



Stantec



Report of Geotechnical
Exploration and Slope
Stability for Dike C

Kingston Fossil Plant
Harriman, Tennessee

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Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

August 3, 2009



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Mr. Barry Snider
Tennessee Valley Authority
1101 Market Street
LP 2N
Chattanooga, Tennessee 37402

Re: Report of Geotechnical Exploration and Slope Stability for Dike C
Kingston Fossil Plant
Harriman, Tennessee

Dear Mr. Snider:

As requested, Stantec Consulting Services Inc. (Stantec) has completed our Report of Geotechnical Exploration and Slope Stability Evaluation for Dike C at the Kingston Fossil Plant. The report documents the subsurface conditions, results of laboratory testing, findings from the historical document reviews, results of our analyses and evaluation, and recommendations for the facility. These services were performed under Engineering Service Request ESR/TAO 650 in accordance with the terms and provisions established in our System-Wide Services Agreement dated December 22, 2008.

Stantec appreciates the opportunity to provide engineering services for this project. If you have any questions, or if we may be of further assistance, feel free to contact our office.

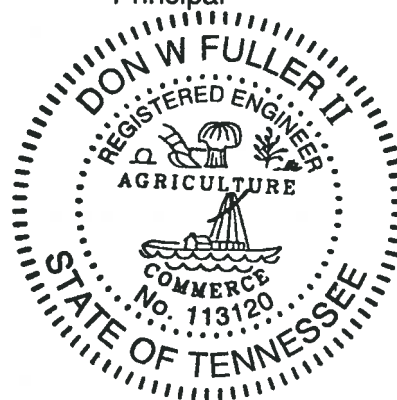
Sincerely,

STANTEC CONSULTING SERVICES INC.

Adam A. Crace, PE
Senior Project Engineer

/cmw

Don W. Fuller, PE
Principal



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Executive Summary

The purpose of this study was to evaluate the current stability of Dike C, the perimeter containment dike around the ash pond and stilling pond at Tennessee Valley Authority's Kingston Fossil Plant. Dike C, which includes the Road Dike, is located adjacent to the failed ash dredge cell and is underlain by similar geologic deposits. TVA is in the process of converting the Kingston plant systems to dry handling of fly ash. This will significantly reduce the fly ash combustion product storage role for the ash pond. It is anticipated that the Dike C structure and pond basin configuration will be modified in association with the conversion and reduced storage needs. The assessment of Dike C and the associated recommendations are based on this understanding of the plant setting.

The existing condition of Dike C was investigated in a subsurface exploration and laboratory testing program, and then assessed for geotechnical stability under static, long-term, steady-state conditions. Seepage and slope stability were evaluated using engineering analyses to quantify factors of safety.

The investigation began with a review of available geologic and historical project information provided by TVA. The site is underlain by alluvial and lacustrine deposits of sands, silts, and clays, with a weathered shale bedrock beneath. Dike C consists of two primary stages, with the lower, initial starter dike constructed in the 1950s to a crest elevation of about 748 ft. The dike crest was raised to an elevation of 765 in the 1970s, with the construction of the upper (clay) dike built over existing ash deposits using the upstream method of construction.

To collect additional subsurface data needed to support updated analyses, a field investigation program was undertaken in the spring of 2009. In total, 54 soil borings and 21 cone penetration tests were advanced at locations along the length of Dike C. Most of these test penetrations were advanced from the crest of the dike levee, or from a bench on the lower downstream face (crest of the original starter dike). Nine borings were completed through interior divider dikes within the ash pond. Instrumentation, consisting of slope inclinometers and piezometers, were installed in several of these borings to monitor conditions within the dike. Samples obtained from the site boring program were tested in the laboratory to establish key index properties, as well as permeability and strength parameters.

The data collected for the Dike C investigation was supplemented with subsurface information obtained by AECOM for the Root Cause Analysis of the dredge cell failure. Logs from AECOM borings (23 locations) in the ash pond, plus laboratory test data, provided additional information on the ash and soil materials within Dike C. AECOM's conclusions regarding the mechanisms that contributed to the dredge cell failure were also considered in the investigation and analysis of Dike C.

The engineering analyses focused on five cross sections through Dike C. Spaced at about 600 to 1200 ft apart, these cross sections were selected to represent the typical conditions in reaches of the perimeter dike. The cross sectional geometry, including the thickness and depth of various soil layers, was estimated using data from the site exploration program, the historical project drawings, and other information on the site development. The 2008 failure of the adjacent dredge cell deposited coal ash against the outslope of Dike C, mostly along the eastern reach. This accumulation of ash, which is primarily fluid in nature and highly erodible and will be removed during the cleanup, was ignored in the engineering analyses.

Eight soil horizons within and beneath Dike C were identified and described. Key properties, including unit weight, saturated hydraulic conductivity, horizontal to vertical permeability ratio, and drained shear strength parameters, were estimated for each soil horizon. These estimates were developed from the available laboratory data. Where needed, some soil parameters were estimated or adjusted based on typical values for similar soils. The soil parameter values selected for use in the stability analyses are tabulated and described in the report.

To understand the seepage conditions within the dike, a finite element seepage model was developed for each of the five cross sections through Dike C. The seepage model was based on the previously defined cross sectional geometry and the estimated hydraulic properties of the principal soil horizons. The applied boundary conditions represented the water levels in the ash pond or stilling pond, depending on the location, and the normal winter pool elevation of Watts Bar Lake. Steady-state seepage conditions were assumed, and a solution was obtained for the total hydraulic head at nodal points throughout the section. The seepage model was iteratively "calibrated" to match the existing field conditions. This was accomplished by varying the estimated hydraulic soil properties until the head at corresponding locations were in reasonable agreement with water levels measured in piezometers installed in the dike. Graphical results from the seepage analyses are presented in Appendix H of the report. The hydraulic pressures predicted with the seepage model were then mapped across the modeled sections to give the pore water pressures needed for the subsequent slope stability analyses.

The results from the seepage analyses were also examined to identify conditions where piping and erosion of soil might develop due to seepage forces. The model results indicated a shallow phreatic surface (ground water table) within the starter dike; these results are generally confirmed by the observation of shallow water in areas where trees and stumps have been removed from the starter dike. On four of the five cross sections, the model indicated seepage flows to the sloping downstream face of the starter dike. This condition creates the potential for the initiation of soil piping, as seepage water will tend to erode material from the dike face at these locations.

Upward, vertical exit gradients in the area of the dike toe were also evaluated. Factors of safety against piping, computed for the surficial 3 to 5 feet of soil in these areas, ranged from 1.3 to 2.7. Based on USACE design criteria for dams (EM 110-2-1901), target minimum factor of safety against piping is three. The results from the seepage model indicate that Dike C does not meet current criteria for soil piping due to seepage.

The stability of the Dike C slopes was evaluated using conventional, two-dimensional, limit equilibrium methods. Factors of safety for slope stability were computed using Spencer's method of analysis, circular and noncircular slip surfaces, and search routines that helped to identify critical (low safety factor) sliding mechanisms. Using pore water pressures predicted with the seepage model, the resistance to sliding was quantified using effective stresses and shear strength parameters determined on the basis of laboratory testing.

This analysis is limited to static, long-term, fully drained conditions within the existing dike. Dike C has existed in its current cross sectional geometry (slopes and crest elevation) for at least 30 years. Excess pore water pressures generated in the underlying soil during construction have had sufficient time to dissipate, and steady state seepage conditions have developed within the dike. Hence, for the current static conditions, the soils can be treated as

fully drained and the stability can be assessed using effective stress analyses. If stabilizing berms or other modifications to the dike cross section are built, then undrained, total stress stability analyses will be needed to assess stability during construction.

