
Wt. of Tin (g)		28.4	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil	(g)	99.6	116.9	84.8	165.8	163.6	164.9
Wt. of Tin + Dry soil (g)	89.8	104.4	76.9	146.5	144.7	145.6
Wt. of Dry Soil (g)		61.40	76.50	48.80	119.1	116.7	117.4
Wt. of Water (g)		9.80	12.50	7.90	19.3	18.9	19.3
Water Content (%)		15.96	16.34	16.19	16.2	16.2	16.4
Average Water Conte	ent (%)		16.2			16.3	
Sample No)	1	2	3	No.	STREET, STREET,	
Cell Pressure (kPa)		68.95	137.90	275.79		Sectionary)	16
Average Height, L (ci	n)	7.15	7.15	7.13	83		25
Average Diameter, D		3.54	3.52	3.53		and the second	1h
Dry Unit Weight (kN/r		16.63	16.46	16.50	15	Contraction of the	ID
Initial Void ratio	11 <i>)</i>	0.56	0.57	0.57	53		51
Saturation (%)		0.77	0.75	0.76			100
Strain at Failure (%)		12.81	14.58	14.84	- 88	学校社 会	a summing
Max Deviator Stress	(kPa)	255.0	286.6	393.1			1
Membrane Correction	n (kPa)	2.8	3.2	3.3	-		
Corrected Deviator S	tress (kPa)	252.2	283.4	389.8		CTR IN	11
Corrected Major Stre	ss (kPa)	321.1	421.3	665.6			2
400 -	Triaxial - Str	ess-Strain C $\sigma_3 = 27$					16
dy 300 -		σ ₃ = 13	38 kPa				2 /
Deviator Stress (kPa)		$\sigma_3 = 69$) kPa				29
	6	9	12	15			18
	Axial S	Strain (%)			Chan Int	-see 5	1 miles



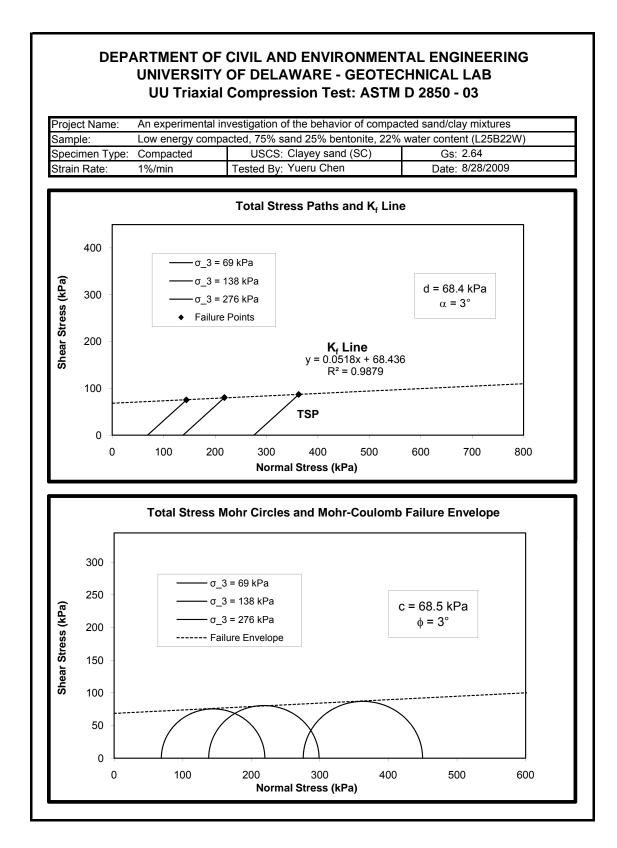
•	ental investigation of					
	compacted, 75% s		,		`	/)
Specimen Type: Compacted		Clayey sand			2.64	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/27/2009	
-		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	7
Wt. of Tin (g)	28.7	28	28.9	28.9	28.1	28.3
Wt. of Tin + Wet soil (g)	109.2	128	110.6	170.5	169.7	172.2
Wt. of Tin + Dry soil (g)	97.1	113.1	98.3	148.9	148.1	150.2
Wt. of Dry Soil (g)	68.40	85.10	69.40	120.0	120.0	121.9
Wt. of Water (g)	12.10	14.90	12.30	21.6	21.6	22.0
Water Content (%)	17.69	17.51	17.72	18.0	18.0	18.0
Average Water Content (%)		17.6			18.0	
Sample No.	1	2	3	1	City Long	
Cell Pressure (kPa)	68.95	137.90	275.79			100
Average Height, L (cm)	7.10	7.11	7.13			4
Average Diameter, D (cm)	3.53	3.55	3.55			Es
Dry Unit Weight (kN/m ³)	16.97	16.77	16.94			2
Initial Void ratio	0.53	0.54	0.53			18
Saturation (%)	0.90	0.87	0.90			1.0
Strain at Failure (%)	14.81	14.59	14.82	of the local division of the		
Max Deviator Stress (kPa)	227.0	255.5	304.7		and the second	And a state
Membrane Correction (kPa)	3.3	3.2	3.2	6	Contraction in the	-
Corrected Deviator Stress (I	(Pa) 223.7	252.3	301.5			T.
Corrected Major Stress (kPa	a) 292.6	390.2	577.2			12
UU Triaxia 300 σ ₃ = 276 k 200 100 0	I - Stress-Strain C Pa $\sigma_3 = 13$ $\sigma_3 = 69$	38 kPa				The seal
0 3 Notes: Membrane	6 9 Axial Strain (%)	12	15			C.



	An experimental investigation of the behavior of compacted sand/clay mixtures Low energy compacted, 75% sand 25% bentonite, 20% water content (L25B20W)					
						/)
Specimen Type: Compacted		USCS: Clayey sand (SC)		Gs: 2.64		
Strain Rate: 1%/min	Tested By:	Yueru Cher		Date:	8/27/2009	
Comula No		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	B-19	101	7
Wt. of Tin (g)	28.4	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil (g)	87.9	86.4	119	166.1	168.4	168.6
Wt. of Tin + Dry soil (g)	78	76.7	104	142.9	144.8	144.9
Wt. of Dry Soil (g)	49.60	48.80	75.90	115.5	116.8	116.7
Wt. of Water (g)	9.90	9.70	15.00	23.2	23.6	23.7
Water Content (%)	19.96	19.88	19.76	20.1	20.2	20.3
Average Water Content (%)		19.9			20.2	
Sample No.	1	2	3		Contraction of the	1
Cell Pressure (kPa)	68.95	137.90	275.79			4
Average Height, L (cm)	7.10	7.11	7.13			25
Average Diameter, D (cm)	3.53	3.53	3.53			5.
Dry Unit Weight (kN/m ³)	16.27	16.43	16.40	1		10
Initial Void ratio	0.59	0.58	0.58			8
Saturation (%)	0.90	0.93	0.93			
Strain at Failure (%)	14.84	14.81	14.82	1000		Concession of
Max Deviator Stress (kPa)	189.1	216.8	251.2	State of State	Carlo and	150-00
Membrane Correction (kPa)	3.3	3.3	3.3	4	Contraction of the	-
Corrected Deviator Stress (kPa)	185.9	213.5	247.9			
Corrected Major Stress (kPa)	254.8	351.4	523.7			4
UU Triaxial - S						128
$\sigma_3 = 276 \text{ kPa}$	$\sigma_3 = 13$	<u>38 kPa</u>				
$\sigma_3 = 276 \text{ kPa}$	$\sigma_3 = 69$	9 kPa		6	ALL PROPERTY	3/1
0 Deviator						500
0 3 6	9 I Strain (%)	12	15	and the second		-



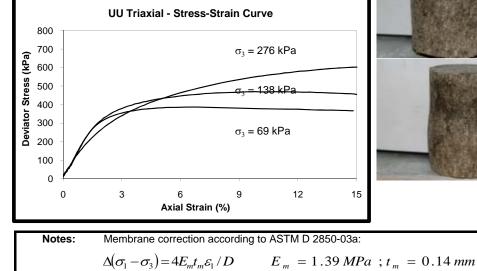
Project Name:	An experimental ir	nvestigation c	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample:	Low energy compa	acted, 75% s	and 25% ber	ntonite, 22%	water conter	nt (L25B22W	/)
Specimen Type:			Clayey sand		Gs: 2.64		
Strain Rate:	1%/min	Tested By: Yueru Chen			Date:	8/28/2009	
		1	Trimming			Specimen	
Sam	ple No.	1	2	3	1	2	3
Tin No.		B8	213	1	ь В-19	101	7
Wt. of Tin (g)		28.4	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + We	et soil (q)	126.7	75.9	113.2	164.7	167.0	165.9
Wt. of Tin + Dr		108.9	67.3	97.9	139.8	141.8	140.8
Wt. of Dry Soil		80.50	39.40	69.80	112.4	113.8	112.6
Wt. of Water (g		17.80	8.60	15.30	24.9	25.2	25.1
Water Content	(%)	22.11	21.83	21.92	22.2	22.1	22.3
Average Water	r Content (%)		22.0			22.2	
			-	_		Call No. of Lot.	-
	iple No.	1	2	3			
Cell Pressure (68.95	137.90	275.79			2
Average Heigh		7.13	7.14	7.12			
Average Diame	,	3.52	3.53	3.54			2
Dry Unit Weigh Initial Void ratio		15.91	15.98	15.76			S
Saturation (%))	0.63	0.62	0.64			10
Strain at Failur	o (%)	0.93 14.87	0.94 14.87	0.91 14.86	_		18 m
Max Deviator S	· · /	14.87	164.2	177.3	100 million	了机能性	10 -10
Membrane Cor	1	3.3	3.3	3.3	Constant of the	CONTRACTOR OF THE OWNER	and the second
	iator Stress (kPa)	150.9	160.9	174.0		NOR OF STREET	411
Corrected Majo	, ,	219.8	298.8	449.8			
Deviator Stress (kPa)	UU Triaxial - Str $\sigma_3 = 276 \text{ kPa}$ $\sigma_3 = \sigma_3 = \sigma_3$	ess-Strain C					24
0 0 Notes:	3 6 Axial S Membrane correct	9 Strain (%)	12 g to ASTM D	15 2850-03a:			



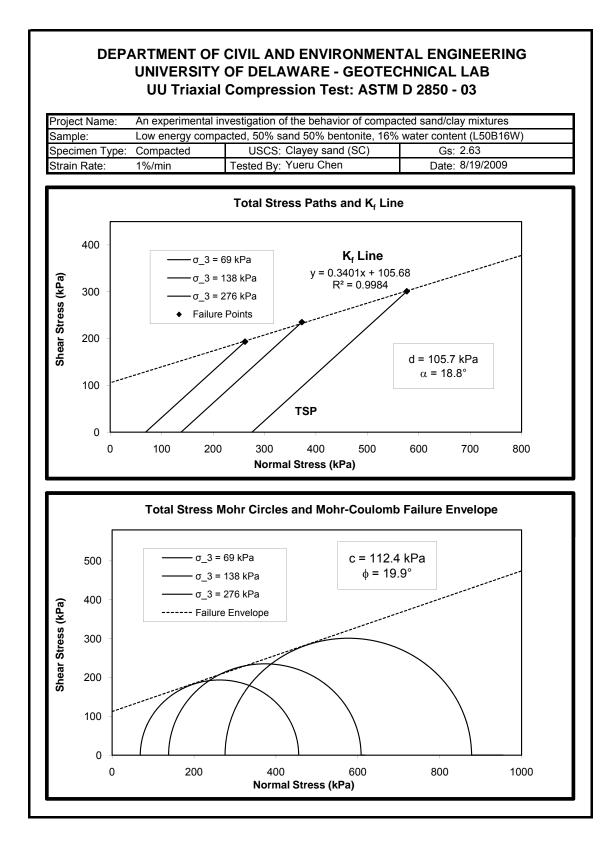
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Low energy compacted, 50% sand 50% bentonite, 16% water content (L50B16W)					
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.63			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/19/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	209	31	
Wt. of Tin (g)	28.7	28.0	28.8	28.9	28.2	28.3	
Wt. of Tin + Wet soil (g)	77.4	64.3	54.2	151.4	144.2	139.8	
Wt. of Tin + Dry soil (g)	70.5	59.1	50.6	134.1	126.8	123.9	
Wt. of Dry Soil (g)	41.8	31.1	21.8	105.2	98.6	95.6	
Wt. of Water (g)	6.9	5.2	3.6	17.3	17.4	15.9	
Water Content (%)	16.5	16.7	16.5	16.4	17.6	16.6	
Average Water Content (%)		16.6		6.6 16.9			

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.14	6.76	6.66
Average Diameter, D (cm)	3.53	3.53	3.52
Dry Unit Weight (kN/m ³)	14.75	14.62	14.47
Initial Void ratio	0.75	0.76	0.78
Saturation (%)	0.58	0.61	0.56
Strain at Failure (%)	6.80	9.57	15.01
Max Deviator Stress (kPa)	388.0	472.1	605.3
Membrane Correction (kPa)	1.5	2.1	3.3
Corrected Deviator Stress (kPa)	386.5	470.0	602.0
Corrected Major Stress (kPa)	455.5	607.9	877.8



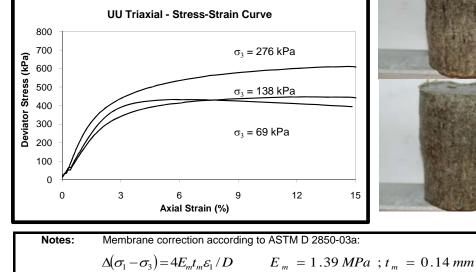




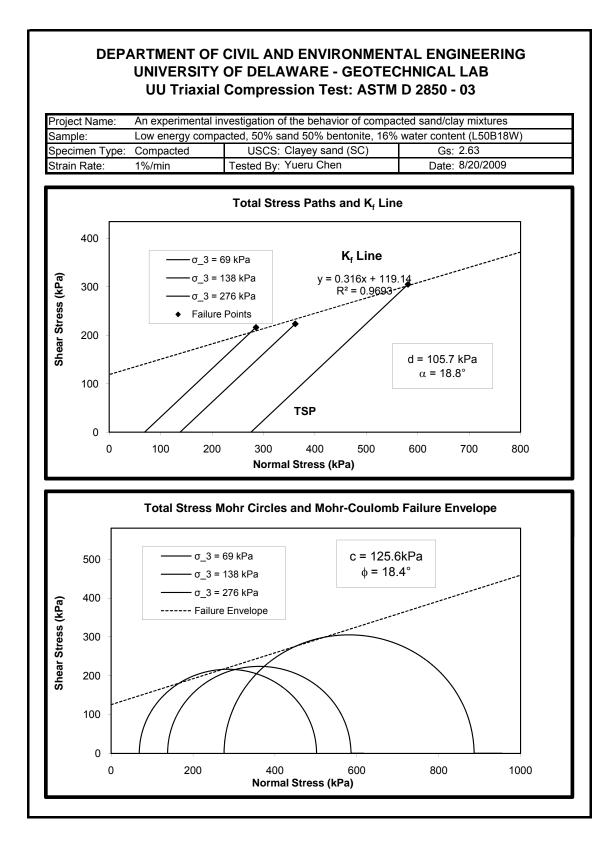
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures				
Sample:	Low energy compacted, 50% sand 50% bentonite, 18% water content (L50B18W)				
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.63		
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/20/2009		

Sample No.	Trimming			Specimen		
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.1	28.3
Wt. of Tin + Wet soil (g)	92.2	59.8	70.4	147.3	141.6	152.3
Wt. of Tin + Dry soil (g)	82.5	54.8	64.0	129.4	124.5	133.1
Wt. of Dry Soil (g)	53.8	26.8	35.1	100.5	96.4	104.8
Wt. of Water (g)	9.7	5.0	6.4	17.9	17.1	19.2
Water Content (%)	18.0	18.7	18.2	17.8	17.7	18.3
Average Water Content (%)	18.3				18.0	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.68	6.66	6.93
Average Diameter, D (cm)	3.54	3.55	3.55
Dry Unit Weight (kN/m ³)	15.00	14.35	14.99
Initial Void ratio	0.72	0.80	0.72
Saturation (%)	0.65	0.58	0.67
Strain at Failure (%)	5.80	12.32	14.84
Max Deviator Stress (kPa)	434.2	450.5	613.7
Membrane Correction (kPa)	1.3	2.7	3.3
Corrected Deviator Stress (kPa)	432.9	447.8	610.5
Corrected Major Stress (kPa)	501.9	585.7	886.3



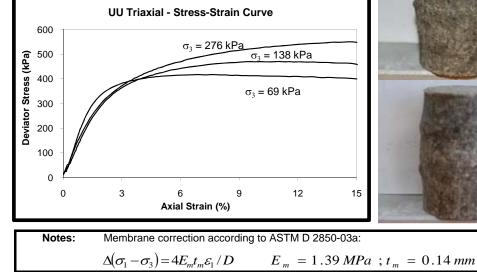




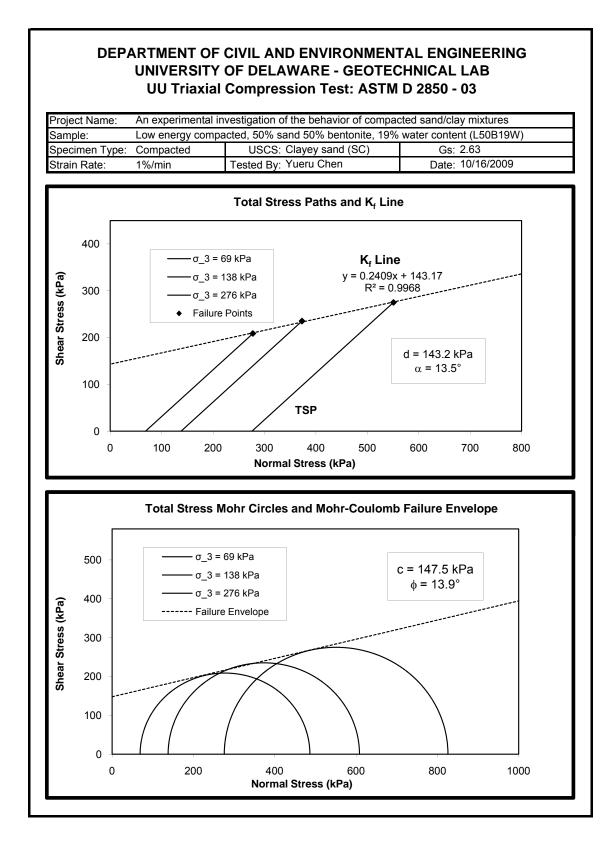
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures				
Sample:	Low energy compacted, 50% sand 50% bentonite, 19% water content (L50B19W)				
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.63		
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/16/2009		

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	209	31	
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.2	28.4	
Wt. of Tin + Wet soil (g)	109.4	101.0	103.8	158.5	154.2	151.3	
Wt. of Tin + Dry soil (g)	96.4	89.3	91.7	137.7	133.9	131.4	
Wt. of Dry Soil (g)	67.7	61.3	62.8	108.8	105.7	103.0	
Wt. of Water (g)	13.0	11.7	12.1	20.8	20.3	19.9	
Water Content (%)	19.2	19.1	19.3	19.1	19.2	19.3	
Average Water Content (%)		19.2		19.2			

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.09	6.88	6.74
Average Diameter, D (cm)	3.51	3.53	3.51
Dry Unit Weight (kN/m ³)	15.57	15.39	15.47
Initial Void ratio	0.66	0.68	0.67
Saturation (%)	0.77	0.75	0.76
Strain at Failure (%)	7.57	11.06	14.57
Max Deviator Stress (kPa)	419.0	472.9	553.5
Membrane Correction (kPa)	1.7	2.4	3.2
Corrected Deviator Stress (kPa)	417.3	470.4	550.3
Corrected Major Stress (kPa)	486.2	608.3	826.1



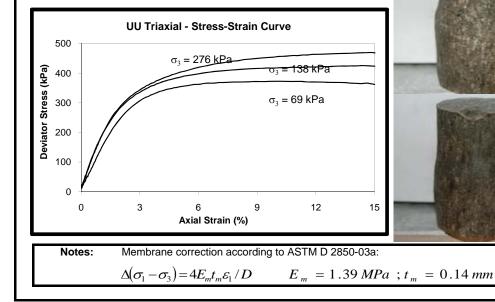


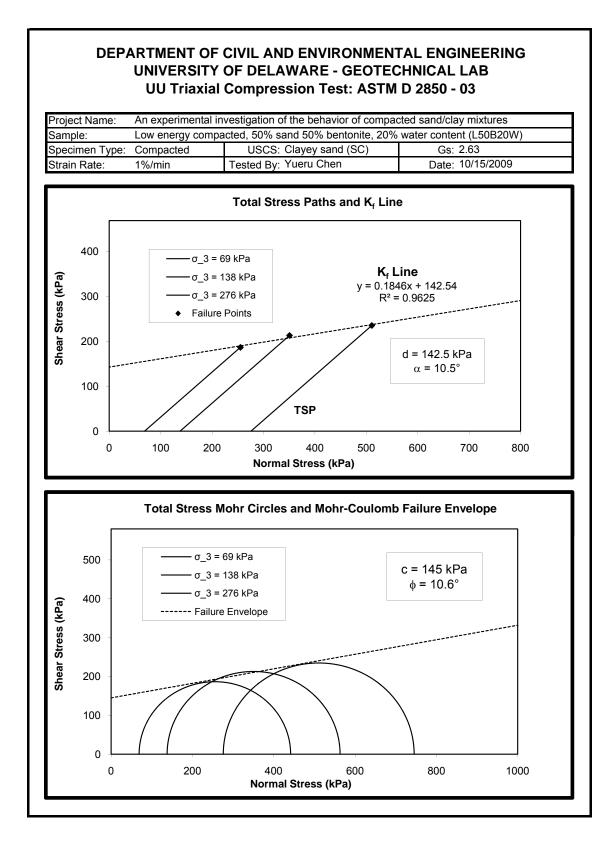


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures				
Sample:	Low energy compacted, 50% sand 50% bentonite, 20% water content (L50B20W)				
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.63		
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/15/2009		

Sample No.	Trimming			Specimen		
	1	2	3	1	2	3
Tin No.	B8	213	1	B-19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil (g)	83.3	97.7	114.9	160.2	153.8	159.8
Wt. of Tin + Dry soil (g)	74.0	85.6	99.8	137.0	131.9	136.8
Wt. of Dry Soil (g)	45.5	57.7	71.7	109.6	103.9	108.6
Wt. of Water (g)	9.3	12.1	15.1	23.2	21.9	23.0
Water Content (%)	20.4	21.0	21.1	21.2	21.1	21.2
Average Water Content (%)		20.8			21.1	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.03	6.64	6.89
Average Diameter, D (cm)	3.54	3.52	3.54
Dry Unit Weight (kN/m ³)	15.57	15.78	15.71
Initial Void ratio	0.66	0.64	0.64
Saturation (%)	0.85	0.87	0.87
Strain at Failure (%)	10.05	14.31	14.83
Max Deviator Stress (kPa)	374.8	428.4	472.9
Membrane Correction (kPa)	2.2	3.2	3.3
Corrected Deviator Stress (kPa)	372.6	425.3	469.6
Corrected Major Stress (kPa)	441.5	563.2	745.4





	al investigation of							
	mpacted, 50% s			water conter	nt (L50B22W))		
pecimen Type: Compacted		Clayey san		Gs: 2.63				
train Rate: 1%/min	Tested By:	Yueru Cher	1	Date:	8/26/2009			
		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	B8	213	1	B-19	101	7		
Wt. of Tin (g)	28.4	27.9	28.1	27.4	28.0	28.2		
Wt. of Tin + Wet soil (g)	85.7	101.9	79.1	158.2	162.3	158.4		
Wt. of Tin + Dry soil (g)	75.3	88.5	69.8	134.3	137.8	134.6		
Wt. of Dry Soil (g)	46.9	60.6	41.7	106.9	109.8	106.4		
Wt. of Water (g)	10.4	13.4	9.3	23.9	24.5	23.8		
Water Content (%)	22.2	22.1	22.3	22.4	22.3	22.4		
Average Water Content (%)		22.2			22.3			
Sample No.		0	2		Constant in	-		
Cell Pressure (kPa)	1 68.95	2 137.90	3 275.79	1		11		
Average Height, L (cm)	6.84	7.00	6.77	10		D D		
Average Diameter, D (cm)	3.55	3.54	3.54	16		50		
<u> </u>	15.49	15.63	15.66	100		27		
Dry Unit Weight (kN/m ³) Initial Void ratio	0.67	0.65	0.65	- 34	A COLOR			
Saturation (%)	0.88	0.90	0.00	100		30 3		
Strain at Failure (%)	7.55	12.58	14.58	1000				
Max Deviator Stress (kPa)	357.5	381.6	429.0			The Tre		
Membrane Correction (kPa)	1.3	2.7	3.3		Contraction of the			
Corrected Deviator Stress (kPa		378.9	425.8		THE REAL	19h		
Corrected Major Stress (kPa)	425.1	516.8	701.5	1	AN AL			
					- Aller	D		
	Stress-Strain C	urve				20		
800						1		
7 00 -	σ_3	= 276 kPa		Tool Statement		and the second		
600 -				- March	and the second	and and		
600 - 500 - 400 - 300 - 200 -	5	= 138 kPa			Contraction of the second	100		
	03	- 100 11 0			and the same of	The second		

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 $E_m = 1.39 MPa ; t_m = 0.14 mm$

9

Membrane correction according to ASTM D 2850-03a:

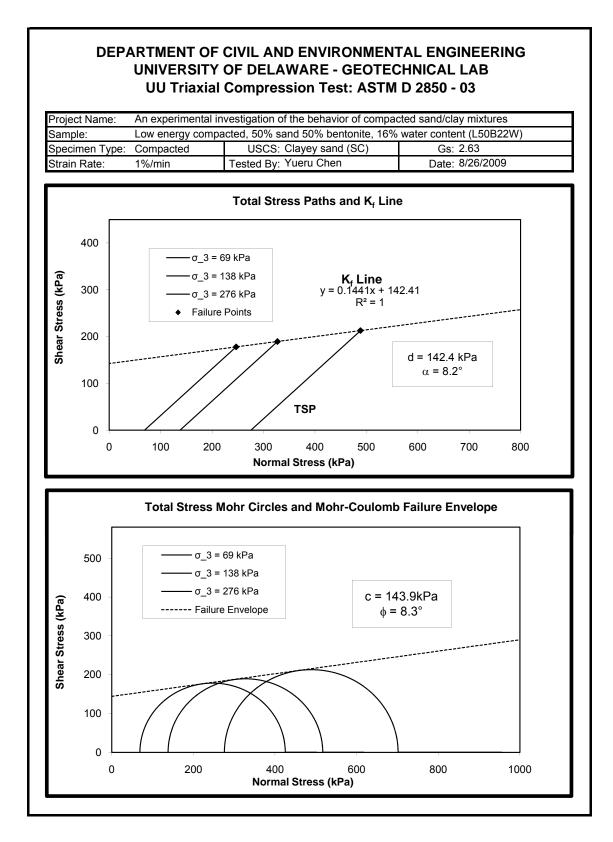
6 Axial Strain (%)

 $\Delta\!\left(\underline{\sigma_1}-\underline{\sigma_3}\right)=4E_mt_m\varepsilon_1/D$

100 0

0

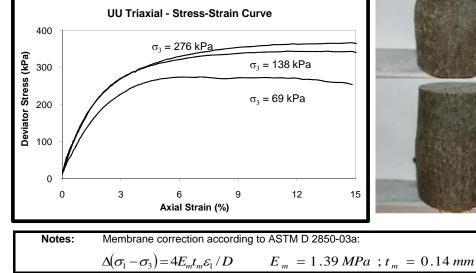
Notes:



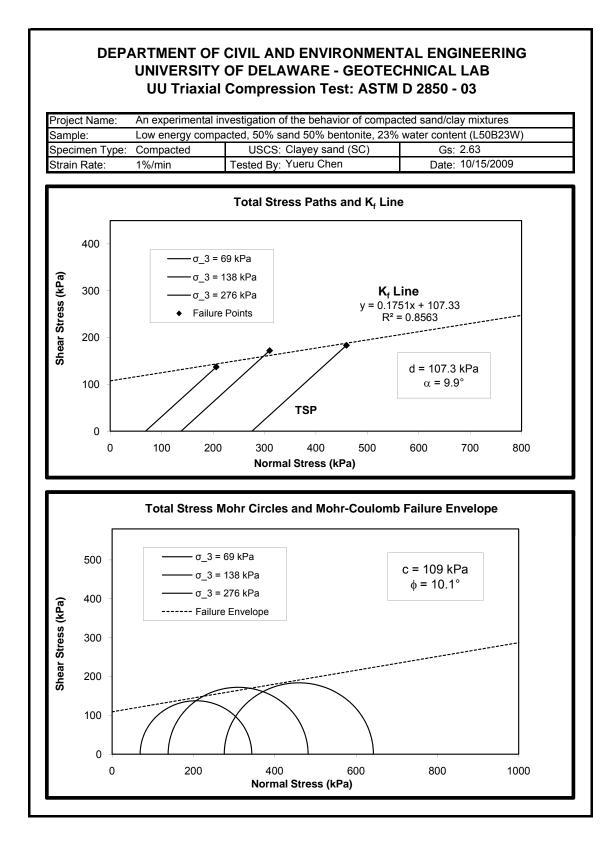
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Low energy compacted, 50% sand 50% bentonite, 23% water content (L50B23W)						
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.63				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/15/2009				

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	209	31	
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.2	28.4	
Wt. of Tin + Wet soil (g)	59.6	89.0	116.1	159.2	162.7	158.6	
Wt. of Tin + Dry soil (g)	53.7	77.5	99.7	134.7	137.6	134.1	
Wt. of Dry Soil (g)	25.0	49.5	70.8	105.8	109.4	105.7	
Wt. of Water (g)	5.9	11.5	16.4	24.5	25.1	24.5	
Water Content (%)	23.6	23.2	23.2	23.2	22.9	23.2	
Average Water Content (%)		23.3			23.1		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.80	7.08	6.90
Average Diameter, D (cm)	3.55	3.51	3.52
Dry Unit Weight (kN/m ³)	15.46	15.65	15.45
Initial Void ratio	0.67	0.65	0.67
Saturation (%)	0.91	0.93	0.91
Strain at Failure (%)	7.05	13.56	14.81
Max Deviator Stress (kPa)	276.1	347.2	370.2
Membrane Correction (kPa)	1.5	3.0	3.3
Corrected Deviator Stress (kPa)	274.5	344.2	366.9
Corrected Major Stress (kPa)	343.5	482.1	642.7



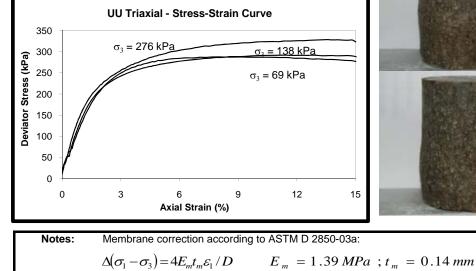




Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Low energy compacted, 50% sand 50% bentonite, 24% water content (L50B24W)						
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/21/2009				

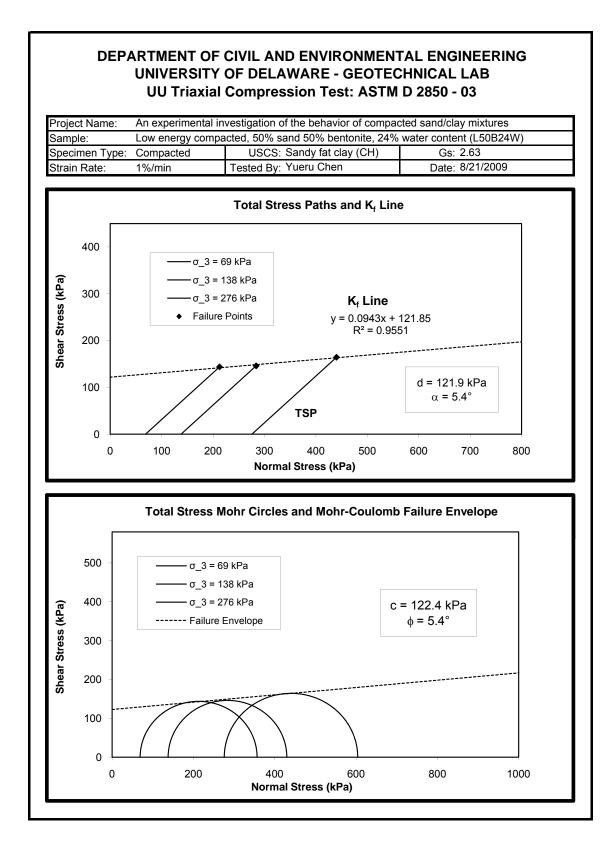
Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	209	31	
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.1	28.3	
Wt. of Tin + Wet soil (g)	84.5	101.8	91.1	161.1	159.1	159.1	
Wt. of Tin + Dry soil (g)	73.6	87.8	79.0	135.4	133.4	133.4	
Wt. of Dry Soil (g)	44.9	59.8	50.1	106.5	105.3	105.1	
Wt. of Water (g)	10.9	14.0	12.1	25.7	25.7	25.7	
Water Content (%)	24.3	23.4	24.2	24.1	24.4	24.5	
Average Water Content (%)		23.9			24.3		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.86	7.08	6.95
Average Diameter, D (cm)	3.54	3.56	3.54
Dry Unit Weight (kN/m ³)	15.52	14.63	15.11
Initial Void ratio	0.66	0.76	0.71
Saturation (%)	0.96	0.84	0.91
Strain at Failure (%)	9.06	12.83	13.59
Max Deviator Stress (kPa)	289.5	294.7	331.3
Membrane Correction (kPa)	2.0	2.8	3.0
Corrected Deviator Stress (kPa)	287.5	291.9	328.3
Corrected Major Stress (kPa)	356.4	429.8	604.1

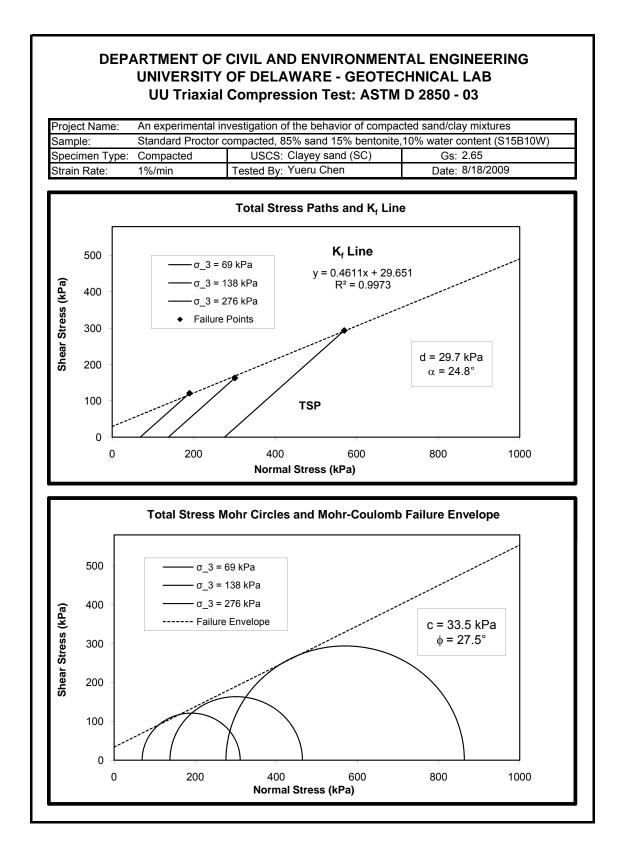








Specimen Type: Compacted	USCS:	r compacted, 85% sand 15% bentonite, USCS: Clayey sand (SC)		Gs: 2.65 Date: 8/18/2009		
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/18/2009	
Sample No.		Trimming			Specimen	
-	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28	28.8	28.9	28.1	28.3
Wt. of Tin + Wet soil (g)	83	108.9	98.3	158.5	156.9	159.6
Wt. of Tin + Dry soil (g) Wt. of Dry Soil (g)	78.1	101.4	92	146.5	145.0	147.5
Wt. of Water (g)	49.40 4.90	73.40 7.50	63.20 6.30	117.60	116.90	119.20 12.10
Water Content (%)	9.92	10.22	9.97	12.00 10.20	11.90 10.18	10.15
Average Water Content (%)	9.92	10.22	5.57	10.20	10.10	10.10
				-	and a second	
Sample No.	1	2	3	100	a de la calle	
Cell Pressure (kPa)	68.95	137.90	275.79		(1915) (1941)	
Average Height, L (cm)	7.11	7.12	7.11			14
Average Diameter, D (cm)	3.52	3.54	3.53			11
Dry Unit Weight (kN/m ³)	16.66	16.37	16.83			
Initial Void ratio	0.56	0.59	0.54			NS:
Saturation (%)	0.48	0.46	0.49			1
Strain at Failure (%)	12.82	14.58	14.82	10		
Max Deviator Stress (kPa)	244.8	329.6	591.0	Contraction of	435 / SP	and the second
Membrane Correction (kPa)	2.8	3.2	3.3	6	The state	-
Corrected Deviator Stress (kPa) Corrected Major Stress (kPa)	241.9 310.9	326.4 464.3	587.8 863.6			
UU Triaxial - S	Stress-Strain C	urve				110
700 600 500 400	σ ₃ = 276 kPa					R
000 - 000 -		5 ₃ = 138 kPa			4	15
100 -		σ ₃ = 69 kPa				Se
	6 9 al Strain (%)	12	15	and the second s	and the second second	

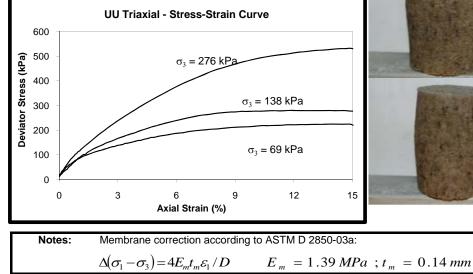


DEP	ARTMENT OF UNIVERSITY UU Triaxial	OF DELA	WARE -	GEOTEC	HNICAL	LAB	G	
Project Name:								
Sample:	Sample: Standard Proctor compacted, 85% sand 15% bentonite, 12% water content (S15B12W)							
Specimen Type:	Compacted	USCS: Clayey sand (SC)		Gs: 2.65				
Strain Rate:	1%/min	Tested By: Yueru Chen		Date: 8/13/2009				
Sam	Trimming			Specimen				
Uam		1	2	3	1	2	3	
Tin No.		B14	2010	410	majid	FJ-1	59	
Wt. of Tin (g)		29.1	28.6	28.4	28.7	28.1	28.3	
Wt. of Tin + Wet soil (g)		133	144	112.6	165.1	164.4	163.1	
Wt. of Tin + Dr	Wt. of Tin + Dry soil (g)		131.4	103.3	149.9	149.2	148.5	
Wt. of Dry Soil	(g)	92.70	102.80	74.90	121.20	121.10	120.20	
Wt. of Water (g))	11.20	12.60	9.30	15.20	15.20	14.60	
Water Content	(%)	12.08	12.26	12.42	12.54	12.55	12.15	

12.3

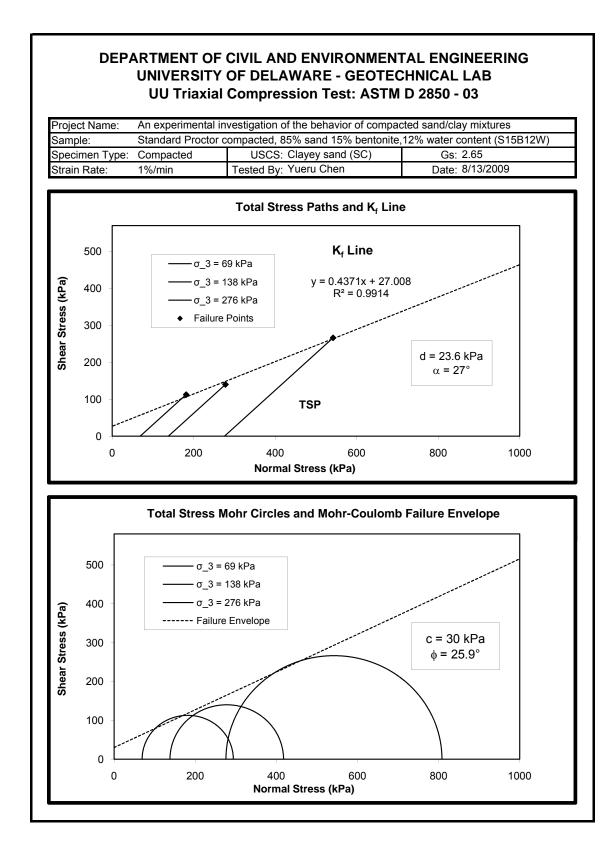
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.13	7.12
Average Diameter, D (cm)	3.54	3.55	3.54
Dry Unit Weight (kN/m ³)	16.98	16.87	16.84
Initial Void ratio	0.53	0.54	0.54
Saturation (%)	0.63	0.61	0.59
Strain at Failure (%)	13.86	13.83	14.86
Max Deviator Stress (kPa)	228.2	283.0	535.6
Membrane Correction (kPa)	3.1	3.0	3.3
Corrected Deviator Stress (kPa)	225.1	279.9	532.3
Corrected Major Stress (kPa)	294.1	417.8	808.1

Average Water Content (%)

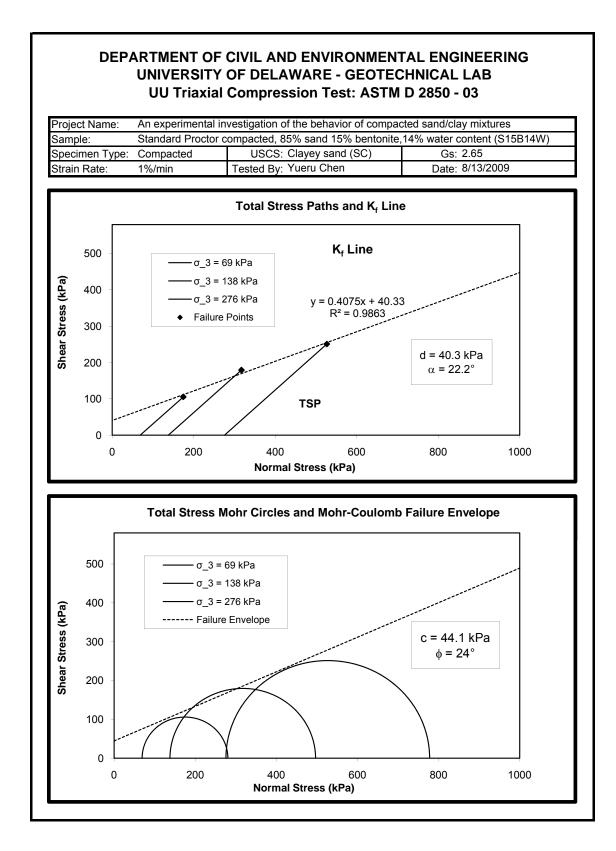




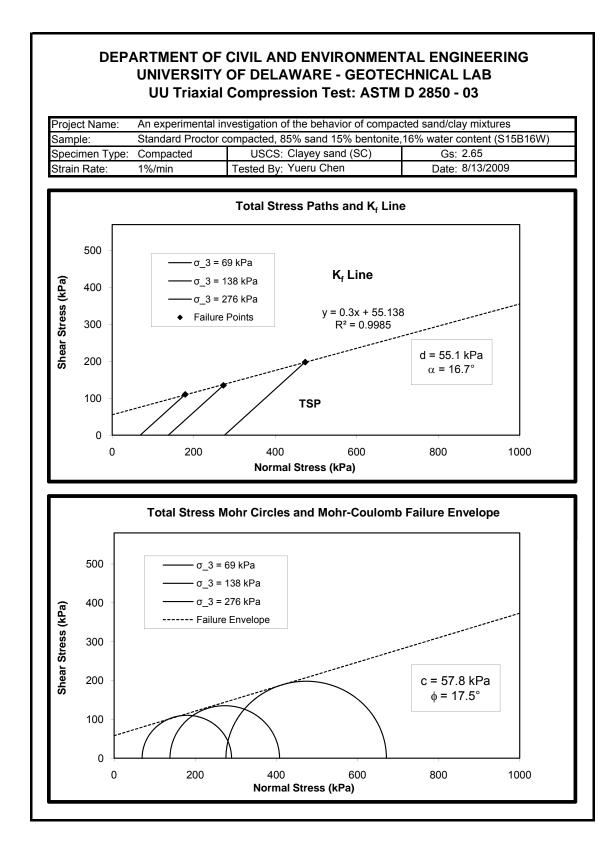
12.4



USCS:	55% sand 15 Clayey sand Yueru Chen Trimming 2 FJ-5 28 104.8 95.2 67.20 9.60 14.29 14.3	l (SC)		2.65 8/13/2009 Specimen 2 209 28.1 170.3 152.4 124.30 17.90	3 201 28.9 167.3 150.0 121.10
1 4 28.7 127 114.7 86.00 12.30 14.30	Yueru Chen Trimming 2 FJ-5 28 104.8 95.2 67.20 9.60 14.29 14.3	3 46 28.8 133.1 120 91.20 13.10	Date: 1 31 28.3 165.4 148.3 120.00 17.10	8/13/2009 Specimen 2 209 28.1 170.3 152.4 124.30 17.90	201 28.9 167.3 150.0 121.10
1 4 28.7 127 114.7 86.00 12.30 14.30 14.30	Trimming 2 FJ-5 28 104.8 95.2 67.20 9.60 14.29 14.3	3 46 28.8 133.1 120 91.20 13.10	1 31 28.3 165.4 148.3 120.00 17.10	Specimen 2 209 28.1 170.3 152.4 124.30 17.90	201 28.9 167.3 150.0 121.10
4 28.7 127 114.7 86.00 12.30 14.30 14.30	2 FJ-5 28 104.8 95.2 67.20 9.60 14.29 14.3	46 28.8 133.1 120 91.20 13.10	31 28.3 165.4 148.3 120.00 17.10	2 209 28.1 170.3 152.4 124.30 17.90	201 28.9 167.3 150.0 121.10
4 28.7 127 114.7 86.00 12.30 14.30 14.30	FJ-5 28 104.8 95.2 67.20 9.60 14.29 14.3	46 28.8 133.1 120 91.20 13.10	31 28.3 165.4 148.3 120.00 17.10	209 28.1 170.3 152.4 124.30 17.90	201 28.9 167.3 150.0 121.10
28.7 127 114.7 86.00 12.30 14.30 14.30	28 104.8 95.2 67.20 9.60 14.29 14.3	28.8 133.1 120 91.20 13.10	28.3 165.4 148.3 120.00 17.10	28.1 170.3 152.4 124.30 17.90	28.9 167.3 150.0 121.10
127 114.7 86.00 12.30 14.30	104.8 95.2 67.20 9.60 14.29 14.3	133.1 120 91.20 13.10	165.4 148.3 120.00 17.10	170.3 152.4 124.30 17.90	167.3 150.0 121.10
114.7 86.00 12.30 14.30 1	95.2 67.20 9.60 14.29 14.3	120 91.20 13.10	148.3 120.00 17.10	152.4 124.30 17.90	150.0 121.10
86.00 12.30 14.30 1	67.20 9.60 14.29 14.3	91.20 13.10	120.00 17.10	124.30 17.90	121.1(
12.30 14.30 1	9.60 14.29 14.3	13.10	17.10	17.90	
14.30 1	14.29 14.3				
1	14.3	14.36	14.25		17.30
				14.40	14.29
	2			14.3	
68.95	2	3		CONTRACTOR OF	
	137.90	275.79			
7.09	7.13	7.14	6	1.1 4	
3.51	3.53	3.51		- LOBER	
17.13	17.46	17.17		tamp -	10
0.52	0.49	0.51			MA .
0.73	0.78	0.74			1/2
14.58	14.84	15.00	Concession of the	HUNDER	
214.6	362.0	505.4	State of some	C. Carrow	-
3.2	3.3	3.3	6	Martin weight	-
211.4	358.7	502.1			
280.3	496.6	777.9		ビニカ州	15
s-Strain C	urve				144
		2 <u>a</u>			19
9	σ ₃ = 69 kPa 12	15			1
	0.52 0.73 14.58 214.6 3.2 211.4 280.3 S-Strain C 276 kPa	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.52 0.49 0.51 0.73 0.78 0.74 14.58 14.84 15.00 214.6 362.0 505.4 3.2 3.3 3.3 211.4 358.7 502.1 280.3 496.6 777.9 s-Strain Curve $\sigma_3 = 138$ kPa $\sigma_3 = 69$ kPa $\sigma_3 = 69$ kPa $\sigma_3 = 12$ 15	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$



Project Name: Ar	n experimental ir	nvestigation c	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: St	andard Proctor	compacted, 8	35% sand 15	nite, 16% water content (S15B16			
Specimen Type: Co	ompacted	USCS: Clayey sand (SC)		Gs: 2.65			
Strain Rate: 19	%/min	Tested By:	Yueru Chen		Date:	8/13/2009	
			Trimmina			Chaoiman	
Sample	No.	1	Trimming 2	3	1	Specimen 2	3
Tin No.		B8	213		7	2 101	B-19
Wt. of Tin (g)		28.4	27.9	28.1	28.2	28.0	27.4
Wt. of Tin + Wet s	oil (a)	103.4	116.2	105.4	170.2	170.2	168.6
Wt. of Tin + Dry so		92.9	103.7	94.6	150.1	150.1	148.6
Wt. of Dry Soil (g)	(0)	64.50	75.80	66.50	121.90	122.10	121.20
Wt. of Water (g)		10.50	12.50	10.80	20.10	20.10	20.00
Water Content (%)	16.28	16.49	16.24	16.49	16.46	16.50
Average Water Co	ontent (%)		16.3			16.5	
0	NI-	1	-	<u>^</u>		Alton and	100
Sample		1	2	3			
Cell Pressure (kPa	,	68.95	137.90	275.79			-
Average Height, L Average Diameter		7.11	7.11 3.53	7.13 3.54			14
-	-	3.53 17.23	3.53 17.18	3.54 16.99	100		11
Dry Unit Weight (k Initial Void ratio	(N/m [*])	0.51	0.51	0.53			
Saturation (%)		0.86	0.85	0.83		ALC: NOT	8
Strain at Failure (%	%)	14.82	14.84	15.00	-		
Max Deviator Stre	,	223.8	273.3	399.0	1000	S. Lokal	2
Membrane Correc		3.3	3.3	3.3	-	Antonio .	0
Corrected Deviato		220.5	270.0	395.7	1. 1997	Sector L	8
Corrected Major S	tress (kPa)	289.5	407.9	671.5	100		15
Deviator Stress (Kpa) 0002 0	JU Triaxial - Str	σ ₃ = 276	kPa $\sigma_3 = 138 \text{ kF}$ $\sigma_3 = 69 \text{ kPa}$				52
0 Notes: M	3 6 Axial S embrane correct	9 Strain (%)	12	15			

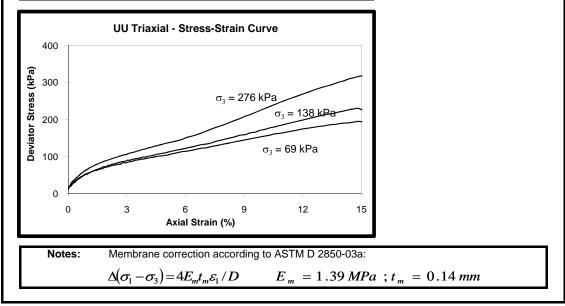


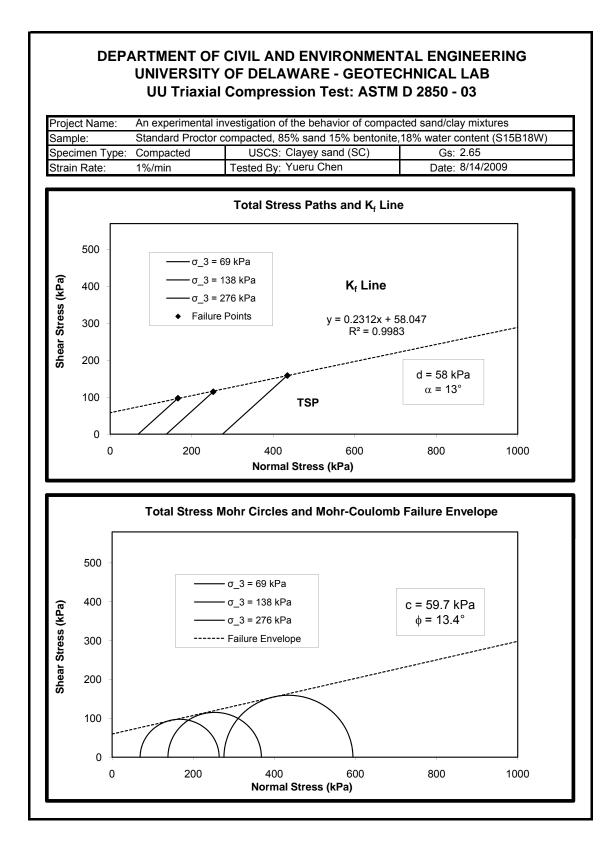
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 85% sand 15% bentonite, 18% water content (S15B18W)					
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.65			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/14/2009			

Sample No.		Trimming		Specimen			
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	31	209	201	
Wt. of Tin (g)	28.7	28	28.8	28.3	28.1	28.9	
Wt. of Tin + Wet soil (g)	95.2	131.8	119.2	171.5	170.0	170.1	
Wt. of Tin + Dry soil (g)	84.9	116	105.3	149.5	148.4	148.6	
Wt. of Dry Soil (g)	56.20	88.00	76.50	121.20	120.30	119.70	
Wt. of Water (g)	10.30	15.80	13.90	22.00	21.60	21.50	
Water Content (%)	18.33	17.95	18.17	18.15	17.96	17.96	
Average Water Content (%)		18.2			18.0		

	-		
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.14	7.10	7.11
Average Diameter, D (cm)	3.53	3.54	3.54
Dry Unit Weight (kN/m ³)	17.06	16.89	16.80
Initial Void ratio	0.52	0.54	0.55
Saturation (%)	0.92	0.88	0.87
Strain at Failure (%)	14.83	14.82	15.02
Max Deviator Stress (kPa)	198.3	233.4	321.4
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	195.0	230.1	318.1
Corrected Major Stress (kPa)	264.0	368.0	593.9

Pictures are not available.





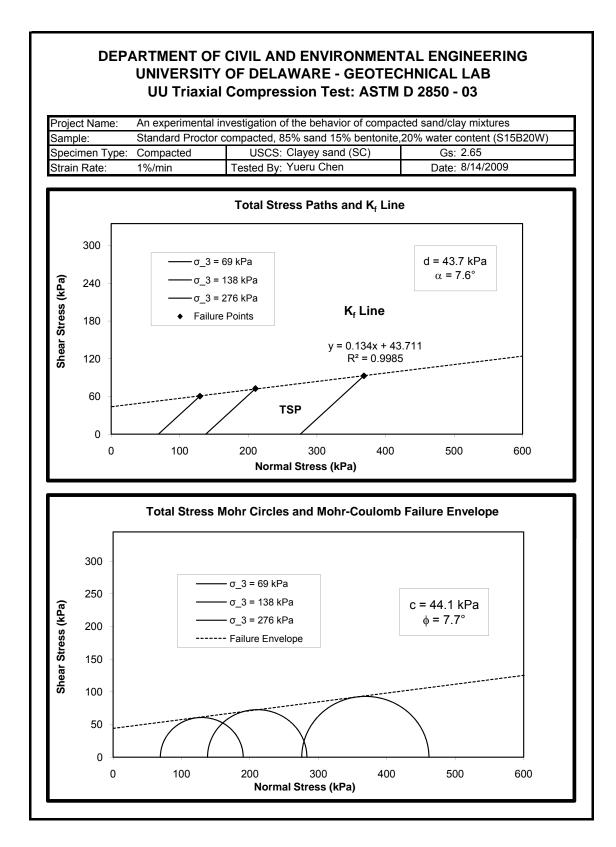
Project Name:	An experimental in						
Sample:		compacted, 85% sand 15% bentonite, 20% water content (S15B20W USCS: Clayey sand (SC) Gs: 2.65					
Specimen Type:						2.65	
Strain Rate:	1%/min	Tested By:	Yueru Cher		Date:	8/14/2009	
			Trimming			Specimen	
Sam	ple No.	1	2	3	1	2	3
Tin No.		B8	213	1	7	101	B-19
Wt. of Tin (g)		28.4	27.9	28.1	28.2	28.0	27.3
Wt. of Tin + We		113.6	121.5	132	168.2	167.4	164.8
Wt. of Tin + Dr		99.6	106	114.8	144.8	144.3	141.9
Wt. of Dry Soil		71.20	78.10	86.70	116.60	116.30	114.60
Wt. of Water (g	"	14.00	15.50	17.20	23.40	23.10	22.90
Water Content	()	19.66	19.85	19.84	20.07	19.86	19.98
Average Water	· Content (%)		19.8			20.0	
Sam	ple No.	1	2	3		-	A
Cell Pressure (68.95	137.90	275.79			
Average Heigh		7.12	7.11	7.08			
Average Diame		3.53	3.54	3.54	Sec. and	and the second	
Dry Unit Weigh	nt (kN/m ³)	16.40	16.30	16.12	1		
Initial Void ratio		0.58	0.60	0.61	1000	· · ··································	
Saturation (%)		0.91	0.88	0.86	Concession of the local division of the loca		
Strain at Failur		14.84	14.81	14.85	1000		
Max Deviator S	· · · /	124.5	148.5	189.0	and the same	an allering	State of the second
Membrane Cor	()	3.3	3.3	3.3		Contrato De la	
	iator Stress (kPa)	121.2	145.3	185.8			200
Corrected Majo	or Stress (kPa)	190.2	283.2	461.6			
	UU Triaxial - Str	oss-Strain C				11.40	1
200		Coo-Otraill O	-ui 75				2
						S. Start	10
Deviator Stress (kPa)					1		
-) s	07	6 kDa	$\sigma_3 = 138$	kPa 🔨	and the second	14	P. Contraction
ŝ	σ ₃ = 27						

Membrane correction according to ASTM D 2850-03a:

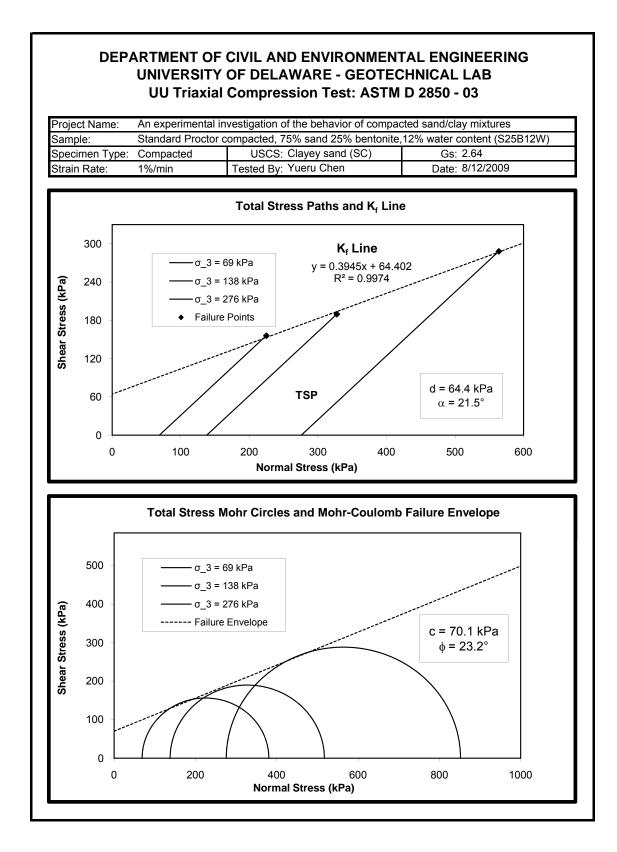
 $\Delta(\sigma_1 - \sigma_3) = 4E_m t_m \varepsilon_1 / D \qquad E_m = 1.39 MPa \; ; t_m = 0.14 mm$

Axial Strain (%)

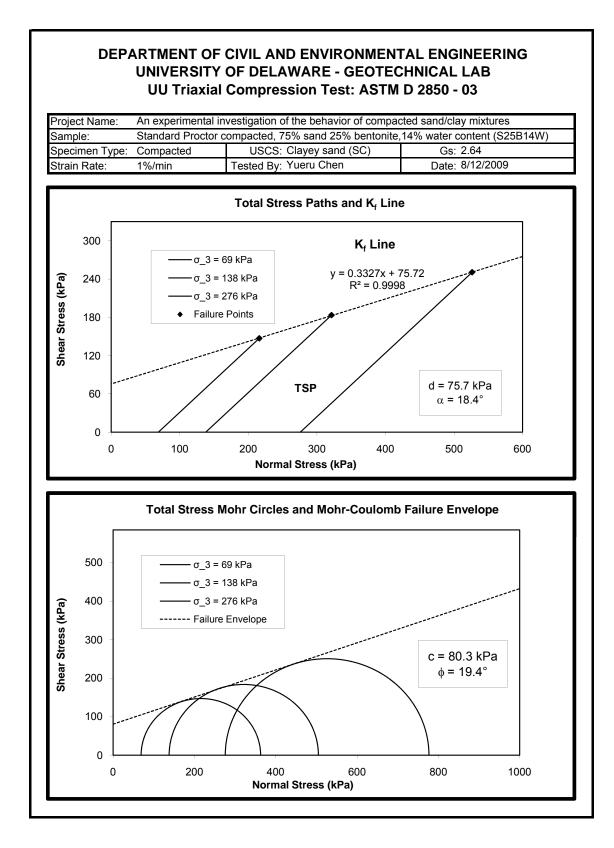
Notes:



Project Name: An experimental in	nvestigation of	of the behavio	or of compac	cted sand/cla	ay mixtures	
Sample: Standard Proctor	compacted, 7	75% sand 25	12% water	content (S25	B12W)	
Specimen Type: Compacted		Clayey sand	, ,	Gs:	2.64	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/12/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	31	209	201
Wt. of Tin (g)	28.7	28	28.9	28.4	28.2	28.9
Wt. of Tin + Wet soil (g)	80.5	83.4	98.9	164.5	165.4	167.3
Wt. of Tin + Dry soil (g)	74.8	77.2	91	149.1	149.7	151.6
Wt. of Dry Soil (g)	46.10	49.20	62.10	120.70	121.50	122.70
Wt. of Water (g)	5.70	6.20	7.90	15.40	15.70	15.70
Water Content (%)	12.36	12.60	12.72	12.76	12.92	12.80
Average Water Content (%)		12.6			12.8	
Sample No.	1	2	3		and the second	1
Cell Pressure (kPa)	68.95	137.90	275.79			00
Average Height, L (cm)	7.08	7.13	7.11			51
Average Diameter, D (cm)	3.50	3.52	3.53	1 13		in the
Dry Unit Weight (kN/m ³)	17.43	17.16	17.31		N. Britstein	271
Initial Void ratio	0.49	0.51	0.50	105		121
Saturation (%)	0.49	0.51	0.68			1.1
Strain at Failure (%)	12.36	14.82	14.82	- 50		73
Max Deviator Stress (kPa)	314.5	382.6	579.3			
Membrane Correction (kPa)	2.8	3.3	3.3	and the second		-
Corrected Deviator Stress (kPa)	311.7	379.3	576.1	1	Personal Association	-
Corrected Major Stress (kPa)	380.7	517.2	851.9			4
UU Triaxial - Str 700 600 500 400 200 100 0 0 0 0 0 0 0 0 0 0 0 0	σ ₃ = 1	38 kPa 39 kPa				512
0 7 0 3 6 Axial S	9 Strain (%)	12	15	-		



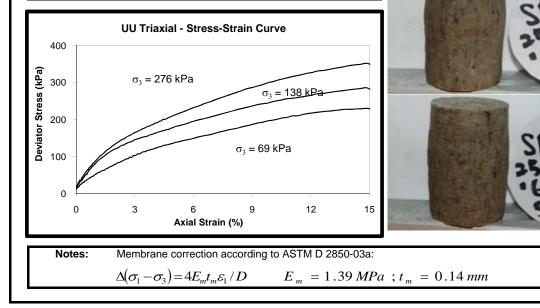
Project Name: An experimental						
Sample: Standard Proctor	compacted, 7	75% sand 25	% bentonite,	14% water	content (S25	B14W)
Specimen Type: Compacted	USCS: Clayey sand (SC)		Gs: 2.64			
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/12/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	7	101	B-19
Wt. of Tin (g)	28.4	27.9	28.1	28.2	28.0	27.4
Wt. of Tin + Wet soil (g)	105.2	96.9	118.8	170.2	170.3	170.8
Wt. of Tin + Dry soil (g)	95.3	88	107.2	151.8	152.1	152.2
Wt. of Dry Soil (g)	66.90	60.10	79.10	123.60	124.10	124.80
Wt. of Water (g)	9.90	8.90	11.60	18.40	18.20	18.60
Water Content (%)	14.80	14.81	14.66	14.89	14.67	14.90
Average Water Content (%)		14.8			14.8	
Sample No.	1	2	3		ALLANK WE	
Cell Pressure (kPa)	68.95	137.90	275.79			C
Average Height, L (cm)	7.14	7.12	7.13	10		3
Average Diameter, D (cm)	3.53	3.52	3.51	15		25
Dry Unit Weight (kN/m ³)	17.40	17.54	17.72		SS SRE	11
Initial Void ratio	0.49	0.48	0.46			17
Saturation (%)	0.81	0.81	0.85		"帮助"。	14
Strain at Failure (%)	14.31	14.87	14.89	and the second second		
Max Deviator Stress (kPa)	297.2	370.1	504.4		A LAND STATE	P. Statistics
Membrane Correction (kPa)	3.2	3.3	3.3		L'AMBRE !!	THE .
Corrected Deviator Stress (kPa)	294.1	366.8	501.1			
Corrected Major Stress (kPa)	363.0	504.7	776.9		alle.	25
UU Triaxial - St	ress-Strain C	urve			C. MARINE	14
$\sigma_3 = 276 \text{ kPa}$				Constant of the local division of the local		
σ ₃ = 276 kPa	σ ₃ = 1	38 kPa				
\$ 300 -				1		1.
	σ ₃ = 6	i9 kPa		-		ļ
0 3 6	9 Strain (%)	12	15			

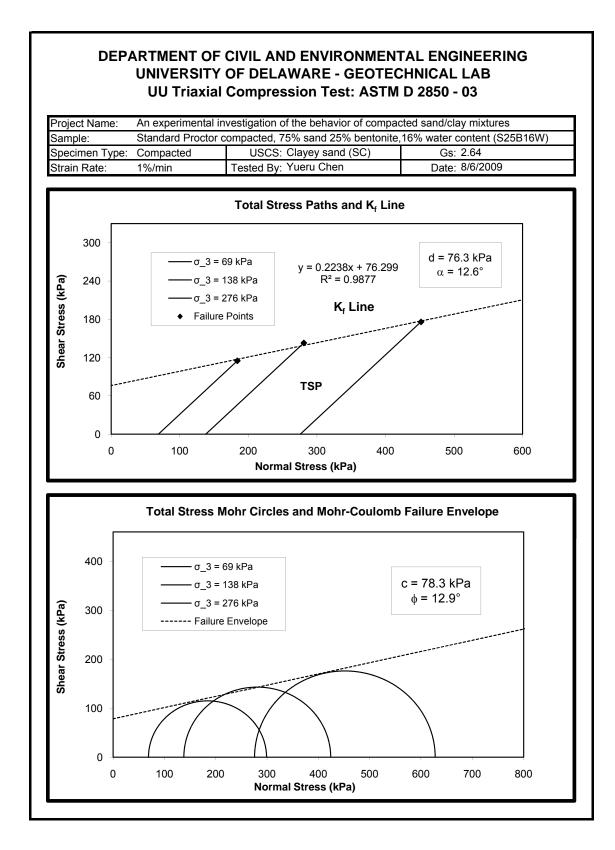


Project Name:	An experimental in	An experimental investigation of the behavior of compacted sand/clay mixtures								
Sample:	Standard Proctor c	ndard Proctor compacted, 75% sand 25% bentonite, 16% water content (S25B16W)								
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.64							
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/6/2009							