The slope stability calculations produced factors of safety against sliding along various potential failure mechanisms. In general, each cross section was evaluated for potential deep-seated slides that would impact the dike crest, plus critical slip surfaces that corresponded to minimum factors of safety. The potential for upstream sliding, into the ash pond or stilling pond, was also evaluated. The results of the stability analyses indicate global dike factors of safety ranging from 1.47 to 1.66. Current USACE criteria for the long-term stability of Dike C require a factor of safety for slope stability of at least 1.5. Considering only potential deep-seated or global failure mechanisms that would immediately impact the crest, the slope stability results show that Dike C meets this criteria. The difference between the minimum computed value of 1.47 and the required value of 1.5 is negligible, considering the inherent uncertainty and localized variability in the characterization of the soil strength. These results suggest that Dike C is stable with respect to the potential formation of large, deep-seated failures that would immediately compromise the retention of the ash pond.

The analysis also indicates that the controlling factors of safety are associated with smaller maintenance type sliding masses about 10 ft in thickness on the downstream face of the starter dike or the upper raised dike section depending on specific geometry present at that section. The projected potential for these shallow slides or slip surfaces occurs on the downstream face along the full length of Dike C (plus the upstream face in the vicinity of Sta. 132+37). The potential shallow slip surfaces occur in the slopes of both the lower starter dike and the upper raised dike (see the cross sections in Appendix F). The lowest factors of safety are currently found along the eastern branch of Dike C, where factors of safety less than 1.2 were computed. As directed by TVA, remedial design work plans are now underway to increase the long-term factors of safety against shallow sliding to achieve the target minimum value. The mitigation plan will incorporate specific interim risk reduction strategies and include both enhanced geotechnical instrumentation and construction of a dike embankment buttress and seepage control system.

Past shallow sliding of the downstream face of Dike C was reported in the project records, in an area along the perimeter of the dredge cell. This surficial slide was observed and repaired by TVA as part of their routine maintenance program. If additional shallow sliding were to develop again in Dike C, it is anticipated the slip surface would be initially confined to the sloping face of the dike. If not repaired and given enough time, these shallow slides could progress up the slope and endanger the ash pond. Because this progressive failure mechanism would be expected to take months or longer to impact the crest, a robust monitoring program can reduce the risk of dike breaching due to shallow sliding. Hence, in the interim while the permanent mitigation design and plant dry ash conversion process is developed, analyzed, and constructed, TVA should continue to monitor Dike C with routine inspections and instrument readings.

In conclusion, the current configuration of Dike C around the Kingston ponds does not exhibit acceptable factors of safety for long-term global stability. This does not imply that the dike is in immediate danger of failure, but TVA should undertake efforts to improve the safety of this facility in association with planned dry ash conversion process following the conclusions and recommendations presented herein.

Report of Geotechnical Exploration and Slope Stability for Dike C

Kingston Fossil Plant

Harriman, Tennessee

1. Introduction

In December, 2008, the Tennessee Valley Authority (TVA) requested that Stantec Consulting Services Inc. (Stantec) develop a geotechnical exploration plan to perform initial characterization and evaluation of Dike C. Dike C (also includes the Road Dike) is approximately 5,600 feet in length and provides perimeter containment for the ash pond and stilling pond. It is Stantec's understanding that TVA is in the process of converting Kingston Plant Systems to the dry handling of fly ash. This will significantly reduce fly ash combustion storage role for the ash pond. It is anticipated that the Dike C structure and pond basin will be modified in association with the conversion process. The assessment of Dike C and the recommendations reflect these planned operations for the pond. Stantec's scope of work associated with this assignment is defined in the document titled "*Revised Addendum to Work Plan for ESR/TAO Request 650*", dated June 17, 2009, submitted to TVA.

The results of initial geotechnical characterization are intended to supplement the historical data reviewed as a part of TVA's fossil group Facility Assessment Phase 1 program. This report presents the conclusions and recommendations of Stantec's evaluation along with general site geology and results of geotechnical exploration, laboratory testing and engineering analysis.

2. General Site Description and Geology

2.1. Location and Description

The Kingston Fossil Plant is located on the Watts Bar Reservoir, at the confluence of the Emory and Clinch Rivers, near Kingston, Tennessee approximately 35 miles southwest of Knoxville, Tennessee. The ash disposal area is centered approximately 4000 feet northeast of the plant's powerhouse. The disposal area (Figure 1) is bordered by the Emory River on the east and southeast with the excavated channel carrying intake condenser water present immediately south of the disposal area.

The ash pond and settling pond have a total surface area of approximately 120 acres and are enclosed to the south, east and north by Dike C, which is approximately 5,600 feet in length. The ash pond is enclosed to the west by Dike D. The top of the dike supports a gravel access road that is at approximate elevation 765 feet, which is approximately 28 feet above the winter pool elevation (737 feet) of Watts Bar Lake. The elevation of the crest from the starter dike crest is approximately 750 feet. Dike C, including the starter dike and the raised dike, have an overall constructed height that varies from 20 feet to 30 feet. The slope



**Kingston Fossil Plant
Harriman, Tennessee**

**Figure 1. Kingston Fossil Plant
Overview**



of the raised dike interior slope varies from 1.7H:1V to 2.8H:1V and the exterior slope varies from 1.5H:1V to 3H:1V. Based on historical documentation and some limited field observations it is estimated that the starter dike was constructed with 3H:1V interior slopes and 6H:1V exterior slopes. The slopes are vegetated with grass turf, with areas of mature trees at various locations around the perimeter near the pool level for Watts Bar Lake. Recent facility maintenance activities include removal of trees and replacement of rip rap armor within the vicinity of the Emory River/Watts Barr Lake water line between approximate Station 128+00 and Station 136+00.

2.2. Geology

The plant is situated on the western edge of the Valley and Ridge Physiographic province near the base of the Cumberland Plateau. Numerous faults, trending northeast to southwest as characteristic of the Valley and Ridge Province, are depicted on the geologic mapping. The plant is positioned between the Chattanooga Fault to the north, and the Kingston Fault to the south.

According to the USGS Geologic Map of the Harriman Quadrangle (1993), the plant is underlain by Lower Ordovician and Cambrian age limestone and shale bedrock formations. Although not depicted on the geologic mapping, previous drilling programs at the plant indicate that alluvial deposits consisting of fine sands, silty sands, and sandy silts are present at the site, as are commonly found adjacent to rivers.

The majority of the plant, including the majority of the ash disposal area, is underlain by the Conassauga Shale Formation, which consists of an argillaceous to silty shale with zones of shaley limestone scattered throughout. The geologic mapping indicates this formation is contorted, brecciated, and sheared throughout. The geologic mapping indicates Pine Ridge, just north of the plant, and the northern corner of the ash disposal area are underlain by the Rome Formation, consisting of arenaceous shale interbedded with very thin siltstone layers and thin beds of sandstone.

A narrow band of the Maynardville Limestone separates the mainland plant from the peninsula and does not underlie Dike C. The Maynardville Limestone Formation consists of fine grained, laminated to thinly bedded dolomite in the upper part and fine grained, thin to very thick bedded limestone with ribboned shale seams and dolomite laminate in the lower part. The peninsula is underlain by the Knox Group, consisting of siliceous dolomite with a few limestone beds in the upper part and scattered thin quartz sandstone beds and lenses. The Knox Group generally weathers to a thick residuum of red-orange soil with chert fragments and is known for karst activity. The USGS topographic map depicts a few enclosed drainage basins indicative of karst activity within the peninsula area.

3. Review of Available Information

3.1. General

As a part of the Phase 1 site assessment Stantec engineers reviewed documents provided by TVA pertaining to Dike C, Ash Pond, and the Stilling Pond. The main objective of the document review was to develop a historical knowledge base prior to beginning the field geotechnical exploration. The documents reviewed included record drawings, cross sections of dikes, aerial photographs, old contour maps, and annual dike stability reports. A complete listing of the reviewed documents is included in the Phase 1 report.