Sample No.		Trimming		Specimen			
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	31	209	
Wt. of Tin (g)	28.8	28.1	28.9	28.9	28.4	28.2	
Wt. of Tin + Wet soil (g)	118.2	110.3	113.9	172.1	174.3	170.0	
Wt. of Tin + Dry soil (g)	105.3	98.4	101.7	151.4	153.1	149.5	
Wt. of Dry Soil (g)	76.50	70.30	72.80	122.50	124.70	121.30	
Wt. of Water (g)	12.90	11.90	12.20	20.70	21.20	20.50	
Water Content (%)	16.86	16.93	16.76	16.90	17.00	16.90	
Average Water Content (%)		16.8			16.9		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.09	7.16	7.10
Average Diameter, D (cm)	3.51	3.56	3.52
Dry Unit Weight (kN/m ³)	17.50	17.21	17.25
Initial Void ratio	0.48	0.50	0.50
Saturation (%)	0.93	0.89	0.89
Strain at Failure (%)	14.81	14.82	14.83
Max Deviator Stress (kPa)	233.3	289.3	355.3
Membrane Correction (kPa)	3.3	3.2	3.3
Corrected Deviator Stress (kPa)	230.0	286.0	352.0
Corrected Major Stress (kPa)	298.9	423.9	627.8



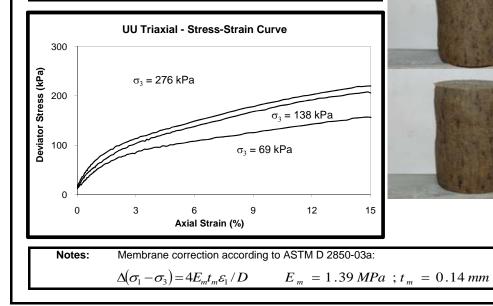


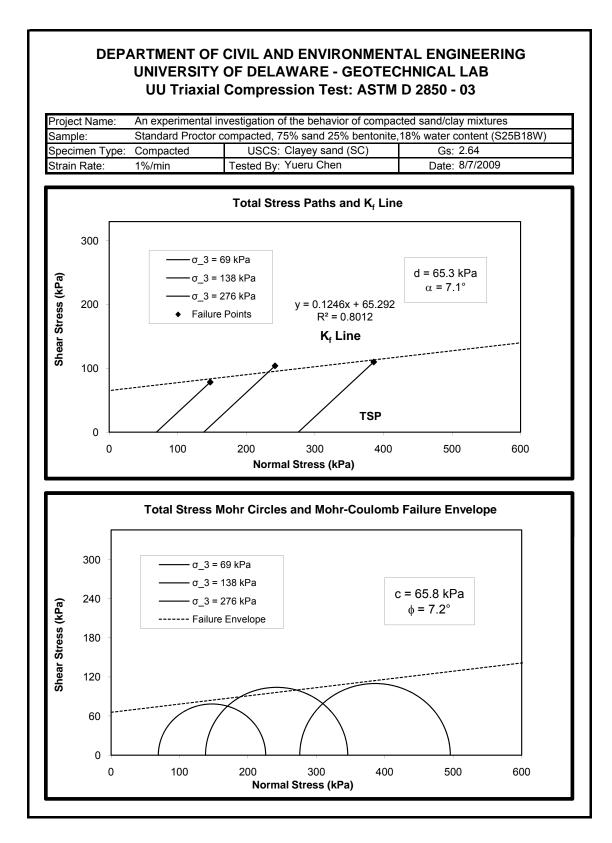
DEP/	ARTMENT OF UNIVERSITY UU Triaxial	OF DELA	WARE -	GEOTEC	CHNICAL	LAB	G
Project Name:	An experimental in	nvestigation of	of the behavi	or of compa	cted sand/cla	ay mixtures	
Sample:	Standard Proctor	compacted, 7	ompacted, 75% sand 25% bentonite, 18% water content (S25B				5B18W)
Specimen Type:	Compacted	USCS:	Clayey san	d (SC)	Gs:	2.64	
Strain Rate:	1%/min	Tested By:	Yueru Cher	ו	Date:	8/7/2009	
0	a la Nia		Trimming			Specimen	
Sample No.		1	2	3	1	2	3
Tin No.		4	FJ-5	46	209	31	201
M/t of Tip (a)		00.7	00	20.0	00.4	00.0	00.0

Tin No.	4	FJ-5	46	209	31	201
Wt. of Tin (g)	28.7	28	28.9	28.1	28.3	28.9
Wt. of Tin + Wet soil (g)	92.1	121.1	104.4	171.1	170.4	170.6
Wt. of Tin + Dry soil (g)	82.1	106.4	92.5	147.8	148.1	147.8
Wt. of Dry Soil (g)	53.40	78.40	63.60	119.70	119.80	118.90
Wt. of Water (g)	10.00	14.70	11.90	23.30	22.30	22.80
Water Content (%)	18.73	18.75	18.71	19.47	18.61	19.18
Average Water Content (%)		18.7			19.1	

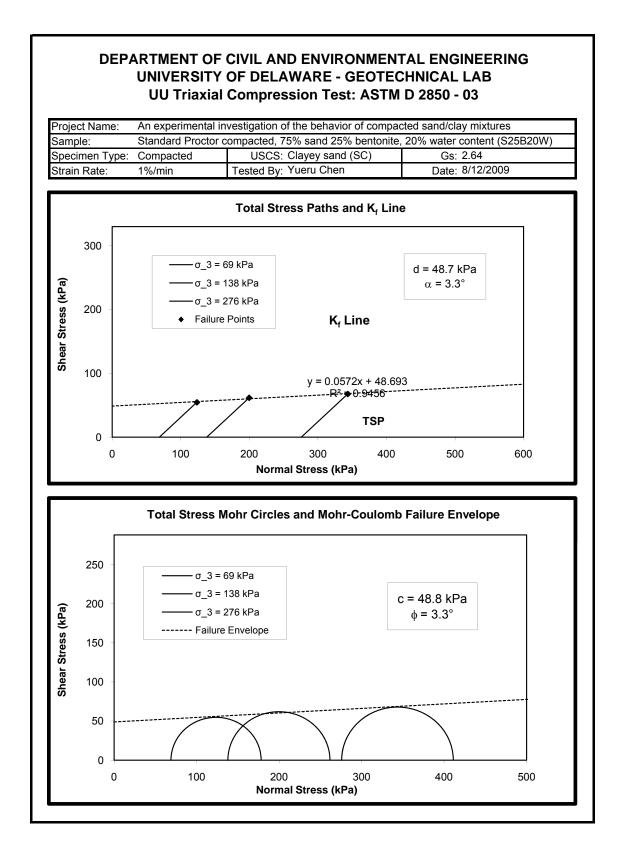
N S

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.11	7.14
Average Diameter, D (cm)	3.52	3.54	3.54
Dry Unit Weight (kN/m ³)	16.89	16.76	16.64
Initial Void ratio	0.53	0.54	0.56
Saturation (%)	0.96	0.90	0.91
Strain at Failure (%)	14.82	14.85	15.01
Max Deviator Stress (kPa)	160.3	211.2	223.3
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	157.0	208.0	220.0
Corrected Major Stress (kPa)	226.0	345.9	495.8





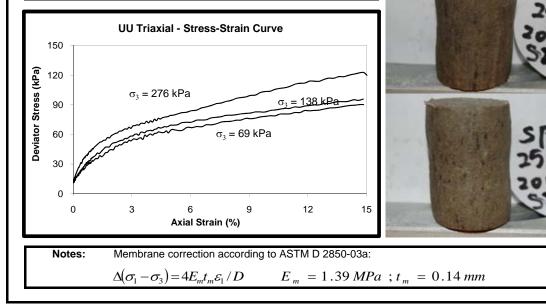
Project Name: An experimenta						
Sample: Standard Proct				20% water	content (S25	B20W)
Specimen Type: Compacted		Clayey sand			2.64	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	8/12/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	FJ-1	59	410	majid	B14	2010
Wt. of Tin (g)	28	28.3	28.4	28.7	29.1	28.6
Wt. of Tin + Wet soil (g)	113.1	120.3	77.1	168.1	166.5	166.4
Wt. of Tin + Dry soil (g)	98.6	104.6	68.8	143.9	142.9	142.7
Wt. of Dry Soil (g)	70.60	76.30	40.40	115.20	113.80	114.1
Wt. of Water (g)	14.50	15.70	8.30	24.20	23.60	23.70
Water Content (%)	20.54	20.58	20.54	21.01	20.74	20.77
Average Water Content (%)		20.6			20.8	
Sample No.	1	2	3	2		
Cell Pressure (kPa)	68.95	137.90	275.79		Wheeler	C
Average Height, L (cm)	7.12	7.07	7.12			122
Average Diameter, D (cm)	3.53	3.54	3.53	1000		1221
Dry Unit Weight (kN/m ³)	16.25	16.00	16.09			200
Initial Void ratio	0.59	0.62	0.61			15
Saturation (%)	0.93	0.89	0.90	_		à
Strain at Failure (%)	14.82	14.82	14.85	- Carl	N. Land	
Max Deviator Stress (kPa)	112.5	127.0	138.8			
Membrane Correction (kPa)	3.3	3.3	3.3		A DESTRUCT	2
Corrected Deviator Stress (kPa) 109.2	123.7	135.5		ALL CHART	S
Corrected Major Stress (kPa)	178.2	261.6	411.3			251
$\sigma_3 = 276 \text{ kPa}$	Stress-Strain C $\sigma_3 = 69 \text{ k}$	0 ₃ = 138	kPa			2020
0 3 Axi	6 9 al Strain (%)	12	15			

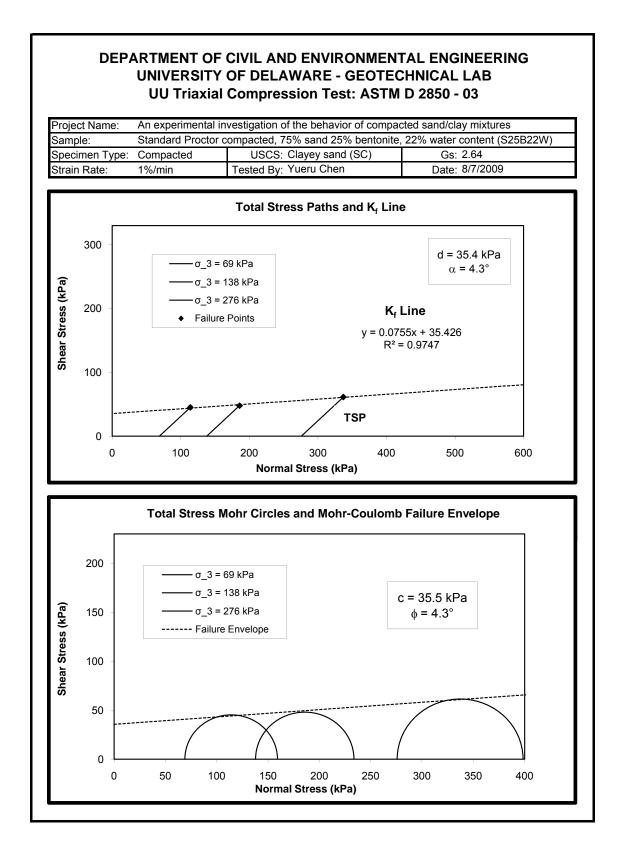


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 75% sand 25% bentonite, 22% water content (S25B22W)					
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.64			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/7/2009			

Sample No.		Trimming		Specimen		
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	7	101	B-19
Wt. of Tin (g)	28.4	27.9	28.1	28.2	28.0	27.4
Wt. of Tin + Wet soil (g)	71.8	93.7	84.5	165.0	165.3	164.8
Wt. of Tin + Dry soil (g)	63.8	81.7	74.1	139.6	139.7	139.2
Wt. of Dry Soil (g)	35.40	53.80	46.00	111.40	111.70	111.80
Wt. of Water (g)	8.00	12.00	10.40	25.40	25.60	25.60
Water Content (%)	22.60	22.30	22.61	22.80	22.92	22.90
Average Water Content (%)		22.5			22.9	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.11	7.12	7.10
Average Diameter, D (cm)	3.53	3.54	3.52
Dry Unit Weight (kN/m ³)	15.73	15.63	15.87
Initial Void ratio	0.65	0.66	0.63
Saturation (%)	0.93	0.92	0.96
Strain at Failure (%)	14.84	14.83	14.84
Max Deviator Stress (kPa)	93.5	99.0	126.0
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	90.2	95.8	122.7
Corrected Major Stress (kPa)	159.1	233.7	398.5

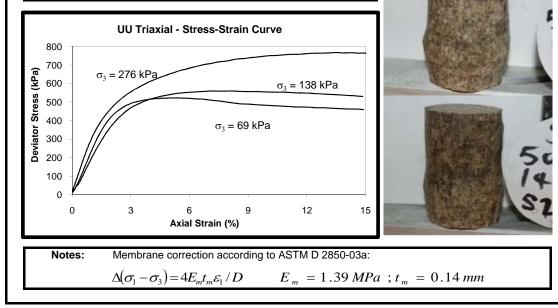


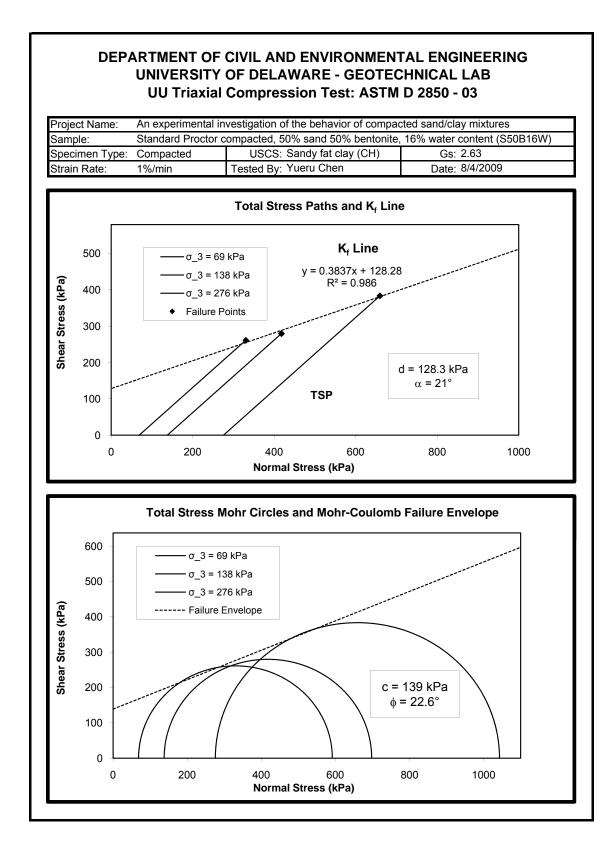


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 50% sand 50% bentonite, 16% water content (S50B16W)					
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 8/4/2009			

Somala No.		Trimming		Specimen		
Sample No.	1	2	3	1	2	3
Tin No.	46	FJ-5	4	7	101	B-19
Wt. of Tin (g)	28.9	28.1	28.7	28.8	28.0	27.4
Wt. of Tin + Wet soil (g)	101.1	100.4	88.5	159.0	152.6	156.2
Wt. of Tin + Dry soil (g)	90.8	90.2	80.2	140.2	134.8	137.6
Wt. of Dry Soil (g)	61.9	62.2	51.5	111.4	106.8	110.2
Wt. of Water (g)	10.3	10.2	8.3	18.8	17.8	18.6
Water Content (%)	16.6	16.4	16.1	16.9	16.7	16.9
Average Water Content (%)		16.4			16.8	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.11	6.99	7.00
Average Diameter, D (cm)	3.53	3.53	3.53
Dry Unit Weight (kN/m ³)	15.75	15.33	15.77
Initial Void ratio	0.64	0.68	0.64
Saturation (%)	0.70	0.64	0.70
Strain at Failure (%)	5.00	8.08	13.58
Max Deviator Stress (kPa)	523.9	561.6	770.1
Membrane Correction (kPa)	1.1	1.8	3.0
Corrected Deviator Stress (kPa)	522.8	559.8	767.1
Corrected Major Stress (kPa)	591.7	697.7	1042.9

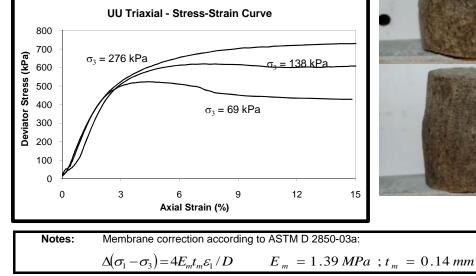




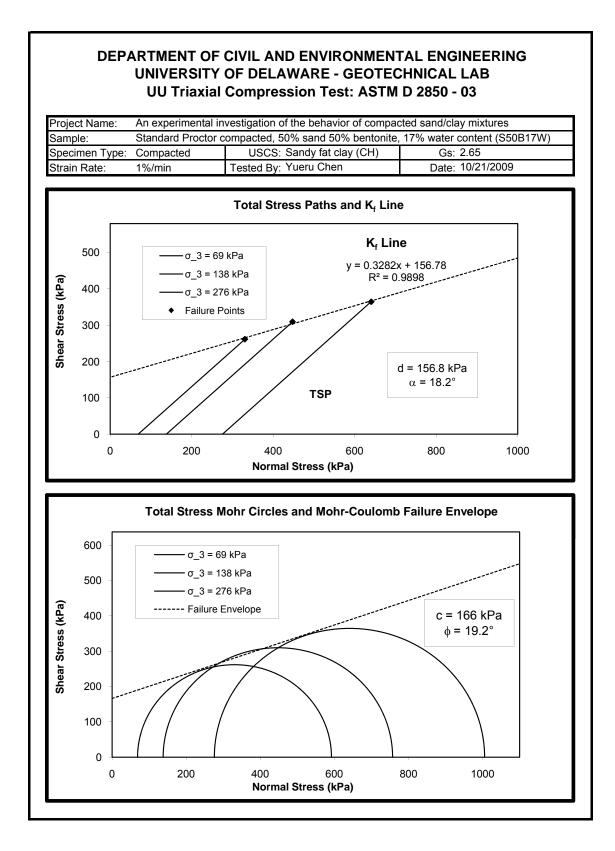
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 50% sand 50% bentonite, 17% water content (S50B17W)					
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.65			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/21/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	majid	59	211	2010	FJ-3	Y-1	
Wt. of Tin (g)	28.7	28.3	28.2	28.6	29.1	28.3	
Wt. of Tin + Wet soil (g)	89.4	89.2	77.4	161.0	160.8	156.5	
Wt. of Tin + Dry soil (g)	80.7	80.6	70.1	141.9	141.8	137.9	
Wt. of Dry Soil (g)	52.0	52.3	41.9	113.3	112.7	109.6	
Wt. of Water (g)	8.7	8.6	7.3	19.1	19.0	18.6	
Water Content (%)	16.7	16.4	17.4	16.9	16.9	17.0	
Average Water Content (%)		16.9			16.9		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.06	7.02
Average Diameter, D (cm)	3.52	3.52	3.55
Dry Unit Weight (kN/m ³)	16.08	16.14	15.52
Initial Void ratio	0.62	0.61	0.68
Saturation (%)	0.72	0.73	0.67
Strain at Failure (%)	4.34	7.31	15.02
Max Deviator Stress (kPa)	524.0	620.8	732.8
Membrane Correction (kPa)	1.0	1.6	3.3
Corrected Deviator Stress (kPa)	523.0	619.2	729.5
Corrected Major Stress (kPa)	592.0	757.1	1005.2



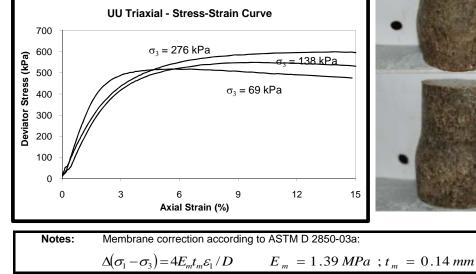




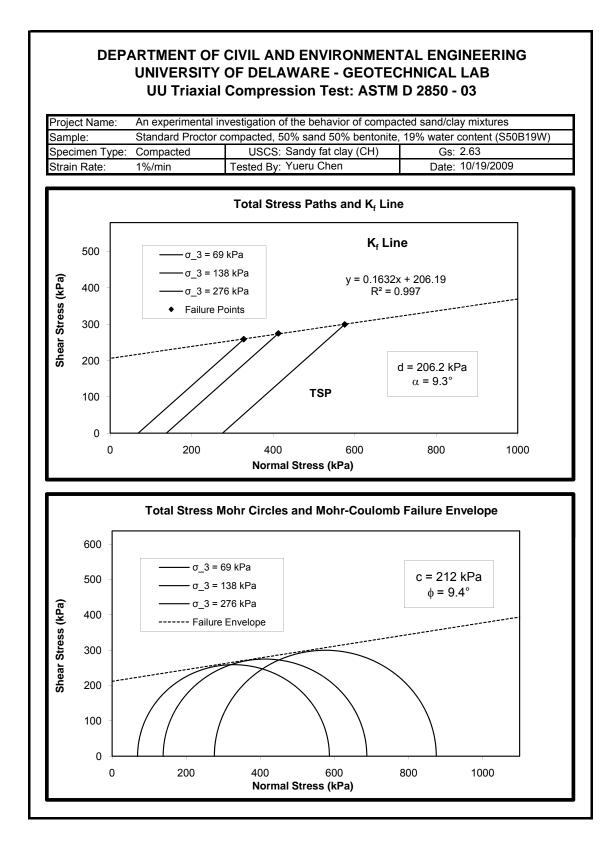
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 50% sand 50% bentonite, 19% water content (S50B19W)					
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/19/2009			

Sample No		Trimming		Specimen		
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	B-19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28.0	28.2
Wt. of Tin + Wet soil (g)	96.6	85.7	86.4	157.1	159.4	156.9
Wt. of Tin + Dry soil (g)	85.5	76.4	76.8	136.5	138.2	135.9
Wt. of Dry Soil (g)	57.0	48.5	48.7	109.1	110.2	107.7
Wt. of Water (g)	11.1	9.3	9.6	20.6	21.2	21.0
Water Content (%)	19.5	19.2	19.7	18.9	19.2	19.5
Average Water Content (%)		19.5			19.2	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.75	6.98	6.74
Average Diameter, D (cm)	3.54	3.52	3.53
Dry Unit Weight (kN/m ³)	16.15	15.96	15.99
Initial Void ratio	0.60	0.62	0.61
Saturation (%)	0.83	0.82	0.84
Strain at Failure (%)	6.55	9.80	13.83
Max Deviator Stress (kPa)	519.1	551.8	602.3
Membrane Correction (kPa)	1.4	2.2	3.0
Corrected Deviator Stress (kPa)	517.7	549.6	599.3
Corrected Major Stress (kPa)	586.6	687.5	875.1



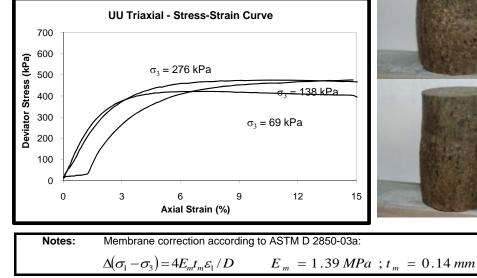




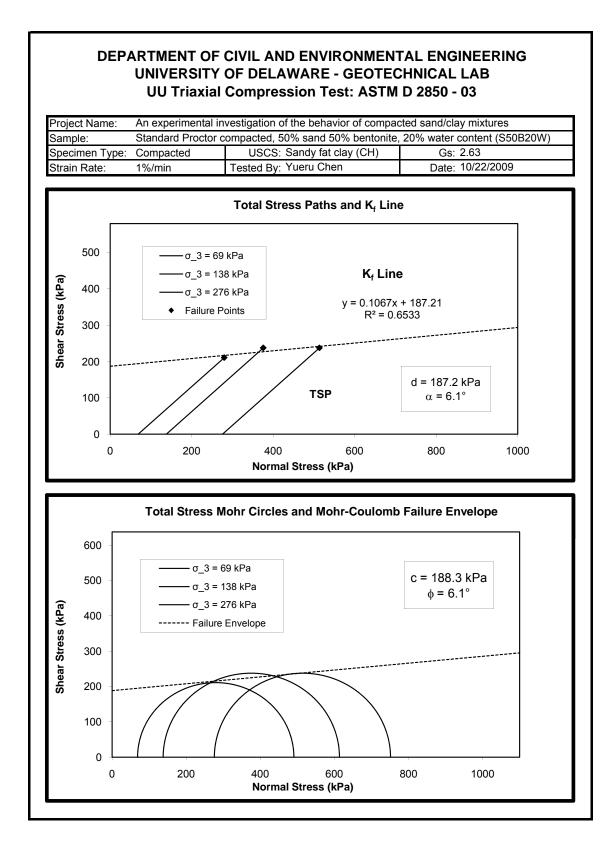
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor compacted, 50% sand 50% bentonite, 20% water content (S50B20W)						
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/22/2009				

Sample No.	Trimming			Specimen		
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.2	28.4
Wt. of Tin + Wet soil (g)	109.4	126.8	90.1	168.0	165.6	164.7
Wt. of Tin + Dry soil (g)	95.9	110.2	79.7	144.1	142.0	141.1
Wt. of Dry Soil (g)	67.2	82.2	50.8	115.2	113.8	112.7
Wt. of Water (g)	13.5	16.6	10.4	23.9	23.6	23.6
Water Content (%)	20.1	20.2	20.5	20.7	20.7	20.9
Average Water Content (%)	20.3 20.8					

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.00	7.04
Average Diameter, D (cm)	3.54	3.53	3.53
Dry Unit Weight (kN/m ³)	16.12	16.33	16.03
Initial Void ratio	0.60	0.58	0.61
Saturation (%)	0.91	0.94	0.90
Strain at Failure (%)	7.56	10.55	14.82
Max Deviator Stress (kPa)	423.5	477.9	478.7
Membrane Correction (kPa)	1.7	2.3	3.3
Corrected Deviator Stress (kPa)	421.8	475.6	475.4
Corrected Major Stress (kPa)	490.7	613.5	751.2



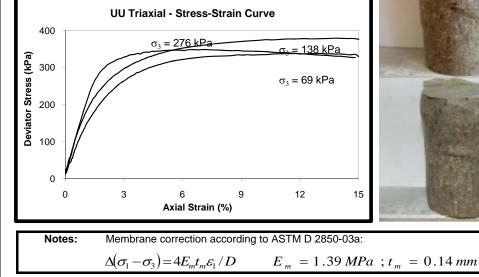




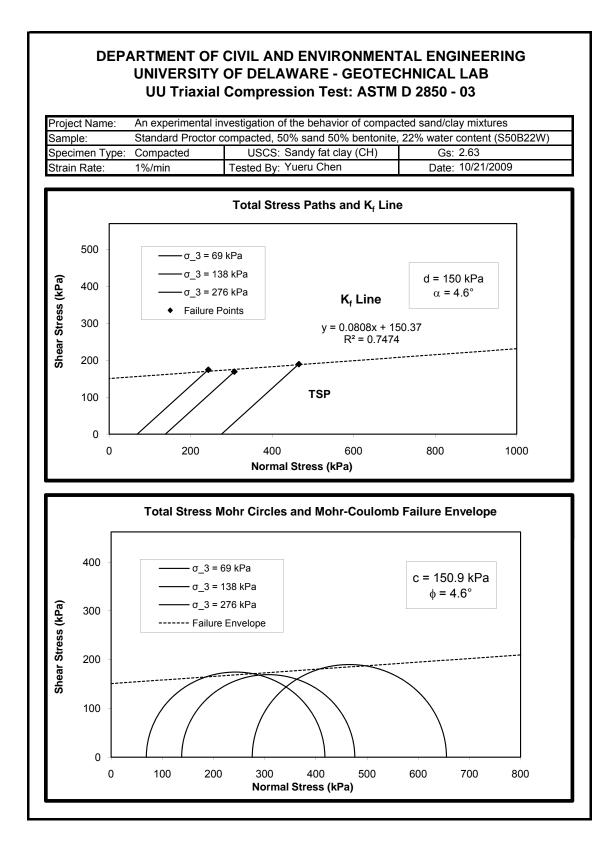
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor compacted, 50% sand 50% bentonite, 22% water content (S50B22W)						
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/21/2009				

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	4	FJ-5	46	201	209	31		
Wt. of Tin (g)	28.7	28.0	28.9	28.9	28.2	28.4		
Wt. of Tin + Wet soil (g)	105.0	110.5	100.0	167.3	167.4	166.1		
Wt. of Tin + Dry soil (g)	91.0	94.6	86.7	141.5	140.9	140.5		
Wt. of Dry Soil (g)	62.3	66.6	57.8	112.6	112.7	112.1		
Wt. of Water (g)	14.0	15.9	13.3	25.8	26.5	25.6		
Water Content (%)	22.5	23.9	23.0	22.9	23.5	22.8		
Average Water Content (%)		23.1			23.1			

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.14	7.14	7.15
Average Diameter, D (cm)	3.53	3.55	3.52
Dry Unit Weight (kN/m ³)	15.78	15.64	15.78
Initial Void ratio	0.64	0.65	0.63
Saturation (%)	0.95	0.95	0.95
Strain at Failure (%)	7.04	13.09	13.82
Max Deviator Stress (kPa)	350.2	341.2	382.5
Membrane Correction (kPa)	1.5	2.9	3.0
Corrected Deviator Stress (kPa)	348.6	338.3	379.4
Corrected Major Stress (kPa)	417.6	476.2	655.2





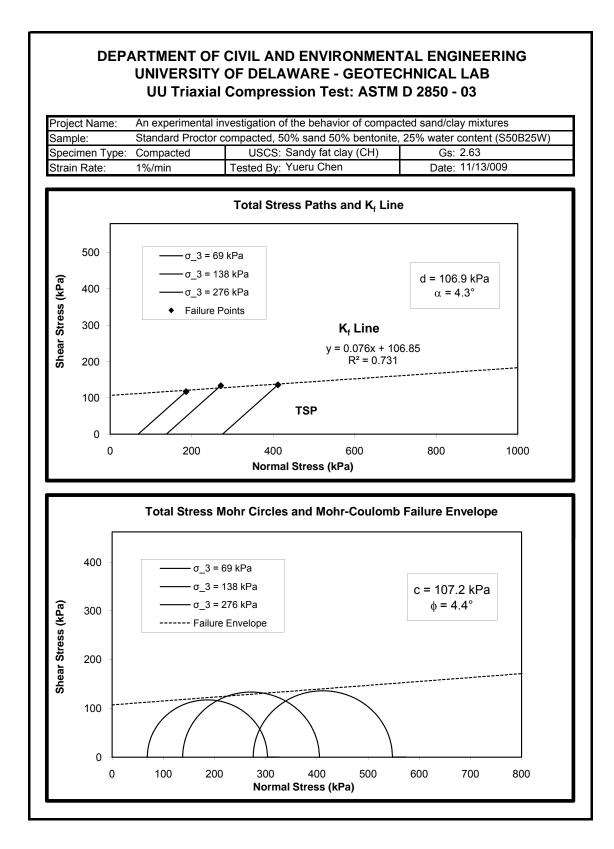


Project Name: An experimental in Sample: Standard Proctor of						25W)
Specimen Type: Compacted		Sandy fat c		Gs:		- /
Strain Rate: 1%/min		Yueru Cher		Date:	11/13/2009	
	,					
Sample No.		Trimming			Specimen	
Sample 140.	1	2	3	1	2	3
Tin No.	209	FJ-3	211	B19	101	7
Wt. of Tin (g)	28.2	29.1	28.2	27.3	28.0	28.1
Wt. of Tin + Wet soil (g)	119.4	93.3	122.8	160.2	161.1	165.6
Wt. of Tin + Dry soil (g)	100.8	80.5	103.7	133.1	134.2	137.8
Wt. of Dry Soil (g)	72.6	51.4	75.5	105.8	106.2	109.7
Wt. of Water (g)	18.6	12.8	19.1	27.1	26.9	27.8
Water Content (%)	25.6	24.9	25.3	25.6	25.3	25.3
Average Water Content (%)		25.3			25.4	
Sample No.	4	2	2	-	and the second second	
Cell Pressure (kPa)	1	2 137.90	3		Hat Parts	E.
Average Height, L (cm)	68.95 6.95		275.79 7.16		ALCONTRACT OF	24
Average Diameter, D (cm)	3.54	6.92 3.55	3.53			
	15.17	15.21	15.36	6	ALC: NO	100
Dry Unit Weight (kN/m ³) Initial Void ratio	0.70	0.70	0.68	- X	A Standard	
Saturation (%)	0.70	0.70	0.88		The state of the s	
Strain at Failure (%)	13.35	11.83	14.80		De antes	
Max Deviator Stress (kPa)	237.5	269.6	275.0	No.	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1
Membrane Correction (kPa)	2.9	203.0	3.3	Contraction of the	ALC THE PARTY	
Corrected Deviator Stress (kPa)	234.5	267.0	271.8	1	and the state	2
Corrected Major Stress (kPa)	303.5	404.9	547.5			
	000.0	101.0	011.0		Photo A	
UU Triaxial - Stre	ess-Strain C	urve				1-
$\sigma_{3} = 276$	∂ kPa			5		4
SSS		$\sigma_3 = 138$	kPa —	AND MCCO		
o 300 -		σ ₃ = 69 kP	a		P. Post	
σ ₃ = 276 200 100						-
0 3 6	9	12	15			B

 $\Delta(\sigma_1 - \sigma_3) = 4E_m t_m \varepsilon_1 / D \qquad E_m = 1.39 MPa \; ; t_m = 0.14 mm$

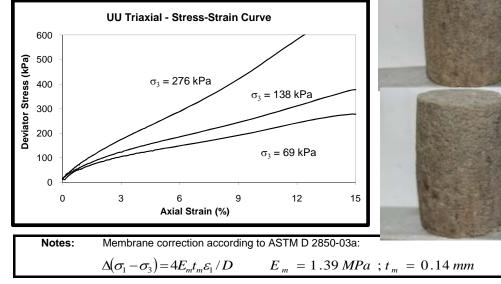
Membrane correction according to ASTM D 2850-03a:

Notes:

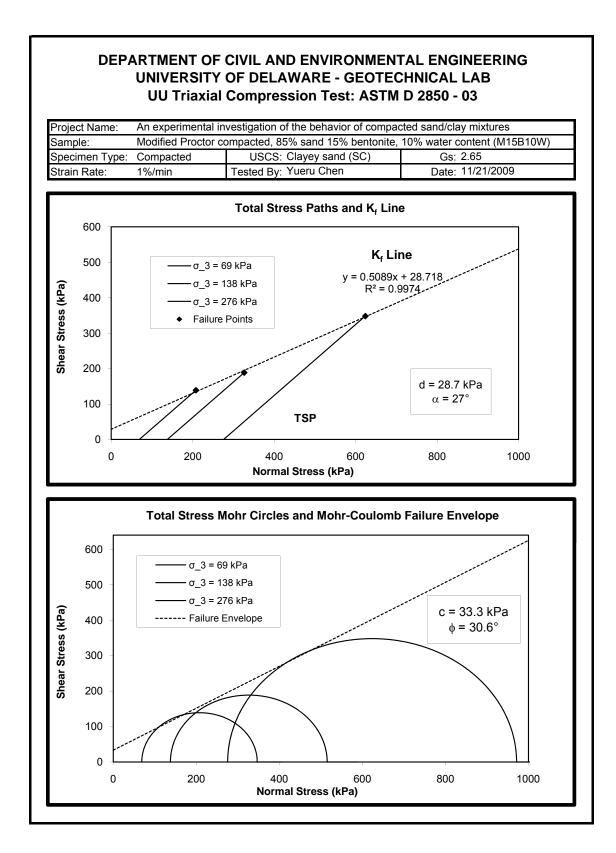


DEI	PARTMENT OF UNIVERSITY UU Triaxia	OF DEL	AWARE -	GEOTE	CHNICAL	LAB	G	
Project Name:	An experimental ir	nvestigation of	of the behavi	or of compa	cted sand/cla	ay mixtures		
Sample:	Modified Proctor of	ompacted, 8	5% sand 159	% bentonite,	10% water of	content (M15E	310W)	
Specimen Type	: Compacted	USCS:	Clayey san	d (SC)	Gs:	2.65		
Strain Rate:	1%/min	Tested By:	Yueru Cher	۱	Date:	11/21/2009		
Sor	Sample No. Trimming Specimen							
Sal	liple No.	1	2	3	1	2	3	
Tin No.		410	4	FJ1	B8	213	1	
Wt. of Tin (g)		28.4	28.7	28	28.5	27.9	28.1	
Wt. of Tin + V		80.9	112.3	84.8	163.5	161.2	163.8	
Wt. of Tin + D	Dry soil (g)	76	104.3	79.5	150.5	148.6	150.8	
Wt. of Dry So	il (g)	47.60	75.60	51.50	122.0	120.7	122.7	
Wt. of Water	(g)	4.90	8.00	5.30	13.0	12.6	13.0	
Water Conter	nt (%)	10.29	10.58	10.29	10.7	10.4	10.6	
Average Wate	er Content (%)		10.4			10.6		
					6	The real of		
	mple No.	1	2	3	1	and the second	M	
Cell Pressure		68.95	137.90	275.79			100	
Average Heig		7.13	7.13	7.11			15 P	
Average Dian	neter, D (cm)	3.50	3.53	3.52		State of the state	10	
D	3.	47 45	40.07	47 40				

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.13	7.11
Average Diameter, D (cm)	3.50	3.53	3.52
Dry Unit Weight (kN/m ³)	17.45	16.97	17.40
Initial Void ratio	0.49	0.53	0.49
Saturation (%)	0.58	0.52	0.57
Strain at Failure (%)	15.03	15.01	15.00
Max Deviator Stress (kPa)	281.3	380.6	699.1
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	278.0	377.3	695.8
Corrected Major Stress (kPa)	347.0	515.2	971.6

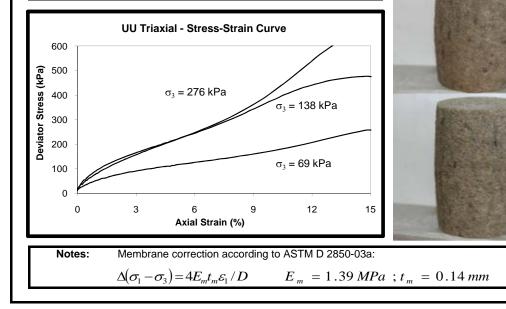


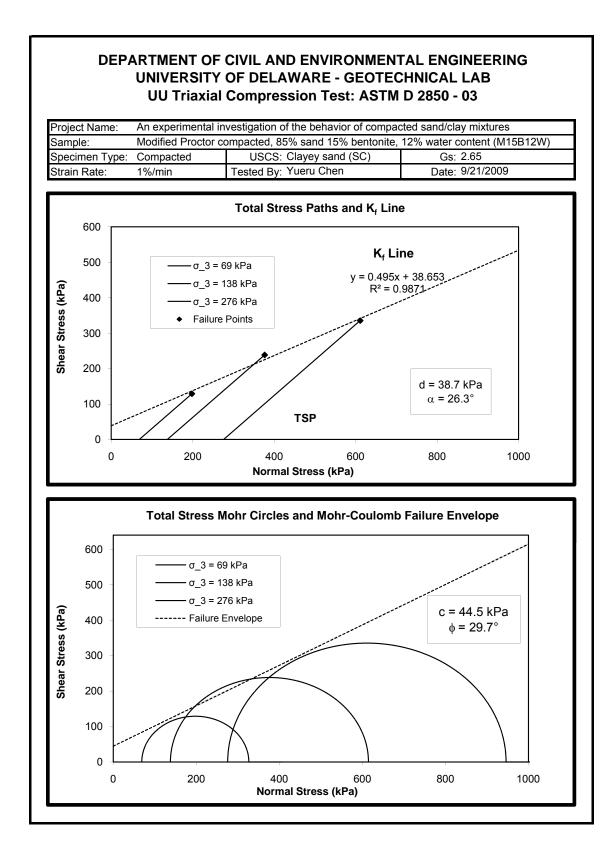




DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING UNIVERSITY OF DELAWARE - GEOTECHNICAL LAB								
	UU Triaxia	I Compre	ssion Te	st: ASTN	I D 2850	- 03		
Project Name:	An experimental in	nvestigation of	of the behavi	or of compa	cted sand/cla	ay mixtures		
Sample:	Modified Proctor of	compacted, 8	5% sand 159	% bentonite,	12% water of	content (M15B	512W)	
Specimen Type:	Compacted	USCS:	Clayey san	d (SC)	Gs:	2.65		
Strain Rate:	1%/min	Tested By:	Yueru Cher	า	Date: 9/21/2009			
		-			-			
Sam	ple No.	Trimming			Specimen			
Can		1	2	3	1	2	3	
Tin No.		B8	213	1	B19	101	7	
Wt. of Tin (g)		28.5	27.9	28.1	27.4	28	28.2	
Wt. of Tin + We	et soil (g)	100.5	105.5	109.1	164.4	170.0	166.8	
Wt. of Tin + Dr	y soil (g)	92.7	97.1	100.5	149.6	154.7	151.9	
Wt. of Dry Soil	(g)	64.20	69.20	72.40	122.2	126.7	123.7	
Wt. of Water (g	a)	7.80	8.40	8.60	14.8	15.3	14.9	
Water Content	(%)	12.15	12.14	11.88	12.1	12.1	12.0	
Average Water	r Content (%)		12.1			12.1		

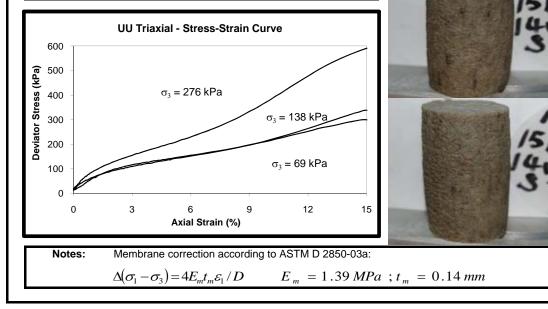
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.15	7.14
Average Diameter, D (cm)	3.50	3.53	3.50
Dry Unit Weight (kN/m ³)	17.48	17.76	17.67
Initial Void ratio	0.49	0.46	0.47
Saturation (%)	0.66	0.69	0.68
Strain at Failure (%)	14.83	14.81	15.03
Max Deviator Stress (kPa)	261.1	480.2	674.0
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	257.8	477.0	670.6
Corrected Major Stress (kPa)	326.8	614.9	946.4

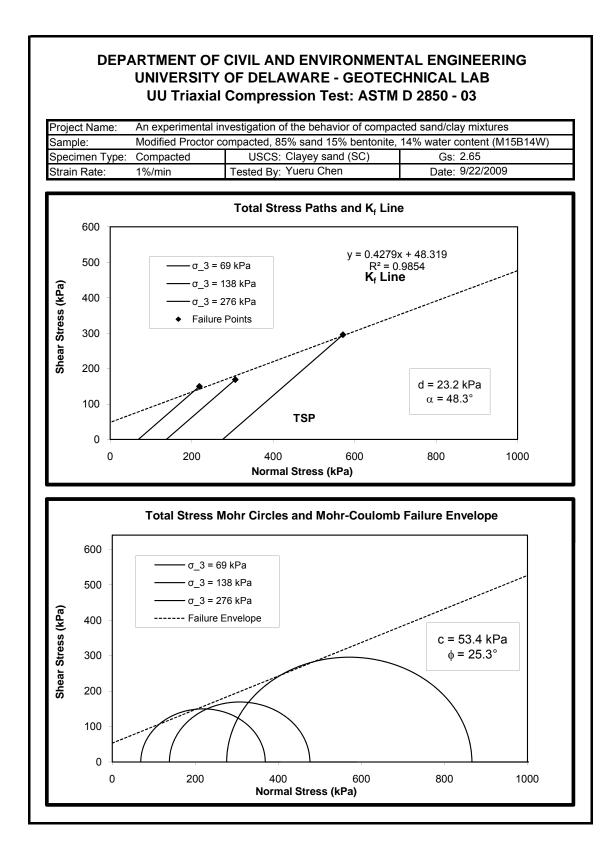




	ARTMENT O UNIVERSIT UU Triaxia	Y OF DELA al Compre	AWARE - ssion Te	GEOTE st: ASTN	CHNICAL I D 2850 ·	LAB 03	G	
Project Name: Sample:	An experimental Modified Proctor	0				,	814\\/\	
· · · ·		USCS:	ompacted, 85% sand 15% bentonite, USCS: Clayey sand (SC) Tested By: Yueru Chen			Gs: 2.65 Date: 9/22/2009		
Sample No.			Trimming		Specimen			
Tin No.		1 4	2 FJ5	3 46	1 201	2 209	3 31	
Wt. of Tin (g)		28.7	28	28.9	28.9	28.2	28.4	
Wt. of Tin + We	t soil (g)	113.6	102.9	121.9	172.5	169.5	168.9	
Wt. of Tin + Dry	v soil (g)	103.2	93.8	110.7	154.8	152.2	151.6	
Wt. of Dry Soil	(g)	74.50	65.80	81.80	125.9	124.0	123.2	
Wt. of Water (g)	/t. of Water (g) 10.40 9.10 11.20		11.20	17.7	17.3	17.3		
Water Content	(%)	13.96	13.83	13.69	14.1	14.0	14.0	
Average Water	Content (%)		13.8			14.0		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.13	7.13
Average Diameter, D (cm)	3.51	3.51	3.47
Dry Unit Weight (kN/m ³)	17.93	17.63	17.92
Initial Void ratio	0.45	0.47	0.45
Saturation (%)	0.83	0.78	0.83
Strain at Failure (%)	15.03	15.01	15.00
Max Deviator Stress (kPa)	303.1	341.5	594.0
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	299.8	338.2	590.7
Corrected Major Stress (kPa)	368.7	476.1	866.5

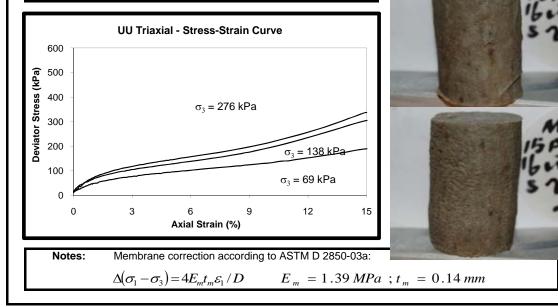


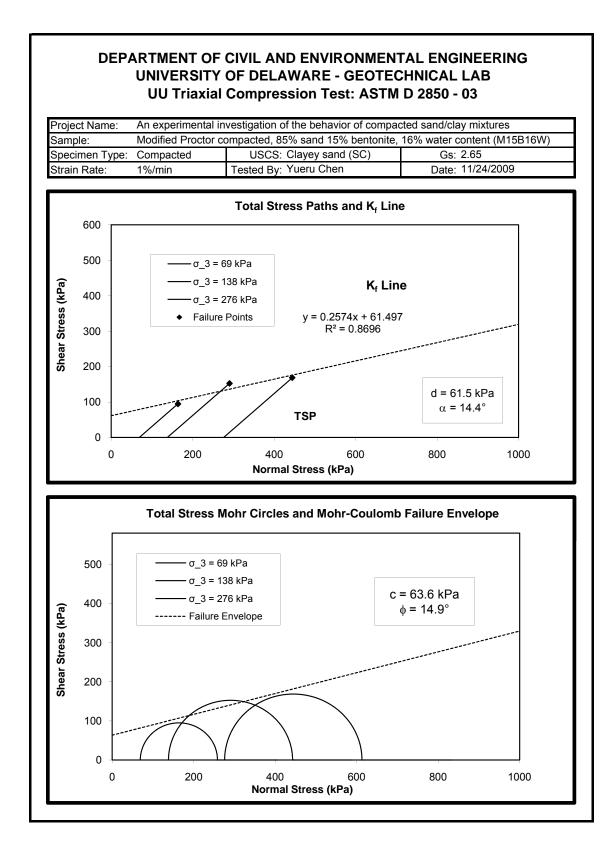


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Modified Proctor co	Modified Proctor compacted, 85% sand 15% bentonite, 16% water content (M15B16W)					
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.65				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 11/24/2009				

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	410	4	FJ1	B8	213	1		
Wt. of Tin (g)	28.4	28.7	28.1	28.5	27.9	28.1		
Wt. of Tin + Wet soil (g)	117.3	117.1	115.8	171.6	169.7	169.6		
Wt. of Tin + Dry soil (g)	105.1	105.1	103.8	151.7	149.8	149.7		
Wt. of Dry Soil (g)	76.70	76.40	75.70	123.2	121.9	121.6		
Wt. of Water (g)	12.20	12.00	12.00	19.9	19.9	19.9		
Water Content (%)	15.91	15.71	15.85	16.2	16.3	16.4		
Average Water Content (%)	15.8		16.3					

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.12	7.14
Average Diameter, D (cm)	3.51	3.50	3.50
Dry Unit Weight (kN/m ³)	17.54	17.48	17.37
Initial Void ratio	0.48	0.49	0.50
Saturation (%)	0.89	0.89	0.87
Strain at Failure (%)	15.02	15.02	15.00
Max Deviator Stress (kPa)	192.9	308.1	340.5
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	189.5	304.7	337.2
Corrected Major Stress (kPa)	258.5	442.6	613.0

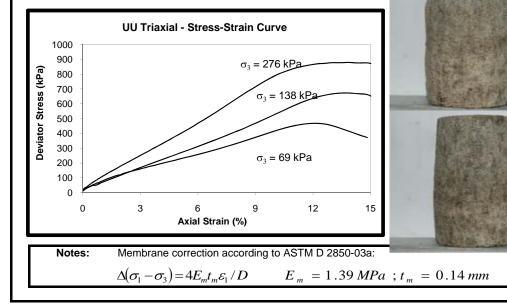


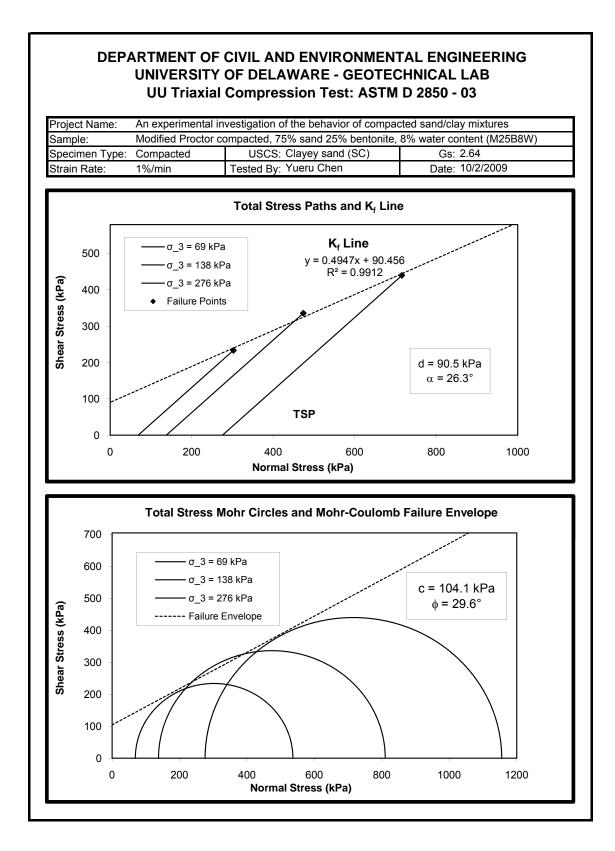


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures								
Sample:	Modified Proctor co	Iodified Proctor compacted, 75% sand 25% bentonite, 8% water content (M25B8W)							
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.64						
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/2/2009						

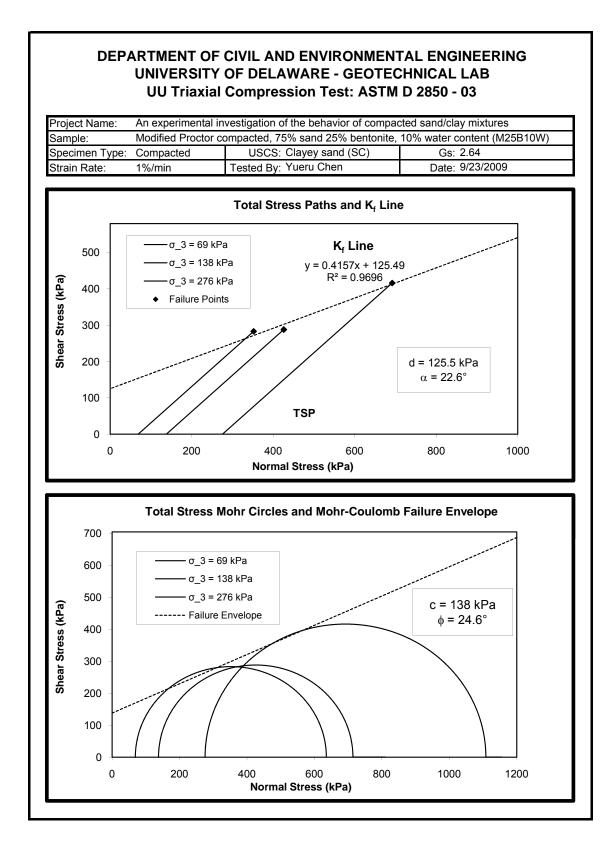
Sample No.		Trimming		Specimen			
Sample No.	1	2	3	1	2	3	
Tin No.	B8	213	1	B-19	B8	101	
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28.5	28	
Wt. of Tin + Wet soil (g)	76.8	69.8	92	156.2	161.4	158.0	
Wt. of Tin + Dry soil (g)	72.9	66.7	87	146.5	150.5	147.9	
Wt. of Dry Soil (g)	44.40	38.80	58.90	119.1	122.0	119.9	
Wt. of Water (g)	3.90	3.10	5.00	9.7	10.9	10.1	
Water Content (%)	8.78	7.99	8.49	8.1	8.9	8.4	
Average Water Content (%)		8.4			8.5		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.14	7.11	7.13
Average Diameter, D (cm)	3.50	3.54	3.54
Dry Unit Weight (kN/m ³)	16.98	17.13	16.78
Initial Void ratio	0.53	0.51	0.54
Saturation (%)	0.41	0.46	0.41
Strain at Failure (%)	12.07	13.81	13.83
Max Deviator Stress (kPa)	469.9	675.1	882.7
Membrane Correction (kPa)	2.7	3.0	3.0
Corrected Deviator Stress (kPa)	467.2	672.1	879.7
Corrected Major Stress (kPa)	536.2	810.0	1155.5

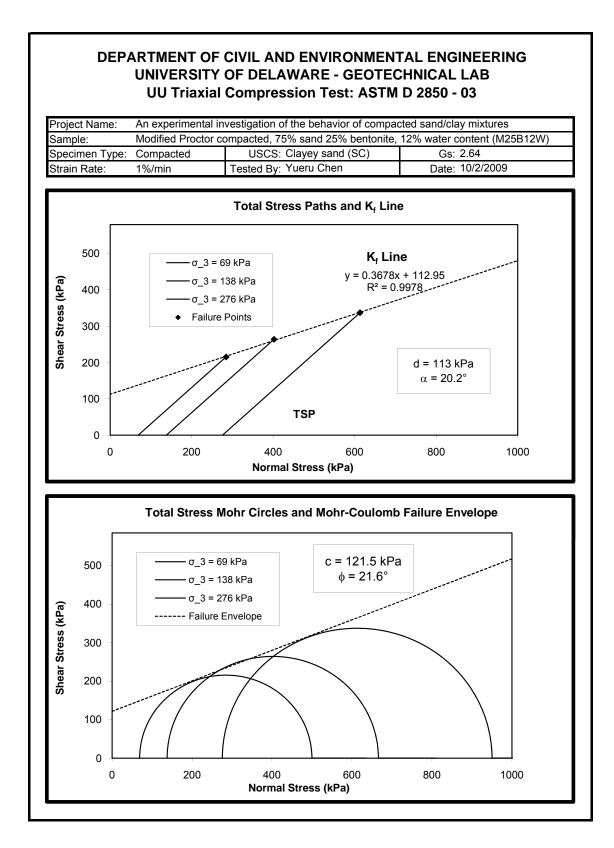




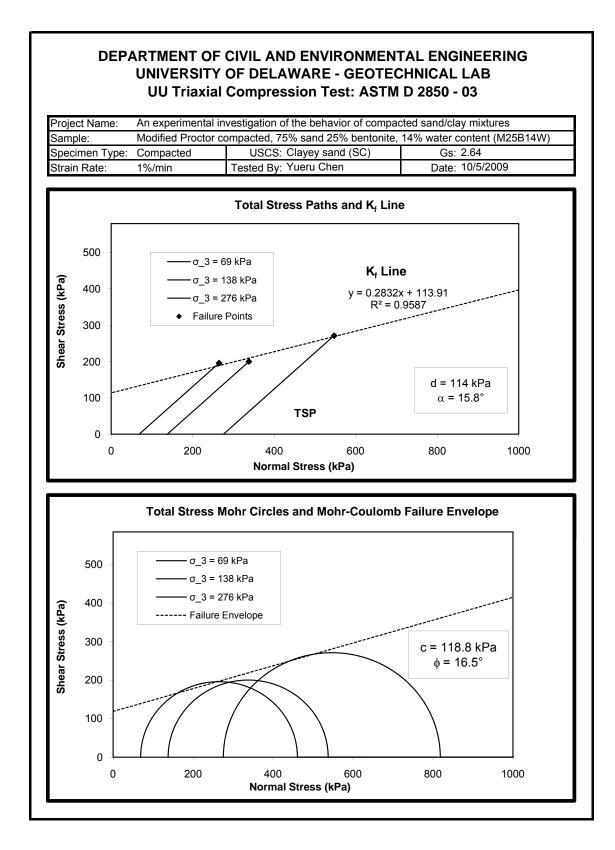
Project Name: An experimental i	nvestigation of	of the behavi	or of compac	ted sand/cla	y mixtures	
Sample: Modified Proctor	compacted, 7	5% sand 25%	6 bentonite,			B10W)
Specimen Type: Compacted		Clayey sand		Gs:	2.64	
Strain Rate: 1%/min	Tested By:	Yueru Cher		Date:	9/23/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	 FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28	28.9	28.9	28.2	28.4
Wt. of Tin + Wet soil (g)	78.1	70.8	93.9	171.9	163.8	168.3
Wt. of Tin + Dry soil (g)	73.5	66.6	87.9	158.2	151.4	155.0
Wt. of Dry Soil (g)	44.80	38.60	59.00	129.3	123.2	126.6
Wt. of Water (g)	4.60	4.20	6.00	13.7	12.4	13.3
Water Content (%)	10.27	10.88	10.17	10.6	10.1	10.5
Average Water Content (%)		10.4			10.4	
Sample No.	1	2	3	1	Cane Street	
Cell Pressure (kPa)	68.95	137.90	275.79			2.0
Average Height, L (cm)	7.13	7.15	7.13			2
Average Diameter, D (cm)	3.49	3.53	3.51			100.00
Dry Unit Weight (kN/m ³)	18.60	17.27	18.00	6		
Initial Void ratio	0.39	0.50	0.44	1		3
Saturation (%)	0.71	0.53	0.63			
Strain at Failure (%)	11.32	14.88	14.80	-	A STREET	-
Max Deviator Stress (kPa)	568.9	579.5	836.0	Sec.	SAL STREET	
Membrane Correction (kPa)	2.5	3.3	3.3	-	- Line	
Corrected Deviator Stress (kPa)	566.4	576.3	832.7			
Corrected Major Stress (kPa)	635.3	714.2	1108.5			
UU Triaxial - Sta 1000 900 - 800 - 800 - 800 - 800 - 500 - 500 - 600 - 600 - 500 - 600 -	σ ₃ =	Curve 276 kPa $\sigma_3 = 69 \text{ kPa}$				103
300 200 100 0 3 3 0 3 0 3 3 6	σ ₃ = 138 kF		15			203



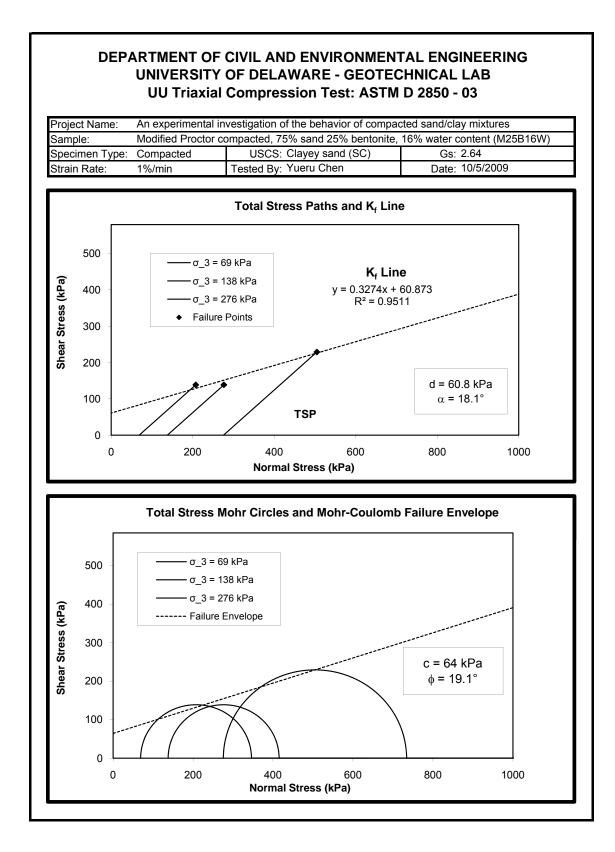
Project Name: An experimental	investigation o	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Modified Proctor				12% water c	ontent (M25	B12W)
Specimen Type: Compacted		Clayey sand	· ·	Gs:	2.64	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	10/2/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28	28.9	28.9	28.2	28.4
Wt. of Tin + Wet soil (g)	81.4	76.6	83.8	172.5	173.0	170.2
Wt. of Tin + Dry soil (g)	75.9	71.2	78	156.6	156.9	154.8
Wt. of Dry Soil (g)	47.20	43.20	49.10	127.7	128.7	126.4
Wt. of Water (g)	5.50	5.40	5.80	15.9	16.1	15.4
Water Content (%)	11.65	12.50	11.81	12.5	12.5	12.2
Average Water Content (%)		12.0			12.4	
Sample No.	1	2	3			
Cell Pressure (kPa)	68.95	137.90	275.79			-
Average Height, L (cm)	7.10	7.12	7.13			
Average Diameter, D (cm)	3.52	3.53	3.51	- 19		25
Dry Unit Weight (kN/m ³)	18.13	18.12	17.97		CALL N	
Initial Void ratio	0.43	0.43	0.44			12
Saturation (%)	0.77	0.77	0.73			5
Strain at Failure (%)	13.58	13.82	14.84			
Max Deviator Stress (kPa)	433.9	531.2	677.8	and the second s	And the second second	
Membrane Correction (kPa)	3.0	3.0	3.3	1		
Corrected Deviator Stress (kPa)	430.9	528.1	674.5			-
Corrected Major Stress (kPa)	499.8	666.0	950.3		2 PM	-
UU Triaxial - St 700 ຄີ 600		Curve 276 kPa				121
Stress (Kpa)		σ ₃ = 138 kPa	à	10	1311-13	
Deviator Stre 000		σ ₃ = 69 kPa				25
0 3 6 Axial	9 Strain (%)	12	15			S



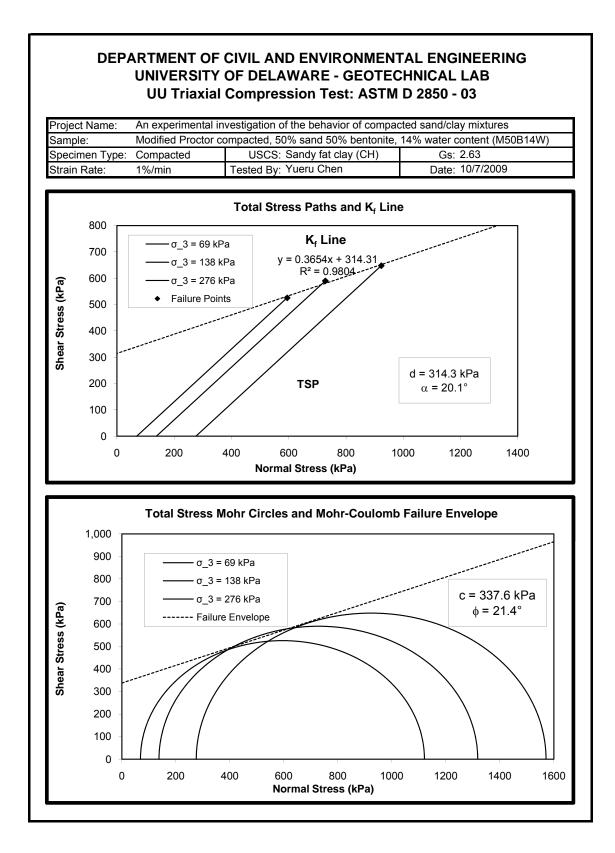
Project Name: An experimental ir	nvestigation of	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Modified Proctor of				14% water c	ontent (M25	B14W)
Specimen Type: Compacted		Clayey sand	Gs:	2.64		
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	10/5/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	31
Wt. of Tin (g)	28.7	28	28.9	28.9	28.2	28.4
Wt. of Tin + Wet soil (g)	109.5	99.9	83.3	176.8	172.4	174.2
Wt. of Tin + Dry soil (g)	99.7	91.1	76.8	158.6	154.5	156.2
Wt. of Dry Soil (g)	71.00	63.10	47.90	129.7	126.3	127.8
Wt. of Water (g)	9.80	8.80	6.50	18.2	17.9	18.0
Water Content (%)	13.80	13.95	13.57	14.0	14.2	14.1
Average Water Content (%)		13.8			14.1	
Sample No.	4	0	0	- 1	THE OWNER	
Sample No. Cell Pressure (kPa)	1	2 137.90	3 275.79		ALC: NO	M
Average Height, L (cm)	68.95 7.13	7.13	7.14			a.c.
Average Diameter, D (cm)	3.53	3.52	3.52			23
	18.23	17.86	18.04			14.
Dry Unit Weight (kN/m ³) Initial Void ratio	0.42	0.45	0.44			9
Saturation (%)	0.88	0.40	0.85			
Strain at Failure (%)	14.82	14.80	14.84			
Max Deviator Stress (kPa)	395.4	403.3	545.9	-		No. of Concession, name
Membrane Correction (kPa)	3.3	3.3	3.3		A REAL AND	
Corrected Deviator Stress (kPa)	392.1	400.1	542.6			
Corrected Major Stress (kPa)	461.1	538.0	818.4			
UU Triaxial - Str 600 500 400 200 0 $\sigma_3 =$ 100 $\sigma_3 =$	$\sigma_3 = 2$	Surve $\sigma_3 = 69 \text{ kPa}$				51
0 3 6 Axial S	9 Strain (%)	12	15			



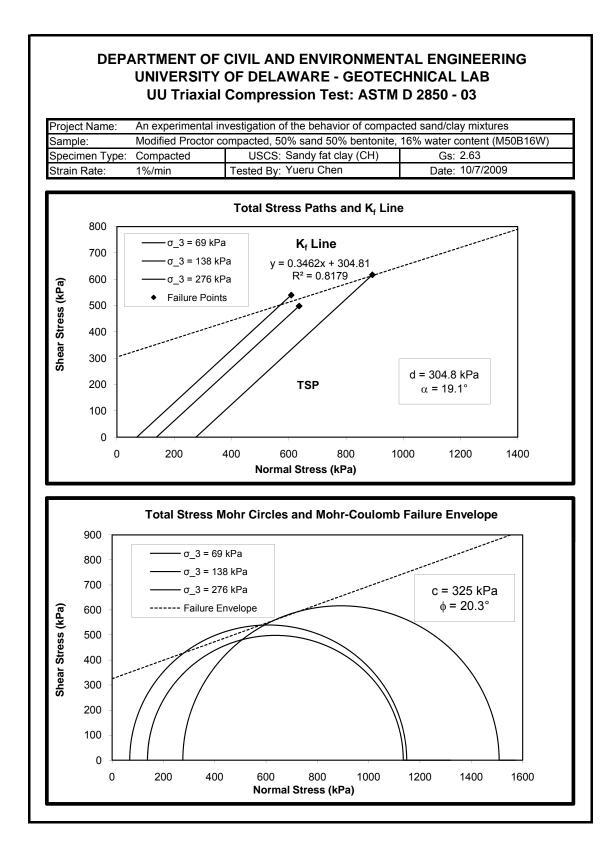
Project Name: An experimental						
Sample: Modified Proctor						B16W)
Specimen Type: Compacted		Clayey sand	· · /	Gs:	2.64	
Strain Rate: 1%/min	Tested By:	Yueru Cher		Date:	10/5/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	B19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28	28.2
Wt. of Tin + Wet soil (g)	86.3	104.2	90.9	174.1	172.1	173.8
Wt. of Tin + Dry soil (g)	78.2	93.9	82.3	153.4	151.9	154.0
Wt. of Dry Soil (g)	49.70	66.00	54.20	126.0	123.9	125.8
Wt. of Water (g)	8.10	10.30	8.60	20.7	20.2	19.8
Water Content (%)	16.30	15.61	15.87	16.4	16.3	15.7
Average Water Content (%)		15.9		-	16.2	
Sample No.	1	2	3	1.0		
Cell Pressure (kPa)	68.95	137.90	275.79			-
Average Height, L (cm)	7.14	7.08	7.12			
Average Diameter, D (cm)	3.53	3.53	3.50			250
Dry Unit Weight (kN/m ³)	17.69	17.54	18.02			L
Initial Void ratio	0.46	0.48	0.44			
Saturation (%)	0.93	0.90	0.95			3
Strain at Failure (%)	14.83	15.01	14.83	And in case of the		
Max Deviator Stress (kPa)	280.5	280.7	461.6	-		2
Membrane Correction (kPa)	3.3	3.3	3.3			
Corrected Deviator Stress (kPa)	277.2	277.4	458.3			
Corrected Major Stress (kPa)	346.2	415.3	734.1			M
UU Triaxial - St	ress-Strain C	Curve				16
(τρ 500 - (τρ 300 - 300 - 300 -	σ3 =	= 276 kPa		-		
		5₃ = 138 kPa				1
200 100 0		σ ₃ = 69 kPa				i
0 3 6	9 Strain (%)	12	15	-		



Project Name: An experimental i	nvestigation o	of the behavio	or of compac	ted sand/cla	ay mixtures	
Sample: Modified Proctor of	compacted, 5	0% sand 50%	6 bentonite,	14% water o	ontent (M50	B14W)
Specimen Type: Compacted		Sandy fat cl		Gs:	2.63	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	10/7/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	4	FJ-5	46	201	209	201
Wt. of Tin (g)	28.7	28	28.9	28.9	28.2	28.9
Wt. of Tin + Wet soil (g)	106.1	159.6	126	168.3	170.4	171.6
Wt. of Tin + Dry soil (g)	96.9	143	114.7	150.5	152.9	152.8
Wt. of Dry Soil (g)	68.20	115.00	85.80	121.6	124.7	123.9
Wt. of Water (g)	9.20	16.60	11.30	17.8	17.5	18.8
Water Content (%)	13.49	14.43	13.17	14.6	14.0	15.2
Average Water Content (%)		13.7			14.6	
Sample No.	1	2	3		ROPE TO A	
Cell Pressure (kPa)	68.95	137.90	275.79	1		
Average Height, L (cm)	7.12	7.14	7.13			M
Average Diameter, D (cm)	3.47	3.49	3.53			50
Dry Unit Weight (kN/m ³)	17.72	17.91	17.42		(主義)	de.
Initial Void ratio	0.46	0.44	0.48	1.1		14
Saturation (%)	0.84	0.84	0.83			15
Strain at Failure (%)	4.04	4.23	9.56	100		
Max Deviator Stress (kPa)	1052.5	1181.2	1297.7	in the second	SEC IN CAR	
Membrane Correction (kPa)	0.9	0.9	2.1		C. A.	
Corrected Deviator Stress (kPa)	1051.6	1180.3	1295.6	100		Sh.
Corrected Major Stress (kPa)	1120.5	1318.2	1571.4			N
UU Triaxial - Str	ess-Strain C		276 kPa			14
1200 - 1000 - 800 - 600 -	σ ₃ =	138 kPa				
400 - X	σ ₃	= 69 kPa		-		
200 0 0 3 6 Axial	9 Strain (%)	12	15			
	9 Strain (%)	12	15			



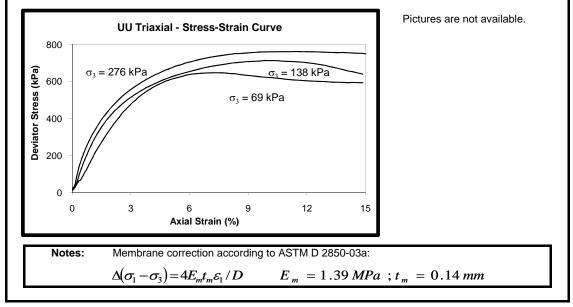
Project Name: An experimenta	al investigation o	of the behavio	or of compac	ted sand/cla	y mixtures	
Sample: Modified Procto	or compacted, 5					B16W)
Specimen Type: Compacted		Sandy fat cl	,	Gs:	2.63	
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	10/7/2009	
		Trimming			Specimen	
Sample No.	1	2	3	1	2	3
Tin No.	B8	213	1	B19	101	7
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28	28.2
Wt. of Tin + Wet soil (g)	95	87	61	174.4	173.8	173.3
Wt. of Tin + Dry soil (g)	85.5	78.8	56.5	154.3	153.0	153.3
Wt. of Dry Soil (g)	57.00	50.90	28.40	126.9	125.0	125.1
Wt. of Water (g)	9.50	8.20	4.50	20.1	20.8	20.0
Water Content (%)	16.67	16.11	15.85	15.8	16.6	16.0
Average Water Content (%)		16.2			16.2	
Sample No.	1	2	3		A. HARLE	
Cell Pressure (kPa)	68.95	137.90	275.79			1.2.2
Average Height, L (cm)	7.14	7.14	7.13			10
Average Diameter, D (cm)	3.53	3.50	3.49			SM
Dry Unit Weight (kN/m ³)	17.82	17.85	17.99	1000		2.0
Initial Void ratio	0.45	0.45	0.43	1.2 14 14		2.
Saturation (%)	0.93	0.98	0.97		1 +	10
Strain at Failure (%)	4.63	6.54	7.04		18 . J	8 . C
Max Deviator Stress (kPa)	1080.4	998.2	1234.2			
Membrane Correction (kPa)	1.0	1.5	1.6	1		
Corrected Deviator Stress (kPa) 1079.3	996.7	1232.6	1		and the
Corrected Major Stress (kPa)	1148.3	1134.6	1508.4		自由运行	
1400	Stress-Strain C		76 kPa		1	100
Deviator Stress (Kpa) 1000	σ ₃ = 69	kPa	<u>138 kPa</u>			211-
0 3 Ax Notes: Membrane corr	6 9 ial Strain (%)	12	15			

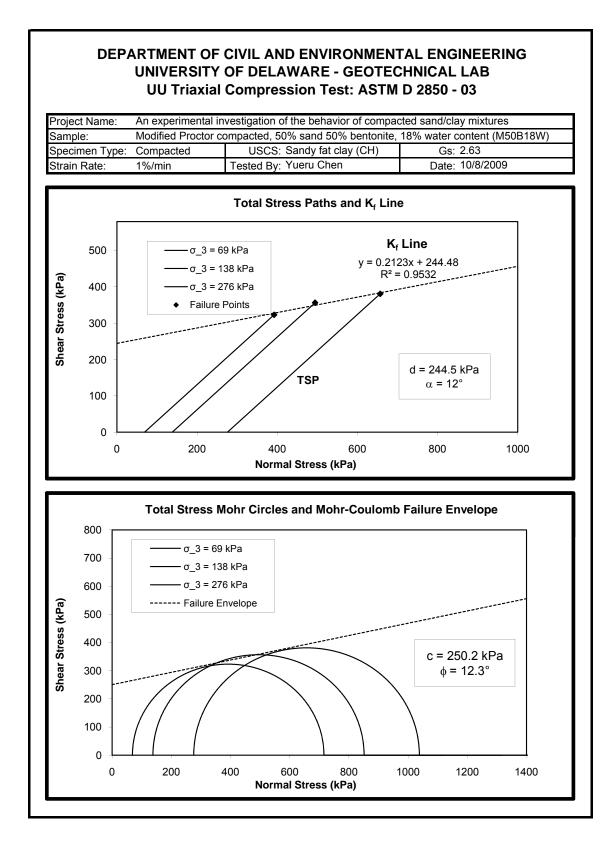


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures									
Sample:	Modified Proctor co	Nodified Proctor compacted, 50% sand 50% bentonite, 18% water content (M50B18W)								
Specimen Type:	Compacted	USCS: Sandy fat clay (CH)	Gs: 2.63							
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 10/8/2009							

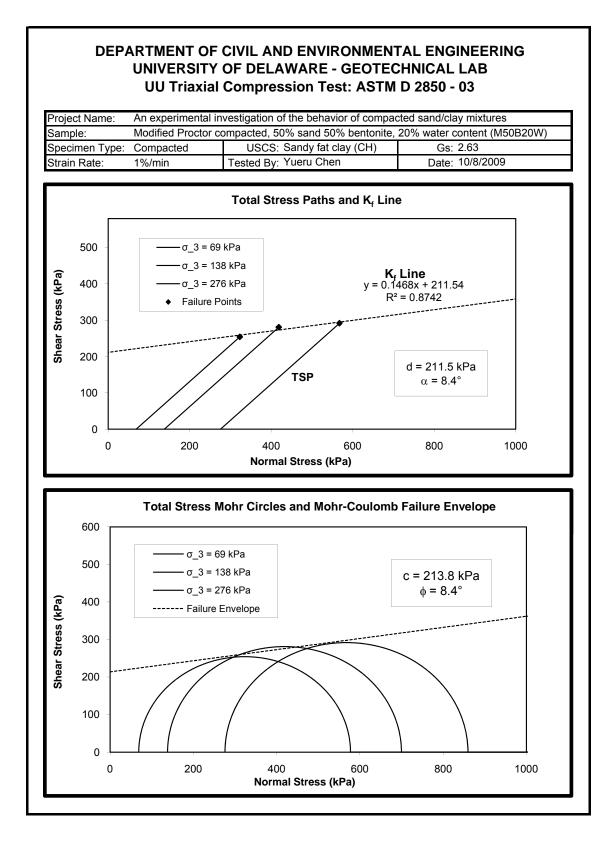
Sample No.		Trimming		Specimen			
Sample No.	1	2	3	1	2	3	
Tin No.	4	FJ-5	46	201	209	31	
Wt. of Tin (g)	28.7	28	28.9	28.9	28.2	28.4	
Wt. of Tin + Wet soil (g)	114.3	98.9	94.5	174.8	175.7	175.5	
Wt. of Tin + Dry soil (g)	100.8	87.8	84.4	151.7	152.2	152.2	
Wt. of Dry Soil (g)	72.10	59.80	55.50	122.8	124.0	123.8	
Wt. of Water (g)	13.50	11.10	10.10	23.1	23.5	23.3	
Water Content (%)	18.72	18.56	18.20	18.8	19.0	18.8	
Average Water Content (%)		18.5			18.9		

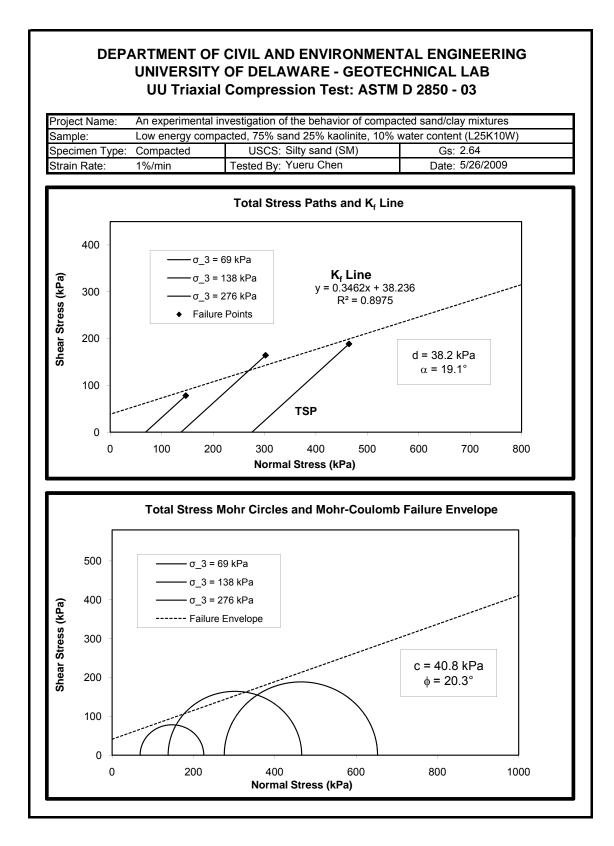
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.13	7.13	7.18
Average Diameter, D (cm)	3.50	3.53	3.52
Dry Unit Weight (kN/m ³)	17.56	17.43	17.38
Initial Void ratio	0.47	0.48	0.48
Saturation (%)	105.45	103.84	102.20
Strain at Failure (%)	7.33	9.83	11.56
Max Deviator Stress (kPa)	648.3	715.4	764.8
Membrane Correction (kPa)	1.6	2.2	2.6
Corrected Deviator Stress (kPa)	646.7	713.3	762.3
Corrected Major Stress (kPa)	715.6	851.2	1038.1

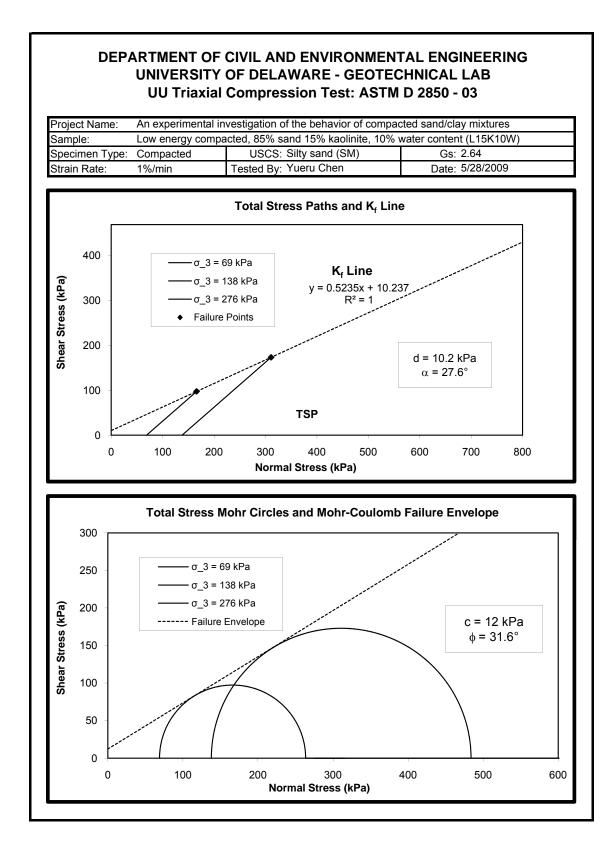




•	ental investigation of							
	octor compacted, 5					B20W)		
Specimen Type: Compacted		USCS: Sandy fat clay (CH)			Gs: 2.63			
Strain Rate: 1%/min	Tested By:	Yueru Chen		Date:	10/8/2009			
		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	B8	213	1	B-19	101	7		
Wt. of Tin (g)	28.5	27.9	28.1	27.4	28	28.2		
Wt. of Tin + Wet soil (g)	97.4	92	88.9	172.3	170.8	172.5		
Wt. of Tin + Dry soil (g)	85.9	81.4	78.8	147.7	146.6	148.0		
Wt. of Dry Soil (g)	57.40	53.50	50.70	120.3	118.6	119.8		
Wt. of Water (g)	11.50	10.60	10.10	24.6	24.2	24.5		
Water Content (%)	20.03	19.81	19.92	20.4	20.4	20.5		
Average Water Content (%)		19.9			20.4			
Sample No.	4	0	2		WARD COL. ST.	100		
Cell Pressure (kPa)	1	2	3		and the second second			
Average Height, L (cm)	68.95	137.90	275.79		200	N		
Average Diameter, D (cm)	7.14	7.10	7.12		Star 1	50		
	3.51 17.08	3.52 16.84	3.53 16.87		A A	-		
Dry Unit Weight (kN/m ³) Initial Void ratio	0.51	0.53	0.53		12-11-20	N 21		
Saturation (%)	105.37	100.84	101.53			10 1		
Strain at Failure (%)	103.37	11.07	14.59	1000	10			
Max Deviator Stress (kPa)	510.7	564.2	586.8	1000	and the second	12		
Membrane Correction (kPa)		2.4	3.2		and the same	-		
Corrected Deviator Stress (I		561.8	583.6		ACCESSION OF	A		
Corrected Major Stress (kPa	,	699.7	859.4	1000		18		
600	II - Stress-Strain C		29 1/20			5		
$\sigma_3 = 276 \text{ kPa}$	$\sigma_3 = 69$		38 kPa	100		-52		
	6 9 Axial Strain (%)	12	15	-		1. al		



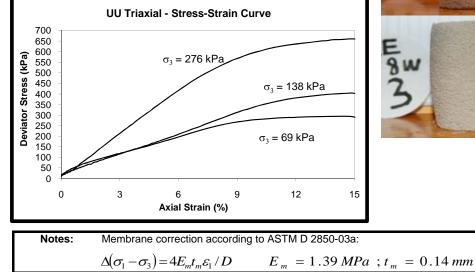


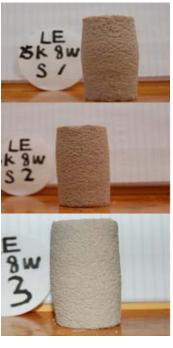


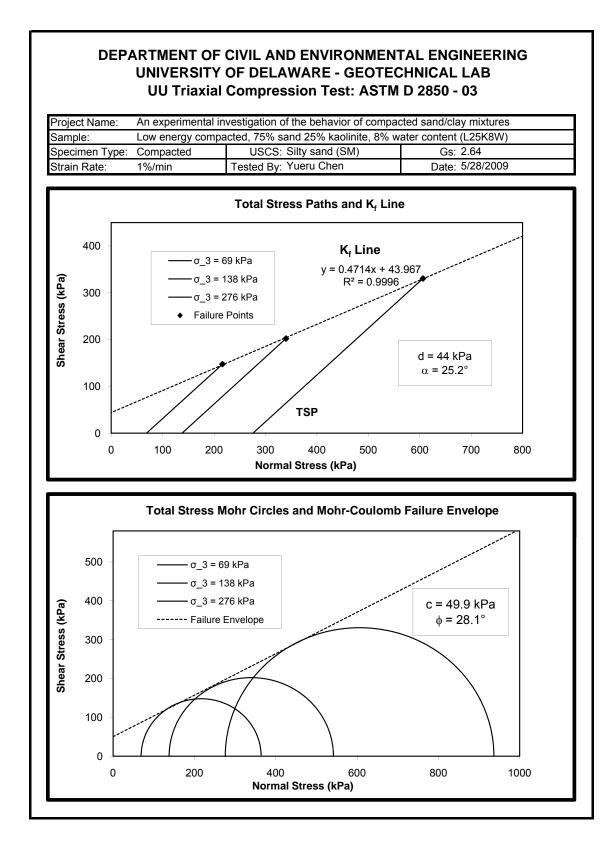
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Low energy compacted, 75% sand 25% kaolinite, 8% water content (L25K8W)					
Specimen Type:	Compacted	USCS: Silty sand (SM) Gs: 2.64				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 5/28/2009			

Sample No.		Trimming			Specimen			
	1	2	3	1	2	3		
Tin No.	213	205	B8	404	405	4		
Wt. of Tin (g)	27.91	29.7	28.44	28.7	27.7	28.7		
Wt. of Tin + Wet soil (g)	111.58	99.55	91.07	161.3	159.1	164.4		
Wt. of Tin + Dry soil (g)	105.5	94.52	86.5	151.9	149.3	154.4		
Wt. of Dry Soil (g)	77.59	64.82	58.06	123.1	121.6	125.7		
Wt. of Water (g)	6.08	5.03	4.57	9.4	9.8	10.0		
Water Content (%)	7.84	7.76	7.87	7.6	8.1	8.0		
Average Water Content (%)		7.8		7.9				

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.09	7.12
Average Diameter, D (cm)	3.53	3.50	3.50
Dry Unit Weight (kN/m ³)	17.29	17.52	18.01
Initial Void ratio	0.50	0.48	0.44
Saturation (%)	0.41	0.45	0.48
Strain at Failure (%)	14.36	14.84	14.83
Max Deviator Stress (kPa)	298.2	407.3	664.2
Membrane Correction (kPa)	3.2	3.3	3.3
Corrected Deviator Stress (kPa)	295.0	404.0	660.9
Corrected Major Stress (kPa)	364.0	541.9	936.7



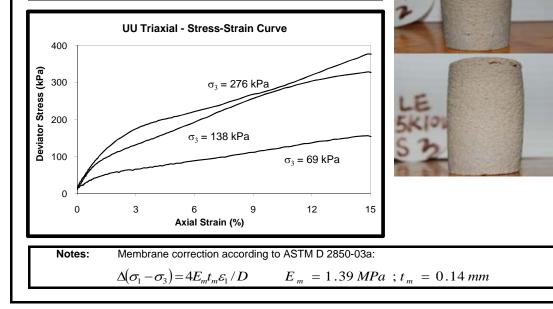


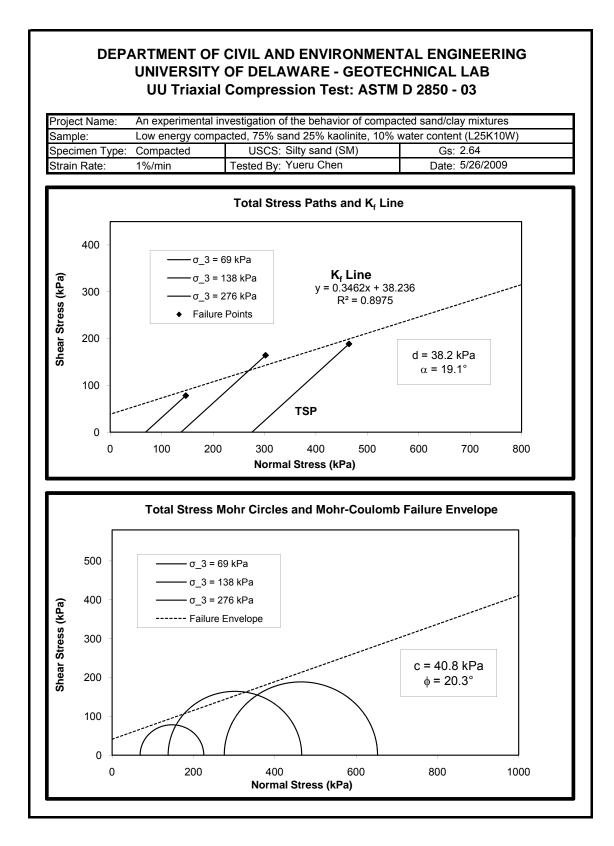


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Low energy compacted, 75% sand 25% kaolinite, 10% water content (L25K10W)					
Specimen Type:	Compacted	USCS: Silty sand (SM) Gs: 2.64				
Strain Rate:	1%/min	Tested By: Yueru Chen Date: 5/26/2009				

Sample No.		Trimming			Specimen			
	1	2	3	1	2	3		
Tin No.	213	205	B8	201	7	B-19		
Wt. of Tin (g)	27.89	29.69	28.44	28.9	28.2	27.4		
Wt. of Tin + Wet soil (g)	65.23	128.07	110.98	165.7	177.1	173.1		
Wt. of Tin + Dry soil (g)	61.99	119.62	103.95	153.4	164.1	160.3		
Wt. of Dry Soil (g)	34.10	89.93	75.51	124.6	135.9	132.9		
Wt. of Water (g)	3.24	8.45	7.03	12.2	13.0	12.8		
Water Content (%)	9.50	9.40	9.31	9.8	9.6	9.7		
Average Water Content (%)		9.4		9.7				

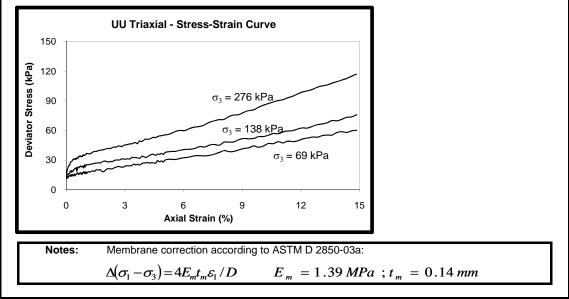
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.81	7.13	7.12
Average Diameter, D (cm)	3.56	3.54	3.55
Dry Unit Weight (kN/m ³)	18.04	19.02	18.49
Initial Void ratio	0.44	0.36	0.40
Saturation (%)	0.60	0.70	0.64
Strain at Failure (%)	14.84	14.87	14.83
Max Deviator Stress (kPa)	159.7	331.8	380.3
Membrane Correction (kPa)	3.2	3.3	3.3
Corrected Deviator Stress (kPa)	156.5	328.5	377.0
Corrected Major Stress (kPa)	225.4	466.4	652.8

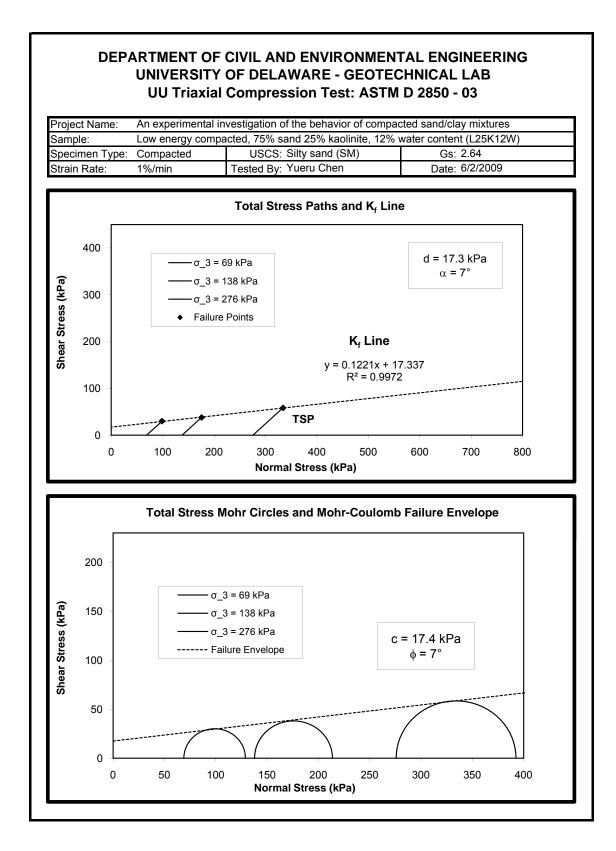




Project Name:	An experimental Low energy com	Ū.				,			
Sample:									
Specimen Type			Silty sand (,	Gs: 2.64				
Strain Rate:	1%/min	Tested By:	Yueru Cher	١	Date:	6/2/2009			
			Trimming			Specimen			
San	nple No.	1	2	3	1	2	3		
Tin No.		4	405	404	2	420	418		
Wt. of Tin (g)		28.71	27.69	28.7	29.0	27.6	28.8		
Wt. of Tin + W	Wt. of Tin + Wet soil (g)		111.5	124.06	177.0	176.0	178.3		
Wt. of Tin + D	Wt. of Tin + Dry soil (g)		102.88	114.17	160.7	159.8	162.2		
Wt. of Dry Soi	Wt. of Dry Soil (g)		75.19	85.47	131.7	132.2	133.4		
Wt. of Water (Wt. of Water (g)		8.62	9.89	16.3	16.2	16.0		
Water Conten	t (%)	11.09	11.46	11.57	12.4	12.2	12.0		
Average Wate	er Content (%)		11.4			12.2			
			_	-	1				
	nple No.	1	2	3					
Cell Pressure	· · ·	68.95	137.90	275.79					
Average Heig	ht, L (cm)	7.10	7.10	7.14					
Average Diam	neter, D (cm)	3.54	3.53	3.56					
Dry Unit Weig	ht (kN/m ³)	18.53	18.62	18.38					
Initial Void rat	Initial Void ratio		0.39	0.41					
Saturation (%))	0.82	0.83	0.78					
Strain at Failu	re (%)	14.86	14.85	14.83					

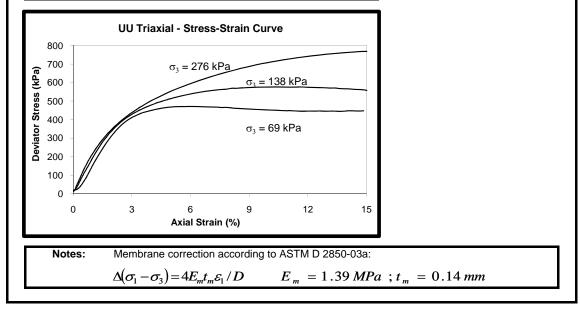
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.10	7.10	7.14
Average Diameter, D (cm)	3.54	3.53	3.56
Dry Unit Weight (kN/m ³)	18.53	18.62	18.38
Initial Void ratio	0.40	0.39	0.41
Saturation (%)	0.82	0.83	0.78
Strain at Failure (%)	14.86	14.85	14.83
Max Deviator Stress (kPa)	63.3	79.1	120.1
Membrane Correction (kPa)	3.3	3.3	3.2
Corrected Deviator Stress (kPa)	60.0	75.8	116.8
Corrected Major Stress (kPa)	129.0	213.7	392.6

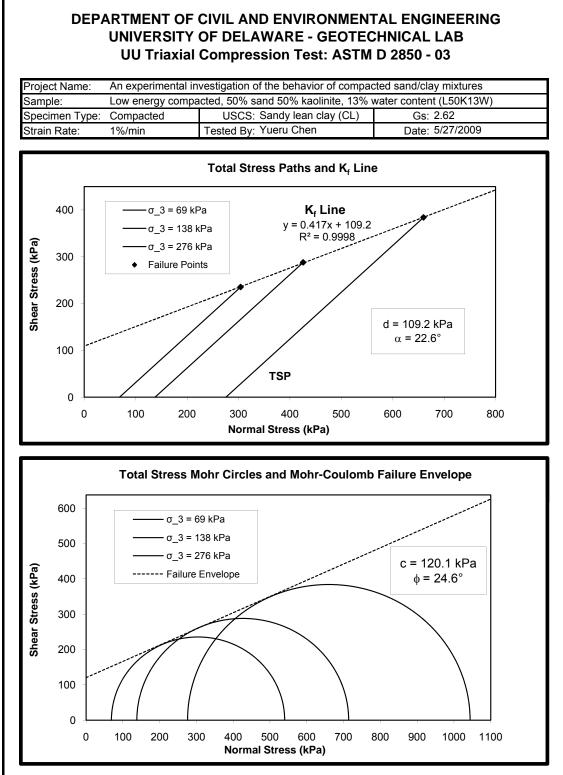




Project Name:	An experimenta	An experimental investigation of the behavior of compacted sand/clay mixtures							
Sample:	Low energy con	npacted, 50% s	and 50% ka	olinite, 13% v	water conten	t (L50K13W)			
Specimen Type	e: Compacted	USCS:	Sandy lean	clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By:	Yueru Cher	١	Date:	5/27/2009			
0-	and No.		Trimming			Specimen			
Sample No.		1	2	3	1	2	3		
Tin No.		46	121	101	31	7	B-19		
Wt. of Tin (g)		28.84	30.91	28.02	28.3	28.2	27.4		
Wt. of Tin + Wet soil (g)		101.78	90.97	95.25	159.0	156.8	151.7		
Wt. of Tin + Dry soil (g)		93.72	84.37	87.54	144.2	142.0	137.6		
Wt. of Dry So	oil (g)	64.88	53.46	59.52	115.8	113.8	110.2		
Wt. of Water	(g)	8.06	6.60	7.71	14.9	14.8	14.2		
Water Conte	nt (%)	12.42	12.35	12.95	12.8	13.0	12.8		
Average Wat	er Content (%)		12.6			12.9			
Sa	mple No.	1	2	3					
Cell Pressure		68.95	137.90	275.79					
Average Heig	ght, L (cm)	7.12	7.12	7.13					
Average Diar	meter, D (cm)	3.55	3.55	3.53					
Dry Unit Wei	ght (kN/m ³)	16.08	15.86	15.51					
1 1									

Cell Pressure (KPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.12	7.13
Average Diameter, D (cm)	3.55	3.55	3.53
Dry Unit Weight (kN/m ³)	16.08	15.86	15.51
Initial Void ratio	0.60	0.62	0.66
Saturation (%)	0.56	0.55	0.51
Strain at Failure (%)	6.07	11.61	14.84
Max Deviator Stress (kPa)	472.0	578.5	771.2
Membrane Correction (kPa)	1.3	2.5	3.3
Corrected Deviator Stress (kPa)	470.7	575.9	767.9
Corrected Major Stress (kPa)	539.6	713.8	1043.7



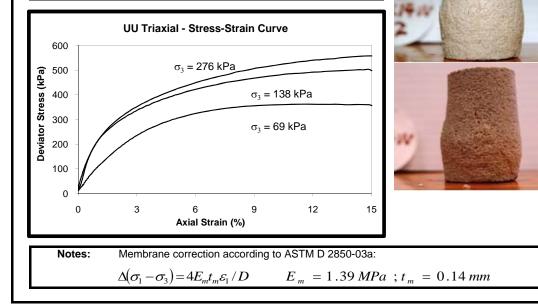


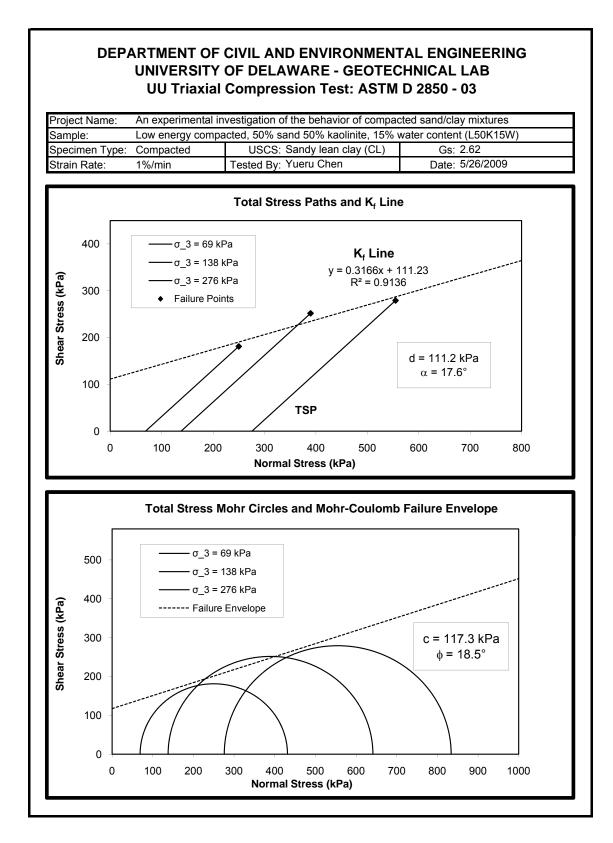
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Low energy compa	Low energy compacted, 50% sand 50% kaolinite, 15% water content (L50K15W)				
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 5/26/2009			

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	404	405	4	2	420	418		
Wt. of Tin (g)	28.7	27.69	28.7	29.0	27.6	28.8		
Wt. of Tin + Wet soil (g)	77.12	77.62	89.38	170.3	168.9	169.7		
Wt. of Tin + Dry soil (g)	70.93	71.06	81.64	151.1	150.3	151.0		
Wt. of Dry Soil (g)	42.23	43.37	52.94	122.1	122.8	122.2		
Wt. of Water (g)	6.19	6.56	7.74	19.2	18.6	18.7		
Water Content (%)	14.66	15.13	14.62	15.8	15.1	15.3		
Average Water Content (%)		14.8			15.4			

414W

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.11	7.12	7.11
Average Diameter, D (cm)	3.51	3.57	3.54
Dry Unit Weight (kN/m ³)	17.41	16.90	17.13
Initial Void ratio	0.48	0.52	0.50
Saturation (%)	0.87	0.76	0.80
Strain at Failure (%)	13.12	14.84	14.86
Max Deviator Stress (kPa)	365.1	506.7	561.3
Membrane Correction (kPa)	2.9	3.2	3.3
Corrected Deviator Stress (kPa)	362.2	503.4	558.1
Corrected Major Stress (kPa)	431.2	641.3	833.9

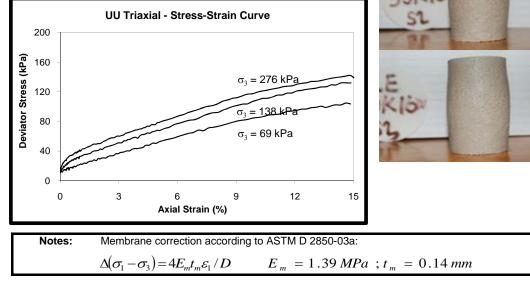




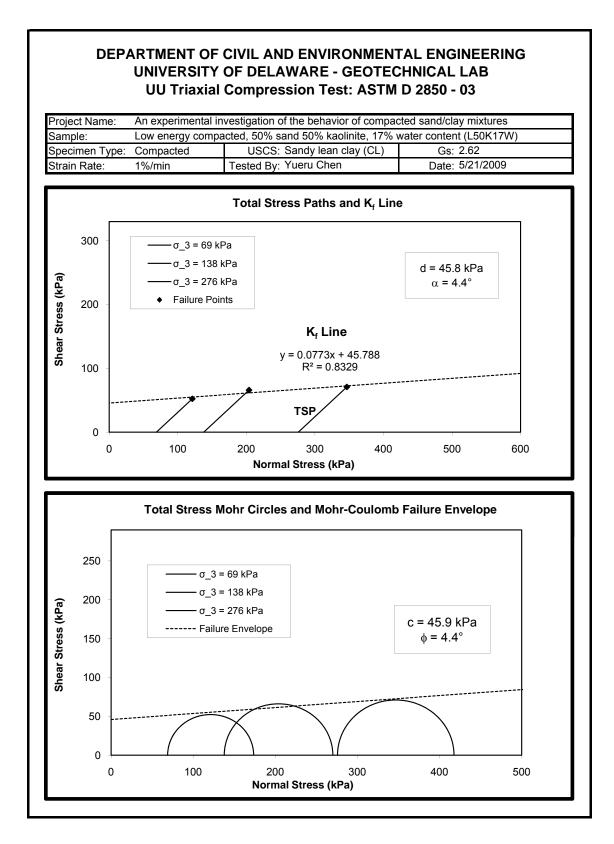
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Low energy compa	Low energy compacted, 50% sand 50% kaolinite, 17% water content (L50K17W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 5/21/2009				

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	7	201	B-19	46	121	101		
Wt. of Tin (g)	28.18	28.89	27.41	28.8	30.9	28.0		
Wt. of Tin + Wet soil (g)	92.77	93.87	116.97	169.8	171.7	169.2		
Wt. of Tin + Dry soil (g)	83.31	84.34	103.61	148.3	150.7	148.0		
Wt. of Dry Soil (g)	55.13	55.45	76.20	119.5	119.8	120.0		
Wt. of Water (g)	9.46	9.53	13.36	21.5	21.0	21.2		
Water Content (%)	17.16	17.19	17.53	18.0	17.5	17.6		
Average Water Content (%) 17.		17.3	17.7					

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.20	7.14	7.16
Average Diameter, D (cm)	3.54	3.55	3.53
Dry Unit Weight (kN/m ³)	16.51	16.59	16.76
Initial Void ratio	0.56	0.55	0.53
Saturation (%)	0.85	0.84	0.87
Strain at Failure (%)	15.02	14.86	14.83
Max Deviator Stress (kPa)	107.9	135.4	145.2
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	104.6	132.1	141.9
Corrected Major Stress (kPa)	173.6	270.0	417.7







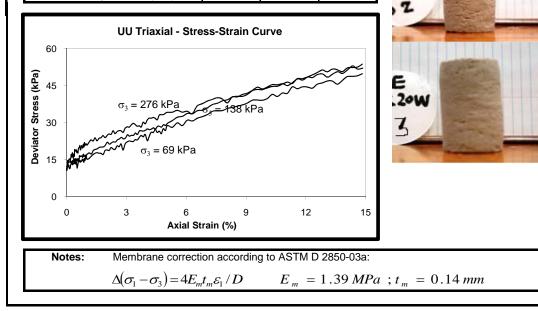
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Low energy compa	Low energy compacted, 50% sand 50% kaolinite, 20% water content (L50K20W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/1/2009				

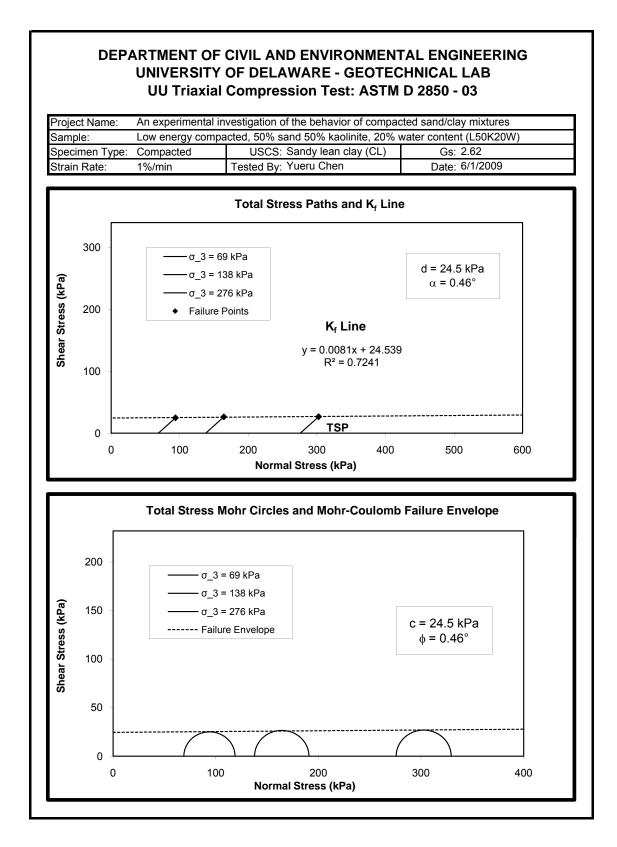
Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	101	121	46	404	405	4		
Wt. of Tin (g)	28.01	30.93	28.83	28.7	27.7	28.7		
Wt. of Tin + Wet soil (g)	134.3	92.02	103.43	166.1	166.0	166.8		
Wt. of Tin + Dry soil (g)	116.92	82	91.27	143.6	143.1	143.9		
Wt. of Dry Soil (g)	88.91	51.07	62.44	114.9	115.4	115.2		
Wt. of Water (g)	17.38	10.02	12.16	22.5	22.9	22.9		
Water Content (%)	19.55	19.62	19.47	19.6	19.8	19.9		
Average Water Content (%)	19.5		19.8					

LE K20W

E 20W

1	2	3
68.95	137.90	275.79
7.11	7.14	7.12
3.56	3.55	3.52
15.95	16.01	16.30
0.61	0.61	0.58
0.84	0.86	0.90
14.83	14.35	14.84
53.1	56.1	56.9
3.2	3.1	3.3
49.8	53.0	53.6
118.8	190.9	329.4
	68.95 7.11 3.56 15.95 0.61 0.84 14.83 53.1 3.2 49.8	68.95 137.90 7.11 7.14 3.56 3.55 15.95 16.01 0.61 0.61 0.84 0.86 14.83 14.35 53.1 56.1 3.2 3.1 49.8 53.0

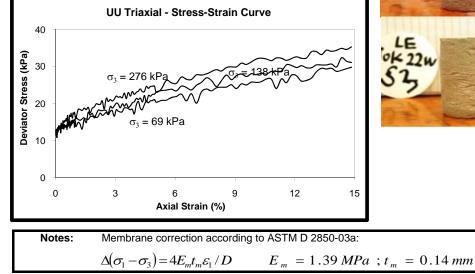




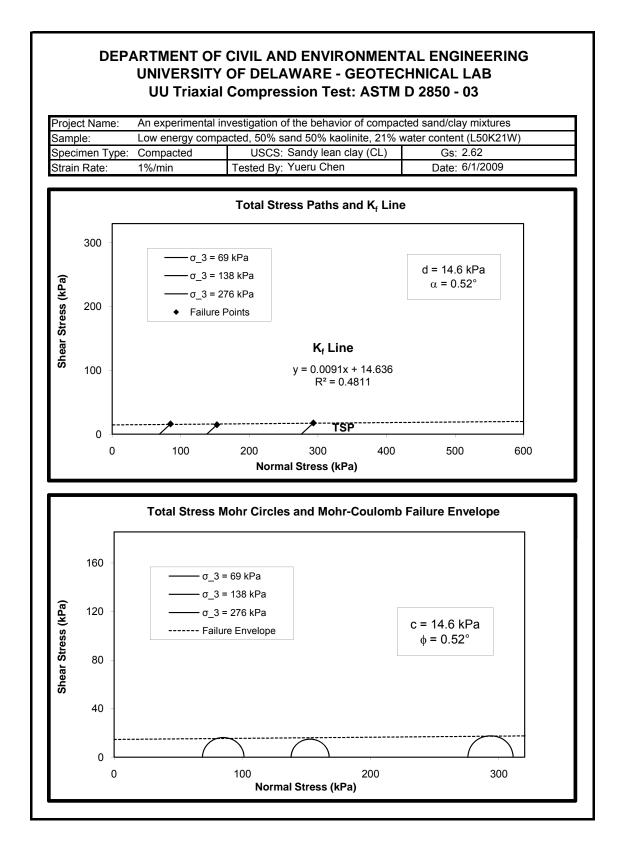
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Low energy compacted, 50% sand 50% kaolinite, 21% water content (L50K21W)					
Specimen Type:	Compacted USCS: Sandy lean clay (CL) Gs: 2.62					
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/1/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	2	420	418	B-19	7	31	
Wt. of Tin (g)	28.97	27.57	28.88	27.3	28.2	28.3	
Wt. of Tin + Wet soil (g)	148.61	120.91	81.82	162.4	164.5	165.5	
Wt. of Tin + Dry soil (g)	127.73	104.69	72.65	138.6	140.7	141.8	
Wt. of Dry Soil (g)	98.76	77.12	43.77	111.3	112.5	113.5	
Wt. of Water (g)	20.88	16.22	9.17	23.8	23.9	23.7	
Water Content (%)	21.14	21.03	20.95	21.4	21.2	20.9	
Average Water Content (%)		21.0			21.1		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.23	7.20	7.23
Average Diameter, D (cm)	3.51	3.55	3.54
Dry Unit Weight (kN/m ³)	15.65	15.52	15.69
Initial Void ratio	0.64	0.66	0.64
Saturation (%)	0.87	0.85	0.86
Strain at Failure (%)	14.34	14.85	14.84
Max Deviator Stress (kPa)	35.5	33.0	38.6
Membrane Correction (kPa)	3.2	3.3	3.3
Corrected Deviator Stress (kPa)	32.3	29.8	35.3
Corrected Major Stress (kPa)	101.3	167.7	311.1



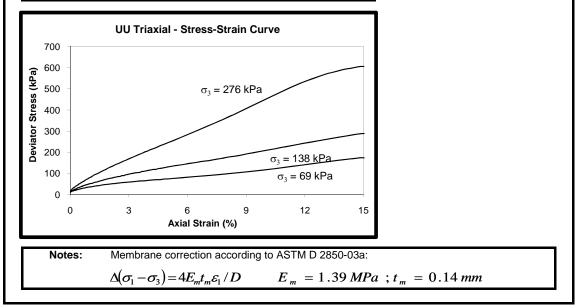


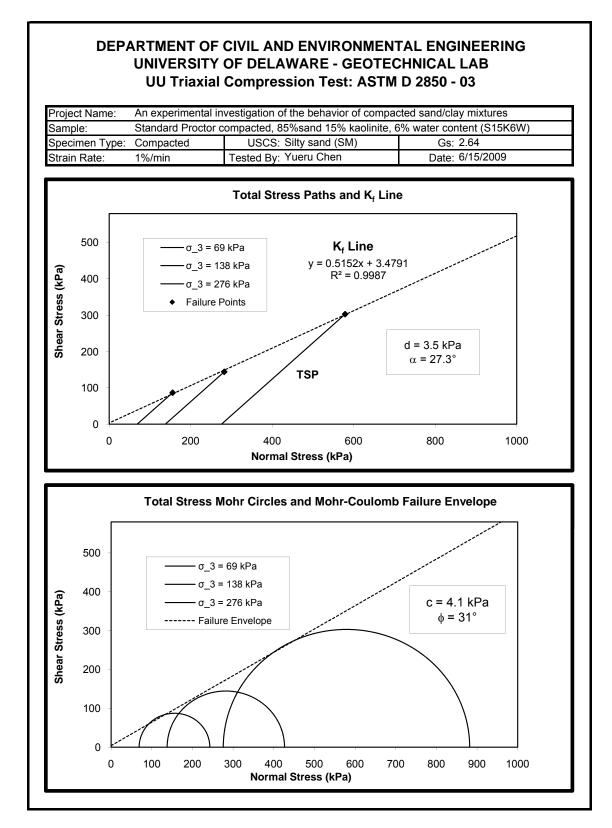


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 85% sand 15% kaolinite, 6% water content (S15K6W)					
Specimen Type:	Compacted USCS: Silty sand (SM) Gs: 2.64					
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/15/2009			

Sample No.		Trimming				
Sample No.	1	2	3	1	2	3
Tin No.	101	46	B-19	405	4	404
Wt. of Tin (g)	28.02	28.84	27.4	27.7	28.7	28.7
Wt. of Tin + Wet soil (g)	95.88	82.48	82.35	162.1	161.0	161.0
Wt. of Tin + Dry soil (g)	92.07	79.44	79.26	154.2	153.2	153.3
Wt. of Dry Soil (g)	64.05	50.60	51.86	126.5	124.5	124.6
Wt. of Water (g)	3.81	3.04	3.09	7.9	7.7	7.7
Water Content (%)	5.95	6.01	5.96	6.3	6.2	6.2
Average Water Content (%)		6.0			6.2	

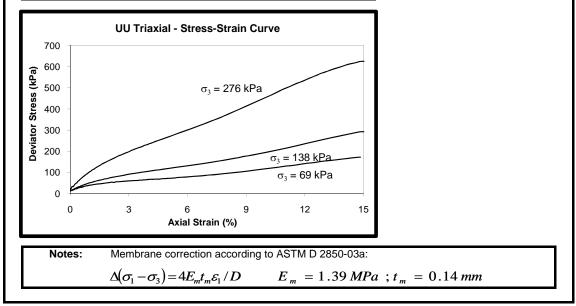
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.11	7.08	7.06
Average Diameter, D (cm)	3.51	3.54	3.52
Dry Unit Weight (kN/m ³)	18.00	17.57	17.77
Initial Void ratio	0.44	0.47	0.46
Saturation (%)	0.38	0.35	0.36
Strain at Failure (%)	14.86	15.03	14.83
Max Deviator Stress (kPa)	177.2	292.2	609.2
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	173.9	288.9	605.9
Corrected Major Stress (kPa)	242.8	426.8	881.7

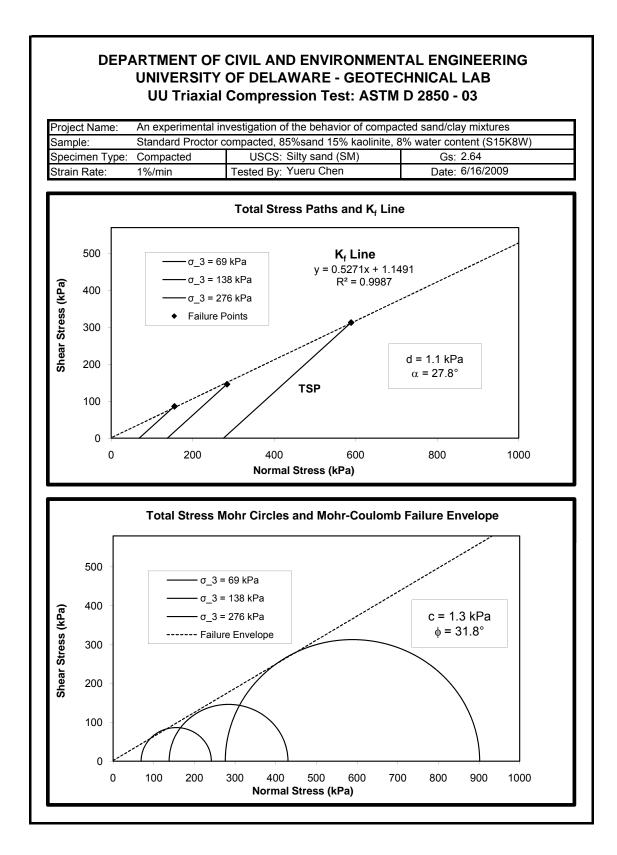




An experimental investigation of the behavior of compacted sand/clay mixtures						
r compacted, 8	35% sand 15	% kaolinite,	8% water co	ntent (S15K8	W)	
USCS:	Silty sand (SM)	Gs:	2.64		
Tested By:	Tested By: Yueru Chen		Date:	6/16/2009		
	Trimming			Specimen		
1	2	3	1	2	3	
Majid	FJ-3	5	Majid	7	201	
28.66	29.03	28.89	28.7	28.2	28.9	
73.09	94.26	97.12	169.1	168.0	168.3	
69.84	89.4	92.3	158.2	157.5	157.7	
41.18	60.37	63.41	129.6	129.3	128.8	
3.25	4.86	4.82	10.8	10.5	10.7	
7.89	8.05	7.60	8.4	8.1	8.3	
	7.8		8.3		-	
1	2	3				
	r compacted, & USCS: Tested By: 1 Majid 28.66 73.09 69.84 41.18 3.25	r compacted, 85% sand 15 USCS: Silty sand (5 Tested By: Yueru Cher 1 2 Majid FJ-3 28.66 29.03 73.09 94.26 69.84 89.4 41.18 60.37 3.25 4.86 7.89 8.05 7.8	r compacted, 85% sand 15% kaolinite, USCS: Silty sand (SM) Tested By: Yueru Chen Trimming 1 2 3 Majid FJ-3 5 28.66 29.03 28.89 73.09 94.26 97.12 69.84 89.4 92.3 41.18 60.37 63.41 3.25 4.86 4.82 7.89 8.05 7.60 7.8	r compacted, 85% sand 15% kaolinite, 8% water co USCS: Silty sand (SM) Gs: Tested By: Yueru Chen Date: Trimming 1 1 2 3 1 Majid FJ-3 5 Majid 28.66 29.03 28.89 28.7 73.09 94.26 97.12 169.1 69.84 89.4 92.3 158.2 41.18 60.37 63.41 129.6 3.25 4.86 4.82 10.8 7.89 8.05 7.60 8.4	Tercompacted, 85% sand 15% kaolinite, 8% water content (S15K8 USCS: Silty sand (SM) Gs: 2.64 Tested By: Yueru Chen Date: 6/16/2009 Trimming Specimen 1 2 3 1 2 Majid FJ-3 5 Majid 7 28.66 29.03 28.89 28.7 28.2 73.09 94.26 97.12 169.1 168.0 69.84 89.4 92.3 158.2 157.5 41.18 60.37 63.41 129.6 129.3 3.25 4.86 4.82 10.8 10.5 7.89 8.05 7.60 8.4 8.1	

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.00	7.13	7.10
Average Diameter, D (cm)	3.54	3.52	3.52
Dry Unit Weight (kN/m ³)	18.48	18.28	18.31
Initial Void ratio	0.40	0.42	0.41
Saturation (%)	0.55	0.51	0.53
Strain at Failure (%)	14.84	15.01	15.02
Max Deviator Stress (kPa)	175.8	295.7	629.0
Membrane Correction (kPa)	3.2	3.3	3.3
Corrected Deviator Stress (kPa)	172.6	292.4	625.6
Corrected Major Stress (kPa)	241.5	430.3	901.4

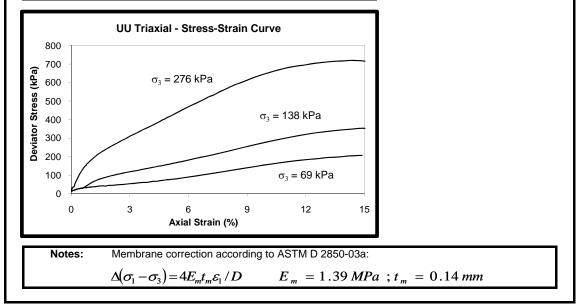


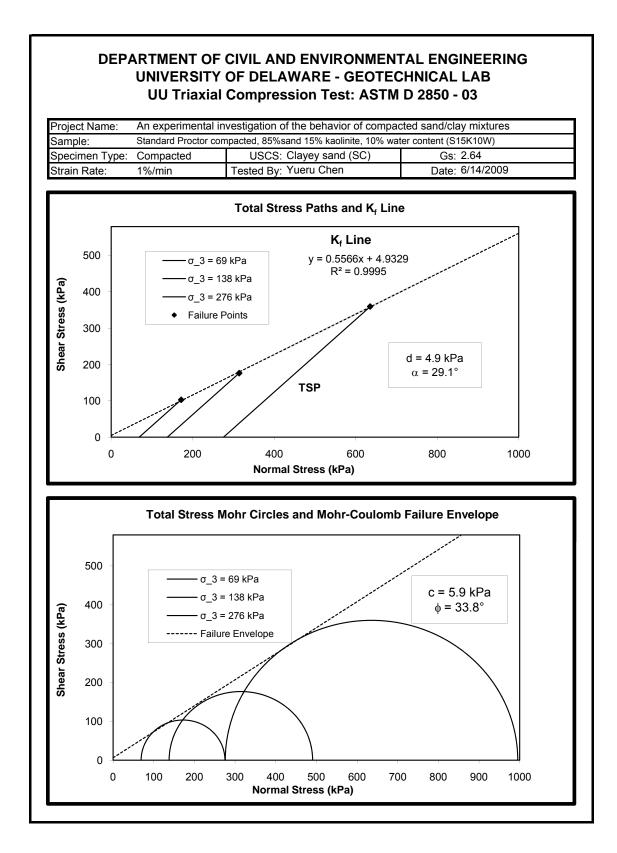


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 85% sand 15% kaolinite, 10% water content (S15K10W)					
Specimen Type:	Compacted	USCS: Clayey sand (SC)	Gs: 2.64			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/14/2009			

Sample No.		Trimming	rimming		Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	213	B8	31	4	405	404	
Wt. of Tin (g)	27.9	28.45	38.34	28.7	27.7	28.7	
Wt. of Tin + Wet soil (g)	95.31	136.28	118.04	178.9	179.3	179.2	
Wt. of Tin + Dry soil (g)	89.02	126.61	109.8	164.7	164.6	164.9	
Wt. of Dry Soil (g)	61.12	98.16	71.46	136.0	136.9	136.2	
Wt. of Water (g)	6.29	9.67	8.24	14.2	14.7	14.4	
Water Content (%)	10.29	9.85	11.53	10.4	10.7	10.5	
Average Water Content (%)		10.6			10.6		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.11	7.11	7.11
Average Diameter, D (cm)	3.56	3.53	3.53
Dry Unit Weight (kN/m ³)	18.89	19.29	19.19
Initial Void ratio	0.37	0.34	0.35
Saturation (%)	0.74	0.83	0.80
Strain at Failure (%)	14.87	14.86	14.35
Max Deviator Stress (kPa)	209.4	356.1	722.6
Membrane Correction (kPa)	3.3	3.3	3.2
Corrected Deviator Stress (kPa)	206.2	352.9	719.4
Corrected Major Stress (kPa)	275.1	490.8	995.2

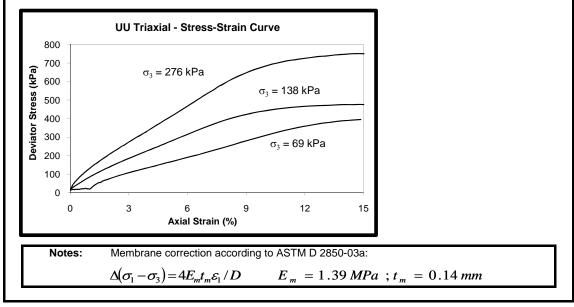


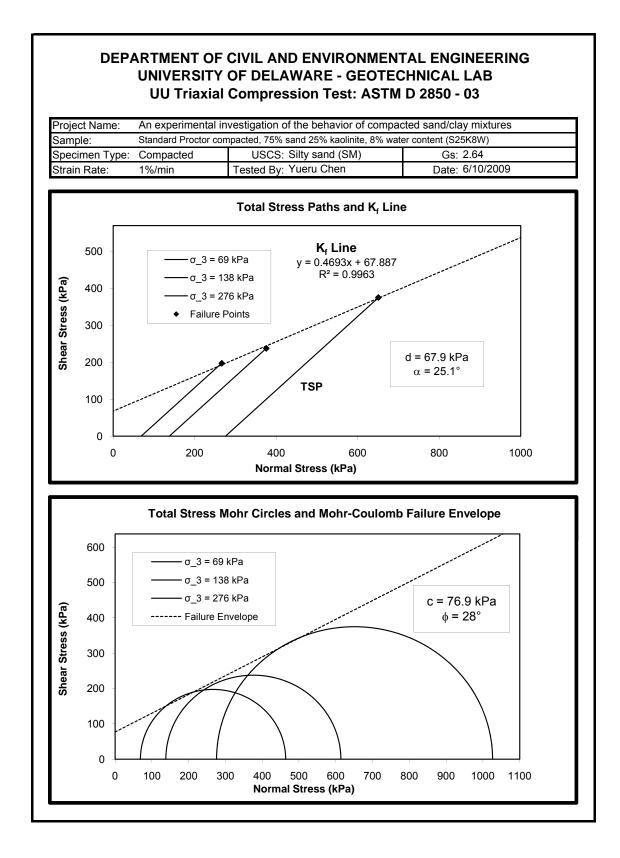


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor compacted, 75% sand 25% kaolinite, 8% water content (S25K8W)						
Specimen Type:	Compacted	USCS: Silty sand (SM)	Gs: 2.64				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/10/2009				

Sample No.		Trimming		Specimen			
Sample No.	1	2	3	1	2	3	
Tin No.	213	205	B8	46	121	101	
Wt. of Tin (g)	27.9	29.7	28.46	28.8	30.9	28.0	
Wt. of Tin + Wet soil (g)	93.69	89.23	79.38	168.3	167.3	172.3	
Wt. of Tin + Dry soil (g)	88.88	84.9	75.68	157.6	156.2	161.6	
Wt. of Dry Soil (g)	60.98	55.20	47.22	128.7	125.3	133.6	
Wt. of Water (g)	4.81	4.33	3.70	10.8	11.1	10.7	
Water Content (%)	7.89	7.84	7.84	8.4	8.9	8.0	
Average Water Content (%)	7.9		8.4				

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.06	7.08	7.15
Average Diameter, D (cm)	3.49	3.53	3.54
Dry Unit Weight (kN/m ³)	18.71	17.72	18.66
Initial Void ratio	0.38	0.46	0.39
Saturation (%)	0.57	0.51	0.55
Strain at Failure (%)	14.86	14.86	14.59
Max Deviator Stress (kPa)	398.3	478.9	753.5
Membrane Correction (kPa)	3.3	3.3	3.2
Corrected Deviator Stress (kPa)	394.9	475.6	750.3
Corrected Major Stress (kPa)	463.9	613.5	1026.1





Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures							
Sample:	Standard Procto	Standard Proctor compacted, 75% sand 25% kaolinite, 10% water content (S25K10W)						
Specimen Type:	Compacted	USCS:	Silty sand (SM)	Gs: 2.64			
Strain Rate:	1%/min	Tested By:	Yueru Cher	1	Date: 6/10/2009			
			Trimming			Specimen		
Sam	Sample No.		2	3	1	2	3	
Tin No.		B-19	46	101	31	B8	213	
Wt. of Tin (g)		27.41	28.84	28.02	28.4	28.5	27.9	
Wt. of Tin + Wet soil (g)		88.29	107.26	103.5	177.1	177.8	178.2	
Wt. of Tin + Dr	y soil (g)	82.69	100.17	96.75	163.2	164.0	164.5	
Wt. of Dry Soil	(g)	55.28	71.33	68.73	134.8	135.5	136.6	

) = (3)	00.20		000		
Wt. of Water (g)	5.60	7.09	6.75	13.9	13.8
Water Content (%)	10.13	9.94	9.82	10.3	10.2
Average Water Content (%)		10.0			10.2
		-	-		
Sample No.	1	2	3		
Cell Pressure (kPa)	68.95	137.90	275.79		
Average Height, L (cm)	7.08	7.11	7.12		
Average Diameter, D (cm)	3.52	3.53	3.53		
Dry Unit Weight (kN/m ³)	19.21	19.06	19.28		
Initial Void ratio	0.35	0.36	0.34		
Saturation (%)	0.78	0.75	0.77		
Strain at Failure (%)	14.86	14.86	15.01		

214.9

3.3

211.6

280.5

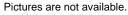
Max Deviator Stress (kPa)

Membrane Correction (kPa)

Corrected Major Stress (kPa)

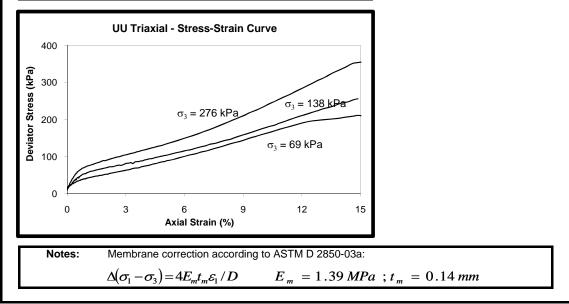
Corrected Deviator Stress (kPa)

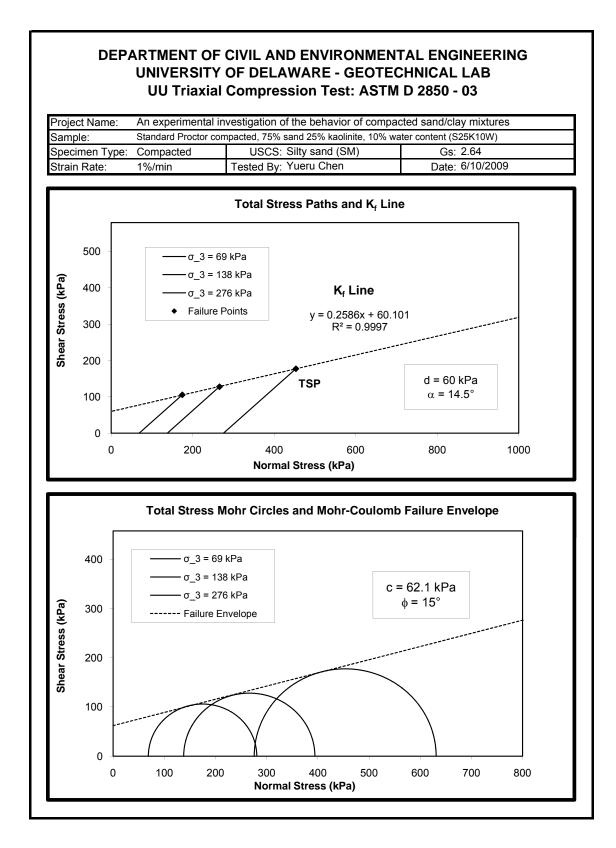
259.6 358.5 3.3 3.3 256.3 355.2 394.2 631.0



13.8

10.1





Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures								
Sample:	Standard Procto	r compacted, 7	compacted, 75% sand 25% kaolinite, 12% water content (S25K12W)						
Specimen Type	: Compacted	USCS:	USCS: Silty sand (SM)			Gs: 2.64			
Strain Rate:	1%/min	Tested By:	Tested By: Yueru Chen			Date: 6/16/2009			
			Trimming			Specimen			
Sar	nple No.	1	2	3	1	2	3		
Tin No.		101	46	B-19	31	B8	213		
Wt. of Tin (g)		28.03	28.84	27.4	28.4	28.5	27.9		
Wt. of Tin + V	Vet soil (g)	121.6	115.09	137.1	176.0	177.0	177.1		
Wt. of Tin + Dry soil (g)		111.8	106.1	125.5	159.9	160.8	161.1		

77.26

8.99

Water Content (%)	11.70	11 64	44.00	
Mator Contone (70)		11.64	11.82	12.2
Average Water Content (%)		11.7		
			-	
Sample No.	1	2	3	
Cell Pressure (kPa)	68.95	137.90	275.79	
Average Height, L (cm)	7.12	7.13	7.11	
Average Diameter, D (cm)	3.52	3.56	3.56	
Dry Unit Weight (kN/m ³)	18.67	18.34	18.49	
Initial Void ratio	0.39	0.41	0.40	
Saturation (%)	0.83	0.78	0.79	
Strain at Failure (%)	14.85	14.85	14.85	
Max Deviator Stress (kPa)	62.2	80.5	116.3	
Membrane Correction (kPa)	3.3	3.3	3.3	
Corrected Deviator Stress (kPa)	59.0	77.3	113.1	
Corrected Major Stress (kPa)	127.9	215.2	388.9	Pict

83.77

9.80

Wt. of Dry Soil (g)

Wt. of Water (g)

Pictures are not available.