Of particular interest and use in this study are the following reports and geotechnical documents:

- "Root Cause Analysis of TVA Kingston Dredge Cell Pond Failure from December 22, 2008", AECOM, June 12, 2009
- "Kingston Fossil Plant Annual Ash Pond Dike Stability Inspection" TVA Engineering Design Services, 1967 to 2009

These studies included boring plans, driller's logs, and results from laboratory tests. The information gained from these reports was evaluated and used to supplement the information gathered from Stantec's geotechnical exploration. Logs from AECOM borings (23 locations) in the ash pond, plus laboratory test data, provided additional information on the ash and soil materials within Dike C. AECOM's conclusions regarding the failure mechanisms that contributed to the dredge cell failure were also considered in the investigation and analyses of Dike C.

3.2. Site History

Kingston Fossil Plant began construction in 1951 and was on-line during February 1954. At that time, ash slurry was discharged directly to slack water area created by Watts Bar Reservoir (Reservoir), which was filled in 1941. The August 1951 TVA design drawings of the ash pond show a gap between the East and North Dikes that formed the initial ash pond storage area and allowed ash to mix with waters of the Reservoir. TVA reports that by 1958 the northern 275-acre ash pond containment dike was completed with the construction of Dike C, which was constructed of residual clay and bottom ash to an elevation of 748 feet. The ash pond containment dike was comprised of a southern leg, which is referred to as the Road Dike, and a north to northeastern leg which is comprised of a portion of Dike C. This initial structure is referenced herein as the "starter dike".

After the initial ash disposal cell bounded by the North and East Dikes was filled in 1965 ash was directed into the main ash disposal cell where it deposited and progressively filled from south to north. From 1958 to 1977, water in the main ash disposal cell exited through a dual Dike C riser pipe system at the north end of the ash pond where it then reentered the Reservoir. In 1974, Dike C and the Road Dike underwent an interim raise of approximately 1.5 feet to provide additional freeboard for the ash pond and a deflector dike was created in the southwestern portion of the ash pond (near the current location of Dredge Cell 1). Between 1976 and 1978, major construction and operational changes took place with a major increase in the height of Dike C and the Road Dike and the creation of the stilling

pond. Dike C and the Road Dike were both raised, using upstream construction methodology, to an elevation of 765 feet to provide the additional freeboard when the stilling pond was created to allow the finer particles to settle out before the water reentered Watts Bar Lake. This upstream construction component of the dike is referenced herein as the "raised dike". The stilling pond was created in the southeastern most portion of the ash pond when an all ash divider dike was constructed in a northeastern to southwestern direction between Dike C and the Road Dike. This divider dike would allow the stilling pond to operate at a pool elevation of 754 to 755 feet while the main ash collection pond would be operating at elevation 760 to 761 feet.

As plant operations continued the ash pond transitioned into smaller subdivided cells formed with interior dikes. In 1983 an interior ash dike was constructed in a southwest to northeast direction that roughly reduced the size of the ash pond by half and is most likely the first effort in the planned transition to Dredge Cell operations. In 1984 TVA reported a failure of the interior ash dike associated with dredge maintenance undermining; this event did not result in any offsite releases, but it did establish the approximate location of future Dike D. The 1985 annual inspection report recognizes the limits of a contained "dredge area" along the western side of the pond designated as Dredge Cell 1. Between 1987 and 1988 Dredge Cells 2 and 3 were created in the northwestern portion of the ash pond. As the Dredge Cells began to fill an Intermediate Dredge Cell was created to the east of Dredge Cell Nos. 1, 2, and 3 and the eastern dike became what we now know as Dike D.

Prior to the dredge cell failure in 2008, the Kingston Fossil Plant operated by sluicing fly ash and bottom ash into a channel that drains into the ash pond. The bottom ash was excavated out of the sluice channels and the ash pond and then transported to the dredge cells. Sluice water from the ash pond flows into five 48-inch reinforced concrete pipe (RCP) riser pipe/weirs that discharge into the stilling basin. Once the particulates have settled out, water from the stilling basin flows into six 48-inch RCP pipe/weirs that discharge into the Emory River intake channel. Approximately 390,000 dry tons of fly ash and 95,000 dry tons of bottom ash is sluiced to the ash pond annually.

4. Scope of Exploration

In response to TVA Engineering Service Request (ESR) 650, Stantec submitted a work plan on February 18, 2009. TVA ESR 650 includes the Dike D buttress construction and support (submitted under a separate cover) and the ash pond stability (addressed under this cover). As the project continued and the scopes were better defined, Stantec submitted an Addendum to the original work plan on April 21, 2009. Finally, as the field exploration was completed and Stantec began to work through some preliminary slope stability analyses, and a Revised Addendum was submitted on June 17, 2009. The Revised Addendum included a slightly reduced scope that was agreed to by TVA and Stantec personnel and will be discussed in the following paragraphs. The reduced scope was a result of the information gained during the field exploration and the preliminary slope stability analyses.

Stantec personnel advanced 54 conventional sample borings using a combination of all terrain vehicle and truck-mounted drill rigs on approximately 200-foot intervals along the centerline of the starter dike, raised dike and select other locations (designated herein as STN-1 through STN-71) from March 17, 2009 to May 27, 2009. Selected borings were also advanced approximately 20 feet into bedrock using NQ-size (approximately two-inch diameter) rock coring equipment. The borings were advanced into bedrock to determine

general engineering characteristics of the uppermost geology. In addition, Stantec assessed the hydraulic conductivity properties of the encountered bedrock utilizing water pressure testing. In response to information provided by AECOM relative to the Root Cause Analysis (RCA), Stantec conducted eight borings with continuous Shelby tube sampling at selected intervals near the original ground line at four discrete locations along the perimeter dike. In addition, Stantec advanced 21 cone penetration test (CPT) borings.

Stantec's original boring plan submitted to TVA on April 21, 2009, identified 71 conventional sample borings that were to be advanced. Based on the results from the initial field exploration, review of TVA's hydrogeographic data and the preliminary slope stability analyses, Stantec removed 17 borings from the original program. STN-1, STN-7, STN-13, STN-17, STN-25, STN-30, STN-35, STN-40, and STN-46 were removed from the program because the preliminary slope stability analyses concluded that the critical failure mechanism was not anticipated to change based on the results of advancing those borings within Watts Bar Lake. STN-33, STN-39, STN-57, STN-58, STN-67, STN-69, and STN-70 were removed from the program because fairly uniform subsurface conditions were encountered in the nearby borings. STN-44 was removed from the program because it was scheduled to be advanced near a previously completed AECOM boring. At the conclusion of the field exploration, TVA personnel surveyed as-drilled boring locations and transmitted the information to Stantec.

The subsurface exploration was performed using 3¼ and 4¼ inch (ID) hollow stem augers equipped with a carbide-tipped tooth bit. Standard Penetration Testing (SPT) or undisturbed (Shelby) tube samples were performed in all 54 of the conventional sample borings at continuous intervals. A standard penetration test consists of dropping a 140-pound hammer to drive a split-spoon sampler 18 inches. The consistency or relative density of soil is estimated by the number of blows it takes to drive the spoon the last 12 inches. This method is typically used to obtain soil samples, estimate the consistency or relative density of the soil, and also to estimate the vertical limits of the subsurface soil horizons. In addition, undisturbed samples (Shelby Tubes) were obtained with a fixed head piston sampler from selected depth intervals within the cohesive materials to provide samples for subsequent laboratory strength testing. After completion of the drilling and sampling procedures, the boreholes were checked for subsurface water and backfilled with bentonite grout.

CPT borings were conducted at offset locations to borings as shown in the list of borings in Section 5. Cone penetration testing was performed by advancing an integrated electronic seismic piezo cone within the soil-like overburden materials to measure tip resistance, sleeve friction and dynamic pore pressure at roughly one-inch intervals. In addition, pore pressure dissipation testing was performed at selected intervals.

Based on encountered site conditions, Stantec installed six slope inclinometers as a part of the overall stability evaluation. The slope inclinometers were constructed by advancing the boring approximately 10 feet into bedrock, installing 2.75 inch slope inclinometer casing, and backfilling the annulus with a bentonite-cement grout that is mixed to a similar consistency as the surrounding soils. Flush-mounted or riser type protective covers were set in concrete to protect the slope inclinometers. These instruments are currently scheduled to be monitored once every week until mid-November 2009.