132.4

16.2

12.3

12.2

133.2

16.0

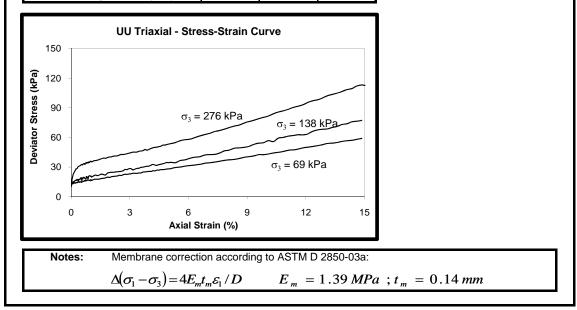
12.0

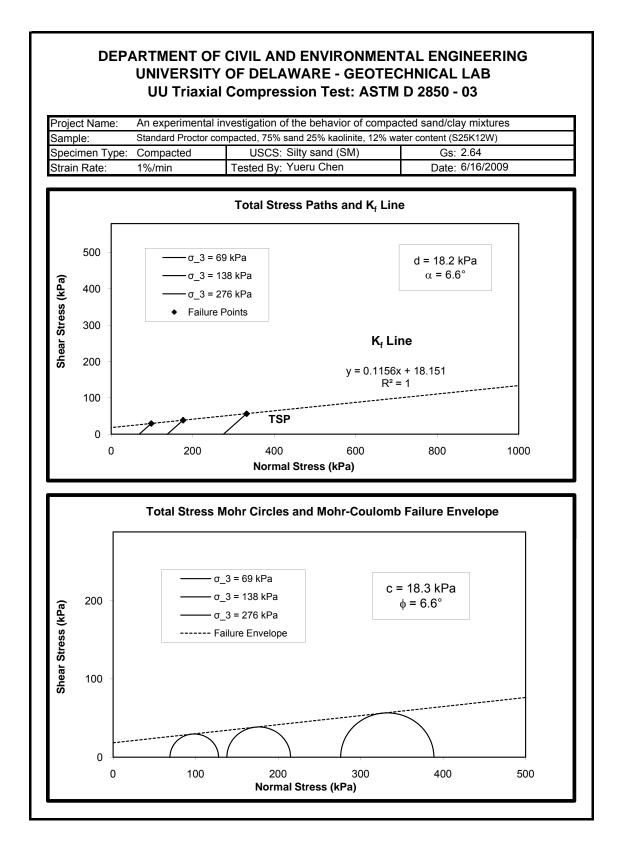
131.6

16.0

98.10

11.60

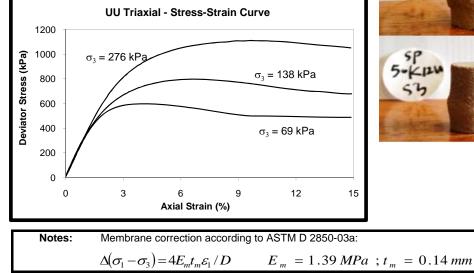




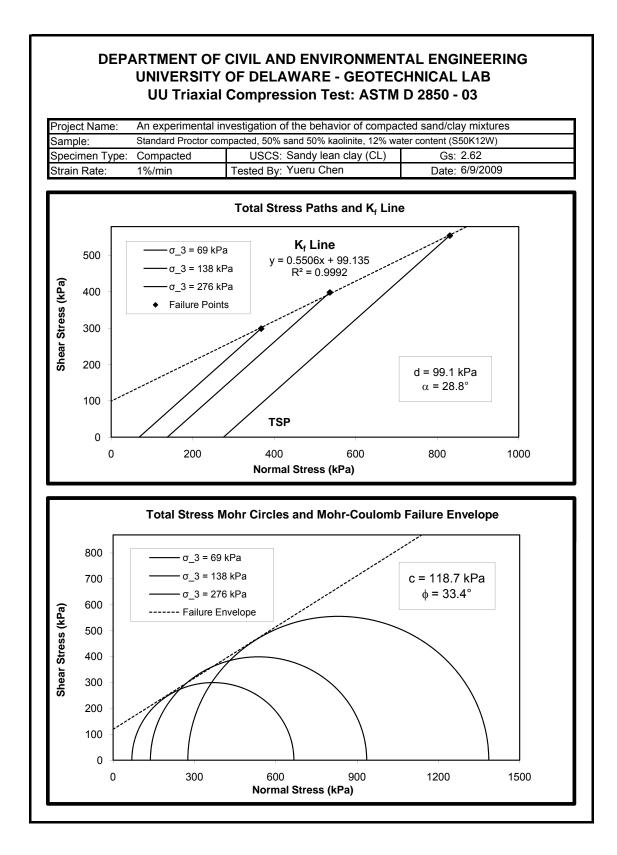
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor c	Standard Proctor compacted, 50% sand 50% kaolinite, 12% water content (S50K12W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/9/2009				

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	213	205	B 8	majid	FJ-3	5		
Wt. of Tin (g)	27.89	29.7	28.45	28.7	29.0	28.9		
Wt. of Tin + Wet soil (g)	92.4	85.99	108.02	161.3	165.4	159.1		
Wt. of Tin + Dry soil (g)	85.86	80.12	100.05	147.4	151.4	145.6		
Wt. of Dry Soil (g)	57.97	50.42	71.60	118.7	122.4	116.7		
Wt. of Water (g)	6.54	5.87	7.97	13.9	13.9	13.5		
Water Content (%)	11.28	11.64	11.13	11.7	11.4	11.6		
Average Water Content (%)	11.4		11.6					

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.16	7.17	6.89
Average Diameter, D (cm)	3.53	3.50	3.51
Dry Unit Weight (kN/m ³)	16.62	17.40	17.19
Initial Void ratio	0.55	0.48	0.50
Saturation (%)	0.56	0.63	0.61
Strain at Failure (%)	4.06	6.87	9.58
Max Deviator Stress (kPa)	599.3	799.1	1112.3
Membrane Correction (kPa)	0.9	1.5	2.1
Corrected Deviator Stress (kPa)	598.4	797.6	1110.2
Corrected Major Stress (kPa)	667.3	935.5	1386.0



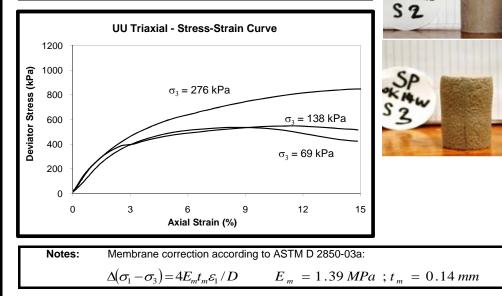


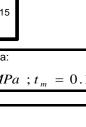


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor c	Standard Proctor compacted, 50% sand 50% kaolinite, 14% water content (S50K14W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/3/2009				

Sample No.		Trimming			Specimen			
Sample No.	1	2	3	1	2	3		
Tin No.	404	405	4	2	420	418		
Wt. of Tin (g)	28.71	27.7	28.71	29.0	27.6	28.9		
Wt. of Tin + Wet soil (g)	122.13	123.88	105.16	161.6	156.5	159.2		
Wt. of Tin + Dry soil (g)	110.93	112.17	95.48	145.5	140.2	143.1		
Wt. of Dry Soil (g)	82.22	84.47	66.77	116.5	112.6	114.2		
Wt. of Water (g)	11.20	11.71	9.68	16.1	16.3	16.2		
Water Content (%)	13.62	13.86	14.50	13.8	14.5	14.1		
Average Water Content (%)	14.0		14.1					

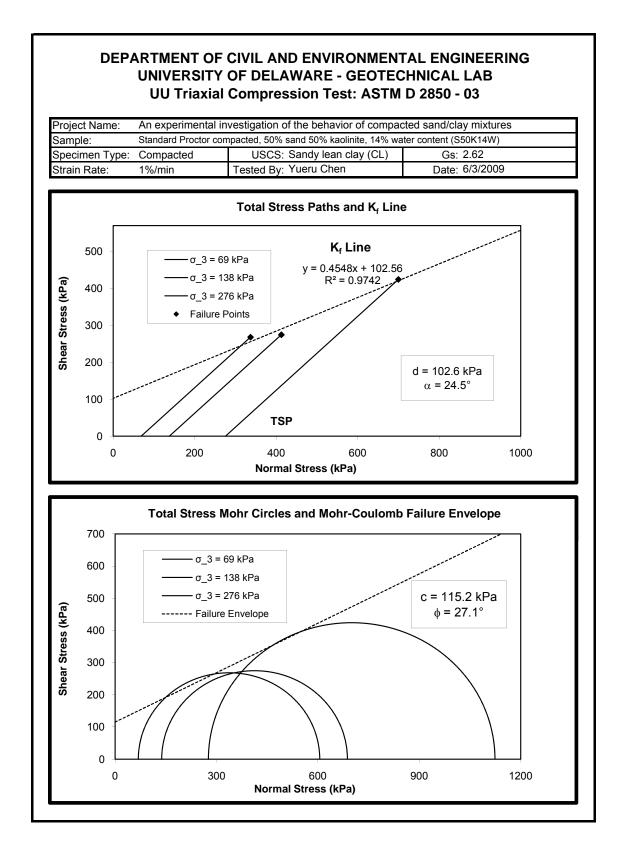
Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	6.85	6.63	6.62
Average Diameter, D (cm)	3.52	3.52	3.51
Dry Unit Weight (kN/m ³)	17.13	17.15	17.46
Initial Void ratio	0.50	0.50	0.47
Saturation (%)	0.72	0.76	0.79
Strain at Failure (%)	8.56	11.35	14.84
Max Deviator Stress (kPa)	538.2	551.9	851.4
Membrane Correction (kPa)	1.9	2.5	3.3
Corrected Deviator Stress (kPa)	536.3	549.4	848.1
Corrected Major Stress (kPa)	605.2	687.3	1123.9





SI

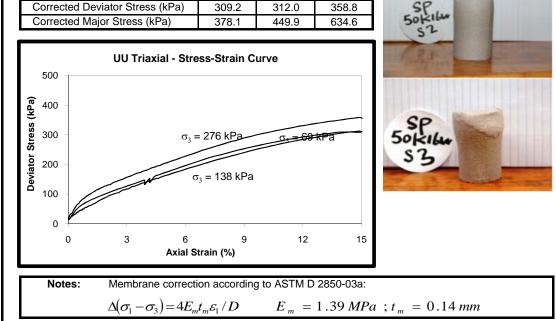
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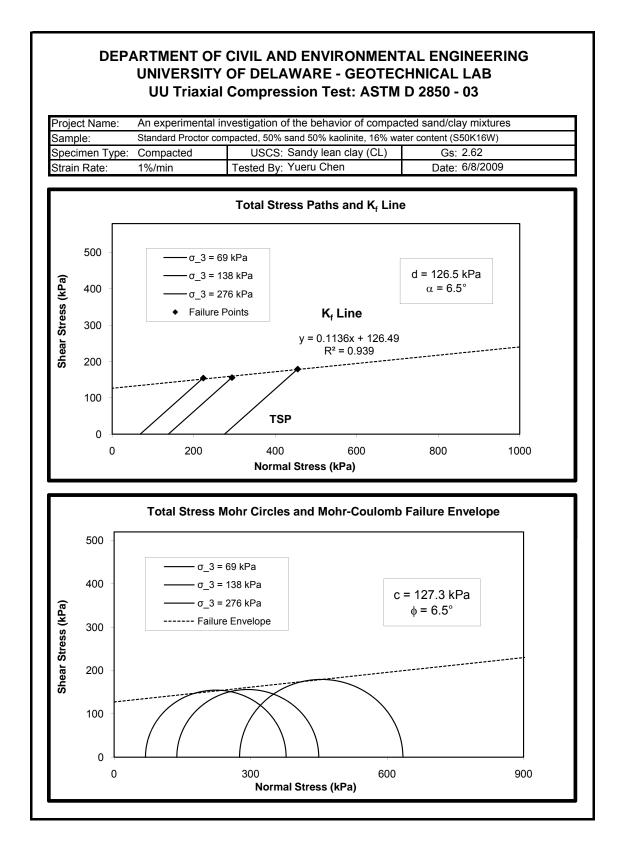


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 50% sand 50% kaolinite, 16% water content (S50K16W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL) Gs: 2.62				
Strain Rate:	1%/min					

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	4	405	404	418	420	2	
Wt. of Tin (g)	28.71	27.7	28.71	28.9	27.6	29.0	
Wt. of Tin + Wet soil (g)	96.36	107.04	105.41	174.5	171.6	175.4	
Wt. of Tin + Dry soil (g)	87.34	96.64	95.46	154.5	151.9	155.3	
Wt. of Dry Soil (g)	58.63	68.94	66.75	125.6	124.3	126.3	
Wt. of Water (g)	9.02	10.40	9.95	20.1	19.7	20.1	
Water Content (%)	15.38	15.09	14.91	16.0	15.8	15.9	
Average Water Content (%)		15.1			15.9		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.14	7.13	7.15
Average Diameter, D (cm)	3.53	3.51	3.52
Dry Unit Weight (kN/m ³)	17.68	17.68	17.81
Initial Void ratio	0.45	0.45	0.44
Saturation (%)	0.92	0.91	0.94
Strain at Failure (%)	14.45	14.89	14.86
Max Deviator Stress (kPa)	312.4	315.3	362.1
Membrane Correction (kPa)	3.2	3.3	3.3
Corrected Deviator Stress (kPa)	309.2	312.0	358.8
Corrected Major Stress (kPa)	378.1	449.9	634.6





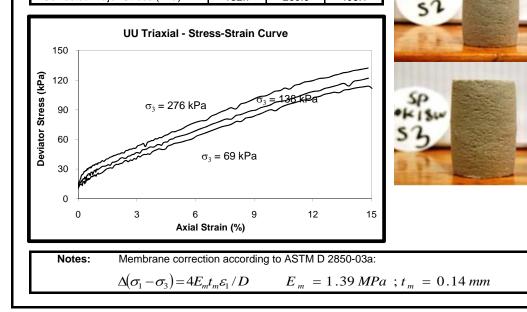
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Standard Proctor compacted, 50% sand 50% kaolinite, 18% water content (S50K18W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62			
Strain Rate:	1%/min Tested By: Yueru Chen Date: 6/4/2009					

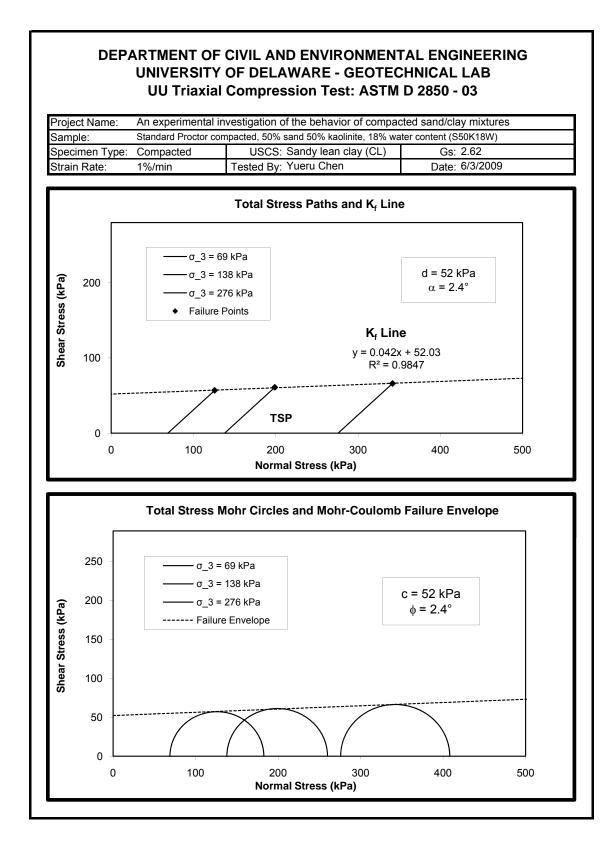
Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	213	205	B 8	majid	FJ-3	5	
Wt. of Tin (g)	27.9	29.72	28.45	28.7	29.0	28.9	
Wt. of Tin + Wet soil (g)	99.96	113.13	145.46	168.8	167.8	168.9	
Wt. of Tin + Dry soil (g)	89.23	100.71	127.89	147.8	146.8	147.8	
Wt. of Dry Soil (g)	61.33	70.99	99.44	119.2	117.8	119.0	
Wt. of Water (g)	10.73	12.42	17.57	21.0	20.9	21.1	
Water Content (%)	17.50	17.50	17.67	17.6	17.7	17.7	
Average Water Content (%)		17.6			17.7		

50K18W

SP SOK 180

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.12	7.09	7.11
Average Diameter, D (cm)	3.55	3.52	3.53
Dry Unit Weight (kN/m ³)	16.55	16.74	16.80
Initial Void ratio	0.55	0.54	0.53
Saturation (%)	0.84	0.87	0.88
Strain at Failure (%)	14.86	14.84	14.82
Max Deviator Stress (kPa)	117.0	125.3	135.6
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	113.8	122.1	132.3
Corrected Major Stress (kPa)	182.7	260.0	408.1

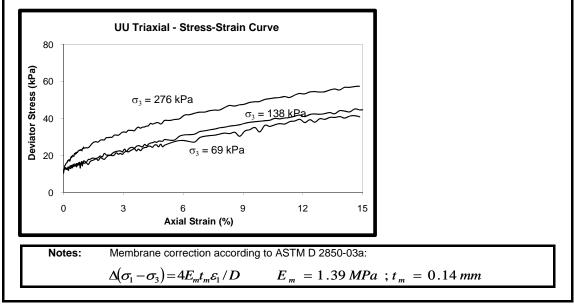


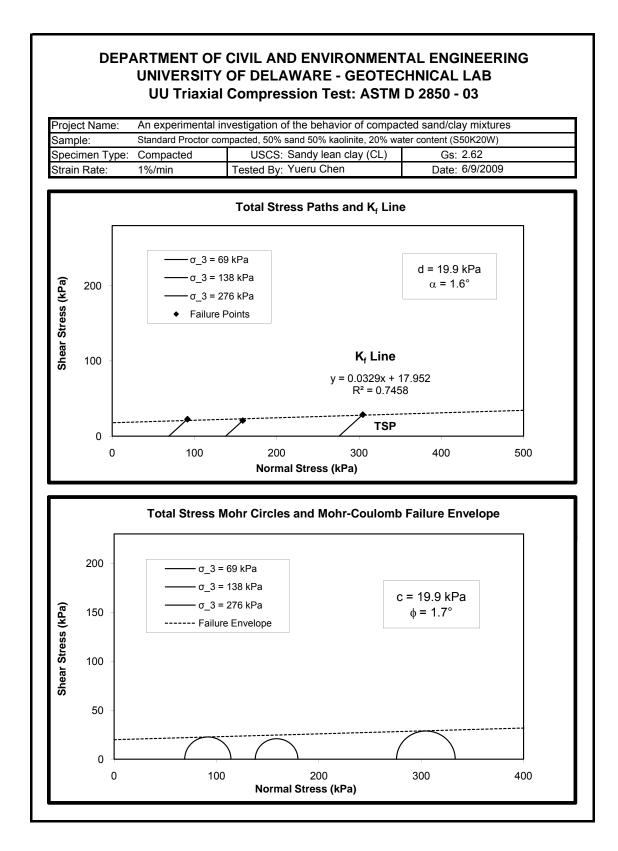


Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures						
Sample:	Standard Proctor compacted, 50% sand 50% kaolinite, 20% water content (S50K20W)						
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62				
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/9/2009				

Comple No.		· · · · · · · · · · · · · · · · · · ·					
Sample No.	1	2	3	1	2	3	
Tin No.	101	121	46	2	420	418	
Wt. of Tin (g)	28.02	30.92	28.85	29.0	27.6	28.9	
Wt. of Tin + Wet soil (g)	120.18	116.21	112.4	166.1	166.2	166.1	
Wt. of Tin + Dry soil (g)	104.98	102.12	98.57	143.2	142.6	143.1	
Wt. of Dry Soil (g)	76.96	71.20	69.72	114.2	115.0	114.3	
Wt. of Water (g)	15.20	14.09	13.83	22.9	23.6	23.0	
Water Content (%)	19.75	19.79	19.84	20.1	20.6	20.1	
Average Water Content (%)		19.8			20.2		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.03	7.07	7.11
Average Diameter, D (cm)	3.57	3.57	3.55
Dry Unit Weight (kN/m ³)	15.92	15.93	15.92
Initial Void ratio	0.61	0.61	0.61
Saturation (%)	0.86	0.88	0.86
Strain at Failure (%)	14.61	14.61	14.84
Max Deviator Stress (kPa)	48.4	44.8	60.7
Membrane Correction (kPa)	3.2	3.2	3.3
Corrected Deviator Stress (kPa)	45.2	41.6	57.5
Corrected Major Stress (kPa)	114.1	179.5	333.2



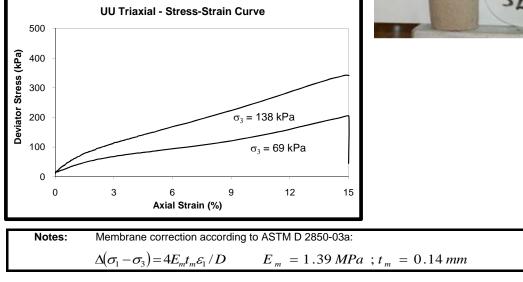


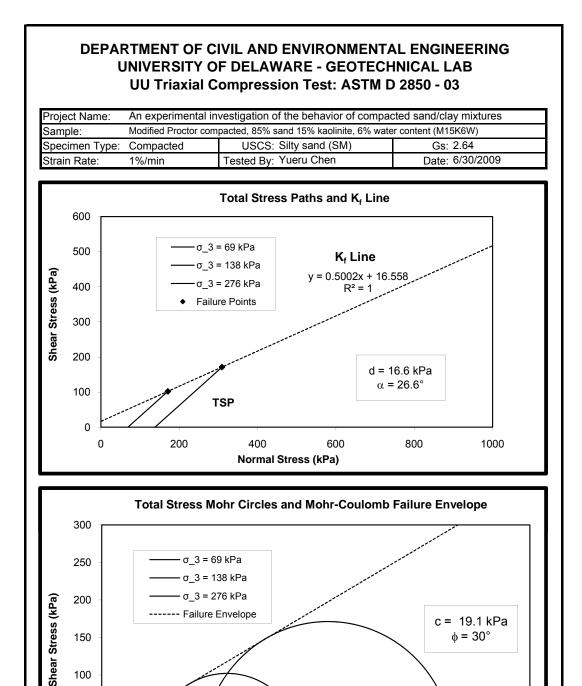
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Modified Proctor compacted, 85% sand 15% kaolinite, 6% water content (M15K6W)					
Specimen Type:	Compacted	USCS: Silty sand (SM)	Gs: 2.64			
Strain Rate:	1%/min	1%/min Tested By: Yueru Chen Date: 6/30/2009				

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2		
Tin No.	213	31	B-8	5	FJ-3		
Wt. of Tin (g)	27.9	28.38	28.46	28.9	29.0		
Wt. of Tin + Wet soil (g)	91.21	100.5	102.83	164.6	165.3		
Wt. of Tin + Dry soil (g)	87.75	96.52	98.75	157.0	157.5		
Wt. of Dry Soil (g)	59.85	68.14	70.29	128.1	128.5		
Wt. of Water (g)	3.46	3.98	4.08	7.6	7.8		
Water Content (%)	5.78	5.84	5.80	5.9	6.1		
Average Water Content (%)		5.8			6.0		

Sample No.	1	2	
Cell Pressure (kPa)	68.95	137.90	
Average Height, L (cm)	7.14	7.15	
Average Diameter, D (cm)	3.49	3.53	
Dry Unit Weight (kN/m ³)	18.40	18.01	
Initial Void ratio	0.41	0.44	
Saturation (%)	0.38	0.37	
Strain at Failure (%)	14.86	14.85	
Max Deviator Stress (kPa)	207.6	345.6	
Membrane Correction (kPa)	3.3	3.3	
Corrected Deviator Stress (kPa)	204.3	342.3	
Corrected Major Stress (kPa)	273.2	480.2	





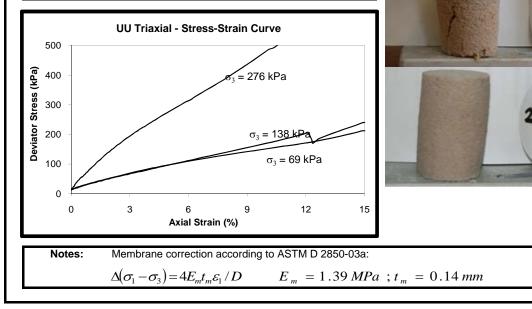


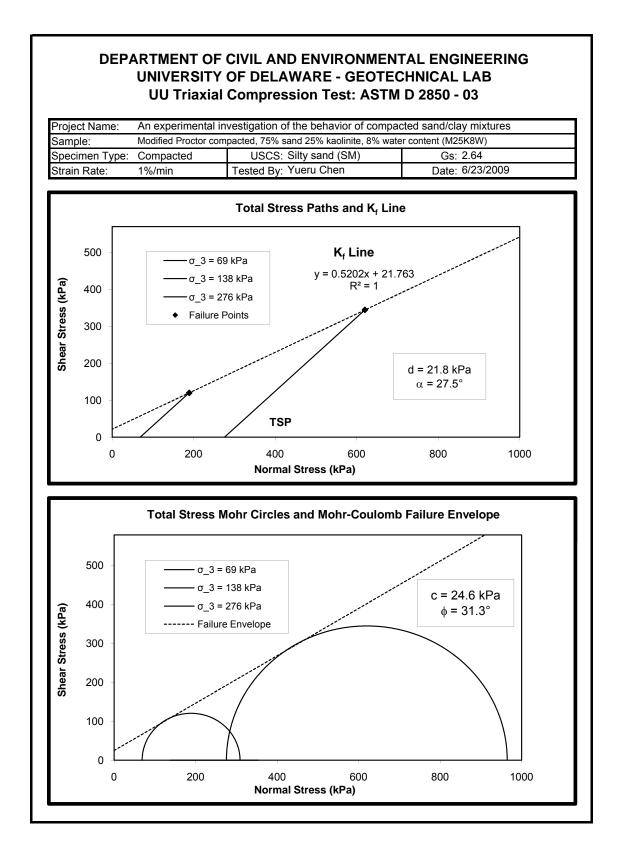
Normal Stress (kPa)

Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Modified Proctor compacted, 75% sand 25% kaolinite, 8% water content (M25K8W)					
Specimen Type:	Compacted	USCS: Silty sand (SM)	Gs: 2.64			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/23/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	7	201	205	5	FJ-3	MAJID	
Wt. of Tin (g)	28.18	28.88	29.69	28.9	29.0	28.7	
Wt. of Tin + Wet soil (g)	90.94	80.89	93.58	160.4	163.6	174.4	
Wt. of Tin + Dry soil (g)	86.19	76.94	88.72	149.6	153.1	163.3	
Wt. of Dry Soil (g)	58.01	48.06	59.03	120.7	124.1	134.6	
Wt. of Water (g)	4.75	3.95	4.86	10.7	10.5	11.1	
Water Content (%)	8.19	8.22	8.23	8.9	8.5	8.3	
Average Water Content (%)		8.2			8.5		

1	2	3
68.95	137.90	275.79
7.12	7.16	7.14
3.52	3.46	3.53
17.09	18.08	18.90
0.52	0.43	0.37
0.46	0.52	0.59
15.00	0.00	15.02
243.5	0.0	692.0
3.3	0.0	3.3
240.2	0.0	688.6
309.2	0.0	964.4
	68.95 7.12 3.52 17.09 0.52 0.46 15.00 243.5 3.3 240.2	68.95 137.90 7.12 7.16 3.52 3.46 17.09 18.08 0.52 0.43 0.46 0.52 15.00 0.00 243.5 0.0 3.3 0.0 240.2 0.0

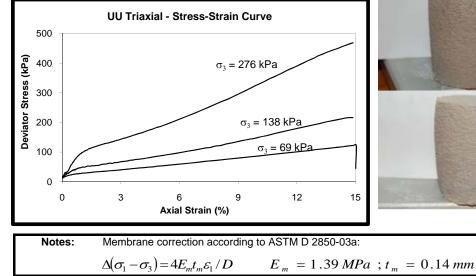




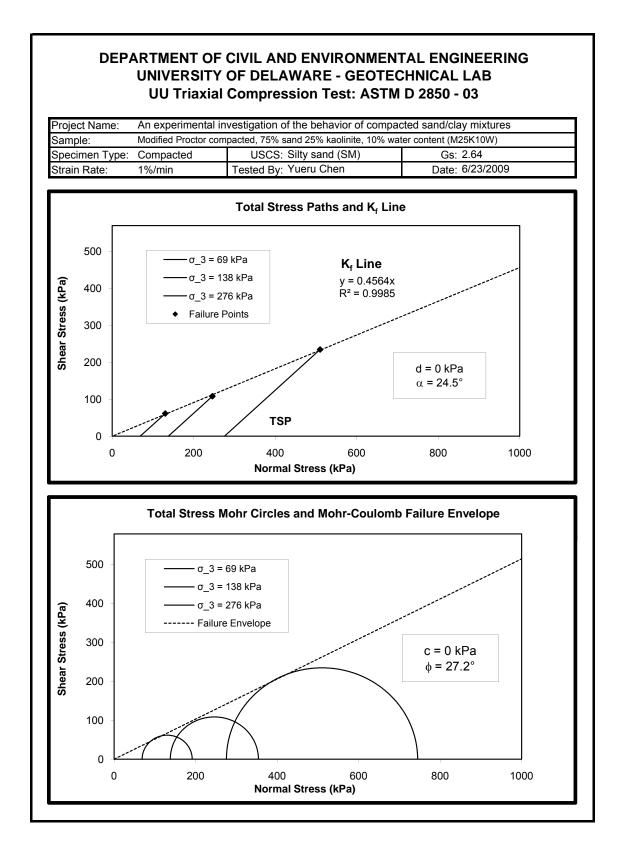
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Modified Proctor compacted, 75% sand 25% kaolinite, 10% water content (M25K10W)					
Specimen Type:	Compacted	USCS: Silty sand (SM)	Gs: 2.64			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/23/2009			

Sample No.		Trimming			Specimen		
	1	2	3	1	2	3	
Tin No.	B-19	46	101	31	B8	213	
Wt. of Tin (g)	27.41	28.84	28.02	28.4	28.5	27.9	
Wt. of Tin + Wet soil (g)	88.29	107.26	103.5	177.1	177.8	178.2	
Wt. of Tin + Dry soil (g)	87.34	96.64	95.46	163.2	164.0	164.5	
Wt. of Dry Soil (g)	59.93	67.80	67.44	134.8	135.5	136.6	
Wt. of Water (g)	0.95	10.62	8.04	13.9	13.8	13.8	
Water Content (%)	1.59	15.66	11.92	10.3	10.2	10.1	
Average Water Content (%)		9.7			10.2		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.07	7.08	7.12
Average Diameter, D (cm)	3.53	3.51	3.52
Dry Unit Weight (kN/m ³)	19.08	19.46	19.38
Initial Void ratio	0.36	0.33	0.34
Saturation (%)	0.76	0.81	0.79
Strain at Failure (%)	15.03	14.61	14.87
Max Deviator Stress (kPa)	126.0	219.4	472.1
Membrane Correction (kPa)	3.3	3.2	3.3
Corrected Deviator Stress (kPa)	122.7	216.1	468.8
Corrected Major Stress (kPa)	191.7	354.0	744.6



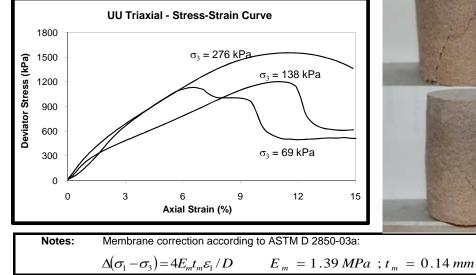




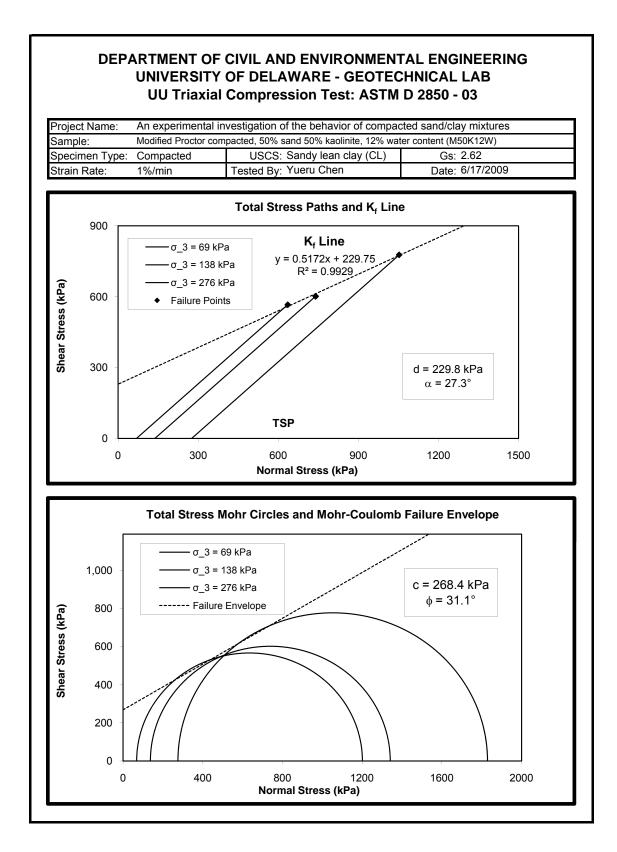
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Modified Proctor compacted, 50% sand 50% kaolinite, 12% water content (M50K12W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/17/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	404	4	405	majid	FJ-3	5	
Wt. of Tin (g)	28.72	28.72	27.71	28.7	29.0	28.9	
Wt. of Tin + Wet soil (g)	102.53	91.25	111.78	178.4	176.1	179.3	
Wt. of Tin + Dry soil (g)	94.26	84.54	102.76	162.5	160.6	163.4	
Wt. of Dry Soil (g)	65.54	55.82	75.05	133.8	131.5	134.5	
Wt. of Water (g)	8.27	6.71	9.02	15.9	15.6	15.9	
Water Content (%)	12.62	12.02	12.02	11.9	11.8	11.8	
Average Water Content (%)		12.2			11.8		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.17	7.19	7.13
Average Diameter, D (cm)	3.51	3.51	3.51
Dry Unit Weight (kN/m ³)	18.89	18.58	19.14
Initial Void ratio	0.36	0.38	0.34
Saturation (%)	0.86	0.81	0.90
Strain at Failure (%)	6.58	10.87	11.34
Max Deviator Stress (kPa)	1133.8	1205.9	1556.2
Membrane Correction (kPa)	1.5	2.4	2.5
Corrected Deviator Stress (kPa)	1132.3	1203.5	1553.7
Corrected Major Stress (kPa)	1201.3	1341.4	1829.5



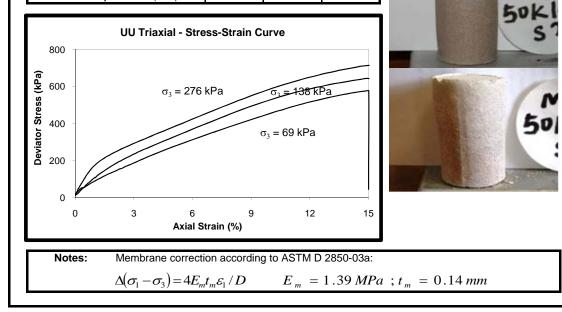




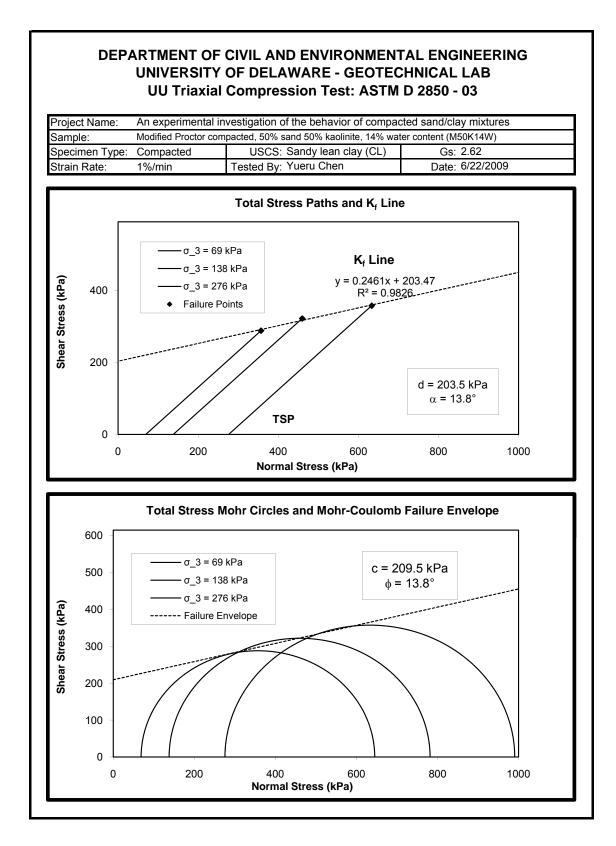
Project Name:	An experimental investigation of the behavior of compacted sand/clay mixtures					
Sample:	Modified Proctor compacted, 50% sand 50% kaolinite, 14% water content (M50K14W)					
Specimen Type:	Compacted	USCS: Sandy lean clay (CL)	Gs: 2.62			
Strain Rate:	1%/min	Tested By: Yueru Chen	Date: 6/22/2009			

Sample No.		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	B-19	46	101	205	201	7	
Wt. of Tin (g)	27.4	28.83	28.01	29.6	28.9	28.2	
Wt. of Tin + Wet soil (g)	93.68	93.06	117.3	176.1	176.6	178.5	
Wt. of Tin + Dry soil (g)	85.28	85.16	106.7	157.7	158.6	160.0	
Wt. of Dry Soil (g)	57.88	56.33	78.69	128.1	129.7	131.9	
Wt. of Water (g)	8.40	7.90	10.60	18.4	18.1	18.4	
Water Content (%)	14.51	14.02	13.47	14.4	14.0	14.0	
Average Water Content (%)		14.0			14.1		

Sample No.	1	2	3
Cell Pressure (kPa)	68.95	137.90	275.79
Average Height, L (cm)	7.08	7.12	7.16
Average Diameter, D (cm)	3.51	3.51	3.54
Dry Unit Weight (kN/m ³)	18.32	18.44	18.36
Initial Void ratio	0.40	0.39	0.40
Saturation (%)	0.93	0.93	0.92
Strain at Failure (%)	15.01	14.85	15.03
Max Deviator Stress (kPa)	579.4	647.0	718.0
Membrane Correction (kPa)	3.3	3.3	3.3
Corrected Deviator Stress (kPa)	576.1	643.7	714.7
Corrected Major Stress (kPa)	645.1	781.6	990.5



MP



DEPARTMENT UNIVERS	OF CIVIL AI		-	-		G	
	axial Compre						
,	ntal investigation of ctor compacted, 5				,	16\\/\	
Specimen Type: Compacted		Sandy lean			2.62	1000)	
Strain Rate: 1%/min		Yueru Cher	, ,	Date:	6/29/2009		
	Tested by.	Tueru Oner	1	Date.	0/29/2009	,	
		Trimming			Specimen		
Sample No.	1	2	3	1	2	3	
Tin No.	7	201	205	418	420	2	
Wt. of Tin (g)	28.18	28.88	29.69	28.8	27.6	29.0	
Wt. of Tin + Wet soil (g)	105.12	119.43	112.08	172.5	171.4	169.9	
Wt. of Tin + Dry soil (g)	94.63	107.13	100.84	152.4	151.2	150.1	
Wt. of Dry Soil (g)	66.45	78.25	71.15	123.6 123.6 121.1			
Wt. of Water (g)	10.49	12.30	11.24	20.1	20.2	19.8	
Water Content (%)	15.79	15.72	15.80	16.3	16.3	16.3	
Average Water Content (%)		15.8			16.3	-	
					and a state of the state of the		
Sample No.	1	2	3		ALCONDUCT. A. P.	N	
Cell Pressure (kPa)	68.95	137.90	275.79				
Average Height, L (cm)	7.13	7.13	7.11	1000		FAK	
Average Diameter, D (cm)	3.53	3.52	3.51			200	
Dry Unit Weight (kN/m ³)	17.37	17.48	17.27	1000	In the second	C	
Initial Void ratio	0.48	0.47	0.49			3	
Saturation (%)	0.89	0.91	0.88			1	
Strain at Failure (%)	14.84	14.86	14.86			- and the second	

234.0

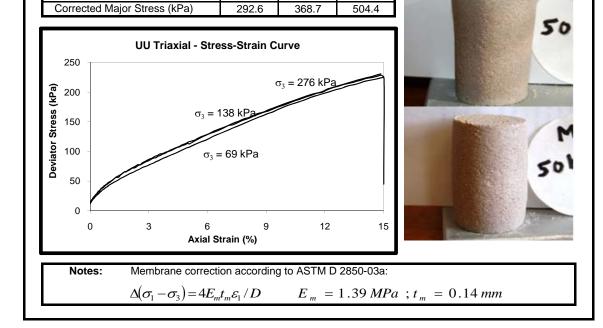
3.3

230.8

231.9

3.3

228.6



227.0

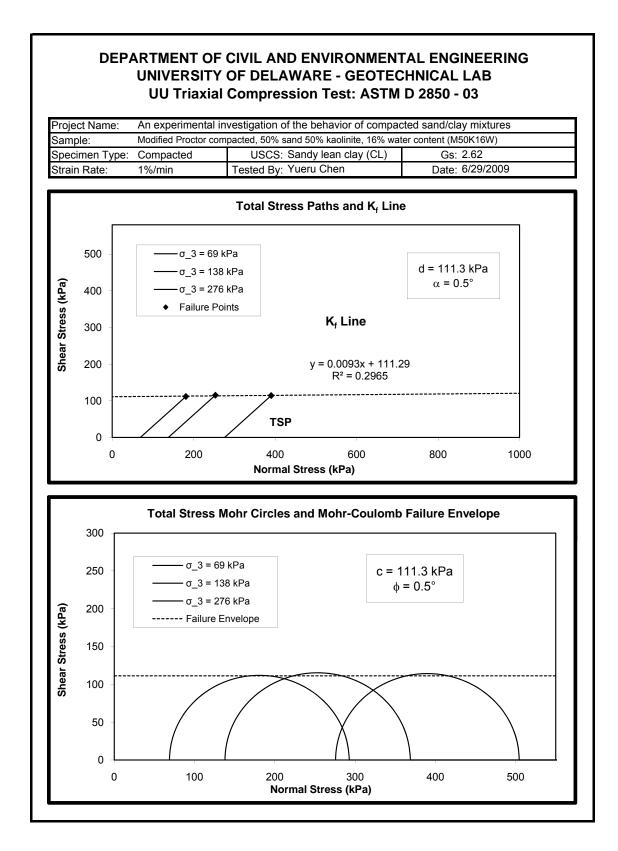
3.3

223.7

Max Deviator Stress (kPa)

Membrane Correction (kPa)

Corrected Deviator Stress (kPa)



APPENDIX G

ONE – DIMENSIONAL COMPRESSION DATA

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures									
Sample:	Low ene	rgy con	npacted, 85% s	sand 1	5% bentonite	, 12% w	ater content (L15B12W)		
Consolid. Type	EI25-047	9			Consolid. Ty	pe l	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.		63.5 mi	m /	Area of Spec.	3166.9	mm ²	
Weight of Ring	66.3	g	Wt. of Stone		133.6 g	١	Nt. of Paper	0.3	g	
Specific Gravity	2.65		Tested By		Yueru Chen	C	Date 3/11/2009			
Trimmings	;			1				2		
Tin No.				213				B8		
Wt. of Tin (g)				27.9			28.4			
Wt. of Tin + Wet Soil	(g)			145.8				169.9		
Wt. of Tin + Dry Soil	(g)		132.9 15				154.6			
Wt. of Dry Soil (g)			105 126.2							
Wt. of Water (g)			12.9 15.3							
Water Content (%)			12.3 12.1							
Average Water Conte	ent (%)				1	2.2				
Sassimon										
Specimen	l		Bef	fore T	est		At	ter Test		
Tare I.D. No.	I				est Paper		At	iter Test 205		
•			Ring, S		Paper		Ai			
Tare I.D. No.	oil (g)		Ring, S	Stone,	Paper		A	205		
Tare I.D. No. Wt. of Tare + Wet S	oil (g)		Ring, S	Stone,	Paper		Ai	205 145.8		
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So	oil (g)		Ring, S	Stone, 316.9 -	Paper		Af	205 145.8 132.6		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)		Ring, S 2 1	Stone, 316.9 - 200.20	Paper)		A	205 145.8 132.6 29.7		
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)		Ring, S 2 1 1	Stone, 316.9 - 200.20 116.70	Paper		A	205 145.8 132.6 29.7 116.1		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)		Ring, S 2 1 1	Stone, 316.9 - 200.20 116.70	Paper		A	205 145.8 132.6 29.7 116.1 102.9		
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g)		Ring, S 2 1 1	Stone, 316.9 - 200.20 116.70 102.90 13.80	Paper		A	205 145.8 132.6 29.7 116.1 102.9 13.2		
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)	ρ _d	Ring, S 2 1 1	Stone, 316.9 - 200.20 116.70 102.90 13.80 13.4	Paper	nsity	ρ	205 145.8 132.6 29.7 116.1 102.9 13.2 12.8	g/cm	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	ρ _d γ _d	Ring, S 2 1 1	Stone, 316.9 - 200.20 116.70 102.90 13.80 13.4 m ³	Paper))		ρ	205 145.8 132.6 29.7 116.1 102.9 13.2 12.8 d 1.78	g/cm [°] kN/m	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γ _d	Ring, S 2 1 1 1.62 g/c	Stone, 316.9 - 200.20 116.70 102.90 13.80 13.4 m ³	Final Dry Der		ρ	205 145.8 132.6 29.7 116.1 102.9 13.2 12.8 d 1.78	-	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g) bil (g)	γ _d	Ring, S 2 1 1 1.62 g/ci 15.9 kN/	Stone, 316.9 - 200.20 116.70 102.90 13.80 13.4 m ³	Final Dry Der		ρ	205 145.8 132.6 29.7 116.1 102.9 13.2 12.8 d 1.78	-	

Project:	An expe	e behavior of compa	acted sand/clay mi	xtures				
Sample:	Low energ	gy com	pacted, 85% sand 1	5% bentonite, 14%	water content (L1	5B14W)		
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	63	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g		
Specific Gravity	2.65		Tested By	Yueru Chen	Date	3/11/2009		
Trimmings	;		1			2		
Tin No.			7		201			
Wt. of Tin (g)			28.2		28.9			
Wt. of Tin + Wet Soil	(g)		158.8	8	15	3.2		
Wt. of Tin + Dry Soil	bil (g)			6	13	7.9		
Wt. of Dry Soil (g)			114.4	4	1	09		
Wt. of Water (g)			16.2		15.3			
Water Content (%)						4.0		
Average Water Cont	ent (%)			14.1				
Specimen			Before 7	Test	After	r Test		
Tare I.D. No.			Ring, Stone	, Paper	B·	-19		
Wt. of Tare + Wet S	oil (g)		309.7	1	151.4			
Wt. of Tare + Dry So	oil (g)		-		131.3			
Wt. of Tare (g)			191.6	0	27.4			
					124			
Wt. of Wet Soil (g)			117.5	0	1	24		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			117.5 103.9			24 13.9		
				0	10			
Wt. of Dry Soil (g)			103.9	0 D	10 20	3.9		
Wt. of Dry Soil (g) Wt. of Water (g)			103.9 13.60	0 D	10 20	93.9 0.1		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρ _d	103.9 13.60	0 D	10 20	3.9 0.1 9.3 1.79 g/cm ³		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	ıt	Pd γd	103.9 13.60 13.1	0 D	10 2(19 Ρ _d	3.9 0.1 9.3 1.79 g/cm ³		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma		γd	103.9 13.6(13.1 1.64 g/cm ³	0) Final Dry Density	10 2(19 Ρ _d	3.9 0.1 9.3 1.79 g/cm ⁵		
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	103.9 13.6(13.1 1.64 g/cm ³	0) Final Dry Density	10 2(19 9d ght γ _d 6	3.9 0.1 9.3 1.79 g/cm ³		

Project:	An expe	rimenta	ıl investiga	of compac	cted sand/c	lay mix	tures			
Sample:	Low energ	gy com	pacted, 85	% sand 1	5% benton	ite, 16% v	vater conte	nt (L15	B16W)	
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	\rm{mm}^2
Weight of Ring	67.5	g	Wt. of St	one	133.6	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.65		Tested E	By	Yueru Che	en	Date		3/5/2	2009
Trimmings	5			1				2	2	
Tin No.				7			201			
Wt. of Tin (g)				28.1	1 28.9					
Wt. of Tin + Wet Soil	(g)			160.7	7		164	1.2		
Wt. of Tin + Dry Soil				142.2	2			14	5.3	
Wt. of Dry Soil (g)				114.1	1			116	6.4	
Wt. of Water (g)			18.5				18	.9		
Water Content (%)			16.2 16.2			.2				
Average Water Cont	ent (%)				16.2					
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Ri	ng, Stone	, Paper			B-	19	
Wt. of Tare + Wet S	oil (g)			324.7	7			15	0	
Wt. of Tare + Dry Se	oil (g)			-			133.1			
Wt. of Tare (g)				201.4	0		27.4			
Wt. of Wet Soil (g)				123.3	0			122	2.6	
Wt. of Dry Soil (g)				105.7	0			10	5.7	
Wt. of Water (g)				17.60	D			16	.9	
Water Content (%)				16.7				16	.0	
Initial Dry Density		ρ_{d}	1.67	g/cm ³	Final Dry			ρ_{d}	1.77	g/cm
Initial Dry Unit Weigh		γd	16.4	kN/m ³	Final Dry	Unit Weig	ht	γd	17.4	kN/m
End of load deformation results										
			~	^	4	~	0		7	
End of load deforma Load Step No. Corrected Def (mm)	1 0.08		2 0.1370	3 0.2440	4 0.4470	5 0.6120	6 0.8790	4	7 1700	

Project: An experimental investigation of the behavior of compact						cted sand/c	lay mix	tures		
Sample: I	ow energ	gy com	pacted, 85%	% sand 1	5% benton	ite, 18% v	water conte	nt (L15	B18W)	
Consolid. Type	El25-047	9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	Dec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	66.3	g	Wt. of Sto	one	133.7	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.65		Tested B	y	Yueru Ch	en	Date		3/6/2	2009
Trimmings				1				2	2	
Tin No.				404				40)5	
Wt. of Tin (g)				28.7			27.7			
Wt. of Tin + Wet Soil	(g)			155				15	5.8	
Wt. of Tin + Dry Soil	(g)	135.8			3			130	5.3	
Wt. of Dry Soil (g)		107.1			1			108	3.6	
Wt. of Water (g)			19.2 19.5			.5				
Water Content (%)			17.9 18.0			.0				
Average Water Conte	ent (%)					17.9				
Specimen				Before 7	Гest			After	Test	
Tare I.D. No.			Rin	g, Stone	, Paper			10)1	
Wt. of Tare + Wet Se	oil (g)			325.8	В		152.7			
Wt. of Tare + Dry Sc	il (g)			-			134			
Wt. of Tare (g)				200.3	0			2	8	
Wt. of Wet Soil (g)				125.5	0			124	4.7	
Wt. of Dry Soil (g)				106.0	0			10)6	
Wt. of Water (g)				19.50	C			18	.7	
Water Content (%)				18.4				17	.6	
				_						
		ρ_d	1.67	g/cm ³	Final Dry	Density		ρ_{d}	1.80	g/cm ³
, <u>,</u>		, u								
Initial Dry Unit Weigh		γd	16.4	kN/m ³	Final Dry	Unit Weig	ht	γd	17.6	kN/m
Initial Dry Unit Weigh End of load deformat	ion result	γd	-					γd		kN/m
Initial Dry Density Initial Dry Unit Weigh End of load deformat Load Step No. Corrected Def (mm)		γ _d s	16.4 2 0.1140	kN/m ³ 3 0.2340	4	Unit Weig 5 0.7420	6 1.0700		17.6 7 3700	kN/m

Project: An experimental investigation of the behavior of compacted sa						cted sand/c	lay mix	tures		
Sample: I	ow energ	gy com	pacted, 85% sar	าd 15%	% benton	ite, 20% v	water conte	nt (L15	B20W)	
Consolid. Type	El25-047	'9		(Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of S	pec.	3166.9	\rm{mm}^2
Weight of Ring	63	g	Wt. of Stone		130	g	Wt. of Pap	ber	0.3	g
Specific Gravity	2.65		Tested By	Y	/ueru Che	en	Date		3/6/2	2009
Trimmings				1				2	2	
Tin No.			3	313			B8			
Wt. of Tin (g)			2	27.9			28.4			
Wt. of Tin + Wet Soil	(g)		14	47.3				180).4	
Wt. of Tin + Dry Soil	(g)		127.3					154	4.7	
Wt. of Dry Soil (g)			99.4 12			126	6.3			
Wt. of Water (g)			20 25.7			.7				
Water Content (%)			20.1 20.3							
Average Water Conte	ent (%)					20.2				
Specimen			Befo	ore Tes	st			After	Test	
Tare I.D. No.			Ring, St	one, F	Paper			20)5	
Wt. of Tare + Wet Se	oil (g)		3	314			151.4			
Wt. of Tare + Dry Sc	il (g)			-			130.9			
Wt. of Tare (g)			19	93.30				29	.7	
			193.30 29.7 120.70 121.7			17				
Wt. of Wet Soil (g)			12	20.70				12′	1.7	
Wt. of Wet Soil (g) Wt. of Dry Soil (g)				20.70 01.20				12 [,] 10 [,]		
(<u>-</u>)			10						1.2	
Wt. of Dry Soil (g)			10 11	01.20				10'	1.2 .5	
Wt. of Dry Soil (g) Wt. of Water (g)			10 1! 1	01.20 9.50 19.3				10 ⁻ 20	1.2 .5	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	10 19 1 1.60 g/cm	01.20 9.50 19.3 n ³ F	inal Dry I			10 ⁻ 20	1.2 .5	0
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	10 1! 1	01.20 9.50 19.3 n ³ F	inal Dry I		ht	10 [,] 20 20	1.2 .5 .3	g/cm ³ kN/m
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformat	ion result	γ _d s	10 19 1.60 g/cm 15.7 kN/n	01.20 9.50 19.3 n ³ F n ³ F	Final Dry	Jnit Weig		10 ² 20 20	1.2 .5 .3 1.79 17.6	0
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d S	10 19 1 1.60 g/cm	01.20 9.50 19.3 n ³ F m ³ F			ht 6 1.7300	10 ² 20 20 Ρ _d γ _d	1.2 .5 .3 1.79	0

Project:	An expe	he behavior of compa	acted sand/clay mi	xtures				
Sample: I	∟ow enerę	gy com	pacted, 75% sand	25% bentonite, 14%	water content (L2	5B14W)		
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	7/21/2009		
Trimmings			1			2		
Tin No.			40	4	405			
Wt. of Tin (g)			28.	71	27.7			
Wt. of Tin + Wet Soil	(g)		156.	.61	162	2.69		
Wt. of Tin + Dry Soil	(g)		140	0.5	14	5.58		
Wt. of Dry Soil (g)			111.	79	117	7.88		
Wt. of Water (g)			16.11 17.11			.11		
Water Content (%)			14.4 14.5			4.5		
Average Water Conte	ent (%)			14.5				
Specimen			Before	Test	After	r Test		
Tare I.D. No.			Ring, Ston	e, Paper		4		
Wt. of Tare + Wet Se	oil (g)		308.	21	14	3.2		
Wt. of Tare + Dry Sc	oil (g)		-		128.8			
M_{t} of Toro (a)						8.8		
Wt. of Tare (g)			193.	14	28	8.8 3.7		
Wt. of Wet Soil (g)			193. 115.					
				07	11	3.7		
Wt. of Wet Soil (g)			115.	07 10	11 10	3.7 4.5		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			115. 100.	07 10 97	11 10 14	3.7 4.5 0.1		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			115. 100. 14.9	07 10 97	11 10 14	8.7 4.5 0.1 4.4		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	115. 100. 14.9 15. 1.58 g/cm ³	07 10 97 0 Final Dry Density	11 10 14 14 Ρ _d	8.7 4.5 10.1 4.4 4.4 1.77 g/cm ²		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	ſt	ρ _d γ _d	115. 100. 14.9 15.	07 10 97 0 Final Dry Density	11 10 14 14 Ρ _d	8.7 4.5 10.1 4.4 4.4 1.77 g/cm ²		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformat	tion result	γd	115. 100. 14.9 15. 1.58 g/cm ³ 15.5 kN/m ³	07 10 97 0 Final Dry Density Final Dry Unit Wei	11 10 14 14 Ρ _d ght γ _d	3.7 4.5 0.1 4.4 4.4 1.77 g/cm ³ 17.4 kN/m		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	115. 100. 14.9 15. 1.58 g/cm ³	07 10 97 0 Final Dry Density Final Dry Unit Wei 4 5	11 10 14 14 14 9d γd 6	8.7 4.5 0.1 4.4 4.4 1.77 g/cm ³		

Project:	An expe	rimenta	al investigation of the	ne behavior of compa	acted sand/clay m	ixtures		
Sample: I	ow energ	gy com	pacted, 75% sand	25% bentonite, 16%	water content (L2	5B16W)		
Consolid. Type	El25-047	'9		Consolid. Type	Fixed Ring	-		
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	7/20/2009		
Trimmings			1			2		
Tin No.			20	1	7			
Wt. of Tin (g)			28.8	38	28	3.18		
Wt. of Tin + Wet Soil	(g)		152.	15	3.82			
t. of Tin + Dry Soil (g)			135.	98	13	5.95		
/t. of Dry Soil (g)			107	.1	10	7.77		
Wt. of Water (g)			16.84 17.87			7.87		
Water Content (%)			15.	7	16.6			
Average Water Conte	ent (%)			16.2				
Specimen			Before	Test	Afte	r Test		
Tare I.D. No.			Ring, Ston	e, Paper	:	31		
Wt. of Tare + Wet So	oil (g)		304.	26	13	135.73		
Wt. of Tare + Dry Sc	il (g)		-		120.98			
Wt. of Tare (g)			196.	55	2	9.7		
Wt. of Wet Soil (g)			107.	71	10	6.03		
Wt. of Dry Soil (g)			91.2	28	91	1.28		
Wt. of Water (g)			16.4	13	14	1.75		
Water Content (%)			18.	0	1	6.2		
		_	4 4 4 4 3	Einel Dr. Der - H		1.00		
Initial Dry Density		ρ_d	1.44 g/cm ³	Final Dry Density	ρ _d	1.62 g/cm		
Initial Dry Density Initial Dry Unit Weigh		γd	1.44 g/cm ³ 14.1 kN/m ³	Final Dry Density Final Dry Unit Wei		1.62 g/cm 15.9 kN/m		
		γ _d s	0			-		

Project:	An expe	An experimental investigation of the behavior of con ow energy compacted, 75% sand 25% bentonite, 18						acted sand/clay mixtures			
Sample:	Low energ	gy com	pacted, 75°	% sand 2	5% benton	ite, 18%	water conte	nt (L25	B18W)		
Consolid. Type	EI25-047	79			Consolid.	Туре	Fixed Rin	g			
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	\rm{mm}^2	
Weight of Ring	-	g	Wt. of St	one	-	g	Wt. of Pa	per	-	g	
Specific Gravity	2.64		Tested B	у	Yueru Che	en	Date		7/21/	2009	
Trimmings	3			1				2	2		
Tin No.				201			7				
Wt. of Tin (g)				28.8	5		28.17				
Wt. of Tin + Wet Soil	(q)			160.3			144				
Wt. of Tin + Dry Soil				140.0				126			
Wt. of Dry Soil (g)		111.16 97.97									
Wt. of Water (g)				20.38		17.96			-		
Water Content (%)				18.3			18.3				
Average Water Cont	ent (%)					18.3					
Specimen				Before 7	Fest			After	Test		
Tare I.D. No.			Rir	ng, Stone	, Paper			3	1		
Wt. of Tare + Wet S	oil (g)			323.7	7			151	.18		
Wt. of Tare + Dry So	oil (g)			-			132.37				
Wt. of Tare (g)				200.2	2			29	.7		
Wt. of Wet Soil (g)				123.4	8			121	.48		
Wt. of Dry Soil (g)				102.6	7			102	.67		
Wt. of Water (g)				20.8	1			18.	81		
Water Content (%)				20.3				18	.3		
			4.00	, 3		D "			4 70		
Initial Dry Density		ρ_d	1.62	g/cm ³	Final Dry			ρ_d	1.78	g/cm ³	
)T	γd	15.9	kN/m ³	Final Dry	Unit Weig	jnt	γd	17.4	kN/m	
, ,		End of load deformation results									
End of load deforma	tion result		2	2	Λ	5	6		7		
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)			2 0.1980	3 0.3200	4 0.4880	5 0.7750	6 1.2200	1	7 7500		

Project:	An expe	rimenta	al investigation of the behavior of compacted sand/clay mixtures						
Sample:	Low energ	gy com	pacted, 75% sand 2	5% bentonite, 20%	water content (L2	5B20W)			
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²			
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g			
Specific Gravity	2.64		Tested By	Yueru Chen	Date	7/21/2009			
Trimmings	6		1			2			
Tin No.			MAJI	C	213				
Wt. of Tin (g)			28.65	5	27.9				
Wt. of Tin + Wet Soil	(g)		125.5	7	13	2.3			
Wt. of Tin + Dry Soil	(g)		109.1	8	114	1.25			
Wt. of Dry Soil (g)				3	86	.35			
Wt. of Water (g)			80.53 86.35 16.39 18.05			.05			
Water Content (%)			20.4 20.9).9			
Average Water Cont	ent (%)			20.6					
Specimen			Before T	est	After	Test			
Tare I.D. No.			Ring, Stone	, Paper	F、	J-3			
Wt. of Tare + Wet S	oil (g)		320.5	4	151.13				
Wt. of Tare + Dry So	oil (g)		-		130.79				
Wt. of Tare (g)			197.7	5	29	9.1			
Wt. of Wet Soil (g)			122.7	9	122	2.03			
					101.69				
Wt. of Dry Soil (g)			101.6	9	101	1.69			
Wt. of Dry Soil (g) Wt. of Water (g)			101.6 21.10	-	-	I.69 .34			
)	20				
Wt. of Water (g)			21.10 20.7)	20	.34).0			
Wt. of Water (g) Water Content (%)		ρ _d	21.10 20.7 1.61 g/cm ³	Final Dry Density	20 20 Ρ _d	.34).0 1.77 g/cm			
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	21.10 20.7)	20 20 Ρ _d	.34).0 1.77 g/cm			
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	21.10 20.7 1.61 g/cm ³ 15.7 kN/m ³	Final Dry Density Final Dry Unit Weig	20 2(Pd γd	.34 0.0 1.77 g/cm 17.3 kN/m			
Wt. of Water (g)		γ _d S	21.10 20.7 1.61 g/cm ³	Final Dry Density	20 20 Pd γd 6	.34).0 1.77 g/cm			