Stantec installed 20 piezometers within the starter dike and the raised dike as a part of the overall stability evaluation, to provide data on piezometric levels within the existing dikes. Piezometer construction consisted of one-inch diameter Schedule 40 PVC well screen (five

feet) and riser pipe. The annular backfill consisted of a sand filter pack to some distance above the screened interval followed by a minimum two-foot bentonite seal. After allowing the bentonite to hydrate, the remaining annulus was backfilled with bentonite grout tremmied into place. Flush-mounted or riser type protective covers were set in concrete to protect the piezometers. These instruments are currently scheduled to be monitored once every two weeks until mid-November 2009.

An engineer/geologist was present with each drill crew throughout the drilling operations. The engineer/geologist directed the drill crews, logged the subsurface materials encountered during the exploration and collected soil samples. Particular attention was given to the soil's color, texture, moisture content and consistency or relative density. The soil samples extracted from the borings were transported to Stantec laboratories for testing.

In the laboratory, SPT samples were subjected to natural moisture content determination in accordance with American Society of Testing and Materials (ASTM) D 2216 and No. 200 wash gradation (ASTM D 1140). Selected SPT samples were also combined and subjected to soil classification tests that included Atterberg limits testing (ASTM D 4318), specific gravity tests (ASTM D 854) and sieve and hydrometer analyses (ASTM D 422). Undisturbed samples were extruded and subjected to unit weight determination, unconfined compression (ASTM D 2166), unconsolidated undrained triaxial compression (ASTM D 2850), consolidated undrained triaxial compression with pore pressure measurements (ASTM D 4767), one-dimensional consolidation (ASTM D 2435), direct simple shear (ASTM D 2435) and permeability (ASTM D 5084) testing.

The results of the field and laboratory testing services were used to develop critical stability sections perpendicular to Dike C. As a part of the original scope that was submitted to TVA on April 21, 2009, Stantec projected 10 stability sections that were located approximately 500 feet apart along the perimeter of Dike C. Based on the results of the field exploration, cross-section geometry and the preliminary slope stability analyses Stantec reduced the total number of stability sections to five under the revised addendum that was submitted on June 17, 2009. Stantec performed seepage and slope stability analyses on five cross sections using as detailed later in the report.

5. Results of Geotechnical Exploration

5.1. Summary of Borings

Stantec developed a boring plan for the field exploration of Dike C at the Kingston Fossil Plant after a review of historical information and existing site conditions. TVA survey personnel established the boring locations and surface elevations in the field in accordance with Stantec's boring plan. A summary of the boring information is presented in Table 1, where all measurements are expressed in feet. Typed boring logs with the results of the water pressure testing are presented in Appendix A and the CPT results are included in Appendix B.

Table 1. Summary of Borings

Boring No.	Northing	Easting	Surface Elevation	Top of Rock Elevation	Refusal/ Begin Core Elevation	Boring Termination Depth	Bottom of Hole Elevation
STN-1	Not Drilled						
STN-2	556804.57	2442329.32	751.2	713.7	710.2	41.0	710.2
STN-2A	556806.57	2442329.32	751.2	--	NR(721.7)	29.5	721.7
STN-2B*	556801.29	2442323.04	751.0	--	--		
STN-3	556756.78	2442263.59	763.7	714.7	713.4	50.3	713.4
STN-3A	556761.99	2442259.75	763.9	--	NR(733.9)	30.0	733.9
STN-3B	556765.05	2442256.36	763.8	--	NR(713.8)	50.0	713.8
STN-3C	556763.50	2442257.42	763.8	--	NR(728.8)	35.0	728.8
STN-3D	556762.50	2442258.42	763.8	--	NR(728.8)	35.0	728.8
STN-3E*	556764.10	2442559.45	763.8	--	--		
STN-4**	556625.56	2442047.01	763.3	702.3	700.3	83.0	680.3
STN-5	556611.15	2442365.31	764.9	712.4	710.9	54.0	710.9
STN-6	556416.17	2442407.10	763.4	699.4	698.9	64.5	698.9
STN-7	Not Drilled						
STN-8**	556248.52	2442540.30	752.2	698.7	696.4	76.7	675.5
STN-8A*	556254.96	2442535.17	751.7	--	--		
STN-9	556233.82	2442499.72	764.8	702.3	701.4	63.4	701.4
STN-9A*	556234.82	2442499.81	764.8	--	--		
STN-10**	556162.76	2442251.63	765.0	705.5	704.0	81.0	684.0
STN-11	556034.83	2442535.05	763.2	704.7	701.2	62.0	701.2
STN-12	555873.09	2442622.48	765.1	704.1	703.1	62.0	703.1
STN-13	Not Drilled						
STN-14	555685.58	2442733.21	753.1	706.1	702.1	51.0	702.1
STN-14A	555687.58	2442734.21	753.1	--	NR(734.6)	18.5	734.6
STN-14B*	555690.29	2442730.41	753.0	--	--		
STN-15	555662.69	2442667.52	763.7	706.2	704.8	58.9	704.8
STN-15A	555669.72	2442691.43	765.3	--	NR(735.3)	30.0	735.3
STN-15B	555672.20	2442690.32	765.3	--	NR(707.3)	58.0	707.3
STN-15C	555671.50	5442690.88	765.3	--	NR(730.3)	35.0	730.3
STN-15D	555665.72	2442690.78	765.3	--	NR(730.3)	35.0	730.3
STN-15E*	555694.24	2442681.34	765.0	--	--		
STN-16	555501.40	2442725.94	764.5	706.5	706.0	58.5	706.0
STN-17	Not Drilled						
STN-18**	555204.87	2442894.11	751.0	702.5	700.5	71.5	679.5
STN-18A*	555204.57	2442886.00	751.8	--	--		
STN-19	555204.68	2442842.94	765.6	701.1	700.6	65.0	700.6
STN-19A*	555204.68	2442843.94	765.6	--	--		
STN-20	555168.84	2442666.59	762.9	703.9	701.9	61.0	701.9
STN-21**	555076.61	2442149.85	765.0	709.0	707.5	77.5	687.5
STN-22**	554990.27	2441723.40	765.0	707.0	706.0	79.0	686.0

Table 1. Summary of Borings

Boring No.	Northing	Easting	Surface Elevation	Top of Rock Elevation	Refusal/ Begin Core Elevation	Boring Termination Depth	Bottom of Hole Elevation
STN-23	555020.22	2442857.46	764.7	703.7	702.7	62.0	702.7
STN-24	554803.45	2442843.16	765.1	701.6	700.9	64.2	700.9
SNT-25	Not Drilled						
STN-26	554624.86	2442889.00	750.0	696.0	692.7	57.3	692.7
STN-26A	554604.66	2442904.17	750.0	--	NR(730.0)	20.0	730.0
STN-26B*	554604.57	2442896.12	751.0	--	--		
STN-27	554601.77	2442850.67	765.1	700.1	697.6	67.5	697.6
STN-27A	554600.64	2442840.21	765.0	--	NR(705.0)	60.0	705.0
STN-27B	554606.18	2442840.52	765.0	--	NR(729.0)	36.0	729.0
STN-27C*	554607.18	2442840.92	765.0	--	--		
STN-28	554406.25	2442841.10	764.8	700.5	700.2	64.6	700.2
STN-29	554155.15	2442854.72	764.7	697.2	697.0	67.7	697.0
STN-30	Not Drilled						
STN-31	553954.94	2442758.22	749.5	696.5	695.5	54.0	695.5
STN-31A*	553960.30	2442764.66	749.7	--	--		
STN-32	553994.90	2442746.44	764.8	696.3	695.8	69.0	695.8
STN-32A*	553996.72	2442757.13	764.8	--	--		
STN-33	Not Drilled						
STN-34	553853.66	2442184.35	764.7	699.7	688.7	76.0	688.7
STN-35	Not Drilled						
STN-36	553776.74	2442198.78	751.9	712.4	707.9	44.0	707.9
STN-36A	553766.08	2442199.97	751.9	--	NR(736.9)	15.0	736.9
STN-36B*	553753.47	2442155.66	751.5	--	--		
STN-37	553799.90	2442184.40	763.8	712.8	709.6	54.2	709.6
STN-37A	553799.38	2442182.40	763.8	--	NR(734.8)	29.0	734.8
STN-37B	553800.49	2442186.20	763.7	--	NR(711.7)	52.0	711.7
STN-37C	553798.81	2442171.01	763.6	--	NR(730.1)	33.5	730.1
STN-37D	553798.26	2442168.95	763.6	--	NR(730.6)	33.0	730.6
STN-37E*	553799.26	2442183.40	763.8	--	--		
STN-38	553730.83	2441988.70	764.1	715.1	712.8	51.3	712.8
STN-39	Not Drilled						
STN-40	Not Drilled						
STN-41**	553583.10	2441510.71	752.7	714.7	709.7	63.0	689.7
STN-41A*	553584.59	2441512.86	751.8	--	--		
STN-42	553623.48	2441513.69	764.7	713.7	713.2	51.5	713.2
STN-42A*	553624.48	2441512.69	764.7	--	--		
STN-43	554004.68	2441548.50	765.9	718.9	711.9	54.0	711.9
STN-43A*	554005.71	2441549.61	765.9	--	--		
STN-44	Not Drilled						
STN-45	553740.50	2441308.40	763.9	716.4	175.4	48.5	715.4
SNT-46	Not Drilled						
STN-47	553747.39	2441146.83	753.4	717.4	713.9	39.5	713.9

Table 1. Summary of Borings

Boring No.	Northing	Easting	Surface Elevation	Top of Rock Elevation	Refusal/ Begin Core Elevation	Boring Termination Depth	Bottom of Hole Elevation
STN-47A	553733.63	2441141.18	753.1	--	NR(745.6)	7.5	745.6
STN-47B*	553742.43	2441143.28	753.8	--	--		
STN-48	553773.29	2441154.53	765.3	716.3	711.3	54.0	711.3
STN-48A	553771.75	2441159.01	765.3	--	NR(742.8)	22.5	742.8
STN-48B	553769.40	2441163.30	765.3	--	NR(717.1)	48.2	717.1
STN-48C*	553770.51	2441164.28	765.3	--	--		
STN-49	553921.85	2441024.39	763.1	718.1	715.6	47.5	715.6
STN-50**	553631.96	2440496.85	741.6	705.9	704.6	57.0	684.6
STN-50A*	553632.98	2440497.85	741.6	--	--		
STN-51	553696.02	2440548.46	750.4	701.5	700.8	49.6	700.8
STN-52	553992.98	2440817.40	753.2	714.2	713.7	39.5	713.7
STN-53	554011.12	2440902.46	763.9	713.9	712.4	51.5	712.4
STN-53A*	554012.14	2440904.05	763.9	--	--		
STN-54	555263.94	2441476.12	765.0	707.0	706.0	59.0	706.0
STN-55	554943.73	2442287.49	764.1	703.1	699.9	64.2	699.9
STN-56**	554555.61	2441998.50	765.8	704.8	703.7	82.0	683.8
STN-57	Not Drilled						
STN-58	Not Drilled						
STN-59	556075.53	2442603.06	752.2	701.2	700.7	51.5	700.7
STN-60	555886.92	2442663.31	752.5	701.0	699.0	53.5	699.0
STN-61	555513.59	2442792.80	752.5	706.5	701.0	51.5	701.0
STN-62	555020.69	2442907.23	749.8	702.8	700.8	49.0	700.8
STN-63	554822.75	2442910.57	750.0	702.5	701.0	49.0	701.0
STN-64	554411.29	2442911.08	749.4	702.9	693.9	55.5	693.9
STN-65	554147.51	2442915.09	748.6	700.6	698.6	50.0	698.6
STN-66	553888.83	2442564.24	750.9	695.9	693.9	57.0	693.9
STN-67	Not Drilled						
STN-68	Not Drilled						
STN-69	553607.58	2441718.01	752.3	707.3	692.8	59.5	692.8
STN-70	Not Drilled						
STN-71	553840.20	2440981.04	752.0	717.0	706.5	45.5	706.5

* Denotes Cone Penetration Test (CPT) boring.

** Boring was advanced approximately 20 feet into bedrock utilizing rock coring techniques
NR indicates no refusal

5.2. Subsurface Soil Conditions

Based on a review of the information obtained from the borings performed, placed embankment fill forming Dike C can be separated into four major horizons. Additionally, three major horizons have been identified as the foundation soils for Dike C.

Beginning just above the foundation soil materials, a discontinuous layer of "Gravel to Clayey Gravel", approximately three-foot thick, was encountered. This layer is most likely associated with placement of subgrade stabilization materials for starter clay dike construction. It should be noted that starter clay dike construction appears to have occurred at times within the impounded slack water area of Swan Pond formed by Watts Bar Reservoir.

The "Starter Clay Dike" horizon extends from the original groundline up to elevation 748 feet. The material was used to construct the initial perimeter containment dike prior to 1954. The starter clay dike soils primarily have a Unified Soil Classification System (USCS) classification of CL with lesser occurrences of CH, SM, and SC. Textural classifications consisted mostly of sandy lean clay and clayey sand with gravel. The soil was described as damp to wet in moisture content and brown to gray in color. Based on SPT N-values and laboratory strength testing, the starter clay dike has strength consistencies ranging from soft to medium stiff.

Above the starter clay dike, the "Constructed Ash" horizon, extending from approximate elevation 748 feet to elevation 750 feet was encountered primarily on the eastern leg of Dike C. The constructed ash was placed as an interim raise in 1974, to provide additional freeboard for the ash pond. It should be noted that the constructed ash was denoted as a thicker layer with a maximum thickness of 13.5 feet in some areas on the boring logs. This greater thickness is most likely attributed to some interim use of available ash materials to form the starter dike. The material generally consists of bottom ash. The bottom ash was described as damp to wet in moisture content and gray to dark gray and black in color. Based on SPT N-values the constructed ash has strength consistencies ranging mostly from loose to dense.

From 1954 to 1976, ash sluiced into the pond formed the "Hydraulically Placed Ash" horizon that now lies below the third raising of Dike C. The hydraulically placed ash extends from the original ground surface to approximate elevation 745 feet. The material generally consists of bottom ash and fly ash in varying mixtures. Classification tests performed on a selected hydraulically placed ash samples resulted in a USCS classification of SM and a textural classification of silty sand with gravel. The hydraulically placed ash was described as damp to wet in moisture content and gray to dark gray and black in color. Based on SPT N-values the hydraulically placed ash has strength consistencies ranging from very loose to dense.

The "Raised Clay Dike," constructed between 1976 and 1978, extends from approximate elevation 745 feet to elevation 765 feet. The raised clay dike soils classified primarily as CL with areas of CH. The raised clay dike had textural descriptions of lean clay with sand, sandy lean clay, fat clay with sand, and sandy fat clay. The soil was described as damp to wet in moisture content and mostly brown in color. Based on SPT N-values and laboratory strength testing, the raised clay dike has strength consistencies ranging from very soft to very stiff.

The uppermost native foundation material encountered at the boring locations consists of a silt and clay material, which appears to be original ground lake sediment deposits associated with the Swan Pond embankment. The material designated herein as the "Sensitive Silt/Clay" horizon, approximately a half to one-foot in thickness, lies near the original ground surface. The sensitive silt/clay soils classified primarily as CL-ML with occurrences of CL and ML. The sensitive silt/clay horizon was usually described as having a silt or silty clay texture, light brown in color, and saturated in moisture content. Based on SPT N-values the sensitive silt/clay horizon has strength consistencies ranging from very soft to soft.