Project:			al investigation of the behavior of compacted sand/clay mixtures apacted, 75% sand 25% bentonite, 22% water content (L25B22W)					
Sample:	Low energ	gy com	pacted, 75% sand 2	5% bentonite, 22%	water content (L2	5B22W)		
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	7/21/2009		
Trimmings	3		1			2		
Tin No.			46		1	01		
Wt. of Tin (g)			28.85	5	28.03			
Wt. of Tin + Wet Soil	l (g)		130.4	8	11:	5.31		
Wt. of Tin + Dry Soil	t. of Tin + Dry Soil (g)			5	99	.33		
Vt. of Dry Soil (g)			83.3		7	1.3		
Wt. of Water (g)			18.33			.98		
Water Content (%)			22.0 22.4			2.4		
Average Water Cont	ent (%)			22.2				
Specimen	I		Before 7	Fest	After	rTest		
Tare I.D. No.			Ring, Stone	, Paper	B8			
Wt. of Tare + Wet S	oil (g)		316.3	3	148.73			
Wt. of Tare + Dry Se	oil (g)		-		127.26			
Wt. of Tare (g)			194.8	4	28	.45		
Mt of Mot Call (-)			121.4	6	120	1 28		
Wt. of Wet Soil (g)						0.20		
Wt. of Vvet Soll (g) Wt. of Dry Soil (g)			98.82	-	98			
			98.8 ⁴ 22.65	1				
Wt. of Dry Soil (g)				1 5	21	.81		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			22.65 22.9	5	21 2'	.81 .47 1.7		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	22.65 22.9 1.56 g/cm ³	Final Dry Density	21 2' ρ _d	.81 .47 1.7 -1.07 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	22.65 22.9	5	21 2' ρ _d	.81 .47 1.7 -1.07 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d S	22.65 22.9 1.56 g/cm ³ 15.3 kN/m ³	Final Dry Density Final Dry Unit Wei	21 2 [·] Pd ght γd	.81 .47 1.7 -1.07 g/cm -10.4 kN/m		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γ _d S	22.65 22.9 1.56 g/cm ³	Final Dry Density	21 2 Pd ght γd 6	.81 .47 1.7 -1.07 g/cm ²		

Project:	An expe	rimenta	al investigatio	of compa	acted sand/clay mixtures					
Sample:	Low ener	gy com	pacted, 75%	sand 2	5% benton	ite, 24%	water conte	nt (L25	B24W)	
Consolid. Type	EI25-047	9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spe	ec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.3	g	Wt. of Stor	ne	130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By		Yueru Che	en	Date		3/6/2	2009
Trimmings	;			1				2	2	
Tin No.				7			201			
Wt. of Tin (g)				28.2			28.9			
Wt. of Tin + Wet Soil	(g)			153.5	5			14	16	
Wt. of Tin + Dry Soil	Soil (g)			129.5	5			12	3.7	
Wt. of Dry Soil (g)					3			94	.8	
Wt. of Water (g)			24 22.3			2.3				
Water Content (%)			23.7 23.5							
Average Water Cont	ent (%)					23.6				
Specimen			E	Before T	est			After	Test	
Tare I.D. No.			Ring	, Stone	, Paper			B-	19	
Wt. of Tare + Wet S	oil (g)			319.4	1		149.1			
Wt. of Tare + Dry So	oil (g)			-			126.4			
Wt. of Tare (g)				196.6	0			27	.4	
Wt. of Wet Soil (g)				122.8	0			12	1.7	
Wt. of Dry Soil (g)				99.00)			9	9	
Wt. of Water (g)				23.80)			22	2.7	
Water Content (%)				24.0				22	2.9	
Initial Dry Density		ρ_{d}		g/cm ³	Final Dry	•		ρ_{d}	1.73	g/cm
	nt	γd	15.3 k	«N/m ³	Final Dry	Unit Weig	ght	γd	16.9	kN/m
, ,										
End of load deforma		S							_	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)	tion result 1 0.16		2 0.2970	3 0.4650	4 0.7240	5 1.1200	6 1.6400		7 9200	

Project:	An expe	erimenta	al investigation	of the	e behavior o	of compa	cted sand/o	clay mix	tures	
Sample:	Low energ	gy com	pacted, 50% sa	nd 50	0% bentoni	ite, 16%	water conte	nt (L50	B16W)	
Consolid. Type	El25-047	79			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	-	g	Wt. of Stone		-	g	Wt. of Pa	per	-	g
Specific Gravity	2.63		Tested By		Yueru Che	en	Date		7/20/	2009
Trimmings	3			1				2	2	
Tin No.				201				7	,	
Wt. of Tin (g)				28.88	3			28.	18	
Wt. of Tin + Wet Soil	l (g)		1		153	.82				
Wt. of Tin + Dry Soil	(0)		1	35.98	8			135	.95	
Wt. of Dry Soil (g)	. = *			107.1				107	.77	
Wt. of Water (g)				16.84	Ļ			17.	87	
Water Content (%)				15.7				16	.6	
Average Water Cont	ent (%)									
Specimen	1		Bef	ore T	est			After	Test	
Tare I.D. No.			Ring, S	itone,	, Paper			3	1	
Wt. of Tare + Wet S	oil (g)		3	04.26	6			135	.73	
Wt. of Tare + Dry Se	oil (g)			-				120	.98	
Wt. of Tare (g)			1	96.55	5			28.	35	
Wt. of Wet Soil (g)			1	07.71	1			107	.38	
Wt. of Dry Soil (g)			ę	92.63	3			92.	63	
Wt. of Water (g)			,	15.08	}			14.	75	
Water Content (%)				16.3				15	.9	
				2						
		ρ_d	1.46 g/ci		Final Dry [ρ_d	1.65	g/cm
					Final Dry l	unit Weid	nt	γd	16.2	kN/m
Initial Dry Unit Weigh		γd	14.3 kN/	m			,	70	10.2	N 1 /111
Initial Dry Unit Weigh End of load deforma	tion result	S			-			70		K N /111
Initial Dry Density Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)		is	2	m 3 1200	4 0.6500	5 0.8800	6		7	

Project:	An expe	erimenta	al investiga	tion of th	e behavior	of compa	cted sand/c	lay mix	tures	
Sample:	Low energ	gy com	pacted, 50	% sand 5	0% benton	ite, 18% v	vater conte	nt (L50	B18W)	
Consolid. Type	EI25-047	79			Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	-	g	Wt. of St	one	-	g	Wt. of Pa	per	-	g
Specific Gravity	2.63		Tested E	By	Yueru Ch	en	Date		7/17/	2009
Trimmings	;			1				2)	
Tin No.				46				10)1	
Wt. of Tin (g)				28.8	5			28.	02	
Wt. of Tin + Wet Soil	(g)			129.2	9			132	.85	
Wt. of Tin + Dry Soil	(g)			114.1	6			116	6.7	
Wt. of Dry Soil (g)				85.3 [,]	1			88.	68	
Wt. of Water (g)				15.13	3			16.	15	
Water Content (%)				17.7			18.2			
Average Water Cont	ent (%)									
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Ri	ng, Stone	, Paper			В	8	
Wt. of Tare + Wet S	oil (g)			311.5	1			143	.06	
Wt. of Tare + Dry So	oil (g)			-			125.32			
Wt. of Tare (g)				196.5	5			28.	44	
Wt. of Wet Soil (g)				114.9	6		114.62			
Wt. of Dry Soil (g)				96.88	3			96.	88	
Wt. of Water (g)				18.08	3			17.	74	
Water Content (%)				18.7				18	.3	
				2						
Initial Dry Density		ρ_d	1.53	g/cm ³	Final Dry			ρ_{d}	1.75	g/cm [°]
	nt	γd	15.0	kN/m ³	Final Dry	Unit Weig	nt	γd	17.2	kN/m
, 0										
End of load deformat			2	2	1	F	6		7	
Initial Dry Unit Weigh End of load deformat Load Step No. Corrected Def (mm)	tion result 1 0.07		2 0.1650	3 0.3050	4 0.5030	5 0.7620	6 1.2200	2	7 5400	

Project:	An expe	rimenta	ntal investigation of the behavior of compacted sand/clay mixtures							
Sample:	Low energ	gy com	pacted, 50% s	and 5	0% benton	ite, 20%	water conte	ent (L50	B20W)	
Consolid. Type	El25-047	'9			Consolid.	Туре	Fixed Rin	ng		
Height of Spec.	20	mm	Dia. of Spec	•	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	-	g	Wt. of Stone		-	g	Wt. of Pa	per	-	g
Specific Gravity	2.63		Tested By		Yueru Che	en	Date		7/17/	2009
Trimmings	6			1				2	2	
Tin No.				201				7	,	
Wt. of Tin (g)					28.	17				
Wt. of Tin + Wet Soil	l (g)				121	.45				
Wt. of Tin + Dry Soil	(0)			104.26	6			105	.96	
Wt. of Dry Soil (g)				75.38	3			77.	79	
Wt. of Water (g)				14.98	3			15.	49	
Water Content (%)				19.9				19	.9	
Average Water Cont	ent (%)									
Specimen	1		Be	fore T	est			After	Test	
Tare I.D. No.			Ring, S	Stone	, Paper			3	1	
Wt. of Tare + Wet S	oil (g)		;	305.10	6			141	.66	
Wt. of Tare + Dry Se	oil (g)			-				122	2.7	
Wt. of Tare (g)				191.4	5			28.	44	
Wt. of Wet Soil (g)				113.7 [.]	1			113	.22	
Wt. of Dry Soil (g)				94.26	5			94.	26	
Wt. of Water (g)				19.45	5			18.	96	
Water Content (%)				20.6				20	.1	
				3						
Initial Dry Density		ρ_d	0	cm ³	Final Dry I			ρ_d	1.71	g/cm
	ht	γd	14.6 kN	l/m ³	Final Dry I	Unit Weig	gnt	γd	16.8	kN/m
, ,		-								
End of load deforma	tion result		2	2	А	F	e		7	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)			2 0.1370 0.	3 2490	4 0.4090	5 0.6580	6 1.3600	0	7 6100	

Project:	An expe	rimenta	al investigation of t	he behavior of comp	acted sand/clay m	ixtures	
Sample: I	_ow ener	gy com	pacted, 50% sand	50% bentonite, 22%	water content (L5	0B22W)	
Consolid. Type	EI25-047	79		Consolid. Type	Fixed Ring		
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²	
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g	
Specific Gravity	2.63		Tested By	Yueru Chen	Date	7/16/2009	
Trimmings			1			2	
Tin No.			MA	IID	2	.13	
Wt. of Tin (g)			28.0	65	2	7.9	
Wt. of Tin + Wet Soil	(g)		159	19	16	3.39	
Wt. of Tin + Dry Soil			135.	84	13	9.37	
Wt. of Dry Soil (g)			107.	19	11	1.47	
Wt. of Water (g)			23.:	35	24	1.02	
Water Content (%)			21.	8	2	1.5	
Average Water Conte	ent (%)			21.7			
Specimen			Before	Test	Afte	r Test	
Tare I.D. No.			Ring, Stor	ie, Paper	F	J-3	
Wt. of Tare + Wet So	oil (g)		311	39	14	5.31	
Wt. of Tare + Dry Sc	oil (g)		-		12	4.84	
Wt. of Tare (g)			194	82	29.03		
					116.28		
Wt. of Wet Soil (g)			116	57	11	6.28	
Wt. of Vvet Soll (g) Wt. of Dry Soil (g)			116. 95.8	-		6.28 5.81	
(<u>-</u>)			-	81	95		
Wt. of Dry Soil (g)			95.	81 76	95 20	5.81	
Wt. of Dry Soil (g) Wt. of Water (g)			95. 20.	81 76	95 20	5.81).47	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	95. 20.	81 76	95 20	5.81).47 1.4 1.70 g/cm	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	t	Pd γd	95. 20. 21.	31 76 7 Final Dry Density	9ξ 2(2 Ρd	5.81).47 1.4 1.70 g/cm	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformat		γd	95. 20. 21. 1.51 g/cm ³ 14.8 kN/m ³	31 76 7 Final Dry Density	9ξ 2(2 Ρd	5.81).47 1.4 1.70 g/cm ² 16.7 kN/m	
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d	95.4 20. ⁻ 21. 1.51 g/cm ³	81 76 7 Final Dry Density Final Dry Unit Wei 4 5	9ε 20 2 2 ight Pd γd 6	5.81).47 1.4 1.70 g/cm ⁵	

Project:	An expe	rimenta	al investigation	ntal investigation of the behavior of compacted sand/clay mixtures							
Sample:	Low energ	gy com	pacted, 50% sa	and 50	0% benton	ite, 24%	water conte	ent (L50	B24W)		
Consolid. Type	EI25-047	9			Consolid.	Туре	Fixed Rin	ng			
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of S	pec.	3166.9	\rm{mm}^2	
Weight of Ring	62.9	g	Wt. of Stone		130	g	Wt. of Pa	per	0.3	g	
Specific Gravity	2.63		Tested By		Yueru Che	en	Date		3/13/	2009	
Trimmings	3			1				2	2		
Tin No.				213				В	8		
Wt. of Tin (g)					28	.4					
Wt. of Tin + Wet Soil	l (g)		,	161.8	;			15	51		
Wt. of Tin + Dry Soil	(g)			135.9	1			12	7.1		
Wt. of Dry Soil (g)				108				98	.7		
Wt. of Water (g)				25.9				23	.9		
Water Content (%)				24.0				24	.2		
Average Water Cont	ent (%)					24.1					
Specimen	1		Bef	ore T	est			After	Test		
Tare I.D. No.			Ring, S	stone,	Paper			20)5		
Wt. of Tare + Wet S	ioil (g)		3	303.2	2			139	9.1		
Wt. of Tare + Dry Se	oil (g)			-				11	7.4		
Wt. of Tare (g)			1	93.20	C			29	.7		
Wt. of Wet Soil (g)			1	10.00	C			109	9.4		
Wt. of Dry Soil (g)			8	87.70	1			87	.7		
Wt. of Water (g)				22.30	1			21	.7		
Water Content (%)				25.4				24	.7		
				3		_					
		ρ_d	1.38 g/ci	m	Final Dry	Density		ρ_d	1.60	g/cm	
			40.0	, 3	E 1 D		1.4				
Initial Dry Unit Weigh		γd	13.6 kN/	/m ³	Final Dry	Unit Weię	ght	γd	15.7	kN/m	
Initial Dry Unit Weigh End of load deforma	tion result	γd			-			γd	-	kN/m	
Initial Dry Density Initial Dry Unit Weigł End of load deforma Load Step No. Corrected Def (mm)		γ _d s	2	/m ³ 3 1800	Final Dry 4 0.3120	Unit Weio 5 0.6880	9ht 6 1.8100		15.7 7 6600	kN/m	

Project:	An exp	perimen	tal investig	gation of t	he behavic	or of compa	acted sand/	clay mi	xtures	
Sample: Sta	andard P	roctor c	compacted	, 85% sar	nd 15% bei	ntonite, 12	% water co	ntent (S	S15B12V	V)
Consolid. Type	El25-047	9			Consolid	. Туре	Fixed Ring	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of Sp	Dec.	3166.9	mm ²
Weight of Ring	66.4	g	Wt. of St	one	130	g	Wt. of Pap	ber	0.3	g
Specific Gravity	2.65		Tested B	Зу	Yueru Ch	en	Date		3/3/2	2009
Trimmings				1				2		
Tin No.				213				В	В	
Wt. of Tin (g)				27.9	-			.4		
Wt. of Tin + Wet Soil (g)			177.3	3			174	1.7	
Wt. of Tin + Dry Soil (g	g)			162.7	1			159	9.5	
Wt. of Dry Soil (g)				134.2	2			131	1.1	
Wt. of Water (g)				15.2	!			15	.2	
Water Content (%)				11.3				11	.6	
Average Water Conter	nt (%)		11.5							
Specimen				Before -	Fest			After	Test	
Tare I.D. No.			Ri	ng, Stone	e, Paper			20	5	
Wt. of Tare + Wet Soi	l (g)			313.2	2			145	5.7	
Wt. of Tare + Dry Soil	(g)			-				133	3.6	
Wt. of Tare (g)				196.7	0			29	.7	
Wt. of Wet Soil (g)				116.5	0			11	6	
Wt. of Dry Soil (g)				103.9	0			103	3.9	
Wt. of Water (g)				12.60	C			12	.1	
Water Content (%)				12.1				11	.6	
Initial Dry Density		ρ_{d}	1.64	g/cm ³	Final Dry	Density		ρ_{d}	1.72	g/cm
		γd	16.1	kN/m ³	Final Dry	Unit Weigl	nt	γd	16.9	kN/m
Initial Dry Unit Weight										
, ,	on results									
Initial Dry Unit Weight End of load deformatic Load Step No.	on results 1		2	3	4	5	6		7	

Project:	/ III CAPO	rimenta	I investigation of t	he behavior of comp	acted sand/clay mi	xtures	
Sample: Star	ndard Pro	octor co	mpacted, 85% sa	nd 15% bentonite, 13	3% water content (S15B13W)	
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring		
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²	
Weight of Ring	66.3	g	Wt. of Stone	128.2 g	Wt. of Paper	0.3 g	
Specific Gravity	2.65		Tested By	Yueru Chen	Date	2/19/2009	
Trimmings			1			2	
Tin No.			40	4	4	05	
Wt. of Tin (g)			28.	6	2	7.7	
Wt. of Tin + Wet Soil ((g)		178	.3	17	'1.1	
Wt. of Tin + Dry Soil (g)		160	.7	15	54.2	
Wt. of Dry Soil (g)			132	.1	12	26.5	
Wt. of Water (g)			17.	6	10	6.9	
Water Content (%)			13.	3	13.4		
Average Water Conte	nt (%)						
Specimen			Before	Test	Afte	r Test	
Specimen Tare I.D. No.			Before Ring, Ston			r Test 01	
·	il (g)			e, Paper	1		
Tare I.D. No.			Ring, Ston	e, Paper	1	01	
Tare I.D. No. Wt. of Tare + Wet So			Ring, Ston	e, Paper .3	1 1 13	01 51	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi			Ring, Ston 318 -	e, Paper .3 80	1 1 13 2	01 51 36.4	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)			Ring, Ston 318 - 194.	e, Paper .3 80 50	1 1 13 2 1	01 51 36.4 28	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Ston 318 - 194. 123.	e, Paper .3 80 50 40	1 13 2 1 10	01 51 36.4 28 23	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Ston 318 - 194. 123. 108.	e, Paper .3 80 50 40 0	1 1 13 2 1 10 10	01 51 96.4 28 23 98.4	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			Ring, Ston 318 - 194. 123. 108. 15. ⁻ 13.	e, Paper .3 80 50 40 9	1 1 13 2 1 1 10 1, 1, 1, 1,	01 51 36.4 28 23 38.4 4.6 3.5	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	Ring, Ston 318 - 194. 123. 108. 15.' 13. 1.71 g/cm ³	e, Paper .3 80 50 40 0 9 Final Dry Density	1 1 13 2 1 1 10 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	01 51 36.4 28 23 98.4 4.6 3.5 1.83 g/cm ²	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	i (g)	γd	Ring, Ston 318 - 194. 123. 108. 15. ⁻ 13.	e, Paper .3 80 50 40 9	1 1 13 2 1 1 10 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	01 51 36.4 28 23 98.4 4.6 3.5 1.83 g/cm ²	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	i (g)	γd	Ring, Ston 318 - 194. 123. 108. 15.' 13. 1.71 g/cm ³	e, Paper .3 80 50 40 0 9 Final Dry Density	1 1 13 2 1 1 10 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	01 51 36.4 28 23 98.4 4.6 3.5 1.83 g/cm ³	

Project:	An exper	imenta	I investigation of t	the behavior of comp	acted sand/clay mi	xtures	
Sample: Sta	ndard Pro	ctor co	mpacted, 85% sa	nd 15% bentonite, 18	5% water content (S15B15W)	
Consolid. Type	EI25-0479	9		Consolid. Type	Fixed Ring		
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²	
Weight of Ring	67.5	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g	
Specific Gravity	2.65		Tested By	Yueru Chen	Date	2/18/2009	
Trimmings			1			2	
Tin No.			41	0		5	
Wt. of Tin (g)			28	.4	30	0.8	
Wt. of Tin + Wet Soil	(g)		151	1.6	13	8.5	
Wt. of Tin + Dry Soil	(g)		13	6	12	4.3	
Wt. of Dry Soil (g)				7.6	9;	3.5	
Wt. of Water (g)			15	.6	14	4.2	
Water Content (%)			14	.5	15	5.2	
Average Water Cont	ent (%)			14.8			
Specimen			Before	+ Test	After	r Test	
Tare I.D. No.			Ring, Stor	ie, Paper	3	BA	
Wt. of Tare + Wet S	oil (g)		327	7.1	16	3.4	
Wt. of Tare + Dry So	oil (g)		-		14	6.6	
Wt. of Tare (g)			- 146.6 197.80 34.7				
(3)			197	.80	34		
Wt. of Wet Soil (g)			197 129		-		
			-	.30	12	4.7	
Wt. of Wet Soil (g)			129	.30 .90	12 11	4.7 8.7	
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			129 111	.30 .90 40	12 11 11	4.7 8.7 1.9	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			129 111 17. 15	.30 .90 40 .5	12 11 11	4.7 18.7 1.9 5.8 5.0	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	129 111 17. 15 1.77 g/cm ³	.30 .90 40 .5 Final Dry Density	12 11 10 11 11 Γ	4.7 1.9 5.8 5.0 1.88 g/cm	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	129 111 17. 15	.30 .90 40 .5 Final Dry Density	12 11 10 11 11 Γ	4.7 1.9 5.8 5.0 1.88 g/cm	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformation	tion results	γd	129 111 17. 15 1.77 g/cm ³ 17.3 kN/m ³	.30 .90 40 .5 Final Dry Density Final Dry Unit We	12 11 1(1) 1) Γd ight γ _d	4.7 (8.7 1.9 5.8 5.0 1.88 g/cm ² 18.4 kN/m	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)		γd	129 111 17. 15 1.77 g/cm ³	.30 .90 40 .5 Final Dry Density Final Dry Unit We 4 5	12 11 16 18 ρ _d γ _d 6	4.7 1.9 5.8 5.0 1.88 g/cm ²	

Project:	An expe	rimenta	l investigat	ion of the	e behavior o	f compa	cted sand/o	clay mix	ktures	
Sample: Stan	ndard Pro	octor co	mpacted, 8	35% sand	d 15% bento	nite, 179	% water cor	ntent (S	615B17W	/)
Consolid. Type	El25-047	9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	Dec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.3	g	Wt. of Sto	one	133.7	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.65		Tested By	y	Yueru Che	n	Date		3/3/2	2009
Trimmings				1				2	2	
Tin No.				201				7	7	
Wt. of Tin (g)								28	3.1	
Wt. of Tin + Wet Soil ((g)			158.7	7			202	2.7	
Wt. of Tin + Dry Soil (g)			139.7	7			17	77	
Wt. of Dry Soil (g)				110.8	3			148	8.9	
Wt. of Water (g)				19				25	5.7	
Water Content (%)				17.1			17.3			
Average Water Conte	nt (%)		17.2							
3						17.2				
						17.2				
Specimen	(///			Before T	Fest	17.2		After	Test	
			Rin	Before T g, Stone		17.2		After B-		
Specimen Tare I.D. No.			Rin		, Paper	17.2			19	
Specimen Tare I.D. No.	il (g)		Rin	g, Stone	, Paper	17.2		B- 152	19	
Specimen Tare I.D. No. Wt. of Tare + Wet So	il (g)		Rin	g, Stone	, Paper 9	17.2		B- 152	19 2.3 3.9	
Specimen Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi	il (g)		Rin	g, Stone 325.9 -	e, Paper 9 0	17.2		B- 152 133 27	19 2.3 3.9	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)	il (g)		Rin	g, Stone 325.9 - 200.3	, Paper 9 0 0	17.2		B- 152 133 27 124	19 2.3 3.9 7.4	
Specimen Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)	il (g)		Rin	g, Stone 325.9 - 200.3 125.6	e, Paper 9 0 0 0	17.2		B- 152 133 27 124	19 2.3 3.9 7.4 4.9 6.5	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	il (g)		Rin	g, Stone 325.9 - 200.3 125.6 106.5	, Paper 9 0 0 0 0	17.2		B- 152 133 27 124 106	19 2.3 3.9 7.4 4.9 6.5 8.4	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)			g, Stone 325.9 200.3 125.6 106.5 19.10 17.9	, Paper 9 0 0 0 0			B- 15: 13: 27 124 100 18 17	19 2.3 3.9 7.4 4.9 6.5 8.4 7.3	
Specimen Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	il (g) I (g)	ρ _d	1.68	g, Stone 325.9 200.3 125.6 106.5 19.10 17.9 g/cm ³	, Paper 9 0 0 0 0 0 5 Final Dry D	Density		B- 153 133 27 124 100 18 17 Ρd	19 2.3 3.9 7.4 4.9 6.5 8.4 7.3 1.80	0
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g) I (g)	γd		g, Stone 325.9 200.3 125.6 106.5 19.10 17.9	, Paper 9 0 0 0 0	Density	ht	B- 15: 13: 27 124 100 18 17	19 2.3 3.9 7.4 4.9 6.5 8.4 7.3	0
Specimen Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	il (g) I (g)	γd	1.68	g, Stone 325.9 200.3 125.6 106.5 19.10 17.9 g/cm ³	, Paper 9 0 0 0 0 0 5 Final Dry D	Density	ht	B- 153 133 27 124 100 18 17 Ρd	19 2.3 3.9 7.4 4.9 6.5 8.4 7.3 1.80	g/cm [°] kN/m

Project:	An expe	rimenta	al investigat	ion of the	e behavior	of compa	cted sand/cl	ay mix	tures	
Sample: Sta	indard Pro	octor co	mpacted, 8	35% sand	d 15% ben	tonite, 19%	% water cont	ent (S	15B19W	/)
Consolid. Type	EI25-047	'9			Consolid	. Туре	Fixed Ring			
Height of Spec.	20	mm	Dia. of Sp	Dec.	63.5	mm	Area of Sp	ec.	3166.9	mm ²
Weight of Ring	67.5	g	Wt. of Sto	one	130	g	Wt. of Pap	er	0.3	g
Specific Gravity	2.65		Tested B	y	Yueru Ch	en	Date		3/4/2	2009
Trimmings	;			1				2	2	
Tin No.				404				40)5	
Wt. of Tin (g)				28.7			27	.7		
Wt. of Tin + Wet Soil	(g)				194	4.2				
Wt. of Tin + Dry Soil	(g)			152.8	3			167	7.7	
Wt. of Dry Soil (g)				124.1	1			14	10	
Wt. of Water (g)				23.7				26	.5	
Water Content (%)				19.1				18	.9	
Average Water Cont	ent (%)		19.0							
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Rin	g, Stone	, Paper			10)1	
Wt. of Tare + Wet S	oil (g)			321.2	2			150	0.4	
Wt. of Tare + Dry So	e + Dry Soil (g)			-				13	81	
Wt. of Tare (g)				197.8	0			2	8	
Wt. of Wet Soil (g)				123.4	0			122	2.4	
Wt. of Dry Soil (g)				103.0	0			10)3	
Wt. of Water (g)				20.40)			19	.4	
Water Content (%)				19.8				18	.8	
Initial Dry Density		ρ_{d}	1.63	g/cm ³	Final Dry	Density		ρ_{d}	1.77	g/cm
initial Dry Donoty			15.9	kN/m ³	Final Dry	Unit Weig	ht	γd	17.3	kN/m
Initial Dry Unit Weigh	nt	γd	15.5			0				
Initial Dry Unit Weigh End of load deformat	tion result	S				0				
Initial Dry Unit Weigh		S	2	3	4 0.5180	5	6 1.2800		7 6100	

	Апсярс	ninenta	tal investigation of the behavior of compacted sand/clay mixtures							
Sample: Stan	ndard Pro	octor co	mpacted, 75% sar	nd 25% bentonite, 14	% water content (S	S25B14W)				
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring					
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²				
Weight of Ring	66.2	g	Wt. of Stone	133.7 g	Wt. of Paper	0.3 g				
Specific Gravity	2.64		Tested By	Yueru Chen	Date	5/16/2009				
Trimmings			1		:	2				
Tin No.			410)	E	38				
Wt. of Tin (g)			28.4	4	28	3.5				
Wt. of Tin + Wet Soil ((g)		108	1	1	12				
Wt. of Tin + Dry Soil (g)		98.0	6	10	1.6				
Wt. of Dry Soil (g)			70.:	2	73	3.1				
Wt. of Water (g)			9.5	i	10).4				
Water Content (%)			13.	5	14	4.2				
Average Water Conte	nt (%)			13.9						
Specimen			Before	Test	After	Test				
Specimen Tare I.D. No.			Before Ring, Ston			[.] Test 19				
•	il (g)			e, Paper	В					
Tare I.D. No.			Ring, Ston	e, Paper	B 14	19				
Tare I.D. No. Wt. of Tare + Wet So			Ring, Ston	e, Paper 4	B 14 13	19 6.1				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi			Ring, Ston 319. -	e, Paper 4 20	B 14 1; 27	19 6.1 32				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)			Ring, Ston 319 - 200.	e, Paper 4 20 20	B 14 1: 27 11	19 6.1 32 7.4				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Ston 319. - 200.: 119.:	e, Paper 4 20 20 60	B 14 13 27 11 10	19 6.1 32 7.4 8.7				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Ston 319 - 200. 119. 104.	e, Paper 4 20 20 60	B 14 1: 27 11 10 14	19 6.1 32 7.4 8.7 4.6				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		0.	Ring, Ston 319 - 200. 119. 104. 14.6 14.	e, Paper 4 20 20 60 0	B 14 1: 27 11 10 14 13	19 6.1 32 7.4 8.7 4.6 4.1 3.5				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	l (g)	ρ _d	Ring, Ston 319. - 200. 119. 104. 14.6 14.6	e, Paper 4 20 20 50 50 50 Final Dry Density	Β 14 1; 27 11 10 14 13 Ρ _d	19 6.1 32 7.4 8.7 4.6 4.1 3.5 1.76 g/cm ²				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	l (g)	γd	Ring, Ston 319 - 200. 119. 104. 14.6 14.	e, Paper 4 20 20 60 0	Β 14 1; 27 11 10 14 13 Ρ _d	19 6.1 32 7.4 8.7 4.6 4.1 3.5				
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	l (g)	γd	Ring, Ston 319. - 200. 119. 104. 14.6 14.6	e, Paper 4 20 20 50 50 50 Final Dry Density	Β 14 1; 27 11 10 14 13 Ρ _d	19 6.1 32 7.4 8.7 4.6 4.1 3.5 1.76 g/cm ²				

Project:	An expe	rimenta	tal investigation of the behavior of compacted sand/clay mixtures							
Sample: Sta	andard Pro	octor co	mpacted, 75% san	d 25% bentonite, 16	% water content (325B16W)				
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring					
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²				
Weight of Ring	66.2	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g				
Specific Gravity	2.64		Tested By	Yueru Chen	Date	7/20/2009				
Trimmings	3		1			2				
Tin No.			FJ-3	}	2	13				
Wt. of Tin (g)			29		27	7.9				
Wt. of Tin + Wet Soi	l (g)		136.	9	13	1.2				
Wt. of Tin + Dry Soil	(g)		122.4	4	11	7.4				
Wt. of Dry Soil (g)			93.4	Ļ	89	9.5				
Wt. of Water (g)			14.5	j	1:	3.8				
Water Content (%)			15.5	;	15	5.4				
Average Water Cont	ent (%)		15.5							
Specimen	1		Before ⁻	Test	After	r Test				
Tare I.D. No.			Ring, Stone	, Paper	1	01				
Wt. of Tare + Wet S	oil (g)		323.	1	15	4.2				
Wt. of Tare + Dry Se	oil (a)									
	on (g)		- 137.1 196.50 28							
Wt. of Tare (g)	un (g)		196.5	i0		37.1 28				
	on (g)		- 196.5 126.6		2					
Wt. of Tare (g)	un (g)			60	2	28				
Wt. of Tare (g) Wt. of Wet Soil (g)	(9)		126.6	60 0	2 12 10	28 26.2				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(g)		126.6 109.1	60 0 0	2 12 10 17	28 26.2 99.1				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			126.6 109.1 17.5 16.0	50 0 0	2 12 10 17	28 26.2 99.1 7.1 5.7				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	126.6 109.1 17.5 16.0 1.72 g/cm ³	Final Dry Density	2 12 10 17 15 Pd	28 26.2 19.1 7.1 5.7 1.85 g/cm				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	nt	γd	126.6 109.1 17.5 16.0	50 0 0	2 12 10 17 15 Pd	28 26.2 19.1 7.1 5.7 1.85 g/cm				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	nt tion result	γd	126.6 109.1 17.5 16.0 1.72 g/cm ³ 16.9 kN/m ³	Final Dry Density Final Dry Unit Weig	2 12 10 17 15 Ρ _d γ _d	28 26.2 99.1 7.1 5.7 1.85 g/cm ² 18.2 kN/m				
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	nt tion result	γ _d s	126.6 109.1 17.5 16.0 1.72 g/cm ³	Final Dry Density Final Dry Unit Weig 4 5	2 12 10 17 11 15 9d γd 6	28 26.2 19.1 7.1 5.7 1.85 g/cm ³				

Project:	An expe	rimenta	I investigation of th	ne behavior of compa	acted sand/clay mi	xtures		
Sample: Sta	andard Pro	octor co	mpacted, 75% san	nd 25% bentonite, 18	% water content (S	S25B18W)		
Consolid. Type El25-0479				Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	62.9	g	Wt. of Stone	129.9 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	2/18/2009		
Trimmings	3		1		:	2		
Tin No.			201	l	7			
Wt. of Tin (g)			28.8	5	28.17			
Wt. of Tin + Wet Soil (g)		160.3	39	144.1				
Wt. of Tin + Dry Soil (g)			140.0	01	126	126.14		
Wt. of Dry Soil (g)		111.1	16	97.97				
Wt. of Water (g)		20.3	8	17.96				
Water Content (%)			18.3	3	18.3			
Average Water Cont	ent (%)			18.3				
Specimen		Before	Test	After Test				
Tare I.D. No.		Ring, Stone	ə, Paper	404				
Wt. of Tare + Wet Soil (g)			324.	6	159.1			
Wt. of Tare + Dry Soil (g)			-		139.8			
Wt. of Tare (g)		100		28.7				
Wt. of Tare (g)			193. <i>′</i>	10	28			
Wt. of Tare (g) Wt. of Wet Soil (g)			193. ⁻ 131.t	-				
				50	13	3.7		
Wt. of Wet Soil (g)			131.8	50 10	13	3.7 0.4		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			131. (111	50 10 0	13 11 19	3.7 0.4 1.1		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			131.(111. ⁻ 20.4 18.4	50 10 0 4	13 11 19	3.7 0.4 1.1 9.3 7.4		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	131. 111. 20.4 18.4 1.75 g/cm ³	50 10 0 4 Final Dry Density	13 11 15 17 Ρd	3.7 0.4 1.1 9.3 7.4 1.90 g/cm		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	nt	ρ _d γ _d	131.(111. ⁻ 20.4 18.4	50 10 0 4	13 11 15 17 Ρd	3.7 0.4 1.1 9.3 7.4 1.90 g/cm		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	131. 111. 20.4 18. 1.75 g/cm ³ 17.2 kN/m ³	50 10 4 Final Dry Density Final Dry Unit Weig	13 11 15 17 Ρ _d 29t γ _d	3.7 0.4 1.1 9.3 7.4 1.90 g/cm ² 18.6 kN/m		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	131. 111. 20.4 18.4 1.75 g/cm ³	50 10 .0 4 Final Dry Density Final Dry Unit Weig 4 5	13 11 15 17 9d 9d γd	3.7 0.4 1.1 9.3 7.4 1.90 g/cm ²		

Project:	An expe	rimenta	l investigatio	on of the	e behavior o	of compa	cted sand/o	clay mix	ktures	
Sample: Sta	ndard Pro	octor co	mpacted, 75	5% sanc	d 25% bent	onite, 19º	% water co	ntent (S	S25B19V	/)
Consolid. Type El25-0479			Consolid. Type			Fixed Ring				
Height of Spec.	20	mm	Dia. of Spe	ec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	67.5	g	Wt. of Stor	ne	130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By		Yueru Che	en	Date		2/20/	2009
Trimmings				1				2	2	
Tin No.		410				5				
Wt. of Tin (g)				28.3			30.8			
Wt. of Tin + Wet Soil (g)			164.2			148.2				
Wt. of Tin + Dry Soil (g)			142.9				129.7			
Wt. of Dry Soil (g)			114.6				98.9			
Wt. of Water (g)			21.3			18.5				
Water Content (%)			18.6			18.7				
Average Water Content (%)			18.6							
Specimen		Before Test			After Test					
Tare I.D. No.		Ring, Stone, Paper			3A					
Wt. of Tare + Wet Soil (g)		323			159.2					
Wt. of Tare + Dry Soil (g)			-			139.9				
Wt. of Tare (g)		197.80			34.7					
Wt. of Wet Soil (g)		125.20			124.5					
Wt. of Dry Soil (g)			105.20			105.2				
Wt. of Water (g)				20.00			19.3			
Water Content (%)			19.0			18.3				
Water Content (%)										
			4.60	, 3					4 07	, .
Initial Dry Density		ρ _d		g/cm ³	Final Dry [ρ _d	1.67	0
Initial Dry Density Initial Dry Unit Weigh		γd		g/cm ³ kN/m ³	Final Dry I Final Dry I		ıht	Ρ _d γ _d	1.67 16.3	0
Initial Dry Density		γd		-			iht 6			g/cm ³ kN/m

Project:	An expe	rimenta	al investigat	ion of the	e behavior	of compa	cted sand/c	lay mix	tures	
Sample: Sta	ndard Pro	octor co	mpacted, 7	'5% sano	d 25% bent	onite, 21º	% water cor	ntent (S	25B21W	/)
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	67.5	g	Wt. of Sto	one	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By	/	Yueru Che	en	Date		3/3/2	2009
Trimmings	5			1				2	2	
Tin No.				404				40)5	
Wt. of Tin (g)				28.7			27.7			
Wt. of Tin + Wet Soil	(g)			165.9	Э			180	0.5	
Wt. of Tin + Dry Soil	(g)			142.1	1			15	54	
Wt. of Dry Soil (g)				113.4	4			126	5.3	
Wt. of Water (g)				23.8				26	.5	
Water Content (%)				21.0				21	.0	
Average Water Cont	ent (%)					21.0				
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Rin	g, Stone	, Paper			10)1	
Wt. of Tare + Wet S	oil (g)			319.1	1			15	50	
Wt. of Tare + Dry So	oil (g)			-				129	9.2	
Wt. of Tare (g)				196.1	0			2	8	
Wt. of Wet Soil (g)				123.0	0			12	22	
Wt. of Dry Soil (g)				101.2	0			101	1.2	
Wt. of Water (g)				21.80	C			20	.8	
Water Content (%)				21.5				20	.6	
				_						
Initial Dry Density		ρ_{d}	1.60	g/cm ³	Final Dry	•		ρ_{d}	1.74	g/cm
		γd	15.7	kN/m ³	Final Dry	Unit Weig	ht	γd	17.1	kN/m
, ,										
End of load deforma	tion result	S					-		-	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)		S	2 0.1600	3 0.2620	4 0.4370	5 0.9040	6 1.3870		7 6660	

Project:	Allexpe	erimenta	I investigation of the	e behavior of compa	acted sand/clay mi	ted sand/clay mixtures			
Sample: Sta	ndard Pro	octor co	mpacted, 75% sand	d 25% bentonite, 24	% water content (S25B23W)			
Consolid. Type	EI25-047	79		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²			
Weight of Ring	63	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g			
Specific Gravity	2.64		Tested By	Yueru Chen	Date	3/4/2009			
Trimmings			1			2			
Tin No.			201			7			
Wt. of Tin (g)			28.9	1	28.2				
Wt. of Tin + Wet Soil	(g)		167.8	3	16	4.9			
Wt. of Tin + Dry Soil	(g)		141.9	Э	13	9.5			
Wt. of Dry Soil (g)			113		11	1.3			
Wt. of Water (g)			25.9	1	2	5.4			
Water Content (%)			22.9	1	22	2.8			
Average Water Conte	ent (%)			22.9					
Specimen			Before 7	Гest	After	r Test			
•					After Test				
Tare I.D. No.			Ring, Stone	, Paper	B·	-19			
Tare I.D. No. Wt. of Tare + Wet So	oil (g)		Ring, Stone 315.	•		-19 9.9			
			0.	•	14	-			
Wt. of Tare + Wet Se			0.	1	14 12	9.9			
Wt. of Tare + Wet So Wt. of Tare + Dry So			315. ⁻	0	14 12 2	9.9 7.3			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			315. - 191.6	0	14 12 21 12	9.9 7.3 7.4			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			315. - 191.6 123.5	0 0 0	14 12 21 12 99	9.9 7.3 7.4 2.5			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			315. - 191.6 123.5 99.90	0 0 0 0	14 12 2 12 99 22	9.9 7.3 7.4 2.5 9.9			
Wt. of Tare + Wet Se Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			315. - 191.6 123.5 99.90 23.60 23.6	0	14 12 2 12 99 22 22	9.9 7.3 7.4 2.5 9.9 2.6 2.6			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	ρ _d	315. - 191.6 123.5 99.9(23.6) 23.6 1.58 g/cm ³	Final Dry Density	14 12 21 12 99 22 22 Ρd	9.9 7.3 7.4 2.5 9.9 2.6 2.6 1.76 g/cm			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	γd	315. - 191.6 123.5 99.90 23.60 23.6	0	14 12 21 12 99 22 22 Ρd	9.9 7.3 7.4 2.5 9.9 2.6 2.6 1.76 g/cm			
Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	bil (g)	γ _d s	315. - 191.6 123.5 99.9(23.6) 23.6 1.58 g/cm ³	Final Dry Density	14 12 21 12 99 22 22 Ρd	9.9 7.3 7.4 12.5 9.9 2.6 2.6 1.76 g/cm ²			

Project:	An expe	rimenta	al investiga	tion of th	e behavior	of compa	cted sand/o	clay mix	ktures		
Sample: Sta	indard Pro	octor co	mpacted,	50% sano	d 50% bent	onite, 16	% water co	ntent (S	\$50B16V	V)	
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g			
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm^2	
Weight of Ring	-	g	Wt. of St	one	-	g	Wt. of Pa	per	-	g	
Specific Gravity	2.63		Tested E	By	Yueru Che	ən	Date		7/16/	/2009	
Trimmings	;			1				2	2		
Tin No.				201				3	1		
Wt. of Tin (g)				28.88	3			28.35			
Wt. of Tin + Wet Soil	(g)			97.19	Э			137	7 .34		
Wt. of Tin + Dry Soil	(0)			87.8 [,]	1			122	2.08		
Wt. of Dry Soil (g)				58.93	3			93.	.73		
Wt. of Water (g)				9.38				15.	.26		
Water Content (%)				15.9				16	6.3		
Average Water Cont	ent (%)					16.1					
Specimen				Before 7	Fest			After	Test		
Tare I.D. No.			Ri	ng, Stone	, Paper			3	1		
Wt. of Tare + Wet S	oil (g)			309.6	4			137	7.34		
Wt. of Tare + Dry So	oil (g)			-				122	2.08		
Wt. of Tare (g)				200.2	3			28.	.35		
Wt. of Wet Soil (g)				109.4	1			108	8.99		
Wt. of Dry Soil (g)				93.73	3			93.	.73		
Wt. of Water (g)				15.68	3			15.	.26		
Water Content (%)				16.7				16	6.3		
				2							
Initial Dry Density		ρ_{d}	1.48	g/cm ³	Final Dry			ρ_d	1.64	g/cm ³	
						Unit Weię	ght	γd	16.1	kN/m	
, ,											
End of load deformat			0	0	4	-	6 7				
End of load deformat Load Step No. Corrected Def (mm)	tion result 1 0.13		2 0.2540	3 0.3910	4 0.5380	5 0.7370	6 1.0700	4	7 9800		

Project:	An expe	rimenta	I investigation of th	e behavior of compa	cted sand/clay mixtures			
Sample: Sta	ndard Pro	ctor co	mpacted, 50% san	d 50% bentonite, 18	% water content (S50B18W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.63		Tested By	Yueru Chen	Date	7/20/2009		
Trimmings			1			2		
Tin No.			404		4	05		
Wt. of Tin (g)			28.73	3	27.71			
Wt. of Tin + Wet Soil	(g)		139.2	8	142	2.94		
Wt. of Tin + Dry Soil	(0)		122.6	2	12	5.95		
Wt. of Dry Soil (g)			93.8	9	98	8.24		
Wt. of Water (g)			16.6	6	16	5.99		
Water Content (%)			17.7		17	7.3		
Average Water Conte	ent (%)			17.5				
Specimen			Before ⁻	Test	After	r Test		
opecimen			20.0.0		After Test			
Tare I.D. No.			Ring, Stone			4		
•	oil (g)			, Paper				
Tare I.D. No.			Ring, Stone	, Paper	140	4		
Tare I.D. No. Wt. of Tare + Wet So			Ring, Stone	e, Paper 9	14(12;	4 0.39		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So			Ring, Stone 306.s	a, Paper 9 2	14(12; 28	4 0.39 3.59		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			Ring, Stone 306.9 - 194.8	9, Paper 9 2 8	14(12: 28 11	4 0.39 3.59 8.71		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Stone 306.9 - 194.8 112.0	a, Paper 9 -2 8 3	14(12: 28 11 ⁻ 94	4 0.39 3.59 9.71 1.68		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Stone 306.9 - 194.8 112.0 94.84	a, Paper 29 12 18 18 19 10	14(12: 28 11 [,] 94 1(4 0.39 3.59 9.71 1.68 9.88		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			Ring, Stone 306.9 - 194.8 112.0 94.8 17.20 18.1	9, Paper 9 12 18 8 9	14(12: 28 11 ⁻ 94 1(1)	4 0.39 3.59 9.71 1.68 4.88 6.8 7.7		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	ρ _d	Ring, Stone 306.9 - 194.8 112.0 94.8 17.20 18.1 1.50 g/cm ³	e, Paper 9 22 8 3 0 Final Dry Density	14(12: 28 11 ⁻ 94 1(1) Ρ _d	4 0.39 3.59 9.71 1.68 9.88 6.8 7.7 1.65 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	γ _d	Ring, Stone 306.9 - 194.8 112.0 94.8 17.20 18.1	9, Paper 9 12 18 8 9	14(12: 28 11 ⁻ 94 1(1) Ρ _d	4 0.39 3.59 9.71 1.68 9.88 6.8 7.7 1.65 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	bil (g)	γ _d	Ring, Stone 306.9 - 194.8 112.0 94.8 17.20 18.1 1.50 g/cm ³	9, Paper 9 22 8 3 0 Final Dry Density	14(12: 28 11 ⁻ 94 1(1) Ρ _d	4 0.39 3.59 5.71 1.68 6.8 7.7 1.65 g/cm ²		

•		Ū		e behavior o					
		mpacted, 50%	sanc	1		T	`	50B19W	/)
EI25-047	'9	1		Consolid.	Туре	Fixed Ring	9		
20	mm	Dia. of Spec		63.5	mm	Area of Sp	bec.	3166.9	mm ²
-	g	Wt. of Stone			g	Wt. of Pap	ber	-	g
2.63		Tested By		Yueru Che	n	Date		7/17/	2009
			1				2	2	
			101				4	6	
			28.03	}		28.85			
(g)			158.72	2			135	.11	
(g)			138				118	.31	
			109.9	7			89.	46	
			20.72	2			16	.8	
			18.8				18	.8	
ent (%)					18.8				
		Ве	fore T	est			After	Test	
		Ring, S	Stone	, Paper			В	8	
oil (g)			316.5	5			146	.83	
il (g)			-			128.27			
			197.73	3			28.	45	
			118.7	7			118	.38	
			99.82	2			99.	82	
			18.95	5			18.	56	
			19.0				18	.6	
	_	4 50 /	3				_	4 70	,
		-			•				g/cm
		15.4 kN	ı/m~	Final Dry C	mit vvei(Juit	γd	10.9	kN/m
Initial Dry Unit Weight γ_d 15.4 kN/m ³ Final Dry Unit Weight γ_d 16.9 kN, End of load deformation results									
ion result 1		2	3	4	5	6 7			
	El25-047 20 - 2.63 (g) (g) ent (%) bil (g) il (g)	El25-0479 20 mm 2.63 (g) (g) (g) (g) (g) (g) (g) (g)	El25-0479 20 mm Dia. of Spec - g Wt. of Stone 2.63 Tested By (g) (g) (g) (g) (g) (g) (g) Ent (%) Be Ring, S pd 1.58 g/c	El25-0479 20 mm Dia. of Spec. - g Wt. of Stone 2.63 Tested By 1 1 101 28.03 (g) 158.72 (g) 138 109.9 20.72 18.8 ent (%) Before T Ring, Stone bil (g) - 1[(g)	EI25-0479 Consolid. 20 mm Dia. of Spec. 63.5 g Wt. of Stone - - 2.63 Tested By Yueru Che 2.63 Tested By Yueru Che 1 101 28.03 (g) 158.72 - (g) 138 109.97 20.72 18.8 - ent (%) Before Test Ring, Stone, Paper pil (g) 316.5 - 18.8 - - pol (g) 197.73 - 18.95 - - 19.0 - -	EI25-0479 Consolid. Type 20 mm Dia. of Spec. 63.5 mm - g Wt. of Stone - g 2.63 Tested By Yueru Chen 1 101 28.03 (g) 158.72	EI25-0479 Consolid. Type Fixed Ring 20 mm Dia. of Spec. 63.5 mm Area of Sp g Wt. of Stone - g Wt. of Pag 2.63 Tested By Yueru Chen Date 1 101 28.03 (g) 158.72	El25-0479 Consolid. Type Fixed Ring 20 mm Dia. of Spec. 63.5 mm Area of Spec. - g Wt. of Stone - g Wt. of Paper 2.63 Tested By Yueru Chen Date Date 1 2 101 44 28.03 28. (g) 158.72 135 (g) 138 118 109.97 89. 20.72 16 18.8 18 109.97 89. 20.72 16 18.8 18 18 18 ent (%) 18.8 18 18 Jil (g) 316.5 146 146 Il (g) - 128 197.73 28. 118.77 118 99.82 99. 18.95 18. 19.0 18 19.0 18 19.0 18	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Project:	An expe	rimenta	l investigation of th	behavior of compacted sand/clay mixtures 50% bentonite, 22% water content (S50B22W)				
Sample: Sta	ndard Pro	ctor co	mpacted, 50% san	d 50% bentonite, 22	% water content (S50B22W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.63		Tested By	Yueru Chen	Date	7/20/2009		
Trimmings			1			2		
Tin No.			46		1	01		
Wt. of Tin (g)			28.8	7	28.03			
Wt. of Tin + Wet Soil	(g)		160.0	5		5.33		
Wt. of Tin + Dry Soil	(0)		137.2			0.7		
Wt. of Dry Soil (g)			108.3	3	11	2.67		
Wt. of Water (g)			22.8	5	24	1.63		
Water Content (%)			21.1		2	1.9		
Average Water Conte	ent (%)			21.5				
					After Test			
Specimen			Before ⁻	Test	Afte	r Test		
Specimen Tare I.D. No.			Before ⁻ Ring, Stone			r Test 38		
•	oil (g)			, Paper	E			
Tare I.D. No.			Ring, Stone	, Paper	E 14	38		
Tare I.D. No. Wt. of Tare + Wet So			Ring, Stone	, Paper 1	14 12	38 3.83		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So			Ring, Stone 309.0 -	, Paper 1 5	14 12 28	38 3.83 3.96		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			Ring, Stone 309.0 - 193.1	, Paper 1 5 6	14 14 12 28 11	38 3.83 3.96 3.46		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Stone 309.0 - 193.1 115.8	a, Paper 1 5 6 0	14 12 28 11 9	38 3.83 3.96 3.46 5.37		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Stone 309.0 - 193.1 115.8 95.50	e, Paper 1 5 6 0 5	14 14 12 28 11 9	38 3.83 3.96 3.46 5.37 5.5		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			Ring, Stone 309.0 - 193.1 115.8 95.5(20.3) 21.3	, Paper 1 5 6 0 5	E 14 12 28 11 9 19 2	38 3.83 3.96 3.46 5.37 5.5 9.87 0.8		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	Ring, Stone 309.0 - 193.1 115.8 95.50 20.30 21.3 1.51 g/cm ³	, Paper 1 5 6 0 5 Final Dry Density	Ε 14 12 28 11 9 15 2 Ρd	38 3.83 3.96 3.46 5.37 5.5 9.87 0.8 1.70 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wrt Soil (g) Wt. of Water (g) Water Content (%)	t	γd	Ring, Stone 309.0 - 193.1 115.8 95.5(20.3) 21.3	, Paper 1 5 6 0 5	Ε 14 12 28 11 9 15 2 Ρd	38 3.83 3.96 3.46 5.37 5.5 9.87 0.8		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	t	γd	Ring, Stone 309.0 - 193.1 115.8 95.50 20.30 21.3 1.51 g/cm ³	, Paper 1 5 6 0 5 Final Dry Density	Ε 14 12 28 11 9 15 2 Ρd	38 3.83 3.96 3.46 5.37 5.5 9.87 0.8 1.70 g/cm		

Project:	An expe	rimenta	al investigation of th	e behavior of compa	cted sand/clay mi	xtures			
Sample: Sta	andard Pro	ctor co	mpacted, 50% san	d 50% bentonite, 24	% water content (\$50B24W)			
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²			
Weight of Ring	62.9	g	Wt. of Stone	129.9 g	Wt. of Paper	0.3 g			
Specific Gravity	2.63		Tested By	Yueru Chen	Date	3/3/2009			
Trimmings	3		1			2			
Tin No.			MAJI	D	F	I-3			
Wt. of Tin (g)			28.6	3	29				
Wt. of Tin + Wet Soi	l (g)		176.	6	14	6.7			
Wt. of Tin + Dry Soil	(g)		148.	5	12	3.8			
Wt. of Dry Soil (g)			119.	9	94	.8			
Wt. of Water (g)			28.1	l	22	2.9			
Water Content (%)			23.4	1	24	.2			
Average Water Cont	ent (%)			23.8					
Specimen	1		Before	Test	After	Test			
Tare I.D. No.			Ring, Stone	e, Paper	4	5			
Wt. of Tare + Wet S	oil (g)		304.	8	1.	40			
Wt. of Tare + Dry Se	oil (g)		-		118.5				
Wt. of Tare (g)			193.1	10	28	3.9			
Wt. of Wet Soil (g)			111.7	70	11	1.1			
			89.6	0	89	111.1 89.6			
Wt. of Dry Soil (g)			0010	0	09.0 21.5				
Wt. of Dry Soil (g) Wt. of Water (g)			22.1						
				0	21				
Wt. of Water (g)			22.1 24.7	0	21	.5 I.0			
Wt. of Water (g) Water Content (%) Initial Dry Density		ρ _d	22.1 24.7 1.41 g/cm ³	0 7 Final Dry Density	2΄ 24 Ρ _d	.5 I.0 1.61 g/cm			
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	22.1 24.7	0	2΄ 24 ρ _d	.5 I.0 1.61 g/cm			
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion results	γd	22.1 24.7 1.41 g/cm ³ 13.9 kN/m ³	0 7 Final Dry Density Final Dry Unit Weiç	2΄ 24 ρ _d γ _d	.5 i.0 1.61 g/cm 15.8 kN/m			
Wt. of Water (g)		Υd Yd	22.1 24.7 1.41 g/cm ³	0 7 Final Dry Density Final Dry Unit Weig 4 5	2 ² 24 ght γ _d 6	.5 1.0 1.61 g/cm ²			

Project: An experimental investigation of the behavior of compacted sand/clay mixtures											
Sample:	Modified Proc	ctor compacte	d, 85% sa	and 15% ber	ntonite, 89	% water con	tent (N	115B8W))		
Consolid. Type	El25-0479			Consolid.	Туре	Fixed Ring	J				
Height of Spec.	20 m	m Dia. of S	Зрес.	63.5	mm	Area of Sp	ec.	3166.9	mm²		
Weight of Ring	67.48 g	Wt. of S	tone	130	g	Wt. of Pap	er	0.3	g		
Specific Gravity	2.65	Tested	Ву	Yueru Che	en	Date		3/30/	2009		
Trimmings			1				2				
Tin No.			7				20)1			
Wt. of Tin (g)			28.1	7		28.91					
Wt. of Tin + Wet Soil	(g)		142.0	9			159	.55			
Wt. of Tin + Dry Soil	(g)		133.1	4			149	.33			
Wt. of Dry Soil (g)			104.9)7			120	.42			
Wt. of Water (g)			8.95	5			10.	22			
Water Content (%)			8.5				8.	5			
Average Water Conte	ent (%)				8.5						
Specimen			Before ⁻	Test			After	Test			
Tare I.D. No.		F	Ring, Stone	e, Paper			B-1	19			
Wt. of Tare + Wet So	oil (g)		322.7	2			151	.77			
Wt. of Tare + Dry So	il (g)		-				141	1.7			
Wt. of Tare (g)			197.7	'8			27	.4			
Wt. of Wet Soil (g)			124.9	94			124	.37			
						124.37					
Wt. of Dry Soil (g)			114.3	80			114	114.3			
Wt. of Dry Soil (g) Wt. of Water (g)			114.3 10.64	-				-			
				-				07			
Wt. of Water (g)			10.64	-			10.	07			
Wt. of Water (g) Water Content (%)		ρ _d 1.80	10.64	-	Density		10.	07	0		
Wt. of Water (g) Water Content (%) Initial Dry Density	t	ρ _d 1.80 γ _d 17.7	10.64 9.3	4		ht	10. 8.	07 8	0		
Wt. of Water (g)			10.64 9.3 g/cm ³	4 Final Dry [ht	10.4 8.5 Ρd γd	07 8 1.87 18.4	0		
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh			10.64 9.3 g/cm ³	4 Final Dry [ht 6	10. 8. ^ρ d γd	07 8 1.87	g/cm ³ kN/m ³		

An expe	rimenta	al investigat	ion of the	e behavior	of compa	cted sand/c	lay mi	tures	
ified Pro	ctor co	mpacted, 8	5% sand	15% bent	onite, 10%	6 water con	itent (M	15B10W	/)
El25-047	'9			Consolid	. Туре	Fixed Rin	g		
20	mm	Dia. of Sp	Dec.	63.5	mm	Area of S	pec.	3166.9	mm ²
66.3	g	Wt. of Sto	one	128.3	g	Wt. of Pa	per	0.3	g
2.65		Tested By	у	Yueru Ch	en	Date		3/31/	2009
			1				2	2	
			7				20)1	
			28.16	6		28.89			
(g)			186.6	6			189	.81	
g)			171.6	5			174	.54	
			143.4	9			145	.65	
			14.95	5			15.	27	
			10.4				10	.5	
nt (%)					10.5				
			Before 7	Fest			After	Test	
		Rin	g, Stone	, Paper			B-	19	
il (g)			320.9	Э			152	.87	
l (g)			-				141	.08	
			194.9	0			27.	39	
			126.0	0			125	.48	
			113.6	9			113	.69	
			12.31	1			11.	79	
			10.8				10	.4	
		4 70	, 3	Final D	Danait			4.07	,
	ρ_d		0	-	-	h 4	ρ _d		g/cm
							γd	18.3	kN/m
	γd	tion results							
	S	2	3	4	5	6	, a	7	
	lified Pro El25-047 20 66.3	ified Proctor co EI25-0479 20 mm 66.3 g 2.65 (g) g) nt (%) il (g) I (g)	(g) g) nt (%) Rin il (g) I (g)	Image: constraint of the constrated of the constraint of the constraint of the constraint of the	Image: constraint of the constrated of the constraint of the constraint of the constraint of the	Image: constraint of the sector compacted, 85% sand 15% bentonite, 10% El25-0479 Consolid. Type 20 mm Dia. of Spec. 63.5 mm 66.3 g Wt. of Stone 128.3 g 2.65 Tested By Yueru Chen 1 7 28.16	Iffied Proctor compacted, 85% sand 15% bentonite, 10% water con El25-0479 Consolid. Type Fixed Rin 20 mm Dia. of Spec. 63.5 mm Area of S 66.3 g Wt. of Stone 128.3 g Wt. of Pa 2.65 Tested By Yueru Chen Date 1 7 28.16	Iffied Proctor compacted, 85% sand 15% bentonite, 10% water content (M El25-0479 Consolid. Type Fixed Ring 20 mm Dia. of Spec. 63.5 mm Area of Spec. 66.3 g Wt. of Stone 128.3 g Wt. of Paper 2.65 Tested By Yueru Chen Date Date 1 2 7 20 20 2.65 Tested By Yueru Chen Date 1 2 7 20 28.16 28 189 143.49 145 143.49 143.49 145 14.95 15 10.4 10.5 10.5 10.4 10 11 10.4 10 10.5 126.00 125 11 (g) 320.9 152 13.69 113 12.31 11 10.8 10.8 10 10.8 10 10	20 mm Dia. of Spec. 63.5 mm Area of Spec. 3166.9 66.3 g Wt. of Stone 128.3 g Wt. of Paper 0.3 2.65 Tested By Yueru Chen Date 3/31/ 2.65 Tested By Yueru Chen Date 3/31/ 1 2 7 201 28.16 28.89 189.81 19.81 g) 171.65 174.54 143.49 145.65 143.49 145.65 14.95 15.27 10.4 10.5 nt (%) 10.5 10.5 152.87 1 <td< td=""></td<>

Project:An experimental investigation of the behavior of compacted sand/clay mixturesSample:Modified Proctor compacted, 85% sand 15% bentonite, 12% water content (M15B12W)									
Sample: Moo	lified Pro	ctor co	mpacted, 85% sa	nd 15% bentonite, 12	% water content (N	/15B12W)			
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²			
Weight of Ring	66.3	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g			
Specific Gravity	2.65		Tested By	Yueru Chen	Date	3/26/2009			
Trimmings			1			2			
Tin No.			21	3	E	38			
Wt. of Tin (g)			27.	87	28	28.43			
Wt. of Tin + Wet Soil	(g)		159	.37	189	9.77			
Wt. of Tin + Dry Soil	g)		145	5.6	17	2.8			
Wt. of Dry Soil (g)			117	.73	144	4.37			
Wt. of Water (g)			13.	77	16	.97			
Water Content (%)			11	.7	11	1.8			
Average Water Conte	ent (%)			11.7					
Specimen			Before	Test	After	[.] Test			
Tare I.D. No.			Ring, Stor	ne, Paper	2	05			
Wt. of Tare + Wet So	oil (g)		326	5.1	16	0.4			
Wt. of Tare + Dry So	il (g)		-		14	6.5			
Wt. of Tare (g)			194	.90	29	.68			
Wt. of Wet Soil (g)			131	.20	130).72			
			116	82	130.72 116.82 13.9				
Wt. of Dry Soil (g)				.02					
Wt. of Dry Soil (g) Wt. of Water (g)			14.	-					
			-	38	1:				
Wt. of Water (g)			14.	38	1:	3.9			
Wt. of Water (g) Water Content (%)		ρ _d	14.	38 .3	1:	3.9 1.9			
Wt. of Water (g) Water Content (%) Initial Dry Density	 :	Ρ _d γd	14. 12	38 .3 Final Dry Density	1: 1 [.] Ρ _d	3.9 1.9 1.91 g/cm			
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	14. 12 1.84 g/cm ³	38 .3 Final Dry Density	1: 1 [.] Ρ _d	3.9 1.9 1.91 g/cm			
Wt. of Water (g)		γd	14. 12 1.84 g/cm ³	38 .3 Final Dry Density	1: 1 [.] Ρ _d	3.9 1.9 1.91 g/cm			

	- 1-	minerite	I investigati	on or the	e behavior o	i compa	cted sand/o	lay mix	tures	
Sample: Mo	dified Pro	ctor co	mpacted, 85	5% sand	15% bento	nite, 14%	6 water con	itent (M	15B14W	/)
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5 ı	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.3	g	Wt. of Stor	ne	133.7 (g	Wt. of Pa	per	0.3	g
Specific Gravity	2.65		Tested By		Yueru Che	n	Date		3/24/	2009
Trimmings	;			1				2	2	
Tin No.				7				20)1	
Wt. of Tin (g)				28.1			28.9			
Wt. of Tin + Wet Soil	(g)			195.6	6			152	2.8	
Wt. of Tin + Dry Soil	(g)			174.9)			137	7.6	
Wt. of Dry Soil (g)				146.8	3			108	3.7	
Wt. of Water (g)				20.7				15	.2	
Water Content (%)				14.1				14	.0	
Average Water Cont	ent (%)					14.0				
							After Test			
Specimen			ł	Before 1	est			After	Test	
Specimen Tare I.D. No.				Before T g, Stone				After B-		
Tare I.D. No.					, Paper				19	
·	oil (g)			g, Stone	, Paper			B-*	19 56	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So	oil (g)			g, Stone	, Paper			B-1	19 56 0.2	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)			g, Stone 329.5 -	, Paper 5 0			B-1 15 14(19 56 0.2 .4	
Tare I.D. No. Wt. of Tare + Wet S	oil (g)			g, Stone 329.5 - 200.3	, Paper 5 0 0			B-15 15 14(27	19 56 0.2 .4 3.6	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)			g, Stone 329.5 - 200.3 129.2	, Paper 5 0 0 0			B-15 15 14(27 128	19 56 0.2 .4 3.6 2.8	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)			g, Stone 329.5 - 200.3 129.2 112.8	, Paper 5 0 0 0 0			B- ⁻ 15 140 27 128 112	19 56 0.2 .4 3.6 2.8 .8	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)	0.	Rinç	g, Stone 329.5 200.3 129.2 112.8 16.4(14.5	, Paper 5 0 0 0 0	lensity		B 15 14(27 128 112 15 14	19 56 0.2 .4 3.6 2.8 .8 .0	a/cm
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	ρ _d	Ring 1.78	g, Stone 329.5 200.3 129.2 112.8 16.40 14.5 g/cm ³	, Paper 5 0 0 0 0) Final Dry D		bt	B-15 140 27 128 112 15 14	19 56 0.2 .4 3.6 2.8 .8 .0 1.87	0
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γd	Ring 1.78	g, Stone 329.5 200.3 129.2 112.8 16.4(14.5	, Paper 5 0 0 0 0		ht	B 15 14(27 128 112 15 14	19 56 0.2 .4 3.6 2.8 .8 .0	0
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g) bil (g)	γd	Ring 1.78	g, Stone 329.5 200.3 129.2 112.8 16.40 14.5 g/cm ³	, Paper 5 0 0 0 0) Final Dry D		ht 6	B-15 140 27 128 112 15 14	19 56 0.2 .4 3.6 2.8 .8 .0 1.87	g/cm kN/m