No material matching the "slime layer" as described in the Dredge Cell Root Cause Analysis report was noted to be encountered during this exploration. This is likely attributed to the subject study area being the most active portion of the historical ash pond operations. If the material had formed in this area, probably removed in association with periodic dredging operations.

There is an occasional "Lean Clay Foundation Soil" layer found below the sensitive silt/clay horizon ranging from about three to twelve feet in thickness. The lean clay foundation soil had a USCS classification of CL with textural descriptions of sandy lean clay and lean clay with sand. The soil was described as predominately saturated in moisture content and light brown in color. Based on SPT N-values the lean clay foundation soil has strength consistencies of very soft to medium stiff.

Below the sensitive silt/clay horizon, "Sandy Silt to Silty Sand" was encountered down to elevations ranging between 717 feet and 703 feet. The sandy silt to silty sand had USCS classifications of predominately SM with occasional occurrences of CL, ML, and CL-ML. Textural descriptions were mostly of silty sand and sandy silt with isolated pockets of clayey soils typical of alluvial deposits. The soil was described as brown to gray in color and moist to saturated in moisture content. Based on SPT N-values and laboratory strength testing, the sandy silt to silty sand has strength consistencies ranging mostly from very loose or very soft to medium dense or medium stiff.

Below the sandy silt to silty sand horizon, "Fine Grained Sand" was encountered down to bedrock having an elevation ranging from about elevation 717 feet to 700 feet. The fine grained sand horizon had a USCS classification of SM with a textural classification of sand. The soil was described as wet or saturated in moisture content and brown to gray in color. Based on SPT N-values the fine grained sand horizon has strength consistencies of loose to very dense.

5.3. Instrumentation

5.3.1. Piezometers

At select boring locations, piezometers were installed to measure pore water pressures within Dike C. In general, piezometer readings were obtained on four separate occasions spaced approximately two weeks apart, beginning with the initial reading on May 28, 2009. Based on Stantec's current scope, it is anticipated that these readings will continue every two weeks until the middle of November. This report includes the results up to the last reading date on July 9, 2009; future readings will be issued under a separate cover. Refer to appendixes C and D for piezometer installation details and the latest piezometer readings, respectively. Piezometer locations and tip elevations are summarized in Table 2 below.

Table 2. Summary of Piezometers

Boring No.	ID	Concrete Pad Elevation (Feet)	Piezometer Tip Elevation (Feet)
STN-2A	PZ-1	751.2	724.7
STN-3A	PZ-2 (U)	763.9	751.9
	PZ-3 (L)		737.9
STN-3B	PZ-4	763.8	718.8
STN-14A	PZ-5	753.1	737.6
STN-15A	PZ-6 (U)	765.3	753.3
	PZ-7 (L)		738.3
STN-15B	PZ-8	765.3	710.3
STN-26A	PZ-9	750.0	733.0
STN-27A	PZ-10 (U)	765.0	752.2
	PZ-11 (L)		735.2
STN-27B	PZ-12	765.0	708.2
STN-36A	PZ-13	751.9	738.4
STN-37A	PZ-14 (U)	763.8	752.9
	PZ-15 (L)		738.1
STN-37B	PZ-16	763.7	715.0
STN-47A	PZ-17	753.1	746.9
STN-48A	PZ-18 (U)	765.3	756.7
	PZ-19 (L)		746.1
STN-48B	PZ-20	765.3	720.1

U – Denotes upper piezometer within the same boring

L – Denotes lower piezometer within the same boring

In general, the water levels were fairly consistent, with slight increases in the water elevation reported for the crest borings and mostly decreases in the water level observed within the toe borings. These changes in the water level observed over the two months of readings are likely attributed to equalization of the water level within the piezometers over time. However, it should be noted that water levels can also fluctuate due to the seasons, precipitation events, variations in pool levels, and other factors.

5.3.2. Slope Inclinometers

Slope inclinometers were installed in borings STN-8, STN-18, STN-34, STN-64, STN-69, and STN-71 to monitor any future movement within Dike C. In general, slope inclinometer readings were obtained soon after installation of the slope inclinometer casing so that a baseline reading could be established. The readings were then taken on a weekly basis with other instruments that were installed as a part of separate projects. Based on Stantec's current scope, it is anticipated that these readings will continue every two weeks for the next six months. This report includes the results up to the last reading date on July 9, 2009; future readings will be issued under a separate cover. Based on the readings taken to date, there has been no significant movement in any of the slope inclinometers installed within Dike C. Refer to Appendixes C and D for slope inclinometer installation details and the latest slope inclinometer readings, respectively.

6. Laboratory Testing

6.1. General

Stantec performed laboratory testing in accordance with applicable ASTM soil testing specifications. Results from the laboratory tests are included in Appendix E. In particular, natural moisture content test results are shown on the attached boring logs in Appendix A and are also shown on the drafted sheets in Appendix F. No further discussion relative to the results of moisture content and classification testing are provided in this section. The discussion that follows is limited to the laboratory testing associated with evaluation of the laboratory strength test characteristics.

6.2. Testing of Cohesive Soils/Undisturbed (Shelby) Tube Testing

The borings drilled for the subject dike included 3-inch diameter undisturbed (Shelby) tube sampling within predominantly cohesive soil horizons. Stantec's soils laboratory extruded the tubes and trimmed six-inch long specimens. Lab personnel determined visual inspections, unit weights (wet and dry), and natural moisture for each six-inch specimen prior to submitting a summary of the extruded specimens to a geotechnical engineer for assignment of lab testing. Select 6-inch specimens extruded from Shelby tubes were subjected to unconfined compressive (UC) strength testing, consolidated-undrained (CU) triaxial testing, unconsolidated-undrained (UU) triaxial testing, direct simple shear (DSS), testing one-dimensional consolidation, and testing permeability testing. Selected tube specimens associated with continuous sampling at the pond base/original ground elevation were also subjected to longitudinal cutting, visual inspection and laboratory microscopic viewing to identify any suspect "slime" type materials. The results of these tests are included in Appendix E and discussed below.

6.2.1. Unconfined Compressive (UC) Strength Testing

Unconfined compressive strength testing was performed to provide information from which soil strength parameters could be estimated. The results of the unconfined compressive strength testing are presented next to the sample borings on the geotechnical drawings in Appendix F and are summarized in Table 3.

Table 3. Summary of Unconfined Compressive Strength Tests

Boring No.	Sample Interval (feet)	Dry (pcf)	Wet (pcf)	Moisture Content (%)	Unconfined Compressive Strength (psf)
STN-20	35.0 - 35.5	103.6	127.0	23.7	760
STN-55	42.6 - 43.1	106.1	128.0	20.4	2,020

6.2.2. Consolidated-Undrained (CU) Triaxial Testing

Stantec performed CU triaxial testing with pore pressure measurements on selected 6-inch long specimens extruded from 3-inch diameter Shelby tubes obtained during drilling. CU testing provides indicators of effective-stress shear-strength parameters. The results of the CU triaxial tests are presented on the stability section in Appendix F, and are summarized in Table 4. The stress path envelopes derived from CU triaxial testing are also presented in Appendix E.

Table 4. Summary of Consolidated – Undrained Triaxial Testing

Boring No.	Sample Interval (feet)	USCS Classification	CU Triaxial Strength	
			c' (psf)	ϕ' (degrees)
STN-28	38.3 - 38.9	CL	103	32.3
	38.9 - 39.5			
	46.3 - 46.9			
STN-29	60.2 - 60.8	CL	0	34.0
	60.8 - 61.4			
	61.4 - 62.0			
STN-26	20.0 - 20.5	CL	125	37.8
STN-64	20.6 - 21.1			
STN-27	30.3 - 30.8			
STN-31	33.6 - 34.1	CL-ML	345	32.6
STN-66	33.6 - 34.1			
STN-32	50.0 - 50.5			
STN-3D	31.0 - 31.6	CL-ML	113	35.6
	31.6 - 32.2			
STN-37D	31.6 - 32.8	CH	40	41.1
STN-37	13.5 - 14.0			
	14.3 - 14.8			
	20.0 - 20.3			

Table 4. Summary of Consolidated – Undrained Triaxial Testing

Boring No.	Sample Interval (feet)	USCS Classification	CU Triaxial Strength	
			c' (psf)	φ' (degrees)
STN-14	23.6 - 24.1	CL-ML	240	33.2
	24.2 - 24.7			
STN-61	23.0 - 23.5			
STN-2	9.0 - 9.5	CL	400	34
	14.0 - 14.5			
	14.6 - 15.1			
STN-50	20.0 - 20.5	CL	80	36.6
	20.5 - 21.0			
STN-51	23.5 - 24.0			
STN-3	10.5 - 11.0	CH	600	21.1
	12.5 - 13.0			
STN-5	11.3 - 11.8			

6.2.3. Direct Simple Shear (DSS) Testing

Stantec selected samples extruded from Shelby tubes for DSS testing to provide additional indicators of effective-stress shear-strength parameters. The results of the DSS tests are presented in the stability section in Appendix F, and are summarized in Table 5. The stress path envelopes are also presented in Appendix E.

Table 5. Summary of Direct Simple Shear Testing

Boring No.	Sample Interval (feet)	USCS Classification	DSS Strength	
			c' (psf)	φ' (degrees)
STN-15D	34.00 - 34.25	CL	170	21
STN-15D	34.25 - 34.50		210	24
STN-27B	33.20 - 33.45	CL	60	22
STN-27B	35.20 - 35.45	CL-ML	260	25
STN-27B	35.45 - 35.80		100	27

6.2.4. Unconsolidated – Undrained (UU) Triaxial Testing

Stantec performed UU triaxial testing on selected soil specimens to provide information for estimated total stress strength parameters for cohesive soil horizons. Table 6 summarizes the data obtained from this test. The Subsurface Data Sheets provided in Appendix F also depict the results of the UU testing adjacent to the appropriate graphical log. The laboratory testing results are also included in Appendix E.

Table 6. Summary of Unconsolidated – Undrained Triaxial Testing

Boring No.	Sample Interval (feet)	Confining Stress (psi)	UU Triaxial Strength	
			(psf)	(tsf)
STN-2	20.5 - 21.0	14	1,224	0.61
STN-2	30.6 - 31.1	18	1,670	0.84
STN-5	38.5 - 39.0	24	660	0.33
STN-8	15.5 - 16.0	13	660	0.33
STN-18	25.5 - 26.0	15	1,670	0.84
STN-19	5.0 - 5.5	4	4,310	2.15
STN-19	39.7 - 40.2	25	880	0.44
STN-22	49.5 - 50.0	20	3,460	1.73
STN-27	12.6 - 13.1	10	2,580	1.29
STN-27	44.7 - 45.2	27	1,440	0.72
STN-31	20.5 - 21.0	10	600	0.30
STN-31	38.0 - 38.5	19	450	0.22
STN-32	5.3 - 5.8	3	2,510	1.25
STN-36	29.0 - 29.5	13	300	0.15
STN-41	15.1 - 15.6	12	1,340	0.67
STN-43	29.1 - 29.6	16	1,390	0.70
STN-48	33.5 - 34.0	21	3,840	1.92
STN-48	4.0 - 4.5	3	1,930	0.97
STN-50	9.0 - 9.5	7	490	0.24
STN-63	9.3 - 9.8	5	900	0.45
STN-64	20.0 - 20.5	11	490	0.25
STN-64	30.0 - 30.5	15	1,930	0.97
STN-65	13.5 - 14.0	10	2,220	1.11

6.2.5. One-Dimensional Consolidation Testing

Stantec selected samples extruded from Shelby tubes for one-dimensional consolidation testing to provide initial void ratio and consolidation parameter indicators for estimates of use in settlement analyses. The results of the consolidation tests are summarized in Table 7 and are presented in Appendix E.

Table 7. Summary of One Dimensional Consolidation Tests

Boring No.	Test Interval (feet)	Initial Void Ratio (e_o)	Compression Index (C_c)	Recompression Index (C_r)	Pre-Consolidation Pressure (P_c) (psf)
STN-2	31.4 - 31.9	0.589	0.182	0.025	5,000
STN-9	11.7 - 12.2	0.844	0.216	0.040	12,000
STN-14	24.8 - 25.3	0.534	0.145	0.025	4,000
STN-19	14.1 - 14.6	0.681	0.125	0.032	6,200
STN-32	14.0 - 14.5	0.700	0.175	0.035	6,000
STN-52	25.2 - 25.7	0.573	0.150	0.025	3,800
STN-63	15.2 - 15.7	0.785	0.110	0.020	1,600
STN-64	21.2 - 21.7	0.752	0.320	0.030	1,200
STN-65	33.8 - 34.3	0.815	0.225	0.033	3,400

6.3. Testing of Standard Penetration Test (SPT) Samples

In general, recovered soil specimens from SPT samples were subjected to natural moisture content determinations and select samples were combined for engineering classification testing. The engineering classification testing consisted of Atterberg limits, specific gravity, and sieve and hydrometer analyses. The results of the classification testing were used in conjunction with the N-values from SPT's to estimate soil strength based on published correlations of such data. The results of the moisture content tests are included on the boring logs and drawings in Appendixes A and F, respectively. The results of the engineering classifications are included on the drawings in Appendix F.

7. Engineering Analyses

7.1. General

Geotechnical engineering analyses included evaluations of strength and permeability parameters, seepage analyses, and slope stability analyses. Prior to beginning the analyses, the geotechnical data and cross sections were combined and the geometry of the existing dikes and soil horizons were approximated using current and historical information. Once the geometry of the sections was determined, each section was reviewed and evaluated to determine the critical cross section for analyses. The criteria for selecting the critical sections was based on the steepness of slopes, the geometry of the sections, and the phreatic surface, and soil conditions. Based on this evaluation, representative cross sections were selected for analyses. Results of the analyses and evaluations are summarized in the following paragraphs. Results of the seepage and slope stability analyses, along with the plan locations of the cross sections, are shown on the drawings included in Appendix F.

It should be noted that construction records indicating the methods used to construct the dikes, as-built dike configurations, etc. were not available for review. In addition, the variable nature of the historical and current strength data shows some signs of inconsistencies in the construction of the dikes. As a result, generalizations in soil parameters and dike geometry

were needed to construct the seepage and stability models. The 2008 failure of the adjacent dredge cell deposited coal ash against the slope of Dike C, mostly along the eastern reach. This accumulation of ash, which is highly erodible and will be removed during the cleanup, was ignored during the analyses.

7.2. Soil Horizons

Based on the results of the drilling, laboratory testing, historical documentation, and drawings, the materials on site were divided into different soil layers. Refer to the stability sections in Appendix F for locations of the soil horizons. For these analyses, the soil layers are as follows:

- *Starter Clay Dike*: This represents the material used for construction of the original perimeter dike. Based on historical information the interior slopes were constructed at a 3:1 (H:V) and the exterior slopes were constructed at a 6:1 (H:V).
- *Raised Clay Dike*: This represents the material that was used for the upstream raising of the original dike.
- *Constructed Ash*: This represents material encountered during the field exploration above the original starter dike between Station 127+00 and 160+00 on the eastern portion of the dike. This material appears to have been used for an interim raising of the starter dike or used for a repair. The material consists of a mixture of fly ash and bottom ash.
- *Hydraulically Placed Ash*: This represents the material that is contained by Dike C. It was encountered upstream of the starter dike and below and upstream of the raised dike.
- *Gravel to Clayey Gravels*: This represents a gravelly layer that is in place below the original dike construction. This material appears to have been used to stabilize the original dike construction.
- *Sensitive Silt/Clay*: This represents the uppermost and relatively recent slack water silt and clay sediment deposits associated with the Swan Pond embankment at the time of the initial ash pond construction. The results of the exploration indicate this material is generally very soft and exhibits relatively low shear strength.
- *Lean Clay Foundation Soil*: This represents a lean clay foundation layer that was encountered in several of the borings.
- *Sandy Silt to Silty Sand*: This represents a foundation layer that was encountered at varying thickness within all the borings.
- *Fine Grained Sand to a Sand with Silt*: This represents a foundation layer that was encountered in several of the borings with varying thickness as the borings were advanced near the top of bedrock.