Project:	An expe	rimenta	al investigation o	of the b	ehavior	of compa	cted sand/cl	ay mix	tures	
Sample: Mc	dified Pro	ctor co	mpacted, 85% s	and 15	5% bent	onite, 16%	water cont	ent (M	15B16W)
Consolid. Type	El25-047	'9		С	Consolid.	. Туре	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of Sp	ec.	3166.9	\rm{mm}^2
Weight of Ring	67.5	g	Wt. of Stone		130	g	Wt. of Pap	er	0.3	g
Specific Gravity	2.65		Tested By	Yι	ueru Ch	en	Date		3/25/	2009
Trimmings	3			1				2	2	
Tin No.			2	404				40)5	
Wt. of Tin (g)			2	28.7			27.7			
Wt. of Tin + Wet Soi	l (g)		2	200				205	5.3	
Wt. of Tin + Dry Soil	(g)		1	76.9				181	1.2	
Wt. of Dry Soil (g)			1	48.2				153	3.5	
Wt. of Water (g)			2	23.1				24	.1	
Water Content (%)			1	15.6				15	.7	
Average Water Cont	ent (%)					15.6				
Specimen	1		Befo	ore Tes	st			After	Test	
Tare I.D. No.			Ring, St	one, Pa	aper			10)1	
Wt. of Tare + Wet S	oil (g)		3	26.9				156	6.4	
Wt. of Tare + Dry Se	oil (g)			-				139	9.1	
Wt. of Tare (g)			19	97.80			139.1 28 128.4			
				97.60						
Wt. of Wet Soil (g)				97.80 29.10						
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			12						3.4	
(0)			12 11	29.10				128	3.4 I.1	
Wt. of Dry Soil (g)			12 11 1	29.10 11.10				128 111	3.4 1.1 .3	
Wt. of Dry Soil (g) Wt. of Water (g)			12 11 1	29.10 11.10 8.00				128 111 17	3.4 1.1 .3	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	12 11 1	29.10 11.10 8.00 16.2	inal Dry	Density		128 111 17	3.4 1.1 .3	g/cm [°]
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	1t	Ρ _d γ _d	12 11 1. 1. 1.	29.10 11.10 8.00 16.2 n ³ Fi	-	Density Unit Weig	ht	128 111 17 15	3.4 1.1 .3 .6	-
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d S	12 11 1.75 g/cm 17.2 kN/r	29.10 11.10 8.00 16.2 n ³ Fi	-	-	ht	128 111 17 15 Ρ _d	3.4 1.1 .6 1.90 18.6	-
Wt. of Dry Soil (g) Wt. of Water (g)	tion result 1	γ _d S	12 11 1.75 g/cm 17.2 kN/r	29.10 11.10 8.00 16.2 m ³ Fin 3	-	-	ht 6 1.2400	128 111 17 15 Ρ _d γ _d	3.4 1.1 .3 .6 1.90	g/cm ³ kN/m

Project:	Аперры	imenta	I investigation of	the behavior of compa	behavior of compacted sand/clay mixtures			
Sample: Mo	odified Pro	octor co	ompacted, 75% s	and 25% bentonite, 8	% water content (N	/125B8W)		
Consolid. Type	EI25-0479)		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.3	g	Wt. of Stone	133.69 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	4/1/2009		
Trimmings			1			2		
Tin No.			7	,	201			
Wt. of Tin (g)			28.	16	28	.87		
Wt. of Tin + Wet Soil	(g)		177	.02	170.28			
Wt. of Tin + Dry Soil	(g)		165	.72	159	9.57		
Wt. of Dry Soil (g)			137	.56	13	0.7		
Wt. of Water (g)			11	.3	10	.71		
Water Content (%)			8.	2	8	.2		
Average Water Conte	ent (%)			8.2				
Specimen			Before	e Test	After	[.] Test		
Specimen Tare I.D. No.			Before Ring, Stor			Test 19		
	oil (g)			ne, Paper	B·			
Tare I.D. No.			Ring, Stor	ne, Paper	B- 157	.19		
Tare I.D. No. Wt. of Tare + Wet So			Ring, Stor	ne, Paper 5.1	B- 15 ⁻ 14 ⁻	-19 1.86		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So			Ring, Stor 32	ne, Paper 5.1 .29	B- 15 ⁻ 14 ⁻ 27	19 1.86 1.97		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			Ring, Stor 32! - 200	ne, Paper 5.1 .29 .81	B- 15 ⁻ 14 ⁻ 27 12 ⁴	19 1.86 1.97 .38		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Stor 325 - 200 124	ne, Paper 5.1 .29 .81 .59	B- 15 ⁻ 14 ⁻ 27 12 ⁻ 11 ⁻	19 1.86 1.97 .38 4.48		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Stor 32! - 200 124 114	ne, Paper 5.1 .29 .81 .59 22	B- 15 ⁻ 14 27 124 114 9.	19 1.86 1.97 .38 4.48 4.59		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			Ring, Stor 325 - 200 124 114 10. 8.	ne, Paper 5.1 .29 .81 .59 22 9	B- 15 ⁻ 14 27 124 114 9. 8	19 1.86 1.97 .38 4.48 4.59 89 .6		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	Ring, Stor 325 - 200 124 114 10. 8. 1.81 g/cm ³	ne, Paper 5.1 .29 .81 .59 22 9 Final Dry Density	Β- 15 ⁻ 14 27 12- 11- 9. 8 Ρ _d	19 1.86 1.97 .38 4.48 4.59 89 .6 1.87 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	t	γd	Ring, Stor 325 - 200 124 114 10. 8.	ne, Paper 5.1 .29 .81 .59 22 9 Final Dry Density	Β- 15 ⁻ 14 27 12- 11- 9. 8 Ρ _d	19 1.86 1.97 .38 4.48 4.59 89 .6 1.87 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	t	γd	Ring, Stor 325 - 200 124 114 10. 8. 1.81 g/cm ³	ne, Paper 5.1 .29 .81 .59 22 9 Final Dry Density	Β- 15 ⁻ 14 27 12- 11- 9. 8 Ρ _d	19 1.86 1.97 .38 4.48 4.59 89 .6 1.87 g/cm		

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures					xtures		
Sample: Mc	dified Pro	ctor co	mpacted, 75% san	d 25% bentonite, 1	0% water content (N	//25B10W)		
Consolid. Type	El25-047	'9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.3	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	4/2/2009		
Trimmings	3		1			2		
Tin No.			MAJ	ID	FJ-3			
Wt. of Tin (g)			28.6	6	2	29		
Wt. of Tin + Wet Soi	l (g)		151.	51	150			
Wt. of Tin + Dry Soil	(g)		139	.8	13	8.58		
Wt. of Dry Soil (g)			111.	14	10	9.58		
Wt. of Water (g)			11.7	'1	11	.42		
Water Content (%)			10.	5	1	0.4		
Average Water Cont	ent (%)			10.5				
Specimen	1		Before	Test	Afte	r Test		
			Ring, Ston	e, Paper		5		
Tare I.D. No.						0		
Tare I.D. No. Wt. of Tare + Wet S	oil (g)		326.	04	326.04 157.92			
	(0)		326.	04	-	-		
Wt. of Tare + Wet S	(0)		326. - 196.		14	7.92		
Wt. of Tare + Wet S Wt. of Tare + Dry Se	(0)		-	60	14 28	7.92 5.48		
Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g)	(0)		- 196.	60 44	14 28 12	7.92 5.48 3.89		
Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	(0)		196. 129.	60 44 59	14 28 12 11	7.92 5.48 9.89 9.03		
Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(0)		- 196. 129. 116.	60 44 59 35	14 28 12 11 11 12	7.92 5.48 8.89 9.03 6.59		
Wt. of Tare + Wet S Wt. of Tare + Dry Se Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	(0)		- 196. 129. 116. 12.8	60 44 59 35	14 28 12 11 11 12	7.92 5.48 9.89 9.03 6.59 2.44		
Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(0)	ρ _d	- 196. 129. 116. 12.8	60 44 59 35	14 28 12 11 11 12 11	7.92 5.48 9.03 6.59 2.44 0.7		
Wt. of Tare + Wet S Wt. of Tare + Dry Se Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)	Ρ _d γ _d	- 196. 129. 116. 12.8 11.	60 44 59 95 0	14 2ε 12 11 1 1 1 1 2 1 1 2	7.92 5.48 9.03 6.59 2.44 0.7 1.92 g/cm		
Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	oil (g)	γd	- 196. 129. 116. 12.8 11. 1.84 g/cm ³ 18.0 kN/m ³	60 44 59 55 0 Final Dry Density	14 2ε 12 11 1 1 1 1 2 1 1 2	7.92 5.48 9.03 6.59 2.44 0.7 1.92 g/cm ² 18.8 kN/m		
Wt. of Tare + Wet S Wt. of Tare + Dry Se Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g)	γ _d s	- 196. 129. 116. 12.8 11. 1.84 g/cm ³	60 44 59 55 0 Final Dry Density	14. 2ε 12: 11: 12: 11: 12: 11: 12: 14: 12: 14: 12: 14: 12: 14: 12: 14: 12: 14: 12: 14: 12: 14: 12: 12: 12: 11: 12: 12: 12: 12: 12: 12	7.92 5.48 9.03 6.59 2.44 0.7 1.92 g/cm ³		

Project:	Ап слрс	erimental investigation of the behavior of compacted sand/clay mixtures							
Sample: Mod	lified Pro	ctor co	mpacted, 75% sa	ind 25% be	ntonite, 12	% water conte	nt (M25B12V	V)	
Consolid. Type	El25-047	'9		Conso	id. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5	mm	Area of Spe	ec. 3166.9	mm²	
Weight of Ring	63	g	Wt. of Stone	130	g	Wt. of Pape	er 0.3	g	
Specific Gravity	2.64		Tested By	Yueru (Chen	Date	3/31/	/2009	
Trimmings				1			2		
Tin No.			2	13			205		
Wt. of Tin (g)			27	27.88			29.68		
Wt. of Tin + Wet Soil ((g)		176	6.99		170.89			
Wt. of Tin + Dry Soil (g)		160	0.25			155.35		
Wt. of Dry Soil (g)			132	2.37			125.67		
Wt. of Water (g)			16	.74			15.54		
Water Content (%)			12	2.6			12.4		
Average Water Conte	nt (%)								
Specimen			Befor	e Test			After Test		
Tare I.D. No.			Ring, Sto	ne, Paper		B8			
				1 4 0					
Wt. of Tare + Wet So	il (g)		32	1.13		155.94			
Wt. of Tare + Wet So Wt. of Tare + Dry Soi			32'	-			155.94 142.37		
				- 3.30					
Wt. of Tare + Dry Soi			193	-			142.37		
Wt. of Tare + Dry Soi Wt. of Tare (g)			19: 12:	- 3.30			142.37 28.43		
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)			19: 12: 11:	- 3.30 7.83			142.37 28.43 127.51		
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			19: 12: 11: 13	- 3.30 7.83 3.94			142.37 28.43 127.51 113.94		
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			19: 12: 11: 13 12: 11:	- 3.30 7.83 3.94 .89 2.2	a Donoitra		142.37 28.43 127.51 113.94 13.57 11.9		
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	l (g)	ρ _d	19: 12: 11: 13 12 13 12 1.80 g/cm	- 3.30 7.83 3.94 	y Density	abt	142.37 28.43 127.51 113.94 13.57 11.9 ρ _d 1.90	•	
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weight	l (g)	γd	19: 12: 11: 13 12: 11:	- 3.30 7.83 3.94 	ry Density ry Unit Wei	ght	142.37 28.43 127.51 113.94 13.57 11.9	•	
Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	l (g)	γ _d s	19: 12: 11: 13 12 13 12 1.80 g/cm	- 3.30 7.83 3.94 		ght 6	142.37 28.43 127.51 113.94 13.57 11.9 ρ _d 1.90	g/cm ² kN/m	

Project:					xtures			
Sample: Mc	odified Pro	ctor co	mpacted, 75% san	d 25% bentonite, 15	% water content (N	125B15W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.3	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	3/30/2009		
Trimmings	3		1		:	2		
Tin No.			21:	3	205			
Wt. of Tin (g)			27.8	39	29	.69		
Wt. of Tin + Wet Soi	l (g)		166.	54	155.21			
Wt. of Tin + Dry Soil	(g)		148.	62	139	9.03		
Wt. of Dry Soil (g)			120.	73	109	9.34		
Wt. of Water (g)			17.9	92	16	.18		
Water Content (%)			14.	8	14	4.8		
Average Water Cont	ent (%)			14.8				
Specimen	1		Before	Test	After	Test		
Tare I.D. No.			Ring, Ston	e, Paper	B8			
Wt. of Tare + Wet S	oil (g)		325.	18	158	158.15		
Wt. of Tare + Dry So	oil (a)		_					
	uii (g)				141.36			
Wt. of Tare (g)	ui (g)		194.	90		I.36 .44		
	un (g)		194. 130.		28			
Wt. of Tare (g)	on (g)		-	28	28 129	.44		
Wt. of Tare (g) Wt. of Wet Soil (g)	un (g)		130.	28 92	28 129 112	.44 9.71		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			130. 112.	28 92 36	28 129 112 16	.44 9.71 2.92		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			130. 112. 17.3	28 92 36	28 129 112 16	.44 9.71 2.92 .79		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	130. 112. 17.3	28 92 36	28 129 112 16	.44 9.71 2.92 .79 4.9		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d γ _d	130. 112. 17.3 15.	28 92 36 4 Final Dry Density	28 129 112 16 14 Ρd	.44 9.71 2.92 .79 4.9 1.88 g/cm		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	nt	γd	130. 112. 17.3 15. 1.78 g/cm ³	28 92 36 4 Final Dry Density	28 129 112 16 14 Ρd	.44 9.71 2.92 .79 4.9 1.88 g/cm ³		
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	nt	γd	130. 112. 17.3 15. 1.78 g/cm ³	28 92 36 4 Final Dry Density	28 129 112 16 14 Ρd	.44 9.71 2.92 .79 4.9 1.88 g/cm		

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures									
Sample: Mc	dified Pro	ctor co	mpacted, 75%	sand	25% bento	onite, 16%	water cont	tent (M	25B16W	')
Consolid. Type	EI25-047	9			Consolid.	Туре	Fixed Ring	3		
Height of Spec.	20	mm	Dia. of Spec		63.5	mm	Area of Sp	bec.	3166.9	\rm{mm}^2
Weight of Ring	66.3	g	Wt. of Stone		130	g	Wt. of Pap	ber	0.3	g
Specific Gravity	2.64		Tested By		Yueru Che	en	Date		3/27/	2009
Trimmings	\$			1				2		
Tin No.				MAJIE	5		FJ-3			
Wt. of Tin (g)			28.67				29.	03		
Wt. of Tin + Wet Soi	l (g)			137.45	5		165.28			
Wt. of Tin + Dry Soil	(g)			122.55	5		146.5			
Wt. of Dry Soil (g)				93.88	3			117	.47	
Wt. of Water (g)				14.9				18.	78	
Water Content (%)							16	.0		
Average Water Cont	ent (%)					15.9				
Specimen	I		Be	fore T	est			After	Test	
Tare I.D. No.			Ring, S	Stone,	, Paper		5			
Wt. of Tare + Wet S	oil (g)		;	325.62	2		157.33			
Wt. of Tare + Dry So	oil (g)			-				139	.58	
Wt. of Tare (g)				196.60	0			28.	89	
Wt. of Wet Soil (g)				129.02	2			128	.44	
							110.69			
Wt. of Dry Soil (g)				110.69	9			110	.09	
Wt. of Dry Soil (g) Wt. of Water (g)				110.69 18.33				110 17.		
·								-	75	
Wt. of Water (g)				18.33 16.6	3			17.	75	
Wt. of Water (g) Water Content (%)		ρ _d	1.75 g/c	18.33 16.6 cm ³		Density		17.	75	-
Wt. of Water (g) Water Content (%)	nt	Pd γd	1.75 g/c	18.33 16.6	3	-	ht	17. 16	75 .0	-
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γd	1.75 g/c 17.1 kN	18.33 16.6 cm ³ /m ³	Final Dry	Unit Weig		17. 16 ρ _d	75 .0 1.85 18.2	g/cm ³ kN/m ³
Wt. of Water (g)		γ _d s	1.75 g/c 17.1 kN 2	18.33 16.6	Final Dry	-	ht 6 0.8000	17. 16 ρ _d γ _d	75 .0 1.85	-

Project:	An expe	rimenta	al investiga	ation of th	e behavior	of compa	cted sand/c	lay mi	tures	
Sample: Moo	dified Pro	ctor co	mpacted,	75% sand	d 25% bent	onite, 17%	6 water con	tent (M	25B17W	/)
Consolid. Type	EI25-047	'9			Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	spec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.3	g	Wt. of S	tone	130	g	Wt. of Pa	oer	0.3	g
Specific Gravity	2.64		Tested I	Зу	Yueru Ch	en	Date	Date 3/25/2009		
Trimmings				1				2	2	
Tin No.				MAJI	D		FJ-3			
Wt. of Tin (g)				28.6	5		29			
Wt. of Tin + Wet Soil	(g)			159.3	2		158.38			
Wt. of Tin + Dry Soil (g)			140			139.3			
Wt. of Dry Soil (g)				111.3	35			11(0.3	
Wt. of Water (g)				19.2	2			19.	08	
Water Content (%)				17.2	2			17	.3	
Average Water Conte	ent (%)					17.3				
Specimen				Before ⁻	Test			After	Test	
Tare I.D. No.			Ri	ng, Stone	e, Paper			5	5	
Wt. of Tare + Wet Sc	oil (g)			323.	2			154.7		
Wt. of Tare + Dry So	il (g)			-				130	5.1	
Wt. of Tare (g)				196.6	60			27	.4	
Wt. of Wet Soil (g)				126.6	60			12	7.3	
Wt. of Dry Soil (g)				108.7	0			108	3.7	
Wt. of Water (g)				17.9	0			18	.6	
Water Content (%)				16.5	5			17	.1	
		ρ_d	1.72	g/cm ³	Final Dry	-		ρ_{d}	1.87	g/cm
Initial Dry Density				2	E's al David	11-11-11-14/-1-	4		40.0	1.8.17
	t	γd	16.8	$_{\rm H}$ 16.8 kN/m ³ Final Dry Unit Weight $\gamma_{\rm d}$ 18.3			kN/m			
Initial Dry Density Initial Dry Unit Weight End of load deformati	on result	S		kN/m ³	-	_		Ϋ́d		kN/m
Initial Dry Unit Weight		S	16.8 2 0.2310	kN/m ³ 3 0.3860	4	5 0.8920	6 1.3100		7 6600	kN/m

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures odified Proctor compacted, 75% sand 25% bentonite, 19% water content (M25B19W)				acted sand/clay miz	xtures	
Sample: Mc	dified Pro	ctor co	mpacted, 75% sand	d 25% bentonite, 199	% water content (N	125B19W)	
Consolid. Type	El25-047	'9		Consolid. Type	Fixed Ring	-	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²	
Weight of Ring	63	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g	
Specific Gravity	2.64		Tested By	Yueru Chen	Date	3/25/2009	
Trimmings			1			2	
Tin No.			213		B8		
Wt. of Tin (g)			27.9)	28	3.4	
Wt. of Tin + Wet Soil	l (g)		162.3	8	171.4		
Wt. of Tin + Dry Soil	(g)		140.8	8	14	8.2	
Wt. of Dry Soil (g)			112.	9	11	9.8	
Wt. of Water (g)			22		23	3.2	
Water Content (%)			19.5	5	19	9.4	
Average Water Cont	ent (%)			19.4			
Specimen	I		Before	Test	After	Test	
Tare I.D. No.			Ring, Stone	e, Paper	205		
Wt. of Tare + Wet S	oil (g)		314.8	37	1:	52	
Wt. of Tare + Dry Se	oil (g)		-		13	22	
					132.2		
Wt. of Tare (g)			191.6	60	29).7	
Wt. of Tare (g) Wt. of Wet Soil (g)			191.6 123.2				
				27	12	9.7	
Wt. of Wet Soil (g)			123.2	50	12 10).7 2.3	
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			123.2 102.5	27 50 7	12 10 19	9.7 2.3 2.5	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			123.2 102.5 20.7	27 50 7	12 10 19	9.7 2.3 2.5 9.8	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρ _d	123.2 102.5 20.7 20.3 1.62 g/cm ³	Final Dry Density	12 10 19 19 Ρd	9.7 2.3 2.5 9.8 9.3 -0.96 g/cm	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	ıt	Ρ _d γ _d	123.2 102.5 20.7 20.3	27 50 7 3	12 10 19 19 Ρd	9.7 2.3 2.5 9.8 9.3 -0.96 g/cm	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	123.2 102.5 20.7 20.3 1.62 g/cm ³ 15.9 kN/m ³	27 50 7 Final Dry Density Final Dry Unit Weig	12 10 19 19 19 Ρα 9d 9d	9.7 2.3 2.5 9.8 9.3 -0.96 g/cm ² -9.4 kN/m	
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γ _d s	123.2 102.5 20.7 20.3 1.62 g/cm ³	Final Dry Density Final Dry Unit Weig 4 5	12 10 19 19 9d 9d γd	9.7 2.3 2.5 9.8 9.3 -0.96 g/cm	

110,000	ject: An experimental investigation of the behavior of compacted sand/clay mixtures nple: Modified Proctor compacted, 50% sand 50% bentonite, 13% water content (M50B13W)									
Sample: Mo	dified Pro	ctor co	mpacted, 50% s	and 50	0% bento	onite, 139	% water con	tent (M	50B13W	/)
Consolid. Type	El25-047	9		С	Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.27	g	Wt. of Stone		128.35	g	Wt. of Pa	oer	0.3	g
Specific Gravity	2.63		Tested By	Υı	ueru Che	en	Date		4/3/2	2009
Trimmings	;			1				2	2	
Tin No.			2	404				40)5	
Wt. of Tin (g)			2	28.71				27	.7	
Wt. of Tin + Wet Soil	(g)		145.47			189	9.7			
Wt. of Tin + Dry Soil	(g)		13	32.52			171.11			
Wt. of Dry Soil (g)			10	03.81				143	.41	
Wt. of Water (g)			1:	2.95				18.	59	
Water Content (%)			1	12.5				13	.0	
Average Water Cont	ent (%)					12.7				
Specimen			Befo	ore Tes	t			After	Test	
Tare I.D. No.			Ring, St	one, P	aper		101			
	- 1 (-)		31	15.63				148		
Wt. of Tare + Wet S	oli (g)		315.63 148							
Wt. of Tare + Wet S Wt. of Tare + Dry So				-				134	.81	
			19	- 94.92				134 28.	-	
Wt. of Tare + Dry So				- 94.92 20.71				-	02	
Wt. of Tare + Dry So Wt. of Tare (g)			12					28.	02 .98	
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			12 10	20.71				28. 119	02 .98 .79	
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			12 10 11	20.71 06.79				28. 119 106	02 .98 .79 19	
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			12 10 1: 1	20.71 06.79 3.92 13.0				28. 119 106 13. 12	02 .98 .79 19 .4	
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	ρ _d	12 10 1: 1: 1.69 g/cm	20.71 06.79 3.92 13.0 n ³ Fi	inal Dry I			28. 119 106 13. 12 Ρ _d	02 .98 .79 19 .4	-
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	γd	12 10 1: 1	20.71 06.79 3.92 13.0 n ³ Fi		Density Unit Weig	ght	28. 119 106 13. 12	02 .98 .79 19 .4	-
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	γd	12 10 1: 1: 1.69 g/cm	20.71 26.79 3.92 13.0 n ³ Fi m ³ Fi			ght 6	28. 119 106 13. 12 Ρ _d	02 .98 .79 19 .4	g/cm kN/m

Project:	An expe	rimenta	al investiga	tion of th	e behavior	of compa	cted sand/o	clay mix	ktures		
Sample: Mo	odified Pro	ctor co	mpacted, 5	50% sand	50% bent	onite, 14%	% water cor	ntent (N	150B14W	/)	
Consolid. Type	EI25-047	'9			Consolid	Туре	Fixed Rin	g			
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm ²	
Weight of Ring	62.91	g	Wt. of St	one	134.64	g	Wt. of Pa	per	0.3	g	
Specific Gravity	2.63		Tested B	у	Yueru Ch	en	Date		4/28/	/2009	
Trimmings	3			1				2	2		
Tin No.				7	,			201			
Wt. of Tin (g)				28.1				28	.88		
Wt. of Tin + Wet Soi	l (g)			141.4	7			171	.07		
Wt. of Tin + Dry Soil	(0)			126.8	7		154.65				
Wt. of Dry Soil (g)				98.77	7			125	5.77		
Wt. of Water (g)				14.6	i			16	.42		
Water Content (%)				14.8	i			13	8.1		
Average Water Cont	ent (%)					13.9					
Specimer	1			Before 7	Fest			After	Test		
Tare I.D. No.			Rir	ng, Stone	, Paper			B-	B-19		
Wt. of Tare + Wet S	ioil (g)			324.2	4			153.96			
Wt. of Tare + Dry Se	oil (g)			-			138.18				
Wt. of Tare (g)				197.8	5			27	' .4		
Wt. of Wet Soil (g)				126.3	9			126	6.56		
Wt. of Dry Soil (g)				110.7	8			110).78		
Wt. of Water (g)				15.6 ⁻	1			15	.78		
Water Content (%)				14.1				14	l.2		
				-							
Initial Dry Density		ρ_{d}	1.75	g/cm ³	Final Dry			ρ_{d}	1.80	g/cm	
	nt	γd	17.1	kN/m ³	Final Dry	Unit Weig	ght	γd	17.6	kN/m	
, ,											
End of load deforma	tion result	S	0	0	A	~	<u>^</u>		7		
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)			2 0.0432	3 0.0610	4 0.1090	5 0.2080	6 0.3330	0	7 5260		

Project:	An expe	rimenta	al investigati	on of the	e behavior	of compa	cted sand/c	lay mix	tures	
Sample: Mo	odified Pro	ctor co	mpacted, 50)% sand	50% bent	onite, 15%	6 water con	itent (M	I50B15W	/)
Consolid. Type	EI25-047	'9			Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	66.3	g	Wt. of Sto	ne	133.6	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.63		Tested By		Yueru Ch	en	Date		3/31/	2009
Trimmings	6			1				2	2	
Tin No.				404			405			
Wt. of Tin (g)				28.7				27	.7	
Wt. of Tin + Wet Soi	l (g)			151.2	1		169.24			
Wt. of Tin + Dry Soil	(g)			134.9	3			151	.15	
Wt. of Dry Soil (g)				106.2	3			123	.45	
Wt. of Water (g)				16.28	3			18.	09	
Water Content (%)				15.3				14	.7	
Average Water Cont	ent (%)					15.0				
Specimer	1			Before T	「est			After	Test	
Tare I.D. No.			Ring	g, Stone	, Paper			10)1	
Wt. of Tare + Wet S	ioil (g)			327.4	8			154	.81	
Wt. of Tare + Dry Se	oil (g)			-				138	.41	
Wt. of Tare (g)				200.2	0			28.	.01	
Wt. of Wet Soil (g)				127.2	8			120	5.8	
Wt. of Dry Soil (g)				110.4	0			11(0.4	
Wt. of Water (g)				16.88	3			16	.4	
Water Content (%)				15.3				14	.9	
		ρ_d		g/cm ³	Final Dry	-		ρ_{d}	1.81	g/cm
					Linel Dr.	Linit Waia	ht	γ.	17.8	kN/m
Initial Dry Unit Weigh		γd	17.1	kN/m ³	γ_d 17.1 kN/m ³ Final Dry Unit Weight γ_d 17.8			KIN/III		
Initial Dry Unit Weigl End of load deforma	tion result	S						7 d	-	KIN/III
Initial Dry Density Initial Dry Unit Weigl End of load deforma Load Step No. Corrected Def (mm)		S	17.1 2 0.2620	kN/m ³ 3 0.3150	4 0.3760	5 0.4700	6 0.5890		7	KIN/III

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures Modified Proctor compacted, 50% sand 50% bentonite, 16% water content (M50B16W)				xtures			
Sample: Mo	dified Pro	ctor co	mpacted, 50% sand	d 50% bentonite, 169	% water content (N	150B16W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.3	g	Wt. of Stone	133.74 g	Wt. of Paper	0.3 g		
Specific Gravity	2.63		Tested By	Yueru Chen	Date	4/3/2009		
Trimmings	5		1		:	2		
Tin No.			213	i	20	05		
Wt. of Tin (g)			27.9	2	29	.73		
Wt. of Tin + Wet Soi	l (g)		160.9	97	142.17			
Wt. of Tin + Dry Soil	(g)		142.7	7 6	127	7.02		
Wt. of Dry Soil (g)			114.8	34	97	.29		
Wt. of Water (g)			18.2	1	15	.15		
Water Content (%)			15.9)	15	5.6		
Average Water Cont	ent (%)			15.7				
Specimen	1		Before	Test	After	Test		
Tare I.D. No.			Ring, Stone	e, Paper	E	8		
Wt. of Tare + Wet S	oil (g)		329.1	8	157	7.01		
Wt. of Tare + Dry Se	oil (g)		-		139	9.49		
Wt. of Tare (g)			200.3		139.49 28.45			
			200.0	34	28	.45		
Wt. of Wet Soil (g)			128.8			.45 3.56		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)				34	128			
(0)			128.8	34)4	128 111	3.56		
Wt. of Dry Soil (g)			128.8 111.0	34 04 0	128 11 ¹ 17	3.56 1.04		
Wt. of Dry Soil (g) Wt. of Water (g)			128.8 111.0 17.8	34 04 0	128 11 ¹ 17	8.56 1.04 5.52 5.8		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	128.8 111.0 17.8 16.0 1.75 g/cm ³	34 04 0	128 11 ¹ 17	3.56 1.04 .52 5.8 1.82 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	ıt	ρ _d γ _d	128.8 111.0 17.8 16.0	34 04 0	128 111 17 15 Ρd	3.56 1.04 .52 5.8 1.82 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γd	128.8 111.0 17.8 16.0 1.75 g/cm ³ 17.2 kN/m ³	34 0 Final Dry Density Final Dry Unit Weig	128 111 17 17 15 Ρ _d γ _d	8.56 1.04 .52 5.8 1.82 g/cm ² 17.9 kN/m		
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	128.8 111.0 17.8 16.0 1.75 g/cm ³	34 0 Final Dry Density Final Dry Unit Weig 4 5	128 11 ¹ 17 15 9d 9d γd	3.56 1.04 .52 5.8 1.82 g/cm ²		

Project:	An expe	rimenta	al investigation of	the behavio	ehavior of compacted sand/clay mixtures					
Sample: Mo	dified Pro	ctor co	mpacted, 50% sa	and 50% bei	ntonite, 17	% water conf	tent (M	50B17W	/)	
Consolid. Type	EI25-047	9		Consoli	d. Type	Fixed Ring	3			
Height of Spec.	20	mm	Dia. of Spec.	63.5	mm	Area of Sp	bec.	3166.9	mm²	
Weight of Ring	62.9	g	Wt. of Stone	130.03	s g	Wt. of Pap	ber	0.3	g	
Specific Gravity	2.63		Tested By	Yueru C	hen	Date		3/30/	2009	
Trimmings	6			1			2	2		
Tin No.			4	04)4			405		
Wt. of Tin (g)			28		27	.7				
Wt. of Tin + Wet Soi	l (g)		15	1.72		146.43				
Wt. of Tin + Dry Soil			13	3.83			128	.45		
Wt. of Dry Soil (g)			10	5.12			100	.75		
Wt. of Water (g)			17	.89			17.	98		
Water Content (%)			1	7.0			17	.8		
Average Water Cont	ent (%)				17.4					
Specimer	I		Befor	e Test			After	Test		
Tare I.D. No.			Ring, Sto	ne, Paper			10)1		
Wt. of Tare + Wet S	oil (g)		32	0.79			155	5.2		
Wt. of Tare + Dry Se	oil (g)			-			135	.81		
Wt. of Tare (g)			193	3.23			28.	02		
Wt. of Wet Soil (g)			12	7.56			127	.18		
Wt. of Dry Soil (g)			10	7.79			107	.79		
			19	.77			19.	39		
Wt. of Water (g)						18.0				
Wt. of Water (g) Water Content (%)			18	3.3			18	.0		
Water Content (%)							18	.0		
Water Content (%)		ρ _d	1.70 g/cm	³ Final Dr	y Density		18 ρ _d	.0 1.80	-	
Water Content (%)	ıt	Ρ _d γ _d		³ Final Dr	y Density y Unit Wei	ght			-	
Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	1.70 g/cm 16.7 kN/m	³ Final Dr ³ Final Dr	y Unit Wei	-	ρ _d	1.80 17.6	-	
		γ _d S	1.70 g/cm	³ Final Dr ³ Final Dr 4	y Unit Wei 5	6	Ρ _d γ _d	1.80	g/cm ³ kN/m	

Project:	An expe	rimenta	al investigation c	of the b	behavior	of compa	cted sand/c	clay mix	tures	
Sample: Mo	dified Pro	ctor co	mpacted, 50% s	and 5	0% bent	onite, 20%	% water con	itent (M	150B20W	/)
Consolid. Type	EI25-047	'9		C	Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of S	pec.	3166.9	\rm{mm}^2
Weight of Ring	62.9	g	Wt. of Stone		130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.63		Tested By	Y	'ueru Ch	en	Date		3/26/	2009
Trimmings	3			1				2	2	
Tin No.			7			201				
Wt. of Tin (g)			2	28.16				28.	88	
Wt. of Tin + Wet Soil	l (g)		14	45.08				157	.24	
Wt. of Tin + Dry Soil	(0)		1	25.9				13	5.9	
Wt. of Dry Soil (g)			9	7.74				107	.02	
Wt. of Water (g)			1	9.18				21.	34	
Water Content (%)			,	19.6			19.9			
Average Water Cont	ent (%)					19.8				
Specimen	l		Befo	ore Tes	st			After	Test	
Tare I.D. No.			Ring, St	one, F	Paper			B-	19	
Wt. of Tare + Wet S	oil (g)		3′	17.05				150	.78	
Wt. of Tare + Dry Se	oil (g)			-			129.8			
Wt. of Tare (g)			19	93.20				27.	39	
Wt. of Wet Soil (g)			12	23.85				123	.39	
Wt. of Dry Soil (g)			1(02.41				102	.41	
Wt. of Water (g)			2	1.44				20.	98	
Water Content (%)				20.9				20	.5	
				-						
Initial Dry Density		ρ_{d}	1.62 g/cn		inal Dry			ρ_{d}	1.75	g/cm
Initial Dry Unit Weigh	nt	γd	15.8 kN/r	n° F	inal Dry	Unit Weig	pht	γd	17.1	kN/m
End of load deforma			0	`	4	5	0		7	
End of load deforma Load Step No. Corrected Def (mm)	tion result 1 0.08	-	2 3 0.1570 0.2	3	4 0.4420	5 0.6650	6 0.9880	1	7 5100	

Project:	An experimental investigation of Low energy compacted, 85% s				the behavior of compacted sand/clay mixtures					
Sample:	Low er	nergy co	ompacted, 8	35% san	d 15% kao	linite, 6%	water conte	nt (L15	K6W)	
Consolid. Type	EI25-047	9			Consolid	. Туре	Fixed Ring)		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5	mm	Area of Sp	ec.	3166.9	$\rm mm^2$
Weight of Ring	66.4	g	Wt. of Sto	one	130	g	Wt. of Pap	er	0.3	g
Specific Gravity	2.64		Tested By	1	Yueru Ch	en	Date		2/12/	2009
Trimmings	5			1				2)	
Tin No.				MAJI	D			FJ	-3	
Wt. of Tin (g)				28.6				2	9	
Wt. of Tin + Wet Soil	(g)			186.7	7			193	3.9	
Wt. of Tin + Dry Soil	(g)			177.7	7			184	4.6	
Wt. of Dry Soil (g)				149.1	1			158	5.6	
Wt. of Water (g)				9				9.	3	
Water Content (%)				6.0				6.	0	
Average Water Conte	ent (%)					6.0				
Specimen	-			Before 7	Fest			After	Test	
Tare I.D. No.			Rir	ng, Stone	, Paper			3/	Ą	
Wt. of Tare + Wet Se	oil (a)							150	0.6	
	on (g)			313.1	I					
Wt. of Tare + Dry Sc	(0)			313.1 -	I			144	4.3	
	(0)			313.1 - 196.7				144 34	-	
Wt. of Tare + Dry Sc	(0)			-	0				.7	
Wt. of Tare + Dry Sc Wt. of Tare (g)	(0)			196.7	0 0			34	.7 5.9	
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g)	(0)			- 196.7 116.4	0 0 0			34 115	.7 5.9 9.6	
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(0)			- 196.7 116.4 109.6	0 0 0			34 11: 10:	.7 5.9 9.6 3	
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	(0)			196.7 116.4 109.6 6.80	0 0 0			34 115 109 6.	.7 5.9 9.6 3	
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(0)	ρ _d	1.73	196.7 116.4 109.6 6.80	0 0 0	Density		34 115 109 6.	.7 5.9 9.6 3	g/cm ³
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	Pd γd	1.73 17.0	196.7 116.4 109.6 6.80 6.2	0 0 0		ht	34 115 109 6. 5.	.7 5.9 9.6 3 7	U U
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	tion results	γ _d	17.0	196.7 116.4 109.6 6.80 6.2 g/cm ³ kN/m ³	0 0 0 Final Dry	Unit Weig		34 11 10 6. 5. Ρ _d	7 5.9 9.6 3 7 1.83 17.9	U U
Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	bil (g)	γ _d		196.7 116.4 109.6 6.80 6.2 g/cm ³	0 0 0 Final Dry		ht 6	34 11 6. 5. Ρ _d γ _d	.7 5.9 9.6 3 7 1.83	g/cm ² kN/m ²

Project:	An expe	rimenta	I investigation	of the	behavior	f the behavior of compacted sand/clay mixtures				
Sample:	Low ene	ergy cor	npacted, 85% s	sand 1	15% kaolir	nite, 8% w	ater content	t (L15ł	<8W)	
Consolid. Type	El25-047	'9			Consolid.	Туре	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.		63.5	mm	Area of Sp	ec.	3166.9	mm ²
Weight of Ring	66.3	g	Wt. of Stone		133.6	g	Wt. of Pap	er	0.3	g
Specific Gravity	2.64		Tested By	Ì	Yueru Che	en	Date		2/11/	2009
Trimmings	;			1				2	2	
Tin No.				418				41	5	
Wt. of Tin (g)				28.8				28	.8	
Wt. of Tin + Wet Soil	(g)		2	222.7				186	5.8	
Wt. of Tin + Dry Soil	(g)		2	208.2				175	5.1	
Wt. of Dry Soil (g)			1	179.4				146	5.3	
Wt. of Water (g)				14.5				11	.7	
Water Content (%)				8.1				8.	0	
Average Water Cont	ent (%)					8.0				
Specimen			Befo	ore Te	est			After	Test	
Tare I.D. No.			Ring, S	tone,	Paper			В	8	
Wt. of Tare + Wet S	oil (g)		3	324.7				151	1.9	
Wt. of Tare + Dry So	oil (g)			-				143	3.2	
Wt. of Tare (g)			2	00.20	1			27	.4	
			1	24.50	1			124	1.5	
Wt. of Wet Soil (g)				2 1.00						
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			1	15.80	1			115	5.8	
					I			115 8.		
Wt. of Dry Soil (g)				15.80					7	
Wt. of Dry Soil (g) Wt. of Water (g)				15.80 8.70				8.	7	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	1.83 g/cr	15.80 8.70 7.5 m ³ F	Final Dry I	Density		8.	7	-
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	nt	Pd γd	;	15.80 8.70 7.5 m ³ F			ht	8. 7.	7 5	-
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d S	1.83 g/cr 17.9 kN/i	15.80 8.70 7.5 m ³ F m ³ F	Final Dry I Final Dry I	Jnit Weig		8. 7. ρ _d	7 5 1.92 18.8	-
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d S	1.83 g/cr 17.9 kN/ 2	15.80 8.70 7.5 m ³ F	Final Dry I		ht 6 0.8250	8. 7. Ρ _d γ _d	7 5 1.92	g/cm ⁻ kN/m

Project:	An expe	rimenta	I investigation of	the behavior	of compa	cted sand/c	ted sand/clay mixtures			
Sample:	Low ener	gy com	pacted, 85% san	d 15% kaolin	ite, 10% v	vater conter	nt (L15ł	< 10W)		
Consolid. Type	EI25-047	'9		Consolid	. Туре	Fixed Rin	g			
Height of Spec.	20	mm	Dia. of Spec.	63.5	mm	Area of S	pec.	3166.9	mm ²	
Weight of Ring	67.5	g	Wt. of Stone	129.9	g	Wt. of Pap	ber	0.3	g	
Specific Gravity	2.64		Tested By	Yueru Ch	en	Date		2/11/	2009	
Trimmings	;			1			2	2		
Tin No.			2	13			20)5		
Wt. of Tin (g)			27	7 .9			29	.7		
Wt. of Tin + Wet Soil	(g)		20	9.6			209	9.7		
Wt. of Tin + Dry Soil	(g)		19	3.1			193	3.5		
Wt. of Dry Soil (g)			16	5.2			163	3.8		
Wt. of Water (g)			16	6.5			16	.2		
Water Content (%)			1(0.0			9.	9		
Average Water Cont	ent (%)				9.9					
Specimen			Befor	e Test			After	Test		
Tare I.D. No.			Ring, Sto	ne, Paper			В	7		
Wt. of Tare + Wet S	oil (g)		32	2.2			151	1.6		
Wt. of Tare + Dry Se	oil (g)			-			141	1.3		
Wt. of Tare (g)			197	7.70			28	.7		
Wt. of Wet Soil (g)			124	1.50			122	2.9		
Wt. of Dry Soil (g)			112	2.60			112	2.6		
Wt. of Water (g)			11	.90			10	.3		
			10).6			9.	1		
Water Content (%)					-					
Water Content (%)										
Initial Dry Density		ρ_{d}	1.78 g/cm ²				ρ_{d}	1.89	-	
Initial Dry Density Initial Dry Unit Weigł		γd	1.78 g/cm [°] 17.4 kN/m			jht	Ρ _d Yd	1.89 18.5	-	
Initial Dry Density Initial Dry Unit Weigł End of load deforma	tion result	γ _d s	17.4 kN/m	³ Final Dry	Unit Weig	,		18.5	-	
Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)		γ _d s	0	³ Final Dry 4		9ht 6 1.0130	γd		g/cm ³ kN/m	

Project:	An expe	rimenta	al investigation of th	ne behavior of compacted sand/clay mixtures				
Sample:	Low ener	gy com	pacted, 85% sand	15% kaolinite, 12%	water content (L15	5K12W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	67.6	g	Wt. of Stone	132 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	2/10/2009		
Trimmings	5		1			2		
Tin No.			B7		2	05		
Wt. of Tin (g)			28.7	7	29	9.6		
Wt. of Tin + Wet Soil	(g)		157.	4	21	0.8		
Wt. of Tin + Dry Soil	(g)		143.	5	19)1.1		
Wt. of Dry Soil (g)			114.	8	16	51.5		
Wt. of Water (g)			13.9	9	19	9.7		
Water Content (%)			12.1	1	12	2.2		
Average Water Cont	ent (%)			12.2				
Specimen	I		Before	Test	After	r Test		
Tare I.D. No.			Ring, Stone	e, Paper	2	13		
Wt. of Tare + Wet S	oil (g)		325.	3	15	51.4		
Wt. of Tare + Dry Se	oil (g)		-		13			
						9.9		
Wt. of Tare (g)			199.9	90	2	9.9 7.9		
Wt. of Tare (g) Wt. of Wet Soil (g)			199.9 125.4					
				40	12	7.9		
Wt. of Wet Soil (g)			125.4	40	12 1	7.9 23.5		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			125.4 112.0	40 00 0	12 1 1'	7.9 23.5 12		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			125.4 112.0 13.4	40 00 0	12 1 1'	7.9 3.5 12 1.5		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	125.4 112.0 13.4	40 00 0	12 1 1'	7.9 33.5 12 1.5 0.3		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	nt	ρ _d γ _d	125.4 112.0 13.4 12.0	40 00 0 0	12 1 1 10 Ρ _d	7.9 13.5 12 1.5 0.3 1.85 g/cm		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	125.4 112.0 13.4 12.0 1.77 g/cm ³	40 00 0 D Final Dry Density	12 1 1 10 Ρ _d	7.9 13.5 12 1.5 0.3 1.85 g/cm ³		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)		γd	125.4 112.0 13.4 12.0 1.77 g/cm ³	40 00 0 D Final Dry Density	12 1 1 10 Ρ _d	7.9 13.5 12 1.5 0.3 1.85 g/cm ³		

Project:	An experimental investigation of				e behavior	of compa	cted sand/c	lay mi	tures	
Sample:	Low ene	ergy cor	mpacted, 7	'5% sand	25% kaolii	nite, 6% w	ater conter	nt (L25	K6W)	
Consolid. Type	EI25-047	9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	67.5	g	Wt. of St	one	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested E	8y	Yueru Ch	en	Date		2/13/	2009
Trimmings				1				2	2	
Tin No.				213				20)5	
Wt. of Tin (g)				27.9	1			29	.7	
Wt. of Tin + Wet Soil	(g)			189.0	6			196	6.5	
Wt. of Tin + Dry Soil ((g)			180.	1			18	7.3	
Wt. of Dry Soil (g)				152.2	2			15	7.6	
Wt. of Water (g)				9.5				9.	2	
Water Content (%)				6.2				5.	8	
Average Water Conte	ent (%)					6.0				
Specimen				Before -	Fest			After	Test	
Tare I.D. No.			Ri	ng, Stone	, Paper			В	8	
Wt. of Tare + Wet Sc	oil (g)			301				13	33	
Wt. of Tare + Dry So	il (g)			-				12	7.4	
Wt. of Tare (g)				196.1	0			28	.4	
Wt. of Wet Soil (g)				104.9	0			104	4.6	
Wt. of Dry Soil (g)				99.00	C			9	9	
Wt. of Water (g)				5.90	1			5.	6	
Water Content (%)				6.0				5.	.7	
Initial Dry Density		ρ_{d}	1.56	g/cm ³	Final Dry			ρ_{d}	1.74	g/cm
		γd	15.3	kN/m ³	Final Dry	Unit Weig	ht	γd	17.1	kN/m
, ,										
End of load deformati	on result			_		_	-		_	
Initial Dry Unit Weight End of load deformati Load Step No. Corrected Def (mm)		S	2 0.3710	3 0.5690	4 0.7900	5 1.0900	6 1.5000		7 0800	

Project:	An expe	rimenta	I investigation of the	e behavior of compacted sand/clay mixtures				
Sample:	Low ene	ergy cor	npacted, 75% san	d 25% kaolinite, 8%	water content (L25	5K8W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	63	g	Wt. of Stone	133.7 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	2/13/2009		
Trimmings			1			2		
Tin No.			7		2	01		
Wt. of Tin (g)			28.	1	28	8.8		
Wt. of Tin + Wet Soil	(g)		18	l	18	31.2		
Wt. of Tin + Dry Soil	(g)		169	6	16	9.5		
Wt. of Dry Soil (g)			141	5	14	0.7		
Wt. of Water (g)			11.	4	1.	1.7		
Water Content (%)			8.1		8	8.3		
Average Water Conte	ent (%)			8.2				
Specimen			Before	Test	After	r Test		
Specimen Tare I.D. No.			Before Ring, Ston			r Test 19		
•	oil (g)			e, Paper	В			
Tare I.D. No.			Ring, Ston	e, Paper	B 14	19		
Tare I.D. No. Wt. of Tare + Wet So			Ring, Ston	e, Paper 3	B 14 14	19 9.4		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So			Ring, Ston 319 -	e, Paper 3 00	B 14 14 21	19 9.4 90.6		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			Ring, Ston 319 - 197.	e, Paper 3 00 30	B 14 14 2 1	19 19.4 10.6 7.4		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			Ring, Ston 319 - 197. 122.	e, Paper 3 00 30 20	B 14 14 21 1 1	19 19.4 10.6 7.4 22		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Ring, Ston 319 - 197. 122. 113.	e, Paper 3 00 30 20 0	B 14 14 2 1 1 11 8	19 99.4 90.6 7.4 22 3.2		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		-	Ring, Ston 319 - 197. 122. 113. 9.1 8.0	e, Paper 3 00 30 20 0	B 14 14 2 1 1 11 8 7	19 19.4 10.6 7.4 22 3.2 3.8 2.8		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	Ρd	Ring, Ston 319 - 197. 122. 113. 9.1 8.0 1.79 g/cm ³	e, Paper 3 00 30 20 0 5 Final Dry Density	Β 14 14 21 1 1 11 8 7 7 Ρ _d	19 19.4 10.6 7.4 22 3.2 5.8 7.8 1.91 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Ory Soil (g) Wt. of Water (g) Water Content (%)	t	γd	Ring, Ston 319 - 197. 122. 113. 9.1 8.0	e, Paper 3 00 30 20 0	Β 14 14 21 1 1 11 8 7 7 Ρ _d	19 19.4 10.6 7.4 22 3.2 5.8 7.8 1.91 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	t	γd	Ring, Ston 319 - 197. 122. 113. 9.1 8.0 1.79 g/cm ³	e, Paper 3 00 30 20 0 5 Final Dry Density	Β 14 14 21 1 1 11 8 7 7 Ρ _d	19 19.4 20.6 7.4 22 3.2 3.8 2.8 1.91 g/cm ²		

Project:	An experimental investig			tion of the	cted sand/o	clay mix	tures			
Sample: L	ow ener	gy com	pacted, 75	5% sand 2	25% kaolinite	e, 10% w	vater contei	nt (L25I	K10W)	
Consolid. Type	El25-047	9			Consolid.	Гуре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5 r	nm	Area of S	pec.	3166.9	\rm{mm}^2
Weight of Ring	67.5	g	Wt. of St	one	128.3 g)	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested B	Ву	Yueru Cher	n	Date		2/12/	2009
Trimmings				1				2	2	
Tin No.				7				20)1	
Wt. of Tin (g)			28.2			28.9				
Wt. of Tin + Wet Soil ((g)			221.7	7			205	5.5	
Wt. of Tin + Dry Soil (g)			203.4	1			189	9.1	
Wt. of Dry Soil (g)				175.2	2			160	0.2	
Wt. of Water (g)				18.3				16	.4	
Water Content (%)				10.4				10	.2	
Average Water Conte	nt (%)					10.3				
Specimen				Before 7	「est			After	Test	
Specimen Tare I.D. No.			Rir	Before T ng, Stone				After B1		
·	il (g)		Rir		, Paper				19	
Tare I.D. No.	,		Rir	ng, Stone	, Paper			B1	19 7.8	
Tare I.D. No. Wt. of Tare + Wet So	,		Rir	ng, Stone	, Paper			B1 157	19 7.8 6.3	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi	,		Rir	ng, Stone 327.6 -	, Paper S 0			B1 157 146	19 7.8 6.3 7.4	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)	,		Rir	ng, Stone 327.6 - 196.1	, Paper 5 0 0			B1 157 146 27	19 7.8 6.3 7.4 0.4	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)	,		Rir	ng, Stone 327.6 - 196.1 131.5	, Paper 5 0 0 0			B1 157 146 27 130	19 7.8 5.3 7.4 0.4 3.9	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	,		Rir	ng, Stone 327.6 - 196.1 131.5 118.9	, Paper 5 0 0 0 0			B1 155 146 27 130 118	19 7.8 6.3 7.4 0.4 8.9 .5	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	,			ng, Stone 327.6 - 196.1 131.5 118.9 12.60 10.6	, Paper 5 0 0 0 0	ensity		B1 157 14(27 13(11) 11 9.	19 7.8 6.3 7.4 0.4 3.9 .5 7	0/000
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	1.88	ng, Stone 327.6 - 196.1 131.5 118.9 12.60 10.6 g/cm ³	, Paper 5 0 0 0 0 5 Final Dry D		lbt	B1 155 14€ 27 130 118 11 9. Ρd	19 7.8 6.3 7.4 0.4 3.9 .5 7 7	-
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	γd		ng, Stone 327.6 - 196.1 131.5 118.9 12.60 10.6	, Paper 5 0 0 0 0		ht	B1 157 14(27 13(11) 11 9.	19 7.8 6.3 7.4 0.4 3.9 .5 7	-
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	il (g)	γd	1.88	ng, Stone 327.6 - 196.1 131.5 118.9 12.60 10.6 g/cm ³	, Paper 5 0 0 0 0 5 Final Dry D		ht 6	Β1 155 14(27 130 11(11 9. Ρ _d	19 7.8 6.3 7.4 0.4 3.9 .5 7 7	g/cm ² kN/m

Project:	An expe	erimenta	I investigation of th	e behavior of compa	cted sand/clay mix	xtures
Sample:	Low ener	gy com	pacted, 75% sand	25% kaolinite, 12% v	vater content (L25	K12W)
Consolid. Type	EI25-047	79		Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	63	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By	Yueru Chen	Date	2/11/2009
Trimmings	;		1		:	2
Tin No.			MAJI	D	FJ	I-3
Wt. of Tin (g)			28.6	6	2	9
Wt. of Tin + Wet Soil	(g)		196		18	33
Wt. of Tin + Dry Soil	(g)		178.	3	16	6.3
Wt. of Dry Soil (g)			149.	7	13	7.3
Wt. of Water (g)			17.7	,	16	6.7
Water Content (%)			11.8	3	12	2.2
Average Water Cont	ent (%)			12.0		
Specimen			Before	Test	After	Test
Tare I.D. No.			Ring, Stone	e, Paper	3	A
Wt. of Tare + Wet S	oil (g)		319.	5	16	0.6
Wt. of Tare + Wet S Wt. of Tare + Dry So	,		319. -	5	-	0.6 8.7
	,		319. - 191.6		14	
Wt. of Tare + Dry So	,		-	60	14 34	8.7
Wt. of Tare + Dry So Wt. of Tare (g)	,		- 191.6	60 90	14 34 12	8.7 1.7
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	,		191.6 127.9	50 90 90	14 34 12 1	8.7 1.7 5.9
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	,		191.6 127.9 114.0	50 10 10 0	14 34 12 1 1	8.7 1.7 5.9 14
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	,		191.6 127.9 114.0 13.9 12.2	50 00 00 2	14 34 12 1 1 1 1 1 1	8.7 1.7 5.9 14 1.9 0.4
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	ρ _d	191.6 127.9 114.0 13.9 12.2 1.80 g/cm ³	50 50 50 50 5 5 Final Dry Density	14 34 12 1 ¹ 11 10 Ρ _d	8.7 1.7 5.9 14 1.9 0.4
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	γd	191.6 127.9 114.0 13.9 12.2	50 00 00 2	14 34 12 1 ¹ 11 10 Ρ _d	8.7 1.7 5.9 14 1.9).4
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	bil (g)	γ _d s	191.6 127.9 114.0 13.9 12.2 1.80 g/cm ³	50 50 50 50 5 5 Final Dry Density	14 34 12 1 ¹ 11 10 Ρ _d	8.7 1.7 5.9 14 1.9 0.4

Project:	An expe	rimenta	al investigation of	the behavior (of compa	cted sand/cla	y mixtures		
Sample:	Low ener	gy com	pacted, 75% san	d 25% kaolinit	te, 14% v	vater content	(L25K14W)		
Consolid. Type	EI25-047	'9		Consolid.	Туре	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5	mm	Area of Spe	ec. 3166	.9 mm ²	
Weight of Ring	63	g	Wt. of Stone	132.7	g	Wt. of Pape	er 0.3	g	
Specific Gravity	2.64		Tested By	Yueru Che	en	Date	2/1	0/2009	
Trimmings				l			2		
Tin No.			FJ	FJ-3			MAJID		
Wt. of Tin (g)			2	9			28.6		
Wt. of Tin + Wet Soil	(g)		16	6.2			233.3		
Wt. of Tin + Dry Soil	(g)		149	9.5			208.5		
Wt. of Dry Soil (g)			12	0.5			179.9		
Wt. of Water (g)			16	5.7			24.8		
Water Content (%)			13	8.9			13.8		
Average Water Cont	ent (%)				13.8				
Specimen			Before	e Test			After Test		
Tare I.D. No.			Ring, Sto	ne, Paper			ЗA		
Wt. of Tare + Wet S	oil (g)		32	23			158.6		
Wt. of Tare + Dry So	oil (g)						145.9		
Wt. of Tare (g)			196	6.00			34.7		
Wt. of Wet Soil (g)			127	.00			123.9		
Wt. of Dry Soil (g)			111	.20					
Wt. of Dry Soil (g) Wt. of Water (g)				-			111.2 12.7		
			15	-					
Wt. of Water (g)			15. 14	.80 .2			12.7		
Wt. of Water (g) Water Content (%)		ρ _d	15. 14 1.76 g/cm ³	80 9.2 Final Dry [12.7	0	
Wt. of Water (g) Water Content (%) Initial Dry Density	ıt	Pd γd	15. 14	80 9.2 Final Dry [ght	12.7 11.4	0	
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	15 14 1.76 g/cm ³ 17.2 kN/m ²	80 .2 Final Dry I ³ Final Dry I	Jnit Weig	-	12.7 11.4 ρ _d 1.98 γ _d 19.4	0	
Wt. of Water (g)		γ _d s	15. 14 1.76 g/cm ³	80 3.2 ³ Final Dry I ³ Final Dry I 4		9ht 6 2.0400	12.7 11.4 ρ _d 1.98	3, 5111	

Project:	An expe	rimenta	al investigation of	the beh	avior	of compa	cted sand/o	clay mix	tures	
Sample:	Low ener	gy com	pacted, 50% sar	ıd 50% k	aolini	te, 14% v	ater conte	nt (L50	K14W)	
Consolid. Type	EI25-047	9		Cor	nsolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Spec.	6	3.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	62.9	g	Wt. of Stone	12	29.9	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested By	Yue	ru Che	en	Date		2/12/	2009
Trimmings	;			1				2	2	
Tin No.			4	18				41	5	
Wt. of Tin (g)			2	8.8				28	.8	
Wt. of Tin + Wet Soil	(g)		17	77.2				16	6.6	
Wt. of Tin + Dry Soil	(g)		15	59.4				149	9.8	
Wt. of Dry Soil (g)			13	30.6				12	21	
Wt. of Water (g)			1	7.8				16	.8	
Water Content (%)			1	3.6				13	.9	
Average Water Cont	ent (%)					13.8				
Specimen			Befor	re Test				After	Test	
Tare I.D. No.			Ring, Sto	one, Pap	er			В	7	
Wt. of Tare + Wet S	oil (g)		30)2.2				13	7.2	
Wt. of Tare + Dry So	oil (g)			-				124	4.5	
Wt. of Tare (g)			19	3.10				28	.7	
Wt. of Wet Soil (g)			10	9.10				108	8.5	
									8	
Wt. of Dry Soil (g)			95	5.80				95	.0	
Wt. of Dry Soil (g) Wt. of Water (g)				5.80 3.30				95 12	-	
			13						7	
Wt. of Water (g)			13 1:	3.30 3.9				12	7	
Wt. of Water (g) Water Content (%) Initial Dry Density		ρ _d	13 1: 1.51 g/cm	3.30 3.9 ³ Fina	•	Density		12	1.7 .3	0
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	13 1:	3.30 3.9 ³ Fina	•	Density Jnit Weig	ht	12 13	2.7 9.3	0
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γd	13 1: 1.51 g/cm 14.8 kN/m	3.30 3.9 1 ³ Fina 1 ³ Fina	l Dry I	Jnit Weig		12 13 Ρ _d	2.7 3.3 1.76 17.2	0
Wt. of Water (g)		γ _d s	13 1: 1.51 g/cm	3.30 3.9 1 ³ Fina 1 ³ Fina	•		ht 6 1.4500	12 13 Ρ _d γ _d	1.7 .3	g/cm ² kN/m ²

	An expe	rimenta	I investigation of th	e behavior of compa	acted sand/clay mi	ed sand/clay mixtures			
Sample: L	ow energ	gy com	pacted, 50% sand s	50% kaolinite, 16%	water content (L50	K16W)			
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²			
Weight of Ring	66.3	g	Wt. of Stone	133.6 g	Wt. of Paper	0.3 g			
Specific Gravity	2.62		Tested By	Yueru Chen	Date	2/12/2009			
Trimmings			1		;	2			
Tin No.			213		20	05			
Wt. of Tin (g)			27.9	1	29	9.7			
Wt. of Tin + Wet Soil ((g)		152.4	4	16	3.3			
Wt. of Tin + Dry Soil (g)		135.	1	14	4.5			
Wt. of Dry Soil (g)			107.2	2	11	4.8			
Wt. of Water (g)			17.3		18	3.8			
Water Content (%)			16.1		16	6.4			
Average Water Conte	nt (%)			16.3					
Chaolman			Before ⁻	Foot	After	Test			
Specimen			Delute	rest		Test			
Tare I.D. No.			Ring, Stone			88			
·	il (g)			, Paper	E				
Tare I.D. No.	(0)		Ring, Stone	, Paper	E 15	88			
Tare I.D. No. Wt. of Tare + Wet So	(0)		Ring, Stone	e, Paper 2	E 15 1:	38 1.7			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi	(0)		Ring, Stone 324.2	a, Paper 2 0	E 15 1: 28	38 1.7 35			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)	(0)		Ring, Stone 324.: - 200.2	9, Paper 2 0 0	E 15 1: 28 12	88 1.7 35 3.4			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)	(0)		Ring, Stone 324.2 - 200.2 124.0	a, Paper 2 0 0 0	E 15 1: 28 12 10	88 1.7 35 3.4 3.3			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(0)		Ring, Stone 324.: - 200.2 124.0 106.6	a, Paper 2 0 0 0 0 0	E 15 1: 28 12 10	88 1.7 35 3.4 3.3 6.6			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(0)		Ring, Stone 324.: 200.2 124.0 106.6 17.40 16.3	a, Paper 2 00 00 00 00	E 15 1: 28 12 10 10 16	88 1.7 35 3.4 3.3 6.6 5.7 5.7			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g)	ρ _d	Ring, Stone 324.2 200.2 124.0 106.6 17.40 16.3 1.68 g/cm ³	Paper 2 0 0 0 0 0 0 5 Final Dry Density	Ε 15 1: 28 12 10 16 15 Ρ _d	88 1.7 35 3.4 3.3 6.6 5.7 5.7 1.86 g/cm			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	: (g)	γd	Ring, Stone 324.: 200.2 124.0 106.6 17.40 16.3	a, Paper 2 00 00 00 00	Ε 15 1: 28 12 10 16 15 Ρ _d	88 1.7 35 3.4 3.3 6.6 5.7 5.7 1.86 g/cm			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	: (g)	γd	Ring, Stone 324.2 200.2 124.0 106.6 17.40 16.3 1.68 g/cm ³	Paper 2 0 0 0 0 0 0 5 Final Dry Density	Ε 15 1: 28 12 10 16 15 Ρ _d	88 1.7 35 3.4 3.3 6.6 5.7 5.7 1.86 g/cm ²			

Project:	An expe	rimenta	al investigation of	the be	havior	of compa	acted sand/	clay mix	ktures	
Sample:	Low ener	gy com	pacted, 50% sar	nd 50%	kaolini	ite, 18%	water conte	nt (L50	K18W)	
Consolid. Type	EI25-047	'9		Co	onsolid	. Туре	Fixed Rir	ng		
Height of Spec.	20	mm	Dia. of Spec.	(63.5	mm	Area of S	Spec.	3166.9	\rm{mm}^2
Weight of Ring	66.4	g	Wt. of Stone		130	g	Wt. of Pa	iper	0.3	g
Specific Gravity	2.62		Tested By	Yue	eru Ch	en	Date		2/11/	2009
Trimmings	6			1				2	2	
Tin No.				7				20	01	
Wt. of Tin (g)			28	8.1				28	8.8	
Wt. of Tin + Wet Soil	(g)		1	72				17:	2.7	
Wt. of Tin + Dry Soil			14	19.7				15	0.6	
Wt. of Dry Soil (g)			12	21.6				12	1.8	
Wt. of Water (g)			2	2.3				22	2.1	
Water Content (%)			1	8.3				18	8.1	
Average Water Cont	ent (%)					18.2				
Specimen			Befor	re Test				After	Test	
Tare I.D. No.			Ring, Sto	one, Pa	per			B	19	
Wt. of Tare + Wet S	oil (g)		32	23.2				15	1.4	
Wt. of Tare + Dry Se	oil (g)			-				13	4.3	
Wt. of Tare (g)			19	6.70				27	7.3	
			12	6.50				124	4.1	
Wt. of Wet Soil (g)				0.00						
Wt. of Wet Soil (g) Wt. of Dry Soil (g)				7.00				10)7	
(0)			10)7 7.1	
Wt. of Dry Soil (g)			10 19	7.00				17		
Wt. of Dry Soil (g) Wt. of Water (g)			10 19 11	7.00 9.50 8.2				17	7.1	
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		Ρd	10 19 11 1.69 g/cm	7.00 9.50 8.2 ³ Fin	al Dry	Density		17	7.1	-
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	ıt	Pd γd	10 19 11	7.00 9.50 8.2 ³ Fin		Density Unit Wei	ght	17 16	7.1 6.0	-
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	10 19 11 1.69 g/cm 16.6 kN/m	7.00 9.50 8.2 ³ Fin			ght	17 16 Ρ _d	7.1 5.0 1.98 19.4	g/cm [°] kN/m
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	10 19 11 1.69 g/cm	7.00).50 8.2 ³ Fin 1 ³ Fin			ght 6	17 16 Ρ _d γ _d	7.1 5.0 1.98	-

Project:	An expe	rimenta	al investigati	on of the	e behavior	of compa	cted sand/c	lay mix	tures	
Sample:	Low ener	gy com	pacted, 50%	% sand 5	50% kaolini	te, 20% v	ater conter	nt (L50I	<20W)	
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	66.3	g	Wt. of Sto	ne	134.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested By	1	Yueru Che	en	Date		2/10/	2009
Trimmings	3			1				2		
Tin No.				418				41	5	
Wt. of Tin (g)				28.8				28	.8	
Wt. of Tin + Wet Soil	l (g)			207.3	3			207	1.7	
Wt. of Tin + Dry Soil	(g)			178.5	5			172	2.9	
Wt. of Dry Soil (g)				149.7	7			144	4.1	
Wt. of Water (g)				28.8				28	.8	
Water Content (%)				19.2				20	.0	
Average Water Cont	ent (%)					19.6				
Specimen	l			Before 7	「est			After	Test	
Tare I.D. No.			Ring	g, Stone	, Paper			B1	9	
Wt. of Tare + Wet S	oil (g)			321.6	6			144	1.2	
Wt. of Tare + Dry Se	oil (g)			-				127	7.1	
Wt. of Tare (g)				200.9	0			27	.4	
Wt. of Wet Soil (g)				120.7	0			116	6.8	
Wt. of Dry Soil (g)				99.70)			99	.7	
Wt. of Water (g)				21.00)			17	.1	
Water Content (%)				21.1				17	.2	
				_						
Initial Dry Density		ρ_{d}		g/cm ³	Final Dry I			ρ_{d}	1.82	g/cm ³
	- 1	γd	15.4	kN/m ³	Final Dry	Unit Weig	ht	γd	17.9	kN/m
, ,										
End of load deforma	tion result	S					-		7	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)		S	2 0.3990	3 0.6910	4 1.2100	5 1.7500	6 2.2400	0.1	7 7300	

Project:	An exp	perimen	tal investi	gation of t	he behavio	or of compa	acted sand/	clay mi	xtures	
Sample:	Standard	Proctor	compacte	ed, 85% s	and 15% k	aolinite, 5%	% water cor	ntent (S	15K5W)	
Consolid. Type	EI25-047	9			Consolid	. Туре	Fixed Ring	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm²
Weight of Ring	63.1	g	Wt. of St	one	130	g	Wt. of Pap	ber	0.3	g
Specific Gravity	2.64		Tested E	Ву	Yueru Ch	en	Date		1/27/	2009
Trimmings	3			1				2	2	
Tin No.				5				FJ	-3	
Wt. of Tin (g)				28.9)			29	.1	
Wt. of Tin + Wet Soil	(g)			126.9	9			143	3.5	
Wt. of Tin + Dry Soil	(0)			122				137	7.7	
Wt. of Dry Soil (g)				93.1				108	3.6	
Wt. of Water (g)				4.9				5.	8	
Water Content (%)				5.3				5.	3	
Average Water Cont	ent (%)					5.3				
Specimer	1			Before -	Test			After	Test	
Tare I.D. No.			Ri	ng, Stone	e, Paper			В	7	
Wt. of Tare + Wet S	oil (g)			313.0	6			148	3.3	
Wt. of Tare + Dry So	oil (g)			-				142	2.4	
Wt. of Tare (g)				193.4	0			28	.7	
Wt. of Wet Soil (g)				120.2	20			119	9.6	
Wt. of Dry Soil (g)				113.7	0			11:	3.7	
Wt. of Water (g)				6.50)			5.	9	
Water Content (%)				5.7				5.	2	
Initial Dry Density		ρ_{d}	1.80	g/cm ³	Final Dry			ρ_{d}	1.87	g/cm
	ht.	γd	17.6	kN/m ³	Final Dry	Unit Weigl	nt	γd	18.3	kN/m
Initial Dry Unit Weigh	it.									
End of load deformat	tion results	3								
Initial Dry Unit Weigh End of load deformat Load Step No. Corrected Def (mm)			2 0.1140	3 0.2410	4 0.3760	5 0.5280	6 0.6630		7 8030	

dard Proctor c 25-0479 20 mm - g 2.64	Dia. of Spec. Wt. of Stone Tested By 1 213 27.9 174	nd 15% kaolinite, 8% Consolid. Type 63.5 mm - g Yueru Chen	Fixed Ring Area of Spec. Wt. of Paper Date	3166.9 mm ² - g 1/22/2009
20 mm - g 2.64	Wt. of Stone Tested By 1 213 27.9	63.5 mm - g	Area of Spec. Wt. of Paper Date	- g 1/22/2009 2
- g 2.64	Wt. of Stone Tested By 1 213 27.9	- g	Wt. of Paper Date	- g 1/22/2009 2
2.64	Tested By 1 213 27.9	Ţ	Date	1/22/2009
	1 213 27.9	Yueru Chen	2 2 8	2
	213 27.9		В	_
1	27.9			37
I			~	
ì	174			3.7
			19	2.1
	163.8	3	18	0.8
	135.9)	15	2.1
	10.2		11	1.3
	7.5		7	.4
(%)		7.5		
	Before T	est	After	[.] Test
	Ring, Stone,	, Paper	3	A
(g)	321.1		15	8.3
g)	-		1:	50
	197.00	D	34	4.7
	124.10	D	12	3.6
	115.30	D	11	5.3
	8.80		8	.3
	7.6		7	.2
	4.00 / 3			4.00
	0			1.92 g/cm ²
	17.8 kN/m°	Final Dry Unit Weig	jni γ _d	18.8 kN/m
	2 3	Δ 5	6	7
				.0465
	g)	(%) Before T Ring, Stone g) 321.1 g) - 197.00 124.10 115.30 8.80 7.6 P _d 1.82 g/cm ³ γ _d 17.8 kN/m ³ results 1 2 3	(%) 7.5 Before Test Ring, Stone, Paper g) 321.1 g) - 197.00 124.10 115.30 8.80 7.6 ρ _d 1.82 g/cm ³ Final Dry Density γ _d 17.8 kN/m ³ Final Dry Unit Weig results 1 2 3 4 5	(%) 7.5 Before Test After Ring, Stone, Paper 3 g) 321.1 15 g) - 19 197.00 34 124.10 12 115.30 11 8.80 8 7.6 7 ρ_d 1.82 g/cm ³ Final Dry Density ρ_d γ_d 17.8 kN/m ³ Final Dry Unit Weight γ_d results 2 3 4 5 6

Project:	An expe	rimenta	al investigation of t	he behavior of compa	acted sand/clay mi	xtures
Sample: Sta	andard Pr	octor co	ompacted, 85% sa	and 15% kaolinite, 10	% water content (S	15K10W)
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	63	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By	Yueru Chen	Date	1/26/2009
Trimmings	3		1			2
Tin No.			41	5	4	18
Wt. of Tin (g)			28	.8	28	3.8
Wt. of Tin + Wet Soil	(g)		28.8 194.1			4.9
Wt. of Tin + Dry Soil			194.1204.9179.8189.9			
Wt. of Dry Soil (g)			15	1	16	1.1
Wt. of Water (g)			14.	.3	1	5
Water Content (%)			9.	5	9	.3
Average Water Cont	ent (%)			9.4		
Specimen			Before	Test	After	Test
Tare I.D. No.			Ring, Stor	ne, Paper		5
Wt. of Tare + Wet S	oil (g)		320).8	15	5.1
Wt. of Tare + Dry Se	oil (g)		-		14	4.7
Wt. of Tare (g)			193	.30	28	
						3.9
Wt. of Wet Soil (g)			127.		12	6.2
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			127. 115.	.50		
				.50 .80	11	6.2
Wt. of Dry Soil (g)			115	.50 .80 70	11 1(6.2 5.8
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)			115. 11. 10.	.50 .80 70 .1	11 1(6.2 5.8).4 .0
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	115. 11. 10. 1.83 g/cm ³	50 .80 70 .1 Final Dry Density	11 1(9 Ρ _d	6.2 5.8).4 .0 1.91 g/cm
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	115. 11. 10.	50 .80 70 .1 Final Dry Density	11 1(9 Ρ _d	6.2 5.8).4 .0 1.91 g/cm
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d S	115. 11. 10. 1.83 g/cm ³ 17.9 kN/m ³	.50 .80 70 .1 Final Dry Density Final Dry Unit Wei	11 1(9 P _d ght γ _d	6.2 5.8).4 .0 1.91 g/cm 18.7 kN/m
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	115. 11. 10. 1.83 g/cm ³	50 .80 70 .1 Final Dry Density Final Dry Unit Wei 4 5	11 10 9 Pd βht γd	6.2 5.8 0.4 .0 1.91 g/cm

Project:	An expe	rimenta	al investigat	ion of th	e behavior	of compa	acted sand/o	clay mix	ktures	
Sample: Sta	andard Pr	octor co	ompacted, 8	85% san	d 15% kac	olinite, 129	% water cor	ntent (S	15K12W	')
Consolid. Type	EI25-047	'9			Consolid	l. Type	Fixed Rin	ng		
Height of Spec.	20	mm	Dia. of Sp	bec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	63.1	g	Wt. of Sto	one	130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By	y	Yueru Ch	ien	Date		1/28/	/2009
Trimmings	5			1				2	2	
Tin No.				B7				MA	JID	
Wt. of Tin (g)				28.7				28	3.4	
Wt. of Tin + Wet Soil	(g)			261.7	7			24	8.3	
Wt. of Tin + Dry Soil	(g)			236.8	3			224	4.6	
Wt. of Dry Soil (g)				208.	1			19	6.2	
Wt. of Water (g)				24.9	1			23	3.7	
Water Content (%)				12.0	1			12	2.1	
Average Water Cont	ent (%)					12.0				
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Rin	g, Stone	, Paper			21	13	
Wt. of Tare + Wet S	oil (g)			318.2	2			15	0.5	
Wt. of Tare + Dry So	oil (g)			-				13	9.1	
Wt. of Tare (g)				193.4	0			27	' .9	
Wt. of Wet Soil (g)				124.8	0			12	2.6	
Wt. of Dry Soil (g)				111.2	0			11	1.2	
Wt. of Water (g)				13.60	C			11	.4	
Water Content (%)				12.2				10).3	
Initial Dry Density		ρ_{d}		g/cm ³	Final Dry	Density		ρ_{d}	1.85	g/cm
	nt	γd	17.2	kN/m ³	Final Dry	Unit Wei	ght	γd	18.1	kN/m
Initial Dry Unit Weigh										
Initial Dry Unit Weigh End of load deforma	tion result								_	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)			2 0.3680	3 0.5000	4 0.6300	5 0.7820	6 0.9020		7 0200	

Project:	An expe	rimenta	al investigation of th	he behavior of comp	acted sand/clay mi	xtures
Sample: Star	ndard Pro	octor co	ompacted, 85% sa	nd 15% kaolinite, 14	% water content (S15K14W)
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	63	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By	Yueru Chen	Date	1/29/2009
Trimmings			1			2
Tin No.			415	5	MA	JID
Wt. of Tin (g)			28.	7	2	8.6
Wt. of Tin + Wet Soil	(g)		235	6	21	1.4
Wt. of Tin + Dry Soil (g)		210	3	18	9.2
Wt. of Dry Soil (g)			181	6	16	60.6
Wt. of Water (g)			25.	3	2	2.2
Water Content (%)			13.	9	1	3.8
Average Water Conte	nt (%)			13.9		
Specimen			Before	Test	Afte	r Test
Tare I.D. No.			Ring, Ston	e, Paper	3	BA
Wt. of Tare + Wet So	il (g)		317	7	15	5.7
Wt. of Tare + Dry Soi	l (g)		-		14	3.5
Wt. of Tare (g)			193.	30	3	4.7
Wt. of Wet Soil (g)			124.	40	1	21
			108.	80	10	8.8
Wt. of Dry Soil (g)			100.	50	TC TC	0.0
Wt. of Dry Soil (g) Wt. of Water (g)			15.6			2.2
				60	1:	
Wt. of Water (g)			15.6	60	1:	2.2
Wt. of Water (g) Water Content (%)		ρ _d	15.6	60	1:	2.2 1.2 1.82 g/cm ²
Wt. of Water (g) Water Content (%) Initial Dry Density		Ρ _d γ _d	15.6 14.	50 3	1: 1 Ρ _d	2.2 1.2 1.82 g/cm
Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weight End of load deformation		γd	15.6 14. 1.72 g/cm ³ 16.8 kN/m ³	50 3 Final Dry Density	1: 1 Ρ _d	2.2 1.2 1.82 g/cm ² 17.8 kN/m
Wt. of Water (g)		γ _d S	15.6 14. 1.72 g/cm ³	Final Dry Density Final Dry Unit We	1: 1 ight γ _d	2.2 1.2 1.82 g/cm ²

Project:	An expe	rimenta	I investigation of th	e behavior of compa	cted sand/clay mi	xtures	
Sample: S	tandard F	Proctor of	compacted, 75% sa	nd 25% kaolinite, 69	% water content (S	25K6W)	
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring		
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²	
Weight of Ring	66.4	g	Wt. of Stone	128.2 g	Wt. of Paper	0.3 g	
Specific Gravity	2.64		Tested By	Yueru Chen	Date	1/29/2009	
Trimmings	3		1		:	2	
Tin No.			213		E	57	
Wt. of Tin (g)			28		28	3.8	
Wt. of Tin + Wet Soi	l (g)		181.3	8	19	0.1	
Wt. of Tin + Dry Soil	(g)		172.	6	18	0.5	
Wt. of Dry Soil (g)			144.0	6	15	1.7	
Wt. of Water (g)			9.2		9	.6	
Water Content (%)			6.4		6	.3	
Average Water Cont	ent (%)			6.3			
Specimen	1		Before	Test	After	Test	
Tare I.D. No.			Ring, Stone	e, Paper	F	I-3	
Wt. of Tare + Wet S	oil (g)		306.	9	14	0.6	
Wt. of Tare + Dry So	oil (g)		-		13	4.3	
Wt. of Tare (g)			194.9	0	29	9.1	
Wt. of Wet Soil (g)			112.0	0	11	1.5	
Wt. of Dry Soil (g)			105.2	20	10	5.2	
			6.80)	6	.3	
Wt. of Water (g)					6.3 6.0		
Wt. of Water (g) Water Content (%)			6.5		6	.0	
					6	.0	
Water Content (%)		ρ _d	6.5 1.66 g/cm ³	Final Dry Density	Ρ _d	1.77 g/cm	
Water Content (%)	ıt	Ρ _d γ _d			Ρ _d	1.77 g/cm	
Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	1.66 g/cm ³ 16.3 kN/m ³	Final Dry Density Final Dry Unit Wei	Ρ _d ght γ _d	1.77 g/cm [°] 17.3 kN/m	
		γ _d s	1.66 g/cm ³	Final Dry Density Final Dry Unit Weig 4 5	ρ _d ght γ _d 6	1.77 g/cm	

Project:	An expe	rimenta	I investigatior	۱ of the	e behavior of compa	cted sand/clay mi	xtures
Sample: S	tandard F	roctor	compacted, 7	5% sa	nd 25% kaolinite, 8%	% water content (S	325K8W)
Consolid. Type	EI25-047	'9			Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec).	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	66.4	g	Wt. of Stone)	128.3 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By		Yueru Chen	Date	1/27/2009
Trimmings	;			1			2
Tin No.				MAJI	C	4	15
Wt. of Tin (g)				28.6		28	3.7
Wt. of Tin + Wet Soil	(g)			196.5	5	20	1.3
Wt. of Tin + Dry Soil	(g)			184.3	3	18	8.4
Wt. of Dry Soil (g)				155.7	7	15	9.7
Wt. of Water (g)				12.2		1:	2.9
Water Content (%)				7.8		8	.1
Average Water Cont	ent (%)				8.0		
Specimen			Be	efore T	est	After	r Test
Tare I.D. No.			Ring,	Stone	, Paper	3	BA
Wt. of Tare + Wet S	oil (g)			315.9	9	15	5.3
Wt. of Tare + Dry So	oil (g)			-		14	7.1
Wt. of Tare (g)				195.0	0	34	4.7
						40	
Wt. of Wet Soil (g)				120.9	0	12	0.6
Wt. of Wet Soil (g) Wt. of Dry Soil (g)				120.9 112.4			0.6 2.4
					0	11	
Wt. of Dry Soil (g)				112.4	0	11 8	2.4
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)				112.4 8.50 7.6	0	11 8	2.4 5.2 5.3
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	0	112.4 8.50 7.6	0 Final Dry Density	11 8 7 Ρd	2.4 3.2 3.3 1.86 g/cm
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	0	112.4 8.50 7.6	0	11 8 7 Ρd	2.4 3.2 3.3 1.86 g/cm
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformation	tion result	γ _d S	17.4 ki	112.44 8.50 7.6 ⁄cm ³ V/m ³	0 Final Dry Density Final Dry Unit Weiq	11 8 7 Pα ght γ _d	2.4 2.2 3.3 1.86 g/cm ² 18.2 kN/m
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γ _d S	17.4 kM	112.4 8.50 7.6	0 Final Dry Density	11 8 7 Pd ght γd	2.4 3.2 3.3 1.86 g/cm ²

Project:	An expe	rimenta	I investigation of the	ne behavior of compa	acted sand/clay mi	xtures
Sample: Sta	andard Pro	octor co	ompacted, 75% sa	nd 25% kaolinite, 109	% water content (S	25K10W)
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	66.4	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By	Yueru Chen	Date	1/23/2009
Trimmings	3		1			2
Tin No.			MAJ	ID	E	88
Wt. of Tin (g)			28.	5	28	3.4
Wt. of Tin + Wet Soi	l (g)		129	.9	13	1.8
Wt. of Tin + Dry Soil	(g)		12	1	12	2.9
Wt. of Dry Soil (g)			92.	5	94	4.5
Wt. of Water (g)			8.9)	8	.9
Water Content (%)			9.6	3	9	.4
Average Water Cont	ent (%)			9.5		
Specimen	I		Before	Test	After	Test
Tare I.D. No.			Ring, Ston	e, Paper		5
Wt. of Tare + Wet S	oil (g)		335	5	16	6.3
Wt. of Tare + Dry Se						
W. OF TALE + DIY SC	oil (g)		-		15	4.9
Wt. of Tare (g)	oil (g)		196.	70	-	
-	oil (g)		- 196. 138.		28	4.9
Wt. of Tare (g)	oil (g)			30	28 13	4.9 3.9
Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)		138.	30 00	28 13 1:	4.9 3.9 7.4
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)		138. 126.	30 00 30	28 13 1. 11	4.9 3.9 7.4 26
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g)		138. 126. 12.3	30 00 30	28 13 1. 11	4.9 3.9 7.4 26 1.4
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)	ρ _d	138. 126. 12.3	30 00 30	28 13 1. 11	4.9 3.9 7.4 26 1.4
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d γ _d	138. 126. 12.3 9.8	30 00 30 3	2ξ 13 1 1 1 9 9	4.9 3.9 7.4 26 1.4 .0 2.14 g/cm ²
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	nt	γd	138. 126. 12.3 9.8 1.99 g/cm ³	30 00 30 3 Final Dry Density	2ξ 13 1 1 1 9 9	4.9 3.9 7.4 26 1.4 .0 2.14 g/cm ³
Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	nt	γd	138. 126. 12.3 9.8 1.99 g/cm ³	30 00 30 3 Final Dry Density	2ξ 13 1 1 1 9 9	4.9 3.9 7.4 26 1.4 .0 2.14 g/cm ³

Project:	An expe	rimenta	I investigation of th	e behavior of compa	cted sand/clay mix	ktures
Sample: Sta	andard Pr	octor co	ompacted, 75% sar	nd 25% kaolinite, 12%	6 water content (S	25K12W)
Consolid. Type	EI25-047	'9		Consolid. Type	Fixed Ring	
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²
Weight of Ring	66.4	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g
Specific Gravity	2.64		Tested By	Yueru Chen	Date	1/26/2009
Trimmings			1		2	2
Tin No.			MAJI	D	В	8
Wt. of Tin (g)			28.6	3	28	8.5
Wt. of Tin + Wet Soil	(g)		183.	7	17	7.9
Wt. of Tin + Dry Soil	(g)		167.	5	16	2.5
Wt. of Dry Soil (g)			138.	9	1:	34
Wt. of Water (g)			16.2	2	15	5.4
Water Content (%)			11.7	7	11	.5
Average Water Cont	ent (%)			11.6		
Specimen			Before	Test	After	Test
Tare I.D. No.			Ring, Stone	e, Paper	FJ	-3
					16	
Wt. of Tare + Wet S	oil (g)		330.	5	10.	2.2
Wt. of Tare + Wet S Wt. of Tare + Dry So	(0)		330. -	5	-	2.2 0.1
	(0)		330. - 195.0	-	15	
Wt. of Tare + Dry So	(0)		-	00	15 2	0.1
Wt. of Tare + Dry So Wt. of Tare (g)	(0)		- 195.0	00	15 2 13	0.1 9
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	(0)		195.0 135.0	00 50 0	15 2 13 12	0.1 9 3.2
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(0)		- 195.0 135.9 121.7	00 50 10 0	15 2 13 12 12	0.1 9 3.2 1.1
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	(0)		- 195.(135.; 121. ⁻ 14.4	00 50 10 0	15 2 13 12 12	0.1 9 3.2 1.1 2.1
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(0)	ρ _d	- 195.(135.; 121. ⁻ 14.4	00 50 10 0	15 2 13 12 12	0.1 9 3.2 1.1 2.1 0.0
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	bil (g)	ρ _d γ _d	- 195.(135.(121. ⁻ 14.4 11.(00 50 10 0	15 2 13 12 12 12 10 Γd	0.1 9 3.2 1.1 2.1 0.0 2.11 g/cm ²
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	bil (g)	γd	- 195.(135.(121.7 14.4 11.(1.91 g/cm ³	00 50 0 0 Final Dry Density	15 2 13 12 12 12 10 Γd	0.1 9 3.2 1.1 2.1 0.0 2.11 g/cm ² 20.6 kN/m
Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	bil (g)	γ _d S	- 195.(135.(121.7 14.4 11.(1.91 g/cm ³	00 50 0 0 Final Dry Density	15 2 13 12 12 12 10 μht γ _d	0.1 9 3.2 1.1 2.1 0.0 2.11 g/cm ⁵

Project:	An experim	ental investigatio	n of the	behavior of com	pacted sand/clay	[,] mixtures	
Sample: Star	ndard Procto	or compacted, 75	% sanc	1 25% kaolinite, 1	4% water conten	t (S25K14W)	
Consolid. Type E	125-0479			Consolid. Type	Fixed Ring		
Height of Spec.	20 m	m Dia. of Spec	с.	63.5 mm	Area of Spec	3166.9	mm²
Weight of Ring	66.4 g	Wt. of Stone	e	128.3 g	Wt. of Paper	0.3	g
Specific Gravity	2.64	Tested By		Yueru Chen	Date	1/28/2	009
Trimmings			1			2	
Tin No.			415			FJ-3	
Wt. of Tin (g)			28.7			29	
Wt. of Tin + Wet Soil (g)		223.7			190.4	
Wt. of Tin + Dry Soil (g	g)		200			170.8	
Wt. of Dry Soil (g)			171.3			141.8	
Wt. of Water (g)			23.7			19.6	
Water Content (%)			13.8			13.8	
Average Water Conter	nt (%)			13.8			
Specimen		B	efore T	est	A	fter Test	
opeeimen			0.0.0 .	651			
Tare I.D. No.			Stone,			5	
•	il (g)			Paper			
Tare I.D. No.			Stone,	Paper		5	
Tare I.D. No. Wt. of Tare + Wet Soi			Stone,	Paper		5 154	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil			Stone, 323.3 -	Paper		5 154 141.4	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil Wt. of Tare (g)			Stone, 323.3 - 195.00	Paper)		5 154 141.4 28.9	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g)			Stone, 323.3 - 195.00 128.30	Paper))		5 154 141.4 28.9 125.1	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Stone, 323.3 - 195.00 128.30 112.50	Paper))		5 154 141.4 28.9 125.1 112.5	
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g)	Ring,	Stone, 323.3 - 195.00 128.30 112.50 15.80 14.0	Paper))		5 154 141.4 28.9 125.1 112.5 12.6 11.2	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g)	Ring, ρ _d 1.78 g,	Stone, 323.3 - 195.00 128.30 112.50 15.80 14.0 /cm ³	Paper)) Final Dry Density		5 154 141.4 28.9 125.1 112.5 12.6 11.2	•
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g)	Ring, ρ _d 1.78 g,	Stone, 323.3 - 195.00 128.30 112.50 15.80 14.0 /cm ³	Paper))		5 154 141.4 28.9 125.1 112.5 12.6 11.2	•
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	(g)	Ring, ρ _d 1.78 g,	Stone, 323.3 - 195.00 128.30 112.50 15.80 14.0 /cm ³	Paper)) Final Dry Density		5 154 141.4 28.9 125.1 112.5 12.6 11.2	g/cm kN/m

Project:	/ in oxpe	menta	al investigation of the behavior of compacted sand/clay mixtures						
Sample: Sta	andard Pr	octor co	ompacted, 50% s	and 50% kaolinite, 1	12% water conten	t (S50K12W)			
Consolid. Type	EI25-047	79		Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec	c. 3166.9 mm ²			
Weight of Ring	63	g	Wt. of Stone	128.2 g	Wt. of Paper	0.3 g			
Specific Gravity	2.62		Tested By	Yueru Chen	Date	1/23/2009			
Trimmings	;			1		2			
Tin No.			F	-3		415			
Wt. of Tin (g)			2	9		28.7			
Wt. of Tin + Wet Soil	(g)		17	8.8		154.6			
Wt. of Tin + Dry Soil	of Tin + Dry Soil (g)			63		141.2			
Wt. of Dry Soil (g)		134 112.5				112.5			
Wt. of Water (g)			15	i.8		13.4			
Water Content (%)			11	15.8 13.4 11.8 11.9					
Average Water Cont	ent (%)			11.9					
	e Water Content (%) 11.9								
Specimen			Befor	e Test	A	fter Test			
Specimen Tare I.D. No.				e Test ne, Paper	A	fter Test 418			
•			Ring, Sto		A				
Tare I.D. No.	oil (g)		Ring, Sto	ne, Paper	A	418			
Tare I.D. No. Wt. of Tare + Wet S	oil (g)		Ring, Sto 30	ne, Paper	A	418 137.9			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So	oil (g)		Ring, Sto 30 19 ⁴	ne, Paper 1.4		418 137.9 126.8			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)		Ring, Sto 30 19 ⁷ 105	ne, Paper 1.4 - .50		418 137.9 126.8 28.35			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)		Ring, Sto 30 19 109 98	ne, Paper 1.4 .50 9.90		418 137.9 126.8 28.35 109.55			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)		Ring, Sto 30 19 ⁷ 109 98 11	ne, Paper 1.4 .50 0.90 45		418 137.9 126.8 28.35 109.55 98.45			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)		Ring, Sto 30 19 ⁻ 109 98 11 1 ⁻	ne, Paper 1.4 .50 9.90 .45 .6		418 137.9 126.8 28.35 109.55 98.45 11.1 11.3			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	ρ _d	Ring, Sto 30 19 ⁷ 105 98 11 1 ⁷ 1.55 g/cm ²	ne, Paper 1.4 .50 990 .45 .45 .6 Final Dry Densit	У	418 137.9 126.8 28.35 109.55 98.45 11.1 11.3			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γd	Ring, Sto 30 19 ⁻ 109 98 11 1 ⁻	ne, Paper 1.4 .50 990 .45 .45 .6 Final Dry Densit	У	418 137.9 126.8 28.35 109.55 98.45 11.1 11.3			
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g) bil (g)	γ _d s	Ring, Sto 30 19 ⁷ 105 98 11 1 ⁷ 1.55 g/cm ²	ne, Paper 1.4 .50 990 .45 .45 .6 Final Dry Densit	У	418 137.9 126.8 28.35 109.55 98.45 11.1 11.3			

Project:	An expe	rimenta	l investiga	ation of th	ion of the behavior of compacted sand/clay mixtures					
Sample: Sta	andard Pr	octor co	ompacted,	50% san	d 50% kaoli	inite, 14%	6 water con	itent (S	50K14W)
Consolid. Type	EI25-047	'9			Consolid.	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.4	g	Wt. of St	one	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested E	By	Yueru Che	en	Date		1/29/	2009
Trimmings	3		1					2		
Tin No.			418					В	8	
Wt. of Tin (g)			28.9					28	.5	
Wt. of Tin + Wet Soil	l (g)			164.4	4			184	4.2	
Wt. of Tin + Dry Soil				146.9	9			164	4.2	
Wt. of Dry Soil (g)			118				135.7			
Wt. of Water (g)				17.5	i		20			
Water Content (%)				14.8	20 14.7					
	opt (0/)	14.8								
Average Water Cont	ent (%)		14.8							
Average Water Cont	ent (%)					14.8				
Average Water Cont Specimen	. ,			Before 1	Гest	14.8		After	Test	
•	. ,		Ri	Before ⊺ ng, Stone		14.8		After 5		
Specimen	1		Ri		, Paper	14.8			5	
Specimen Tare I.D. No.	oil (g)		Ri	ng, Stone	, Paper	14.8		5	5 D.6	
Specimen Tare I.D. No. Wt. of Tare + Wet S	oil (g)		Ri	ng, Stone	e, Paper 1	14.8		5 150	5 0.6 5.7	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So	oil (g)		Ri	ng, Stone 317.4	e, Paper 1 0	14.8		5 150 135	5 0.6 5.7 3.9	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)		Ri	ng, Stone 317.4 - 195.0	e, Paper 1 0 0	14.8		5 150 135 28	5 D.6 5.7 6.9 1.7	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)		Ri	ng, Stone 317. - 195.0 122.1	a, Paper 1 0 0 0	14.8		5 150 135 28 122	5 0.6 5.7 6.9 1.7 6.8	
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)		Ri	ng, Stone 317. - 195.0 122.1 106.8	e, Paper 1 0 0 0 0 0	14.8		5 150 135 28 12 ² 106	5 0.6 5.7 9.9 1.7 6.8	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)			ng, Stone 317. ⁻ 195.0 122.1 106.8 15.3(14.3	a, Paper 1 0 0 0 0 0 0			5 150 135 28 12 ⁻ 100 14 14	5 0.6 5.7 0.9 1.7 6.8 .9 .0	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	oil (g)	ρ _d	1.69	ng, Stone 317. - 195.0 122.1 106.8 15.30 14.3 g/cm ³	e, Paper 1 0 0 0 0 0 5 Final Dry E	Density		5 150 135 28 12 106 14 14 14	5 0.6 5.7 .9 1.7 5.8 .9 .0 1.80	-
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh	oil (g) oil (g)	γd		ng, Stone 317. ⁻ 195.0 122.1 106.8 15.3(14.3	a, Paper 1 0 0 0 0 0 0	Density	ht	5 150 135 28 12 ⁻ 100 14 14	5 0.6 5.7 0.9 1.7 6.8 .9 .0	g/cm kN/m
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	oil (g) oil (g)	γ _d s	1.69	ng, Stone 317. - 195.0 122.1 106.8 15.30 14.3 g/cm ³	e, Paper 1 0 0 0 0 0 5 Final Dry E	Density	ht	5 150 135 28 12 106 14 14 14	5 0.6 5.7 .9 1.7 5.8 .9 .0 1.80	-

Project:	An expe	rimenta	I investigation of th	f the behavior of compacted sand/clay mixtures				
Sample: Sta	andard Pr	octor co	ompacted, 50% sa	nd 50% kaolinite, 16	% water content (S50K16W)		
Consolid. Type	El25-047	'9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	-	g	Wt. of Stone	- g	Wt. of Paper	- g		
Specific Gravity	2.62		Tested By	Yueru Chen	Date	1/26/2009		
Trimmings	\$		1			2		
Tin No.			B7		2	13		
Wt. of Tin (g)			28.	7	2	7.9		
Wt. of Tin + Wet Soil	n + Wet Soil (g)			7	15	57.5		
Wt. of Tin + Dry Soil	(g)		129	9	139.7 111.8			
Wt. of Dry Soil (g)			101	2				
Wt. of Water (g)			15.8	3	111.8			
Water Content (%)			15.0	6	1	5.9		
Average Water Cont	ent (%)			15.8				
Specimen			Before	Test	Afte	r Test		
Tare I.D. No.			Ring, Ston	e, Paper	:	BA		
Wt. of Tare + Wet S	oil (g)		325	9	16	3.2		
Wt. of Tare + Dry So	Dry Soil (g) - 146.1			6.1				
Wt. of Tare (g)			196.	70	3	4.7		
Wt. of Wet Soil (g)			129.:	20	12	28.5		
(3)					111.4			
Wt. of Dry Soil (g)			111.4	40	11	1.4		
(0)			111. 17.8	-		1.4 7.1		
Wt. of Dry Soil (g)				0	1			
Wt. of Dry Soil (g) Wt. of Water (g)			17.8	0	1	7.1		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	17.8	0	1	7.1 5.4		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	nt	Pd γd	17.8 16.1	0	1 1 Ρ _d	7.1 5.4 1.90 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh		γd	17.8 16.1 1.76 g/cm ³	0) Final Dry Density	1 1 Ρ _d	7.1 5.4 1.90 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g)		γ _d s	17.8 16.1 1.76 g/cm ³	0) Final Dry Density	1 1 Ρ _d	7.1 5.4 1.90 g/cm ³		

	ect: An experimental investigation of the behavior of compacted sand/clay mixtures									
Sample: Sta	indard Pr	octor co	ompacted,	50% san	d 50% kaolin	nite, 18%	water con	tent (S	50K18W)
Consolid. Type	El25-047	'9			Consolid. T	Гуре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	Dec.	63.5 n	nm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.4	g	Wt. of Sto	one	129.6 g	ļ	Wt. of Pa	ber	0.3	g
Specific Gravity	2.62		Tested B	y	Yueru Cher	ו	Date		1/28/	2009
Trimmings				1				2	2	
Tin No.			3A					41	8	
Wt. of Tin (g)				34.8				28	.9	
Wt. of Tin + Wet Soil	(g)			202.2	1			174	4.3	
Wt. of Tin + Dry Soil	of Tin + Dry Soil (g)			176.2	2			152	2.2	
Wt. of Dry Soil (g)			141.4 123.3				3.3			
Wt. of Water (g)				25.9			22.1			
Water Content (%)			25.9 22.1 18.3 17.9				.9			
Average Water Conte	ent (%)					18.1				
		t (%) 18.1								
Specimen				Before 1	Test			After	Test	
Specimen Tare I.D. No.			Rin	Before 1 g, Stone				After B		
•	oil (g)		Rin						8	
Tare I.D. No.			Rin	g, Stone				В	8 1.5	
Tare I.D. No. Wt. of Tare + Wet So			Rin	g, Stone	, Paper			B 15 ⁻	8 1.5 4.7	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So			Rin	g, Stone 322 -	, Paper 0			B 15 ⁻ 134	8 1.5 4.7 .5	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)			Rin	g, Stone 322 - 196.3	, Paper 0 0			B 15 ⁻ 134 28	8 1.5 4.7 .5 23	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)			Rin	g, Stone 322 - 196.3 125.7	, Paper 0 0 0			B 15 ⁻ 134 28 12	8 1.5 4.7 .5 23 5.2	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Rin	g, Stone 322 - 196.3 125.7 106.2	, Paper 0 0 0			B 15 ⁴ 134 28 12 106	8 1.5 4.7 .5 23 5.2 .8	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)				g, Stone 322 - 196.3 125.7 106.2 19.5(18.4	, Paper 0 0 0	ensity		B 15 ⁻¹ 28 12 100 16 15	8 1.5 1.7 .5 23 5.2 .8 .8	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	1.68	g, Stone 322 - 196.3 125.7 106.2 19.50 18.4 g/cm ³	, Paper 0 0 0) Final Dry De	•	bt	Β 15 ⁻¹ 134 28 12 106 16 15	8 1.5 4.7 .5 23 5.2 .8 .8 .8	g/cm
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	t	γd		g, Stone 322 - 196.3 125.7 106.2 19.5(18.4	, Paper 0 0 0	•	ht	B 15 ⁻¹ 28 12 100 16 15	8 1.5 1.7 .5 23 5.2 .8 .8	g/cm [*] kN/m
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	t	γd	1.68	g, Stone 322 - 196.3 125.7 106.2 19.50 18.4 g/cm ³	, Paper 0 0 0) Final Dry De	•	ht	Β 15 ⁻¹ 134 28 12 106 16 15	8 1.5 4.7 .5 23 5.2 .8 .8 .8	0

Project:An experimental investigation of the behavior of compacted sand/clay mixturesSample:Standard Proctor compacted, 50% sand 50% kaolinite, 20% water content (S50K20W)						xtures		
Sample: St	andard Pr	octor co	ompacted, 50% sa	nd 50% kaolinite, 20	% water content (S	\$50K20W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.4	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g		
Specific Gravity	2.62		Tested By	Yueru Chen	Date	1/27/2009		
Trimmings	5		1			2		
Tin No.			21	3	4	18		
Wt. of Tin (g)			27.	9	28	8.8		
Wt. of Tin + Wet Soi	/t. of Tin + Wet Soil (g) /t. of Tin + Dry Soil (g)			.6	19	6.5		
Wt. of Tin + Dry Soil	+ Dry Soil (g)			.3	16	8.7		
Wt. of Dry Soil (g)			121	.4	139.9 27.8 19.9			
Wt. of Water (g)			24.	3				
Water Content (%)			20.	0				
Average Water Cont	ent (%)			19.9				
Specimen	1		Before	Test	After	r Test		
Tare I.D. No.			Ring, Ston	ie, Paper	E	38		
Wt. of Tare + Wet S	oil (g)		319	.1	14	8.6		
Wt. of Tare + Dry Se	oil (g)		-		13	1.8		
Wt. of Tare (g)		195.00						
				.00	20	8.5		
Wt. of Wet Soil (g)			124.			8.5 20.1		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)				10	12			
			124.	10 30	12 10	20.1		
Wt. of Dry Soil (g)			124. 103.	10 30 80	12 10 1(20.1 03.3		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		0-	124. 103. 20.8 20.	10 30 80 1	12 10 10 10	20.1 13.3 6.8 6.3		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	124. 103. 20.8 20. 1.63 g/cm ³	10 30 80 1 Final Dry Density	12 10 10 10 Ρd	20.1 13.3 6.8 6.3 1.91 g/cm		
Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigl		γd	124. 103. 20.8 20.	10 30 80 1 Final Dry Density	12 10 10 10 Ρd	20.1 13.3 6.8 6.3		
Wt. of Dry Soil (g) Wt. of Water (g)		γd	124. 103. 20.8 20. 1.63 g/cm ³	10 30 80 1 Final Dry Density	12 10 10 10 Ρd	20.1 13.3 6.8 6.3 1.91 g/cm		

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures Modified Proctor compacted, 85% sand 15% kaolinite, 4% water content (M15K4W)									
Sample:	Modified	Proctor	compacte	ed, 85% sa	and 15% kaolinite, 49	% water content (M15K4W)			
Consolid. Type	EI25-047	9			Consolid. Type	Fixed Ring				
Height of Spec.	20	mm	Dia. of S	Spec.	63.5 mm	Area of Spec.	3166.9 m	m²		
Weight of Ring	66.4	g	Wt. of S	tone	130 g	Wt. of Paper	0.3 g			
Specific Gravity	2.64		Tested E	Зу	Yueru Chen	Date	2/3/200	9		
Trimminan				4			2			
Trimmings	5			1	D		2			
Tin No.				MAJI			418			
Wt. of Tin (g)	,						28.8			
Wt. of Tin + Wet Soil	(0)	219 212.3					09.1			
Wt. of Tin + Dry Soil	(g)									
Wt. of Dry Soil (g)					ö	173.5				
Wt. of Water (g)				6.7			6.8			
Water Content (%)				3.6		3.9				
	4									
Average Water Conte	ent (%)				3.8					
Average Water Conte				Before		Afte	er Test			
-			R	Before ⁻	Test		er Test 213			
Specimen)		R		Test e, Paper	2				
Specimen Tare I.D. No.	oil (g)		R	ing, Stone	Test e, Paper	2 1	213			
Specimen Tare I.D. No. Wt. of Tare + Wet So	oil (g)		R	ing, Stone	Test e, Paper	2 1. 1.	213 43.4			
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So	oil (g)		R	ing, Stone 312 -	Test e, Paper 70	2 1 1 2	213 43.4 39.1			
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)		R	ing, Stone 312 - 196.7	Test e, Paper 0	2 1. 1. 2 1	213 43.4 39.1 28.7			
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)		R	ing, Stone 312 - 196.7 115.3	Test e, Paper 70 60 60	2 1, 1 2 1 1	213 43.4 39.1 28.7 14.7			
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)		R	ing, Stone 312 - 196.7 115.3 110.4	Test e, Paper 70 60 60	2 1. 1. 2 1 1	213 43.4 39.1 28.7 14.7 10.4			
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)			ing, Stone 312 - 196.7 115.3 110.4 4.90 4.4	Test e, Paper 70 90 90	2 1 1 2 1 1	213 43.4 39.1 28.7 14.7 10.4 4.3 3.9			
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g) Dil (g)	Pa γa	1.74 17.1	ing, Stone 312 - 196.7 115.3 110.4 4.90	Test e, Paper 70 60 60	2 1. 1 2 1 1	213 43.4 39.1 28.7 14.7 10.4 4.3 3.9	/cm [^]		

0.2260 0.3760 0.5330

0.7290

0.8940

1.0600

Corrected Def (mm)

0.1350

Project:	An expe	menta	l investigati			or of compacted sand/clay mixtures					
Sample: N	Iodified P	roctor c	ompacted,	85% sar	nd 15% kaolii	nite, 6%	water cont	ent (M	15K6W)		
Consolid. Type	EI25-047	79			Consolid. T	уре	Fixed Ring	g			
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5 m	nm	Area of S	pec.	3166.9	mm ²	
Weight of Ring	63	g	Wt. of Sto	ne	128.3 g	I	Wt. of Pap	ber	0.3	g	
Specific Gravity	2.64		Tested By	1	Yueru Chen	١	Date		1/30/	2009	
Trimmings	3			1			2				
Tin No.				MAJI	D			-			
Wt. of Tin (g)				28.7							
Wt. of Tin + Wet Soil	l (g)			158.6	6		-				
Wt. of Tin + Dry Soil	(g)		151.3 122.6					-			
Wt. of Dry Soil (g)				122.6	6			-			
Wt. of Water (g)				7.3				-			
Water Content (%)				6.0				-			
Average Water Cont	ent (%)					6.0					
Average Water Cont	ent (%)					6.0					
Average Water Cont Specimen				Before T	「est	6.0		After	Test		
-				Before T g, Stone		6.0		After 3/			
Specimen	· · ·				, Paper	6.0			4		
Specimen Tare I.D. No.	oil (g)			g, Stone	, Paper	6.0		3/	4).6		
Specimen Tare I.D. No. Wt. of Tare + Wet S	oil (g)			g, Stone	, Paper 9	6.0		3/ 160	4).6 3.8		
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So	oil (g)			g, Stone 317.9 -	, Paper 9 0	6.0		3/ 160 153	A).6 3.8 .7		
Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)			g, Stone 317.9 - 191.6	, Paper 9 0 0	6.0		3/ 160 153 34	A).6 3.8 .7 5.9		
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)			g, Stone 317.9 - 191.6 126.3	, Paper 9 0 0	6.0		3/ 160 153 34 125	A 0.6 3.8 .7 5.9 0.1		
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)			g, Stone 317.9 - 191.6 126.3 119.1	, Paper 9 0 0	6.0		3/ 160 153 34 125 119	A 0.6 3.8 .7 5.9 0.1 8		
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)		Ring	g, Stone 317.9 191.6 126.3 119.1 7.20 6.0	, Paper 9 0 0 0			3/ 160 153 34 125 119 6. 5.	A).6 3.8 .7 5.9 9.1 8 7		
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	ρ _d	Ring 1.88	g, Stone 317.9 191.6 126.3 119.1 7.20 6.0 g/cm ³	, Paper 9 0 0 0 Final Dry De	ensity	ht	3/ 160 153 34 125 6. 5.	A).6 3.8 .7 5.9).1 8 7 1.95	-	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γd	Ring 1.88	g, Stone 317.9 191.6 126.3 119.1 7.20 6.0	, Paper 9 0 0 0	ensity	ht	3/ 160 153 34 125 119 6. 5.	A).6 3.8 .7 5.9 9.1 8 7	g/cm [°] kN/m	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γ _d s	Ring 1.88	g, Stone 317.9 191.6 126.3 119.1 7.20 6.0 g/cm ³	, Paper 9 0 0 0 Final Dry De	ensity	ht	3/ 160 153 34 125 6. 5.	A).6 3.8 .7 5.9).1 8 7 1.95	-	

Project:	An expe	rimenta	al investigati	on of the	e behavior	of compa	compacted sand/clay mixtures			
Sample: N	lodified P	roctor c	compacted,	85% sar	nd 15% kao	olinite, 8%	water con	tent (M	15K8W)	
Consolid. Type	EI25-047	'9			Consolid	. Туре	Fixed Rin	ıg		
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5	mm	Area of S	pec.	3166.9	mm ²
Weight of Ring	66.4	g	Wt. of Sto	ne	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By	1	Yueru Ch	en	Date		2/1/2	2009
Trimmings	;			1				2	2	
Tin No.			B-19					20	01	
Wt. of Tin (g)				27.4				28	8.8	
Wt. of Tin + Wet Soi	(g)			179.5	5			203	3.3	
Wt. of Tin + Dry Soil	(g)							19	0.6	
Wt. of Dry Soil (g)				161.8						
Wt. of Water (g)				11.1			12.7			
Water Content (%)				7.9			7.8			
Average Water Cont	ent (%)					7.9				
Specimen			I	Before 7	Fest			After	Test	
Tare I.D. No.			Ring	g, Stone	, Paper			20	05	
Wt. of Tare + Wet S	oil (g)			320.6	6			15	4.6	
Wt. of Tare + Dry Se	oil (g)			-				14	5.8	
Wt. of Tare (g)			195.00			29).7			
Wt. of Wet Soil (g)				125.6	0			124	4.9	
Wt. of Dry Soil (g)				116.1	0			11	6.1	
Wt. of Water (g)				9.50				8	.8	
Water Content (%)				8.2				7.	.6	
			4.00	. 3	E : 1 D	D "			4.00	
			1.83	g/cm ³	Final Dry	Density		ρ_d	1.90	g/cm
		ρ_d		-			1.1		40 7	/
Initial Dry Unit Weigh		γd		kN/m ³	Final Dry	Unit Weig	ht	γd	18.7	kN/m
Initial Dry Unit Weigh End of load deforma	tion result	γ _d s	18.0	kN/m ³		_		γd	-	kN/m
Initial Dry Density Initial Dry Unit Weigł End of load deforma Load Step No. Corrected Def (mm)		γ _d S		-	Final Dry 4 0.3658	Unit Weig 5 0.4851	ht 6 0.6147		18.7 7 7518	kN/m

Project:	An expe	rimenta	al investiga	ation of th	e behavior	of compa	cted sand/c	lay mix	tures	
Sample: Mo	dified Pro	octor co	mpacted,	85% san	d 15% kaol	inite, 10%	water cont	tent (M	15K10W)
Consolid. Type	EI25-047	'9			Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	pec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	66.4	g	Wt. of St	tone	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested E	Зу	Yueru Ch	en	Date		2/5/2	2009
Trimmings			1				2			
Tin No.				415				41	8	
Wt. of Tin (g)				28.8	5			28	.8	
Wt. of Tin + Wet Soil	(g)			187.	6			213	3.2	
Wt. of Tin + Dry Soil				173.	9			196	6.9	
Wt. of Dry Soil (g)		145.1 168.1				3.1				
Wt. of Water (g)				13.7			16.3			
Water Content (%)				9.4				9.	7	
Average Water Conte	ent (%)					9.6				
Specimen				Before	Test			After	Test	
Tare I.D. No.			Ri	ng, Stone	e, Paper			В	7	
Wt. of Tare + Wet Se	oil (g)			325.	2			157	7.6	
Wt. of Tare + Dry Sc	oil (g)			-				14	17	
Wt. of Tare (g)				195.0	0			28	.7	
Wt. of Wet Soil (g)				130.2	20			128	3.9	
Wt. of Dry Soil (g)				118.3	0			118	3.3	
Wt. of Water (g)				11.9	0			10	.6	
Water Content (%)				10.1				9.	0	
				2		_				
Initial Dry Density		ρ_{d}	1.87	g/cm ³	Final Dry			ρ_{d}	1.94	g/cm
			18.3	kN/m ³	Final Dry	Unit Weig	ht	γd	19.0	kN/m
Initial Dry Unit Weigh		γd	10.5							
Initial Dry Unit Weigh End of load deformat	ion result	S				-	<u> </u>		7	
Initial Dry Unit Weigh End of load deformat Load Step No. Corrected Def (mm)		S	2	3	4	5 0.5590	6 0.6680	0.1	7 7720	

Project: An experimental investigation of the behavior of compacted sand/clay mixtures							
Sample: Mo	dified Proctor of	compacted, 75% sar	nd 25% kaolinite, 3%	6 water content (M	25K3W)		
Consolid. Type E	125-0479		Consolid. Type	Fixed Ring			
Height of Spec.	20 mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	66.3 g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64	Tested By	Yueru Chen	Date	2/6/2009		
Trimmings		1		2			
Tin No.		418		4	15		
Wt. of Tin (g)		28.8		28	3.7		
Wt. of Tin + Wet Soil (g	g)	205.2	2	20	7.8		
Wt. of Tin + Dry Soil (g)	199.4	1	20	2.1		
Wt. of Dry Soil (g)		170.6 173.4					
Wt. of Water (g)		5.8		5.7			
Water Content (%)		3.4		3	.3		
Average Water Conten	nt (%)		3.3				
Specimen		Before 7	「est	After	Test		
Specimen Tare I.D. No.		Before T Ring, Stone			⁻ Test 88		
·	l (g)		, Paper	B			
Tare I.D. No.		Ring, Stone	, Paper	B 14	38		
Tare I.D. No. Wt. of Tare + Wet Soil		Ring, Stone	, Paper 5	E 14 14	38 5.2		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil		Ring, Stone 312.5	, Paper 5 0	E 14 14 28	88 5.2 1.4		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g)		Ring, Stone 312.{ - 194.9	, Paper 5 0 0	E 14 14 28 11	88 5.2 1.4 3.5		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g)		Ring, Stone 312.{ - 194.9 117.6	, Paper 5 0 0	E 14 14 28 11	88 5.2 1.4 3.5 6.7		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)		Ring, Stone 312.5 - 194.9 117.6 112.9	, Paper 5 0 0	E 14 14 28 11 11 3	88 5.2 1.4 3.5 6.7 2.9		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g)	Ring, Stone 312. - 194.9 117.6 112.9 4.70 4.2	, Paper 5 0 0 0	E 14 14 28 11 11 3 3	88 5.2 1.4 3.5 6.7 2.9 .8 .4		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(g) ρ _d	Ring, Stone 312.5 - 194.9 117.6 112.9 4.70 4.2 1.78 g/cm ³	, Paper 5 0 0 0 5 Final Dry Density	Ε 14 14 28 11 11 3 3 2	88 5.2 1.4 3.5 6.7 2.9 .8 .4 1.88 g/cm		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weight	(g) ρ _d γ _d	Ring, Stone 312. - 194.9 117.6 112.9 4.70 4.2	, Paper 5 0 0 0	Ε 14 14 28 11 11 3 3 2	88 5.2 1.4 3.5 6.7 2.9 .8 .4		
Tare I.D. No. Wt. of Tare + Wet Soil Wt. of Tare + Dry Soil Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	(g) ρ _d γ _d	Ring, Stone 312.5 - 194.9 117.6 112.9 4.70 4.2 1.78 g/cm ³	, Paper 5 0 0 0 5 Final Dry Density	Ε 14 14 28 11 11 3 3 2	88 5.2 1.4 3.5 6.7 2.9 .8 .4 1.88 g/cm		

Project:	An experimental investigation of the behavior of compacted sand/clay mixtures									
Sample: M	odified P	roctor o	compacted	l, 75% sa	nd 25% kao	olinite, 6%	water cont	tent (M	25K6W)	
Consolid. Type	EI25-047	9			Consolid	Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of S	spec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	63	g	Wt. of S	tone	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested E	Ву	Yueru Ch	en	Date		2/3/2	2009
Trimmings				1					2	
Tin No.			415					FJ	I-3	
Wt. of Tin (g)				28.7	,			2	9	
Wt. of Tin + Wet Soil	(g)			198.	5			19	92	
Wt. of Tin + Dry Soil (of Tin + Dry Soil (g)			188.	8			182	2.4	
Wt. of Dry Soil (g)				160.1 153.4						
Wt. of Water (g)				9.7			9.6			
Water Content (%)				6.1				6.	.3	
Average Water Conte	ent (%)					6.2				
Specimen				Before -	Test			After	Test	
Tare I.D. No.			Ri	ng, Stone	e, Paper			3.	A	
Wt. of Tare + Wet So	oil (g)			317.	7			160	0.7	
Wt. of Tare + Dry So	il (g)			-				153	3.3	
Wt. of Tare (g)				191.6	60			34	l.7	
Wt. of Wet Soil (g)				126.1	0		126			
Wt. of Dry Soil (g)				118.6	60			118	8.6	
Wt. of Water (g)				7.50)			7.	.4	
Water Content (%)				6.3				6.	.2	
		ρ_d	1.87	g/cm ³	Final Dry			ρ_{d}	1.96	g/cm
						1 1 - 1 () (/ - 1 - 1				L NI/ma
Initial Dry Unit Weigh		γd	18.4	kN/m ³	Final Dry	Unit weig	ht	γd	19.2	KIN/M
Initial Dry Unit Weigh End of load deformati	ion result		-					γd		KIN/M
Initial Dry Density Initial Dry Unit Weigh End of load deformati Load Step No. Corrected Def (mm)		S	18.4 2 0.0559	kN/m ³ 3 0.1500	4	5 0.4450	6 0.6480		19.2 7 8890	kN/m

Project: An experimental investigation of the behavior of compacted sand/clay mixtures										
Sample: N	lodified P	roctor c	compacted,	75% sa	nd 25% ka	olinite, 8%	water con	tent (M	25K8W)	
Consolid. Type	El25-047	' 9			Consolid	. Туре	Fixed Rin	g		
Height of Spec.	20	mm	Dia. of Sp	Dec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	66.4	g	Wt. of Sto	one	130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.64		Tested By	у	Yueru Ch	en	Date		1/30/	2009
Trimmings				1	2					
Tin No.			415					FJ	I-3	
Wt. of Tin (g)				28.7				2	9	
Wt. of Tin + Wet Soil	(g)			144.2	2			14	7.1	
Wt. of Tin + Dry Soil	of Tin + Dry Soil (g)			135.9	5			138	8.2	
Wt. of Dry Soil (g)		106.8 109.2				9.2				
Wt. of Water (g)				8.7			8.9			
Water Content (%)				8.1				8.	.2	
Average Water Conte	ent (%)					8.1	I			
Specimen				Before 7	Fest			After	Test	
Tare I.D. No.			Rin	g, Stone	, Paper			41	18	
Wt. of Tare + Wet S	oil (g)			330.8	3		162.5			
Wt. of Tare + Dry So	oil (g)			-				152.9		
Wt. of Tare (g)				196.7	0			28	8.9	
Wt. of Wet Soil (g)				134.1	0			133	3.6	
Wt. of Dry Soil (g)				124.0	0			12	24	
Wt. of Water (g)				10.10	C			9.	.6	
Water Content (%)				8.1				7.	.7	
				_						
Initial Dry Density		ρ_{d}	1.96	g/cm ³	Final Dry			ρ_{d}	2.07	g/cm
	4	γd	19.2	kN/m ³	Final Dry	Unit Weig	ht	γd	20.3	kN/m
, ,										
End of load deformat	ion result	S							_	
Initial Dry Unit Weigh End of load deformat Load Step No. Corrected Def (mm)		S	2 0.2972	3 0.3759	4 0.6604	5 0.7722	6 0.8941		7 0566	

Project:	Allexper	menta	I investiga	tion of the	e behavior o	or compa	cted sand/c	lay mix	tures	
Sample: Moo	dified Pro	ctor co	mpacted,	75% sand	d 25% kaolii	nite, 10%	water cont	ent (M	25K10W)
Consolid. Type E	EI25-0479)	Consolid. Type			Fixed Ring				
Height of Spec.	20	mm	Dia. of Sp	pec.	63.5 mm		Area of Spec.		3166.9 mm ²	
Weight of Ring	66.3	g	Wt. of Sto	one	130	g	Wt. of Pap	ber	0.3	g
Specific Gravity	2.64		Tested B	у	Yueru Che	en	Date		2/2/2	2009
Trimmings				1				2	2	
Tin No.				418				FJ	-3	
Wt. of Tin (g)				28.8				29	9	
Wt. of Tin + Wet Soil ((g)			176.6	6			172	2.2	
Wt. of Tin + Dry Soil (g)			163.3	3			159	9.4	
Wt. of Dry Soil (g)				134.5	5			130).4	
Wt. of Water (g)			13.3				12.8			
Water Content (%)			9.9				9.8			
Average Water Conte	nt (%)		9.9							
Specimen										
Specimen				Before 1	「est			After	Test	
Specimen Tare I.D. No.			Rir	Before T ng, Stone				After B		
•	il (g)		Rir		, Paper				7	
Tare I.D. No.			Rir	ng, Stone	, Paper			B	7 5.7	
Tare I.D. No. Wt. of Tare + Wet So			Rir	ng, Stone	, Paper 3			B 165	7 5.7 4.3	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi			Rir	ng, Stone 334.8 -	, Paper 3 0			B 165 154	7 5.7 4.3 .7	
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry Soi Wt. of Tare (g)			Rir	ng, Stone 334.8 - 196.6	, Paper 3 0 0			B ⁷ 165 154 28	7 5.7 4.3 .7 87	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g)			Rir	ng, Stone 334.8 - 196.6 138.2	, Paper 3 0 0 0			B 165 154 28 13	7 5.7 4.3 .7 37 5.6	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)			Rir	ng, Stone 334.8 - 196.6 138.2 125.6	, Paper 3 0 0 0 0			B 165 154 28 13 125	7 5.7 4.3 .7 37 5.6 .4	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)				ng, Stone 334.{ 196.6 138.2 125.6 12.6(10.0	, Paper 3 0 0 0	Dansin		B 165 28 13 125 11 9.	7 5.7 4.3 .7 5.6 .4 1	
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	l (g)	βď	1.98	ng, Stone 334.8 - 196.6 138.2 125.6 12.60 10.0 g/cm ³	, Paper 3 0 0 0) Final Dry [•	ht	Β 165 28 13 125 11 9. Ρd	7 5.7 4.3 .7 5.6 .4 1 2.12	0
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	l (g)	γd		ng, Stone 334.{ 196.6 138.2 125.6 12.6(10.0	, Paper 3 0 0 0	•	ht	B 165 28 13 125 11 9.	7 5.7 4.3 .7 5.6 .4 1	0
Tare I.D. No. Wt. of Tare + Wet Soi Wt. of Tare + Dry Soi Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	l (g)	γd	1.98	ng, Stone 334.8 - 196.6 138.2 125.6 12.60 10.0 g/cm ³	, Paper 3 0 0 0) Final Dry [•	ht	Β 165 28 13 125 11 9. Ρ _d	7 5.7 4.3 .7 5.6 .4 1 2.12	g/cm [°] kN/m

	Allexpelli	nenta	tal investigation of the behavior of compacted sand/clay mixtures					
Sample: Mo	dified Proc	tor co	pacted, 75% sand 25% kaolinite, 12% water content (M25K12W)					
Consolid. Type	EI25-0479			Consolid. Type	Fixed Ring			
Height of Spec.	20 1	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	63	g	Wt. of Stone	130 g	Wt. of Paper	0.3 g		
Specific Gravity	2.64		Tested By	Yueru Chen	Date	2/5/2009		
Trimmings			1			2		
Tin No.			FJ-3	5	МА	JID		
Wt. of Tin (g)	Vt. of Tin (g)				28	8.6		
Wt. of Tin + Wet Soil (g)			186.2	2	21	2.8		
Wt. of Tin + Dry Soil ((g)		170		19	3.7		
Wt. of Dry Soil (g)			141		16	5.1		
Wt. of Water (g)			16.2		19.1			
Water Content (%)			11.5	i	11.6			
Average Water Conte	ent (%)			11.5				
Specimen				_				
Specimen			Before -	Fest	After	Test		
Tare I.D. No.			Before Ring, Stone			Test A		
•	oil (g)			, Paper	3			
Tare I.D. No.	(0)		Ring, Stone	, Paper	3 16	A		
Tare I.D. No. Wt. of Tare + Wet Sc	(0)		Ring, Stone	e, Paper 3	3 16 15	A 3.4		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So	(0)		Ring, Stone 323.: -	9, Paper 3 0	3 16 15 34	A 3.4 1.4		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So Wt. of Tare (g)	(0)		Ring, Stone 323. - 193.3	9, Paper 3 0 0	3 16 15 34 12	A 3.4 1.4 4.8		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g)	(0)		Ring, Stone 323.: - 193.3 130.0	9, Paper 3 00 0	3 16 15 34 12 11	A 3.4 1.4 I.8 8.6		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	(0)		Ring, Stone 323. - 193.3 130.0 116.6	9, Paper 3 0 0 0 0 0	3 16 15 34 12 11 11 11	A 3.4 1.4 8.8 8.6 6.6		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	(0)		Ring, Stone 323.3 - 193.3 130.0 116.6 13.40 11.5	e, Paper 3 0 0 0 0 0	3 16 15 34 12 11 1 1 1 1 1 10	A 3.4 1.4 4.8 8.6 6.6 2 0.3		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	il (g)	ρ _d	Ring, Stone 323.3 - 193.3 130.0 116.6 13.40 11.5 1.84 g/cm ³	e, Paper 3 0 0 0 0 0 5 Final Dry Density	3 16 15 34 12 11 1 1 1 1 2 0 Ρ _d	A 3.4 1.4 4.8 8.6 6.6 2 0.3 2.00 g/cm		
Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	t	ρ _d γ _d	Ring, Stone 323.3 - 193.3 130.0 116.6 13.40 11.5	e, Paper 3 0 0 0 0 0	3 16 15 34 12 11 1 1 1 1 2 0 Ρ _d	A 3.4 1.4 4.8 8.6 6.6 2 0.3		
Tare I.D. No. Wt. of Tare + Wet Sc Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	t	, a	Ring, Stone 323.3 - 193.3 130.0 116.6 13.40 11.5 1.84 g/cm ³	e, Paper 3 0 0 0 0 0 5 Final Dry Density	3 16 15 34 12 11 1 1 1 1 2 0 Ρ _d	A 3.4 1.4 4.8 8.6 6.6 2 0.3 2.00 g/cm		

Project:	An expe	rimenta	tal investigation of the behavior of compacted sand/clay mixtures							
Sample: Mod	ified Pro	ctor co	mpacted, 50%	sand	50% kaoli	nite, 10%	water cont	ent (M	50K10W)
Consolid. Type E	125-047	9	Consolid. Type			Fixed Ring				
Height of Spec.	20	mm	Dia. of Spec.		63.5 mm		Area of Spec.		3166.9 mm ²	
Weight of Ring	63	g	Wt. of Stone		130	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested By		Yueru Che	en	Date		2/6/2	2009
Trimmings				1				2	2	
Tin No.			:	205				21	3	
Wt. of Tin (g)	of Tin (g)			29.6				27	.8	
Wt. of Tin + Wet Soil (g)				140				153	3.3	
Wt. of Tin + Dry Soil (g	J)		1	30.4				142	2.6	
Wt. of Dry Soil (g)			1	00.8				114	4.8	
Wt. of Water (g)			9.6					10	.7	
Water Content (%)			9.5				9.3			
Average Water Conter	nt (%)		9.4							
Specimen			Befo	ore Te	est			After	Test	
Tare I.D. No.			Ring, Stone, Paper				B7			
Wt. of Tare + Wet Soi	l (g)		318.2				153			
Wt. of Tare + Dry Soil	(g)		-				141.7			
Wt. of Tare (g)			193.30				28.7			
Wt. of Wet Soil (g)			12	24.90)		124.3			
Wt. of Dry Soil (g)			11	13.00)		113			
Wt. of Water (g)			1	1.90			11.3			
			1	10.5			10.0			
Water Content (%)										
Water Content (%)										
		ρ_{d}	1.78 g/cn		Final Dry [•		ρ_{d}	1.86	0
Initial Dry Density Initial Dry Unit Weight		γd			Final Dry I Final Dry I	•	ht	ρ _d γd	1.86 18.2	0
Initial Dry Density Initial Dry Unit Weight End of load deformatic		γd	1.78 g/cn 17.5 kN/r	m³	Final Dry l	Jnit Weig			18.2	0
Water Content (%) Initial Dry Density Initial Dry Unit Weight End of load deformatic Load Step No. Corrected Def (mm)	on results 1 0.02	γ _d	1.78 g/cn 17.5 kN/r 2 3			•	ht 6 0.5588	γd		g/cm ³ kN/m

Project:	An expe	rimenta	l investigati	on of the	e behavior o	of compa	cted sand/c	lay mix	tures	
Sample: Mo	odified Pro	octor co	mpacted, 50	0% sand	d 50% kaolii	nite, 12%	water cont	tent (M	50K12W)
Consolid. Type	EI25-047	' 9	Consolid. Type			Fixed Ring				
Height of Spec.	20	mm	Dia. of Sp	ec.	63.5 mm		Area of Spec.		3166.9 mm ²	
Weight of Ring	66	g	Wt. of Stor	ne	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested By		Yueru Che	en	Date		2/5/2	2009
Trimmings	;			1				2	2	
Tin No.				213				20)5	
Wt. of Tin (g)	of Tin (g)			27.8				29	.6	
Wt. of Tin + Wet Soil	(g)			176				168	3.2	
Wt. of Tin + Dry Soil	(g)			159.6	6			15	53	
Wt. of Dry Soil (g)				131.8	3			123	3.4	
Wt. of Water (g)			16.4				15.2			
Water Content (%)			12.4				12.3			
Average Water Conte	ent (%)		12.4							
3										
Specimen			I	Before T	Test			After	Test	
-				Before T g, Stone				After B		
Specimen					, Paper				8	
Specimen Tare I.D. No.	oil (g)			g, Stone	, Paper			В	8 9.1	
Specimen Tare I.D. No. Wt. of Tare + Wet S	oil (g)			g, Stone	, Paper 2			B 159	8 9.1 5.7	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So	oil (g)			g, Stone 326.2 -	, Paper 2 0			B 159 145	8 9.1 5.7 .5	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g)	oil (g)			g, Stone 326.2 - 194.6	, Paper 2 0 0			B 159 145 28	8 9.1 5.7 .5 0.6	
Specimen Tare I.D. No. Wt. of Tare + Wet Si Wt. of Tare + Dry Sc Wt. of Tare (g) Wt. of Wet Soil (g)	oil (g)			g, Stone 326.2 - 194.6 131.6	, Paper 2 0 0 0			B 159 149 28 130	8 9.1 5.7 .5).6 7.2	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g)	oil (g)			g, Stone 326.2 - 194.6 131.6 117.2	, Paper 2 0 0 0 0			B 159 145 28 130 117	8 9.1 5.7 .5 0.6 7.2 .4	
Specimen Tare I.D. No. Wt. of Tare + Wet S Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g)		Ring	g, Stone 326.2 - 194.6 131.6 117.2 14.4(12.3	, Paper 2 0 0 0			B 159 14 28 130 117 13 13	8 9.1 5.7 .5 0.6 7.2 .4 .4	
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Wet Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	Ρ _d	Ring 1.85	g, Stone 326.2 194.6 131.6 117.2 14.4(12.3 g/cm ³	, Paper 2 0 0 0 0) Final Dry [Density	tht	B 159 149 28 130 117 13 11 29 11	8 9.1 5.7 .5 0.6 7.2 .4 .4 .4	0
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)	oil (g) bil (g)	γd	Ring 1.85	g, Stone 326.2 - 194.6 131.6 117.2 14.4(12.3	, Paper 2 0 0 0	Density	Jht	B 159 14 28 130 117 13 13	8 9.1 5.7 .5 0.6 7.2 .4 .4	g/cm ² kN/m
Specimen Tare I.D. No. Wt. of Tare + Wet So Wt. of Tare + Dry So Wt. of Tare (g) Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	oil (g) bil (g)	γ _d s	Ring 1.85	g, Stone 326.2 194.6 131.6 117.2 14.4(12.3 g/cm ³	, Paper 2 0 0 0 0) Final Dry [Density	jht 6	B 159 149 28 130 117 13 11 29 11	8 9.1 5.7 .5 0.6 7.2 .4 .4 .4	0

Project:	An expe	rimenta	I investigation of	the behavior of compa	acted sand/clay mi	xtures		
Sample: Mo	odified Pro	ctor co	mpacted, 50% sa	and 50% kaolinite, 14%	% water content (M	50K14W)		
Consolid. Type	El25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	63	g	Wt. of Stone	128.3 g	Wt. of Paper	0.3 g		
Specific Gravity	2.62		Tested By	Yueru Chen	Date	1/30/2009		
Trimmings				1	:	2		
Tin No.			E	37	2	13		
Wt. of Tin (g)	Vt. of Tin (g)			3.7	27	7.9		
Wt. of Tin + Wet Soil	(g)		12	8.6	14	7.9		
Wt. of Tin + Dry Soil	(g)		11	6.3	13	2.5		
Wt. of Dry Soil (g)			87	7.6	10	4.6		
Wt. of Water (g)			12	2.3	15	5.4		
Water Content (%)			14	4.0	14.7			
Average Water Cont	ent (%)			14.4				
Specimen			Befor	e Test	After	After Test		
Tare I.D. No.			Ring, Sto	ne, Paper	3A			
Wt. of Tare + Wet S	oil (g)		32	5.6	169			
Wt. of Tare + Dry So	Wt. of Tare + Dry Soil (g)				152.2			
Wt. of Tare (g)				-	15	2.2		
Wt. of Tare (g)	(9)		191	- 1.60	-	2.2 4.7		
Wt. of Tare (g) Wt. of Wet Soil (g)	(3)		-	- 1.60 4.00	34			
			134		34 13	4.7		
Wt. of Wet Soil (g)			134 117	4.00	34 13 11	4.7 4.3		
Wt. of Wet Soil (g) Wt. of Dry Soil (g)			134 117 16	4.00 7.50	34 13 11 16	4.7 4.3 7.5		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)			134 117 16 14	4.00 7.50 5.50 4.0	34 13 11 16	4.7 4.3 7.5 5.8 4.3		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d	134 117 16 14 1.86 g/cm	4.00 7.50 .50 4.0 ³ Final Dry Density	34 13 11 16 14 Ρ _d	4.7 4.3 7.5 5.8 4.3 1.94 g/cm		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%)		ρ _d γ _d	134 117 16 14	4.00 7.50 .50 4.0 ³ Final Dry Density	34 13 11 16 14 Ρ _d	4.7 4.3 7.5 5.8 4.3 1.94 g/cm ²		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g) Water Content (%) Initial Dry Density Initial Dry Unit Weigh End of load deformation	nt tion result	γd	134 117 16 12 1.86 g/cm ² 18.2 kN/m	4.00 7.50 4.0 ³ Final Dry Density ³ Final Dry Unit Wei	34 13 11 16 14 Pd ght γd	4.7 4.3 7.5 5.8 4.3 1.94 g/cm ² 19.0 kN/m		
Wt. of Wet Soil (g) Wt. of Dry Soil (g) Wt. of Water (g)	nt	γ _d s	134 117 16 14 1.86 g/cm	4.00 7.50 .50 4.0 ³ Final Dry Density ³ Final Dry Unit Wei 4 5	34 13 11 16 14 9d ght γ _d	4.7 4.3 7.5 5.8 4.3 1.94 g/cm ²		

Project:	An expe	erimenta	al investigatio	on of the	e behavior	of compa	cted sand/c	lay mix	tures	
Sample: Mo	odified Pro	octor co	mpacted, 50	0% sand	d 50% kaoli	inite, 16%	water cont	ent (M	50K16W)
Consolid. Type	El25-047	79	Consolid. Type			Fixed Ring				
Height of Spec.	20	mm	Dia. of Spe	ec.	63.5	mm	Area of S	pec.	3166.9	mm^2
Weight of Ring	63	g	Wt. of Stor	ne	128.3	g	Wt. of Pa	per	0.3	g
Specific Gravity	2.62		Tested By		Yueru Che	en	Date		2/2/2	2009
Trimmings	5			1				2	2	
Tin No.				415				MA	JID	
Wt. of Tin (g)				28.7				28	.4	
Wt. of Tin + Wet Soil (g)				172.4	1			194	4.7	
Wt. of Tin + Dry Soil	(g)			152.7	7			17 [.]	1.5	
Wt. of Dry Soil (g)				124				143	3.1	
Wt. of Water (g)			19.7				23.2			
Water Content (%)				15.9			16.2			
Average Water Cont	ent (%)		16.0							
Specimen			Before Test				After Test			
Tare I.D. No.			Ring, Stone, Paper				3A			
Wt. of Tare + Wet S	oil (g)		321.9				163.6			
Wt. of Tare + Dry So	oil (g)		-				147.3			
Wt. of Tare (g)			191.60				34.7			
Wt. of Wet Soil (g)			130.30				128.9			
Wt. of Dry Soil (g)				112.6	0		112.6			
Wt. of Water (g)				17.70)		16.3			
Water Content (%)				15.7			14.5			
				_						
Initial Dry Density		ρ_{d}		g/cm ³	Final Dry			ρ_{d}	1.93	g/cm
		γd	17.4	kN/m ³	Final Dry	Unit Weig	lht	γd	18.9	kN/m
, ,										
End of load deforma	tion result	ts	-	0		-			7	
Initial Dry Unit Weigh End of load deforma Load Step No. Corrected Def (mm)		ts	2 0.2616	3 0.3505	4 0.5080	5 0.7798	6 1.1633	4	7 5545	

Project:	An expe	rimenta	al investigation of the behavior of compacted sand/clay mixtures					
Sample: Mo	dified Pro	octor co	mpacted, 50% sar	nd 50% kaolinite, 18%	% water content (M	150K18W)		
Consolid. Type	EI25-047	9		Consolid. Type	Fixed Ring			
Height of Spec.	20	mm	Dia. of Spec.	63.5 mm	Area of Spec.	3166.9 mm ²		
Weight of Ring	63	g	Wt. of Stone	130.4 g	Wt. of Paper	0.3 g		
Specific Gravity	2.62		Tested By	Yueru Chen	Date	2/5/2009		
Trimmings			1			2		
Tin No.			20'	1	В	-19		
Wt. of Tin (g)	Vt. of Tin (g)			8	2	7.4		
Wt. of Tin + Wet Soil (g)			179	.2	17	9.8		
Wt. of Tin + Dry Soil (g)		156	.5	1	57		
Wt. of Dry Soil (g)			127	.7	12	9.6		
Wt. of Water (g)			22.	7	22.8			
Water Content (%)			17.	8	17.6			
Average Water Conte	ent (%)			17.7				
Specimen			Before	Test	Afte	After Test		
Tare I.D. No.			Ring, Ston	e, Paper	7			
Wt. of Tare + Wet Sc	oil (g)		322	.8	155.1			
Wt. of Tare + Dry So	il (g)		-		138			
Wt. of Tare (g)			193.	70	28.1			
Wt. of Wet Soil (g)			129.	10	127			
Wt. of Dry Soil (g)			109.	90	109.9			
Wt. of Water (g)		19.2	20	17.1				
Wt. of Water (g)			10.2					
Wt. of Water (g) Water Content (%)			17.	-	1:	5.6		
(<u> </u>)			17.	5	1:	5.6		
Water Content (%)		ρ _d	17. 1.74 g/cm ³	5 Final Dry Density	ρ_d	5.6 1.94 g/cm ²		
Water Content (%) Initial Dry Density Initial Dry Unit Weight		γd	17.	5	ρ_d	5.6 1.94 g/cm ²		
Water Content (%) Initial Dry Density Initial Dry Unit Weight End of load deformati	on result	γd	17. 1.74 g/cm ³ 17.0 kN/m ³	5 Final Dry Density Final Dry Unit Wei	ρ _d ght γ _d	5.6 1.94 g/cm [*] 19.0 kN/m		
(2)		γ _d s	17. 1.74 g/cm ³	5 Final Dry Density Final Dry Unit Wei 4 5	ρ _d ght γ _d 6	5.6 1.94 g/cm ³		

APPENDIX H

DEFORMATION – TIME CURVES

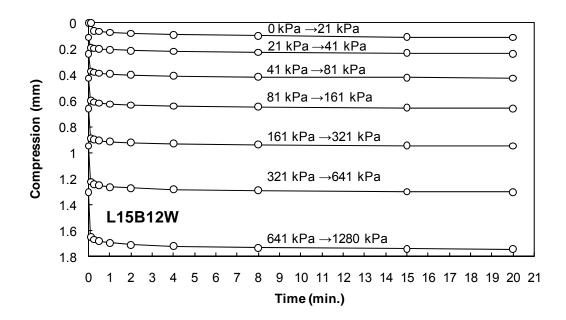


Figure H.1. Compression VS. Time (L15B12W)

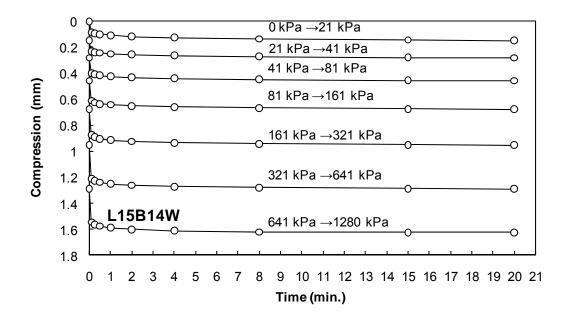


Figure H.2. Compression VS. Time (L15B14W)

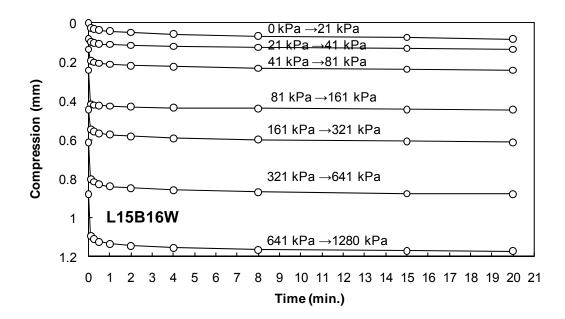


Figure H.3. Compression VS. Time (L15B16W)

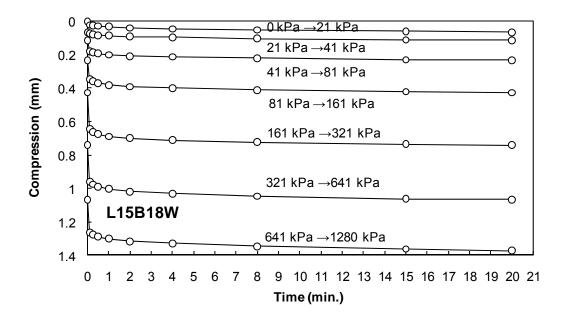


Figure H.4. Compression VS. Time (L15B18W)

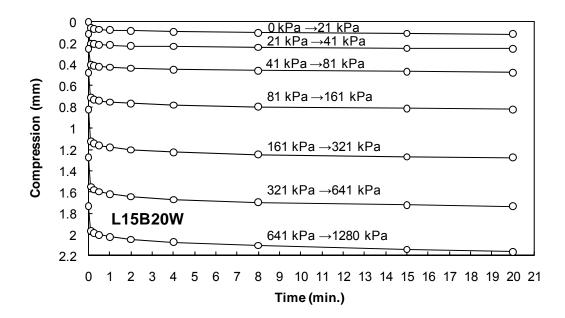


Figure H.5. Compression VS. Time (L15B20W)

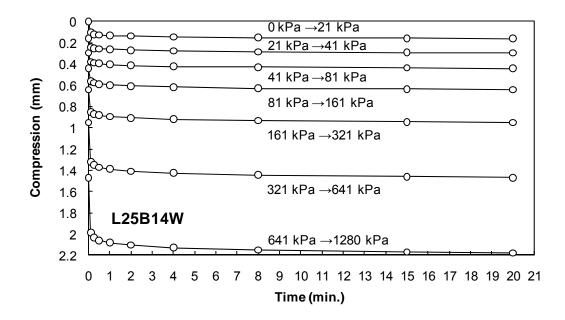


Figure H.6. Compression VS. Time (L25B14W)

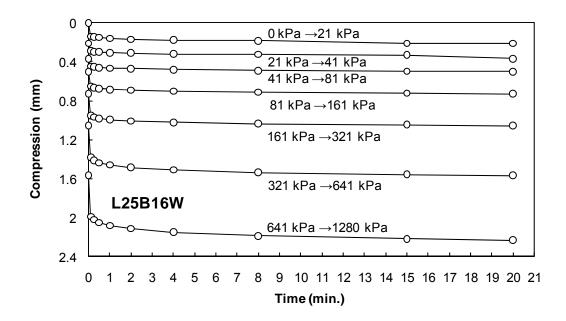


Figure H.7. Compression VS. Time (L25B16W)

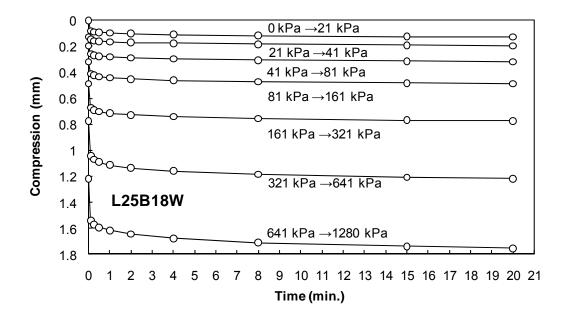


Figure H.8. Compression VS. Time (L25B18W)

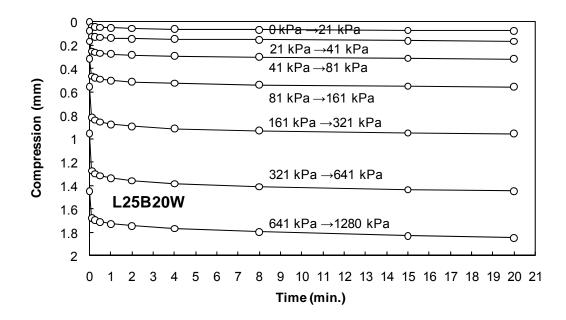


Figure H.9. Compression VS. Time (L25B20W)

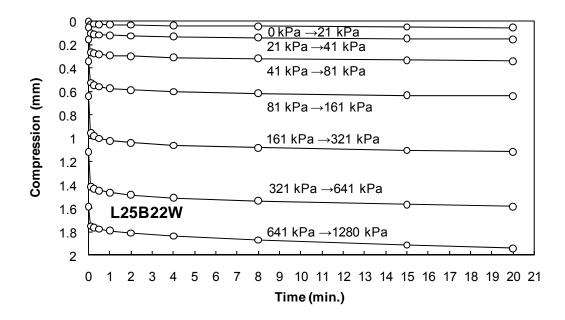


Figure H.10. Compression VS. Time (L25B22W)

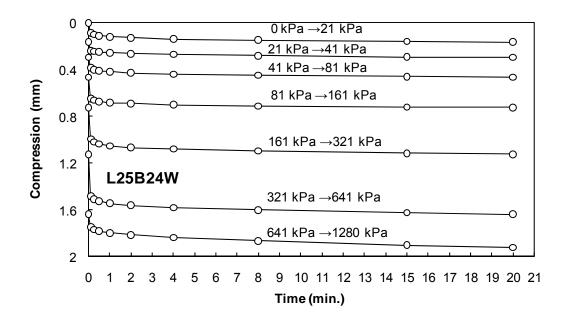


Figure H.11. Compression VS. Time (L25B24W)

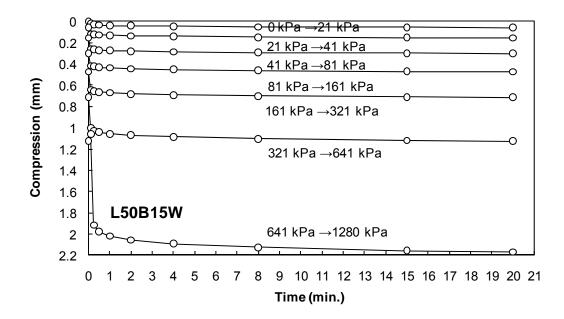


Figure H.12. Compression VS. Time (L50B15W)

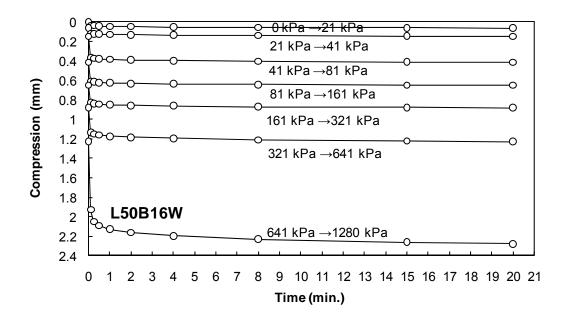


Figure H.13. Compression VS. Time (L50B16W)

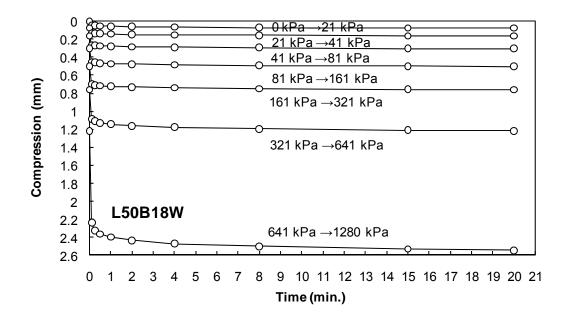


Figure H.14. Compression VS. Time (L50B18W)

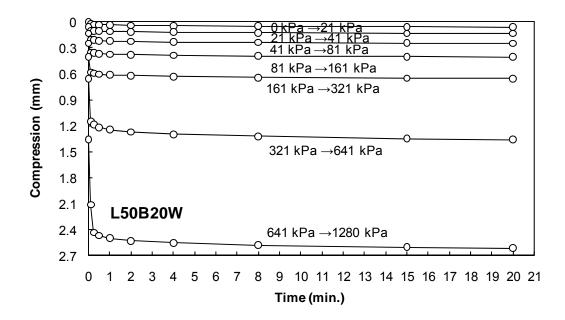


Figure H.15. Compression VS. Time (L50B20W)

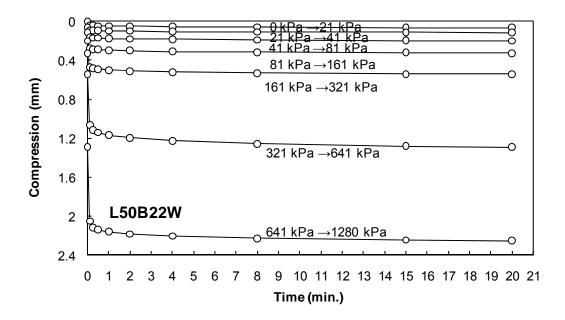


Figure H.16. Compression VS. Time (L50B22W)

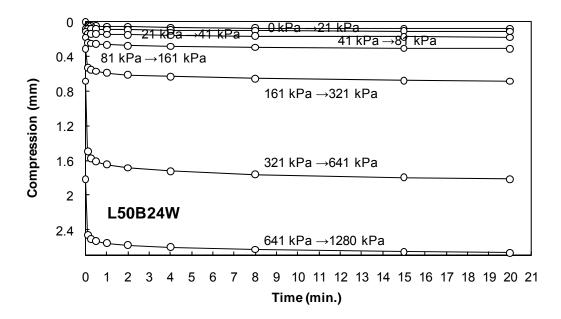


Figure H.17. Compression VS. Time (L50B24W)

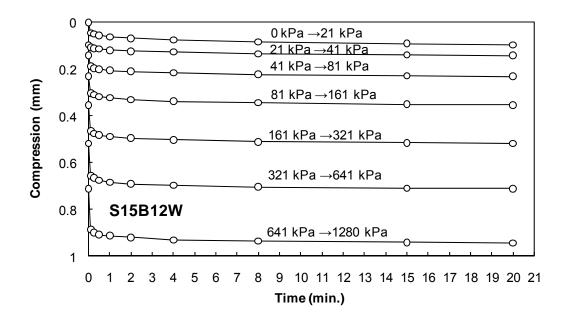


Figure H.18. Compression VS. Time (S15B12W)

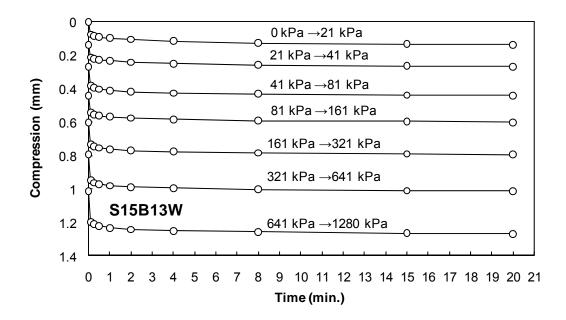


Figure H.19. Compression VS. Time (S15B13W)

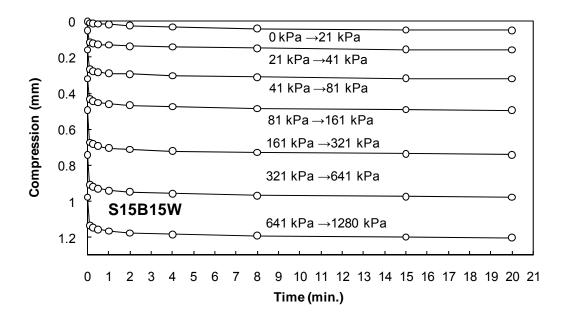


Figure H.20. Compression VS. Time (S15B15W)

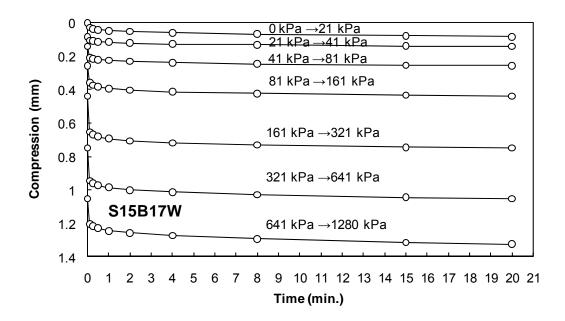


Figure H.21. Compression VS. Time (S15B17W)

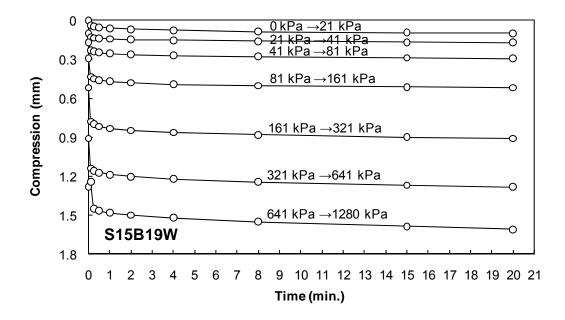


Figure H.22. Compression VS. Time (S15B19W)

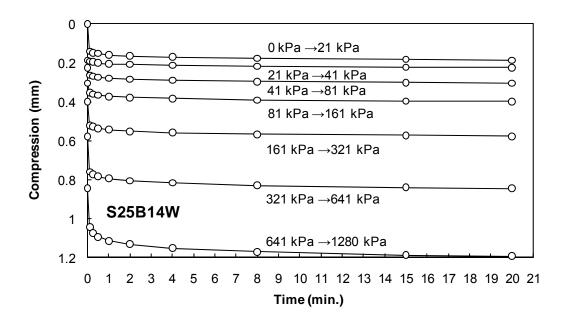


Figure H.23. Compression VS. Time (S25B14W)

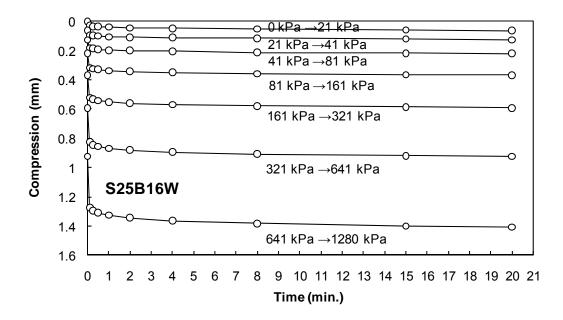


Figure H.24. Compression VS. Time (S25B16W)

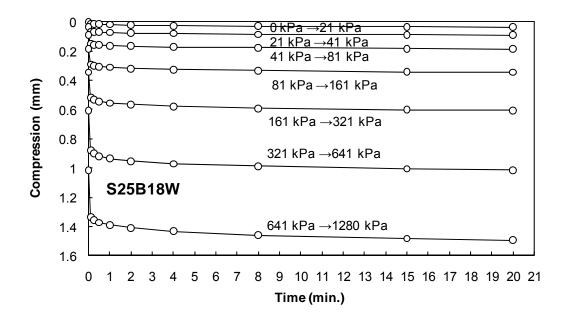


Figure H.25. Compression VS. Time (S25B18W)

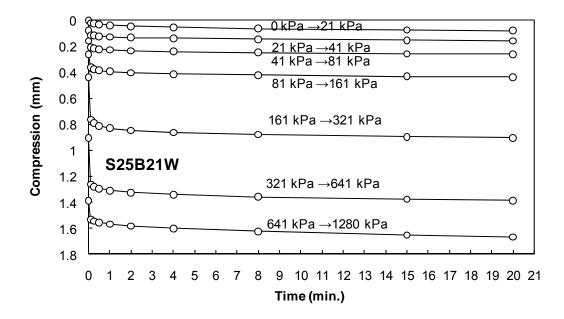


Figure H.26. Compression VS. Time (S25B21W)

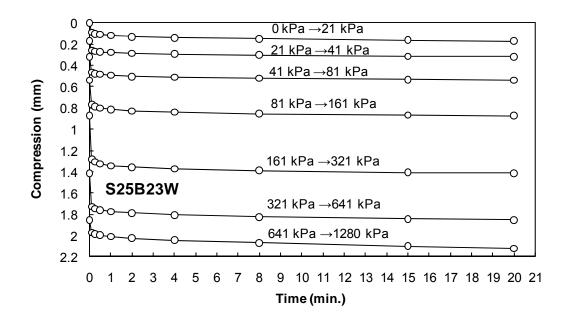


Figure H.27. Compression VS. Time (S25B23W)

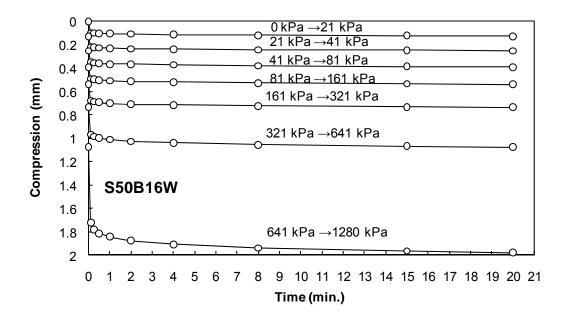


Figure H.28. Compression VS. Time (S50B16W)

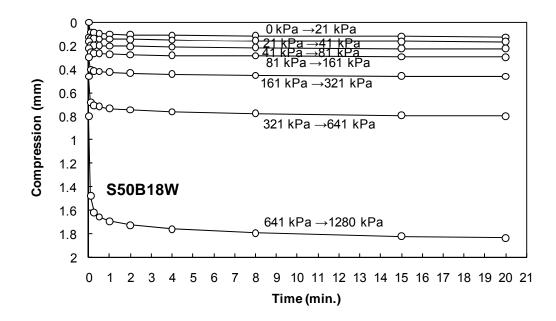


Figure H.29. Compression VS. Time (S50B18W)

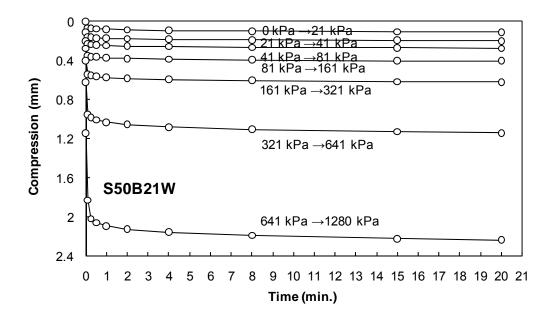


Figure H.30. Compression VS. Time (S50B21W)

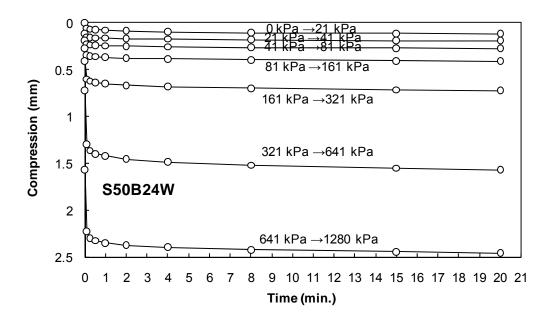


Figure H.31. Compression VS. Time (S50B24W)

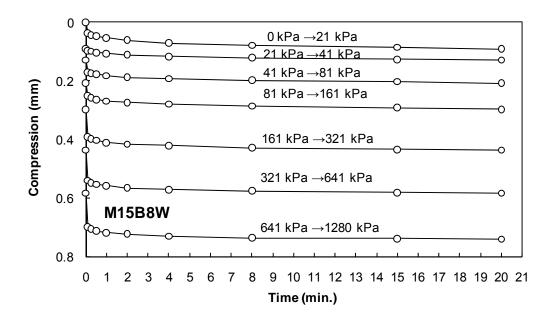


Figure H.32. Compression VS. Time (M15B8W)

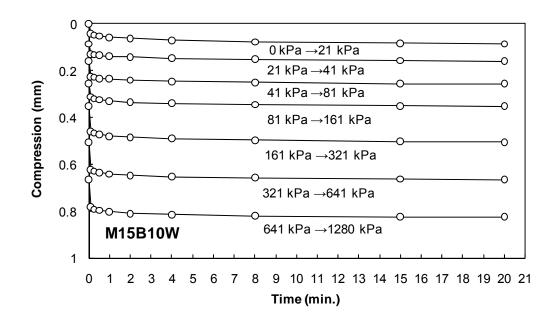


Figure H.33. Compression VS. Time (M15B10W)

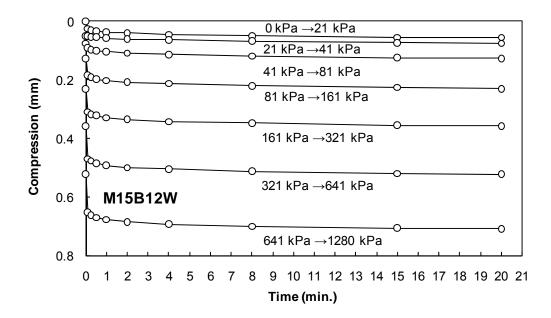


Figure H.34. Compression VS. Time (M15B12W)

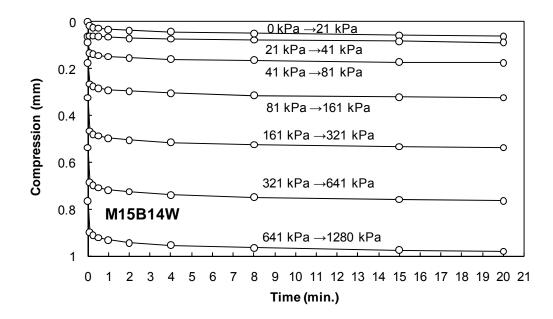


Figure H.35. Compression VS. Time (M15B14W)

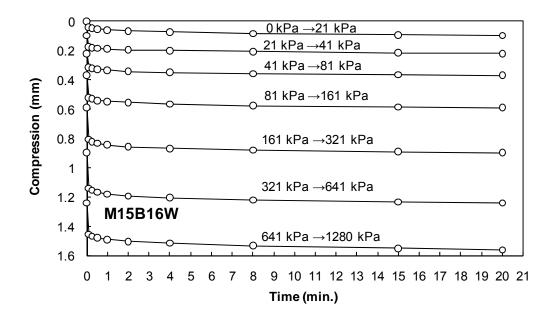


Figure H.36. Compression VS. Time (M15B16W)

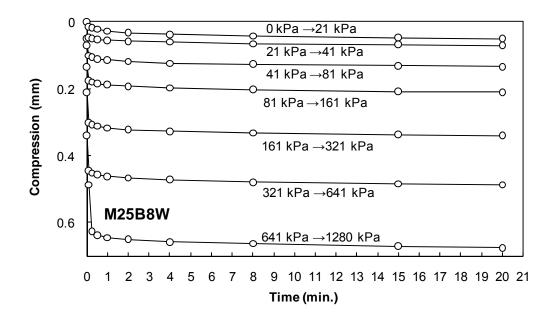


Figure H.37. Compression VS. Time (M25B8W)

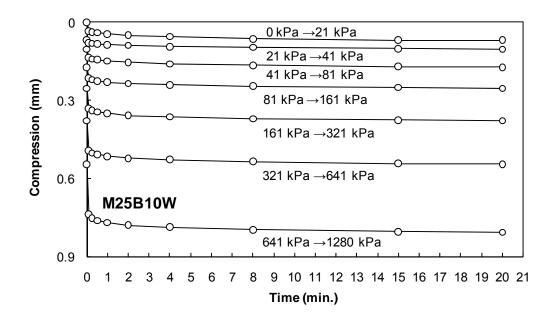


Figure H.38. Compression VS. Time (M25B10W)

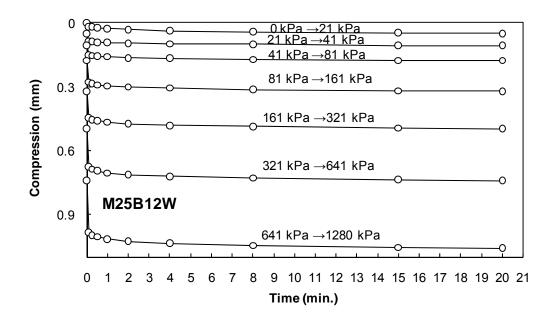


Figure H.39. Compression VS. Time (M25B12W)

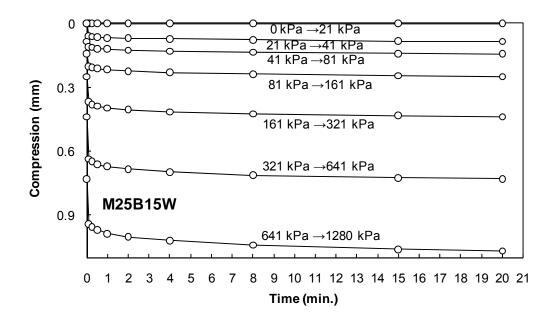


Figure H.40. Compression VS. Time (M25B15W)

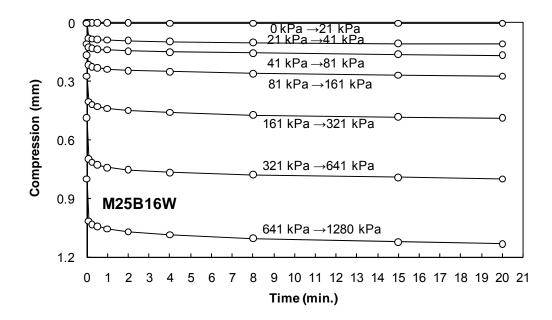


Figure H.41. Compression VS. Time (M25B16W)

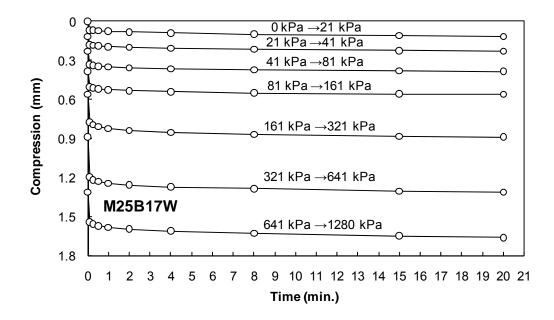


Figure H.42. Compression VS. Time (M25B17W)

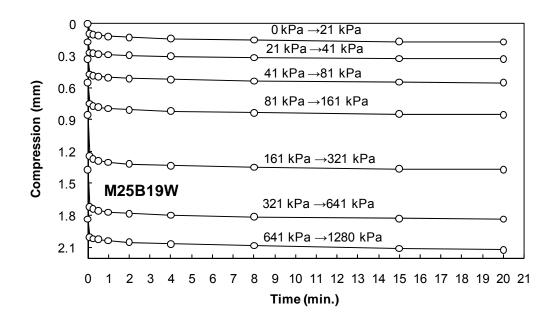


Figure H.43. Compression VS. Time (M25B19W)

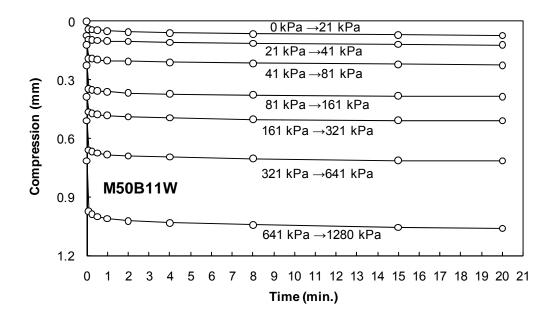


Figure H.44. Compression VS. Time (M50B11W)

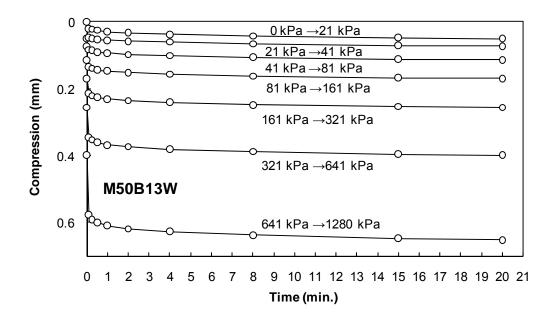


Figure H.45. Compression VS. Time (M50B13W)

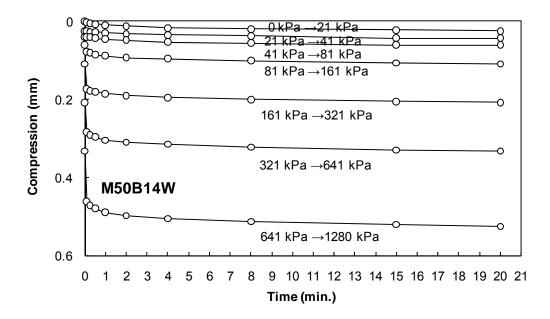


Figure H.46. Compression VS. Time (M50B14W)

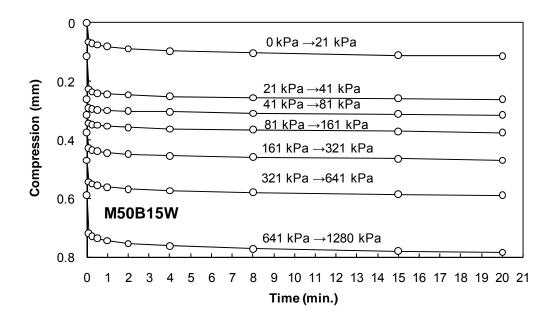


Figure H.47. Compression VS. Time (M50B15W)

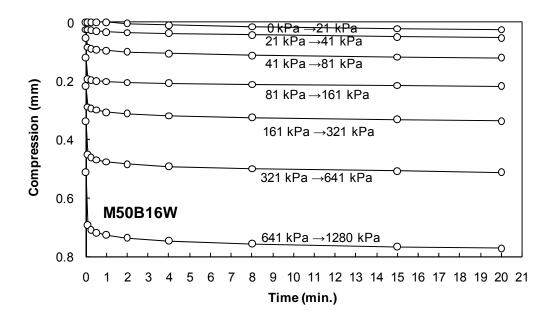


Figure H.48. Compression VS. Time (M50B16W)

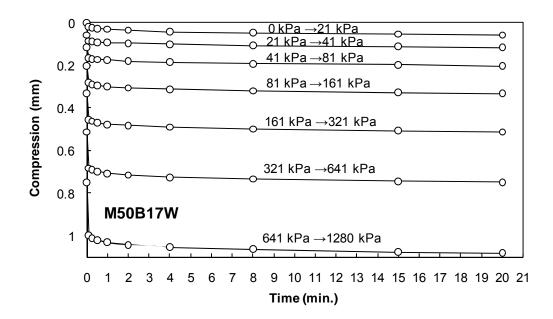


Figure H.49. Compression VS. Time (M50B17W)

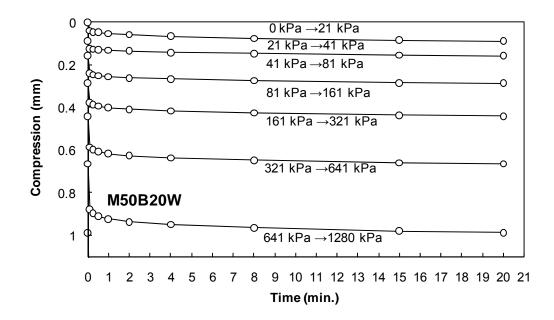


Figure H.50. Compression VS. Time (M50B20W)

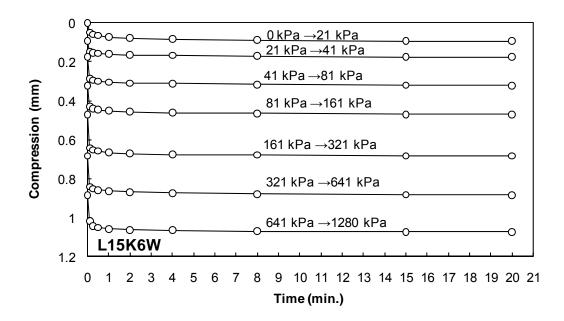


Figure H.51. Compression VS. Time (L15K6W)

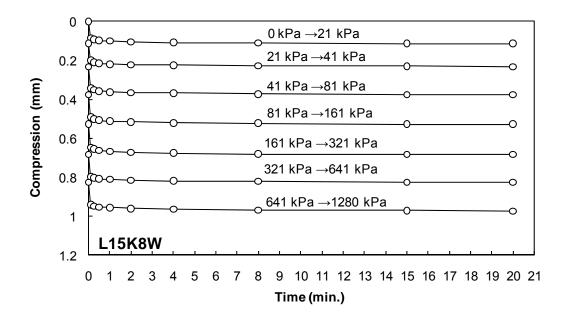


Figure H.52. Compression VS. Time (L15K8W)

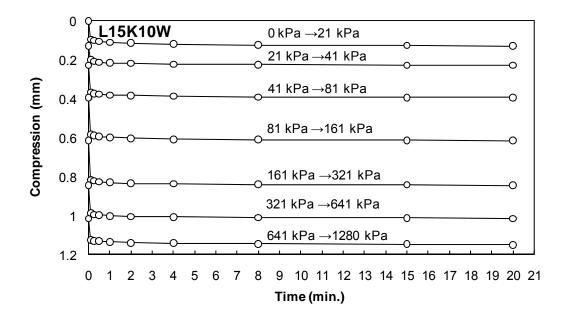


Figure H.53. Compression VS. Time (L15K10W)

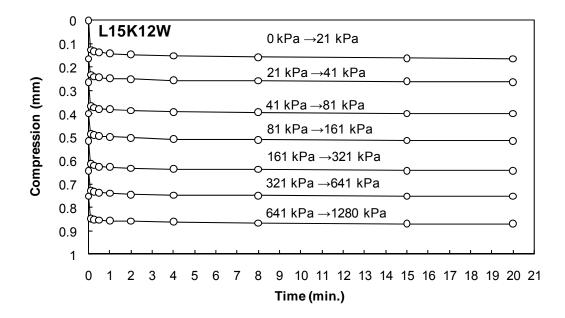


Figure H.54. Compression VS. Time (L15K12W)

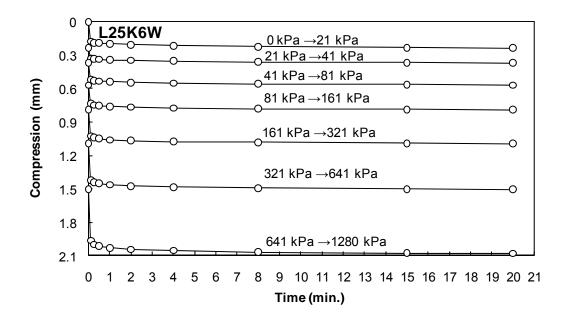


Figure H.55. Compression VS. Time (L25K6W)

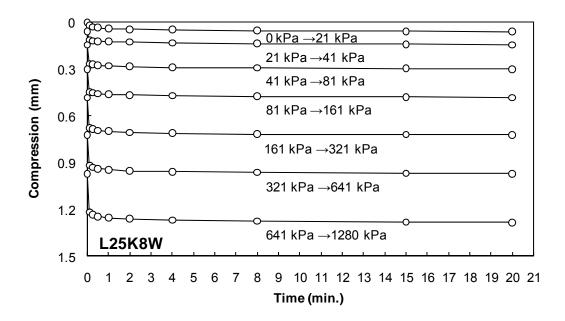


Figure H.56. Compression VS. Time (L25K8W)

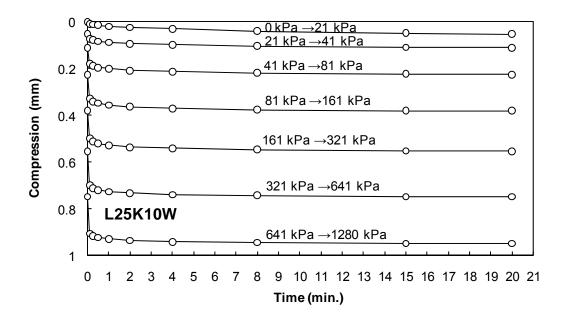


Figure H.57. Compression VS. Time (L25K10W)

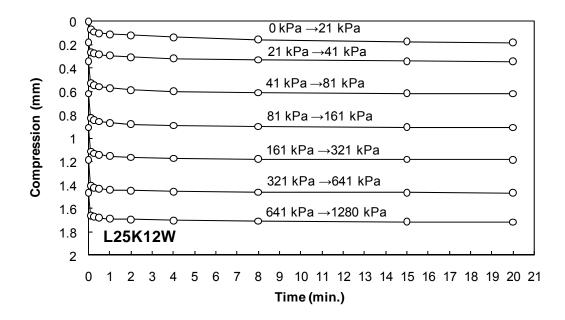


Figure H.58. Compression VS. Time (L25K12W)

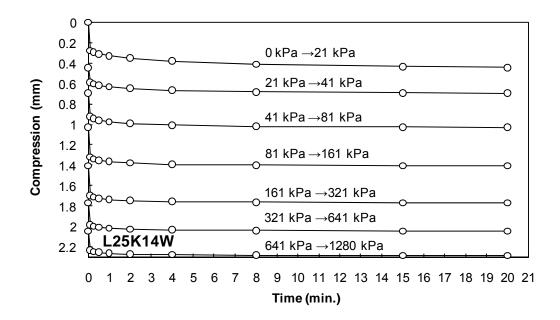


Figure H.59. Compression VS. Time (L25K14W)

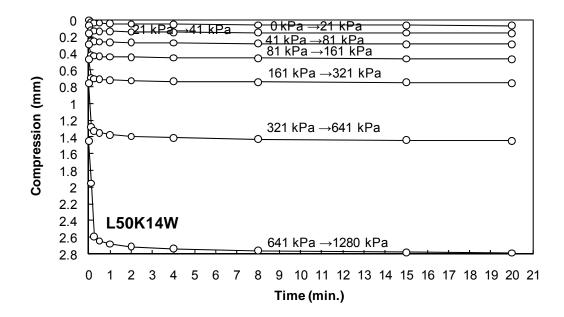


Figure H.60. Compression VS. Time (L50K14W)

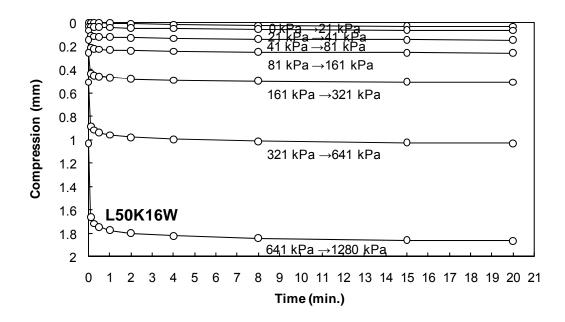


Figure H.61. Compression VS. Time (L50K16W)

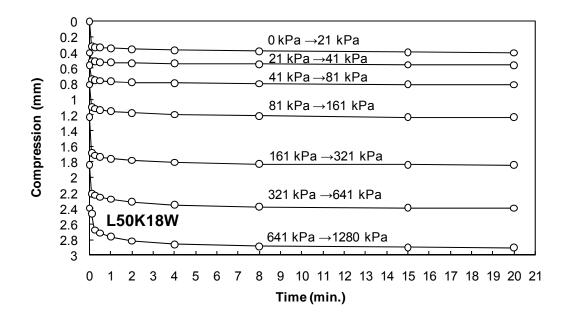


Figure H.62. Compression VS. Time (L50K18W)

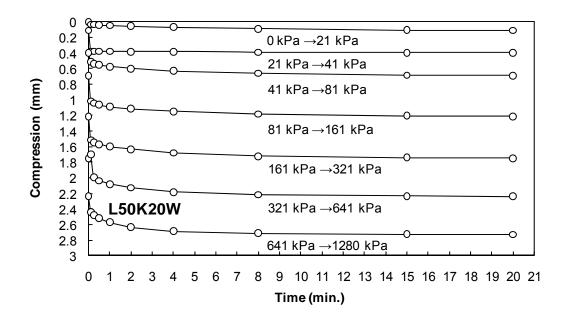


Figure H.63. Compression VS. Time (L50K20W)

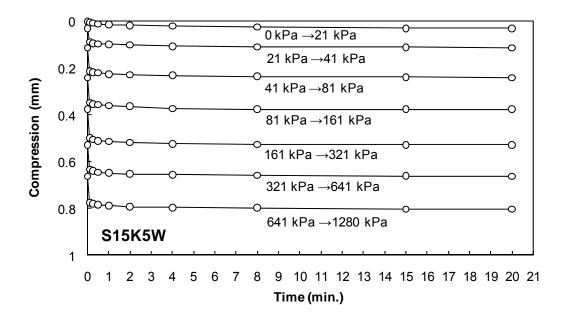


Figure H.64. Compression VS. Time (S15K5W)

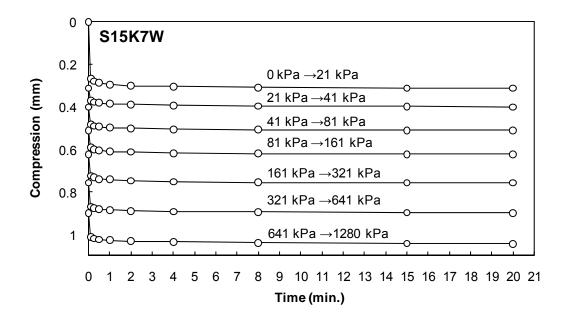


Figure H.65. Compression VS. Time (S15K7W)

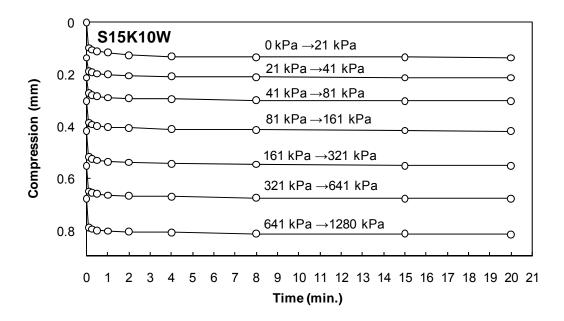


Figure H.66. Compression VS. Time (S15K10W)

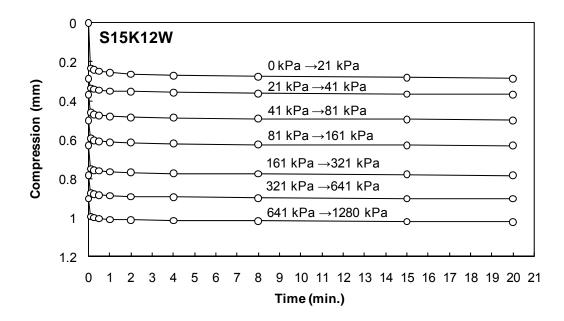


Figure H.67. Compression VS. Time (S15K12W)

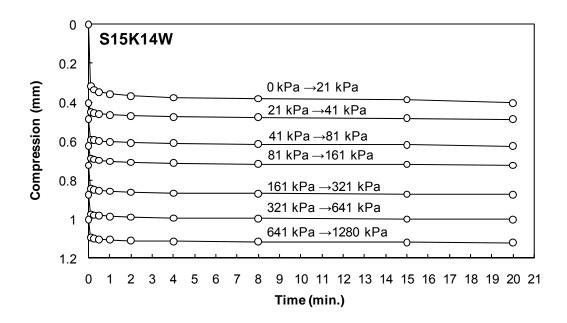


Figure H.68. Compression VS. Time (S15K14W)

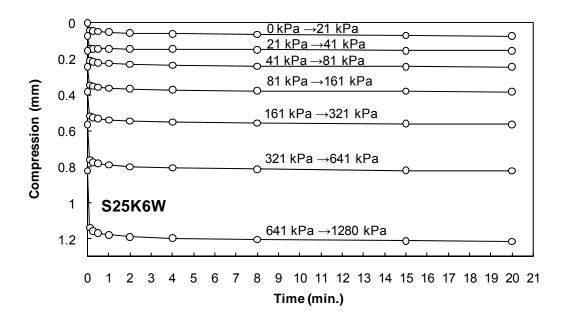


Figure H.69. Compression VS. Time (S25K6W)

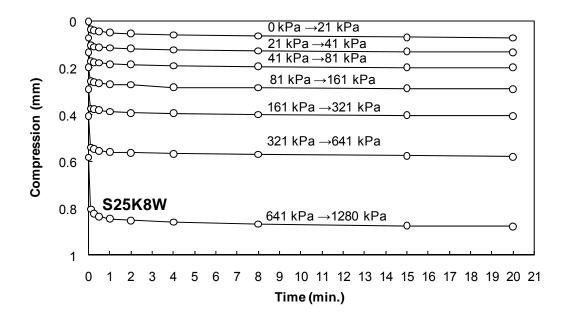


Figure H.70. Compression VS. Time (S25K8W)

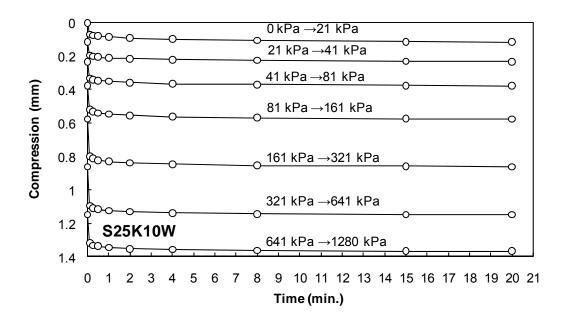


Figure H.71. Compression VS. Time (S25K10W)

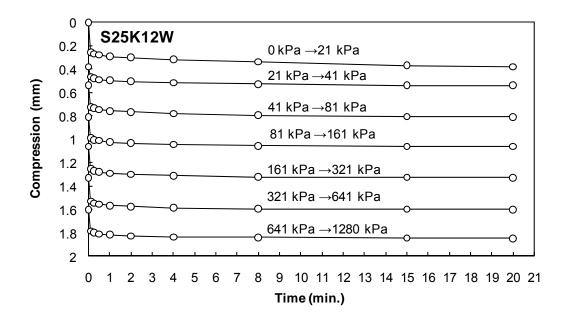


Figure H.72. Compression VS. Time (S25K12W)

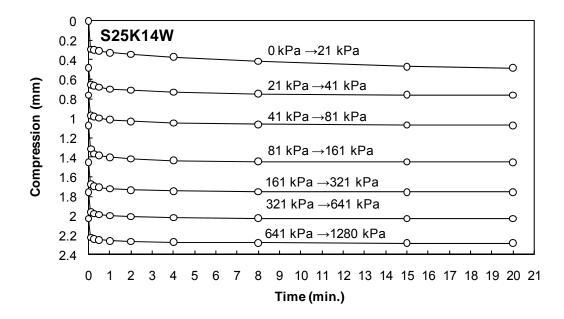


Figure H.73. Compression VS. Time (S25K14W)

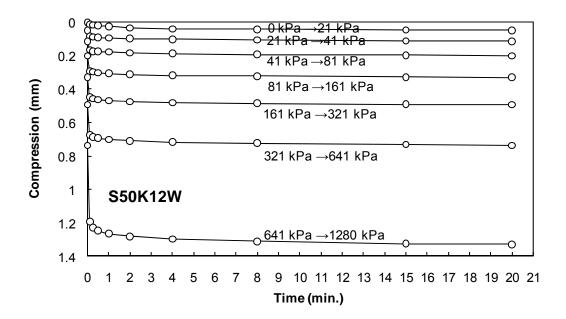


Figure H.74. Compression VS. Time (S50K12W)

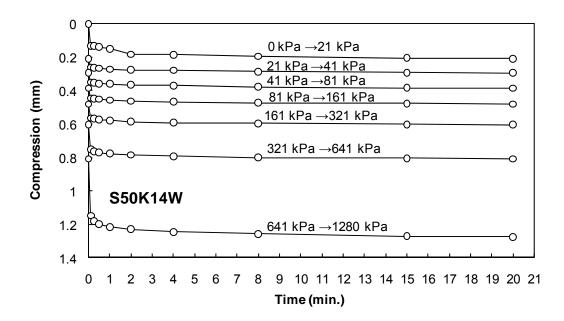


Figure H.75. Compression VS. Time (S50K14W)

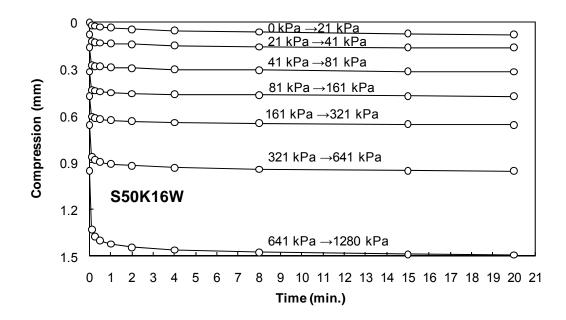


Figure H.76. Compression VS. Time (S50K16W)

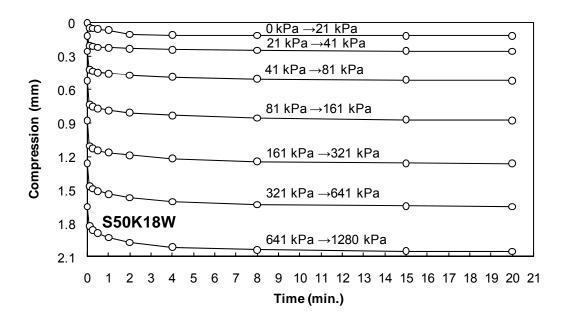


Figure H.77. Compression VS. Time (S50K18W)

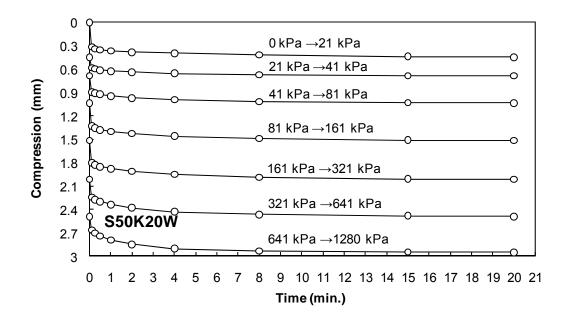


Figure H.78. Compression VS. Time (S50K20W)

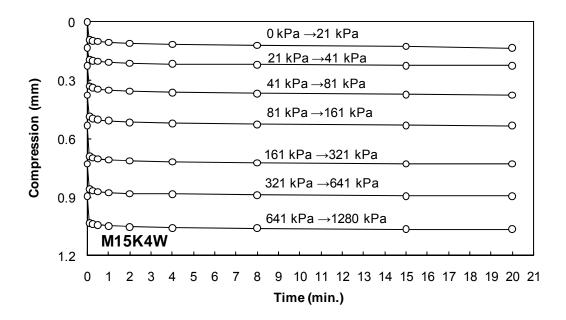


Figure H.79. Compression VS. Time (M15K4W)

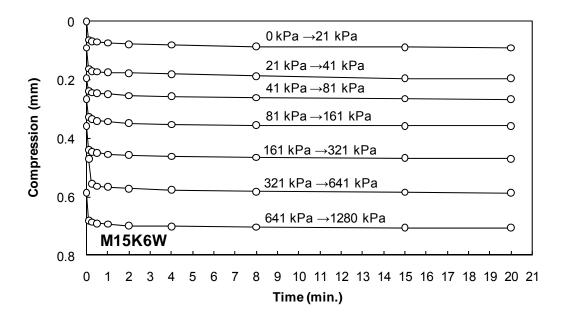


Figure H.80. Compression VS. Time (M15K6W)

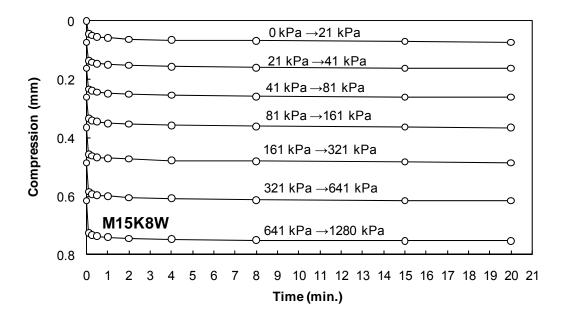


Figure H.81. Compression VS. Time (M15K8W)

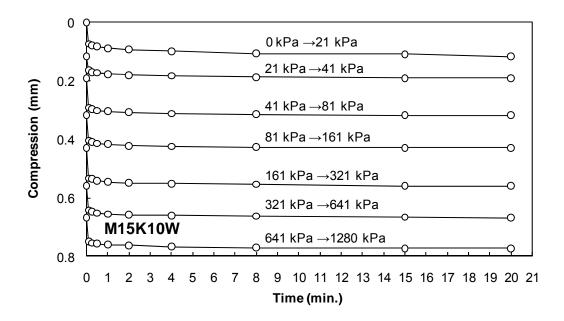


Figure H.82. Compression VS. Time (M15K10W)

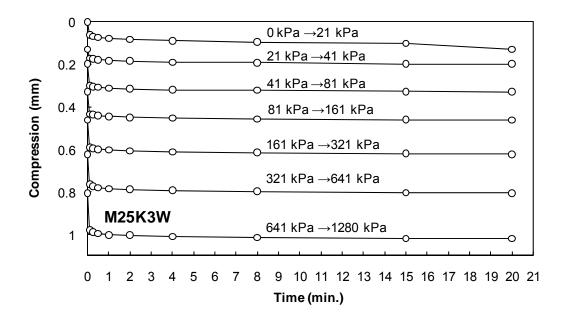


Figure H.83. Compression VS. Time (M25K3W)

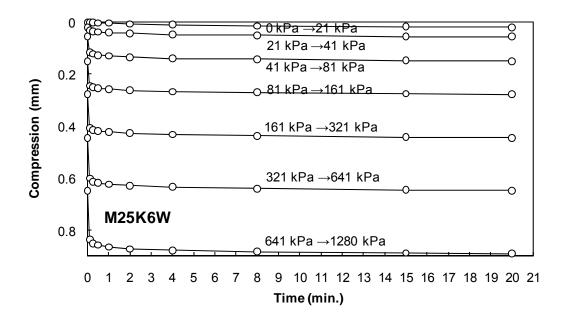


Figure H.84. Compression VS. Time (M25K6W)

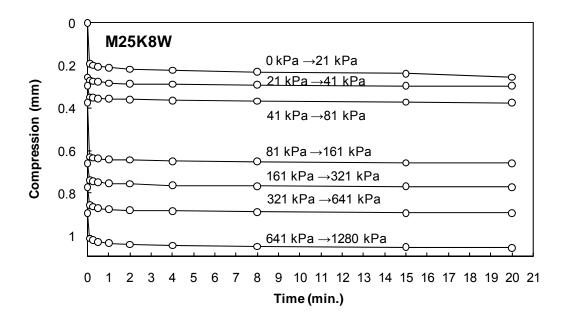


Figure H.85. Compression VS. Time (M25K8W)

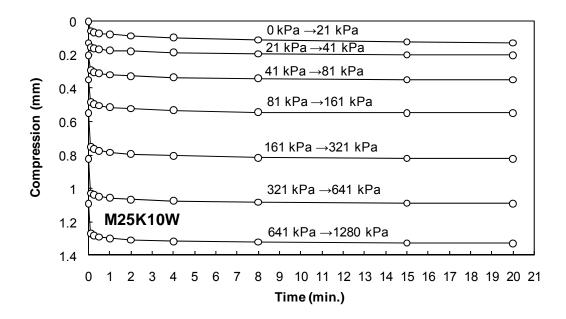


Figure H.86. Compression VS. Time (M25K10W)

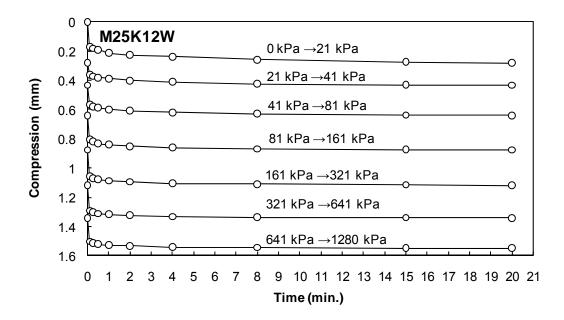


Figure H.87. Compression VS. Time (M25K12W)

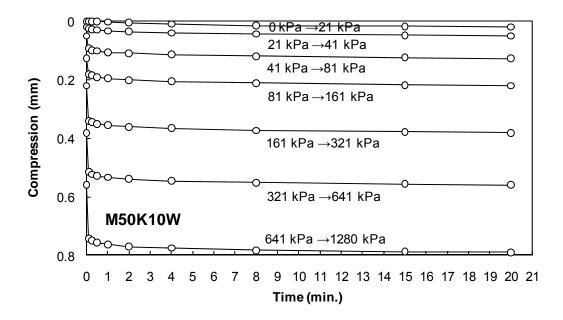


Figure H.88. Compression VS. Time (M50K10W)

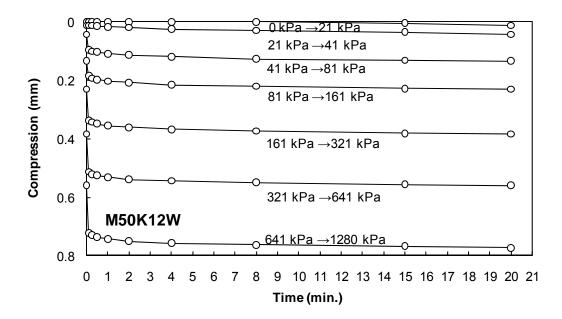


Figure H.89. Compression VS. Time (M50K12W)

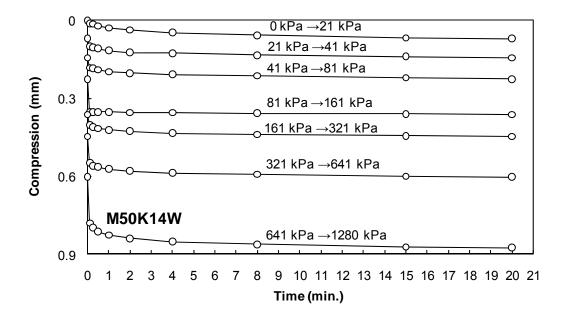


Figure H.90. Compression VS. Time (M50K14W)

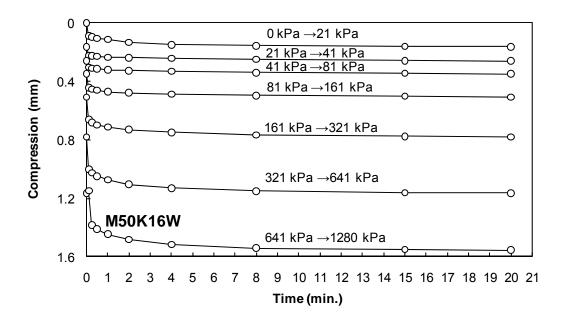


Figure H.91. Compression VS. Time (M50K16W)

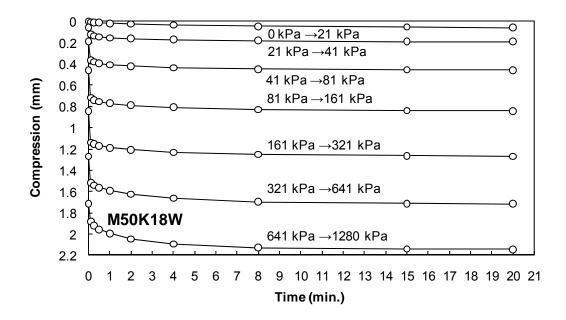


Figure H.92. Compression VS. Time (M50K18W)

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