7.3. Seepage Analysis

7.3.1. SEEP/W Model

An analysis of steady state seepage through the dike was needed to estimate the magnitude of seepage gradients (for the evaluation of potential piping) and pore water pressures within the soils (for the evaluation of slope stability). The numerical seepage model for Kingston Fossil Plant Dike C was developed using SEEP/W 2007 (Version 7.14), a finite element code tailored for modeling groundwater seepage problems in soil and rock. SEEP/W is distributed by GEO-SLOPE International, Ltd, of Calgary, Alberta, Canada (www.geo-slope.com).

SEEP/W uses soil properties, geometry, and boundary conditions provided by the user to compute the total hydraulic head at nodal points within the modeled cross section. Among other features, SEEP/W includes a graphical user interface, semi-automated mesh generation routines, iterative algorithms for solving unconfined flow problems, specialized boundary conditions (seepage faces, etc.), capabilities for steady-state or transient analyses, and features for visualizing model predictions. The code also includes material models that allow tracking both saturated and unsaturated flow, including the transition in seepage characteristics for soils that become saturated or unsaturated during the problem simulation.

Five cross sections through Dike C were modeled with SEEP/W, then subsequently evaluated for slope stability (Section 7.5). For the numerical analysis, each cross section was subdivided into a mesh of elements, consisting of first-order quadrilateral and triangular finite elements. For seepage problems, where the primary unknown (hydraulic head) is a scalar quantity, first-order elements provide for efficient, effective modeling. Given appropriate hydraulic conductivity properties and applied boundary conditions, the finite element method (as implemented in the SEEP/W code) was then used to simulate steady seepage across the mesh. The total hydraulic head is computed at each nodal location, from which pore water pressures and seepage gradients can be determined.

7.3.2. Boundary Conditions

Steady-state seepage was assumed for the analysis, with static water levels on the upstream and downstream sides of Dike C. For the cross sections at Station 108+93, 138+27, and 149+14, the ash pond was assumed to be at elevation 760 feet. The cross sections at Station 119+69 and 132+37 pass through the stilling basin, where the water levels were assumed to be at elevation 755 feet. On the downstream side, Watts Bar Lake was assumed to be at an elevation of 737 feet, corresponding to a normal winter pool. This lower pool elevation was selected to represent the more severe conditions for stability, with increased seepage gradients and lower external stabilizing pressures.

Boundary conditions for the SEEP/W analysis were assumed as follows. Along the vertical, upstream and downstream edges of the model, the hydraulic head at each node was constant with depth and equal to the pool elevation on that side of the dike. A total head equal to the pool level was also applied to all submerged nodes along the ground surface of the model. Other nodes along the ground surface were treated as potential seepage exits. At steps in the analysis, if water was flowing out of the mesh at these nodes, SEEP/W assigned a head equal to the elevation of the node. This routine effectively models the seepage of water out to the ground surface. The horizontal boundary at the base of the model (located within the shale bedrock) was modeled as a seepage barrier, with no vertical flow across the boundary nodes.

7.3.3. Seepage Properties

For each modeled cross section of the dike, a representative subsurface profile was compiled based on boring logs, available record drawings, and the known project history. Material properties were estimated based on available laboratory data and, if no data was available, based on typical values for similar soils. Material properties used in the seepage analysis are summarized in Table 8.

Table 8. Material Properties for SEEP/W Analysis

Soil Horizon	Saturated k_v (cm/s)	Ratio k_h / k_v	Specific Gravity G_s	Void Ratio e	Volumetric Water Content		Basis
					Saturated (%)	Residual (%)	
Hydraulically Placed Ash	3.0e-5	50	2.31	0.85	46	0.04	Available Laboratory Data (Test Trench #3)
Constructed Ash	3.0e-5	25	2.31	0.85	46	0.04	Available Laboratory Data (Test Trench #3)
Clay Raised Dike	1.2e-7	10	2.74	0.83	45	0.03	Available Laboratory Data (STN-27 & STN-48)
Clay Starter Dike	3.1e-8	10	2.69	0.61	38	0.02	Available Laboratory Data (STN-8)
Sensitive Silt/Clay	3.0e-5	50	2.31	0.85	46	0.04	Available Laboratory Data (Test Trench #3)
Lean Clay Foundation Soil	1.9e-8	20	2.70	0.61	38	0.02	Available Laboratory Data (STN-36)
Sandy Silt to Silty Sand	1.0e-5	50	2.70	0.65	39	0.01	Based on Typical Values
Gravel to Clayey Gravel	1.0e-3	50	2.70	0.65	39	0.01	Based on Typical Values
Fine Grained Sand to Sand with Soil	1.0e-5	50	2.70	0.65	39	0.01	Based on Typical Values s
Shale	1.0e-7	10	2.60	0.25	20	0.01	Based on Typical Values

Note: SEEP/W requires input parameters k_h and ratio of k_v/k_h

Significant engineering judgment is needed to select appropriate hydraulic properties for earth materials. Unlike other key properties, hydraulic conductivity can vary over several orders of magnitude for a range of soils, often with substantial anisotropy for seepage in horizontal versus vertical directions. Laboratory test samples often do not represent important variations within a larger soil deposit. For Dike C, an iterative process of parametric

calibration (Section 7.3.4) was used to arrive at final estimates of the seepage properties. Results from trial simulations were compared to field data (measured piezometric levels and the depth to groundwater in borings). The material parameters were then varied until the solutions reasonably matched the field data on all five cross sections. The final set of parameters (Table 8) resulted in the comparisons presented in Section 7.3.4.

Hydraulic conductivities for vertical seepage through saturated materials (k_v) were estimated using available laboratory data. As indicated in Table 8, typical values for similar soils (obtained from various published sources) were used where laboratory data were not available. The value of k_v selected for the alluvial sandy silt to silty sand foundation deposit is one example where engineering judgment was critical to the selection of appropriate material properties. Laboratory permeability tests were conducted on Shelby tube samples of cohesive soils within this deposit; however, the global conductivity of this layer will be closer to that of the more predominant sandy materials.

The ratio of horizontal hydraulic conductivity (k_h) to vertical hydraulic conductivity (k_v) was estimated based on placement of the material. An isotropic material would have $k_h/k_v = 1$, while deposits of horizontally layered soils might have values as high as $k_h/k_v = 100$. For Dike C, relatively high ratios ($k_h/k_v = 50$) were assumed for the hydraulically placed ash and the silty sand to sandy silt, in both cases reflective of periodic deposition of materials with different gradations. Such deposits typically exhibit much greater permeability in the horizontal direction than in the vertical direction. More modest values ($k_h/k_v = 10$) were assumed for the dike materials, which would have been constructed in horizontal lifts.

The governing equations in SEEP/W are formulated to consider seepage through unsaturated soils. In the simulations for Dike C, this formulation is used to locate the phreatic surface for unconfined seepage through the dike cross sections. To represent the change in hydraulic conductivity due to de-saturation of each soil, SEEP/W implements a model based on two curves, a hydraulic conductivity function and a volumetric water content function. Three parameters are needed to define this behavior: the saturated hydraulic conductivity, saturated water content, and residual water content (water content of air dried soil). Of these, only the residual water contents were not previously estimated for each soil. Values were estimated (Table 8) based on typical values for similar soils. Parametric variations, wherein the hydraulic conductivity of the surficial soils were held constant for all saturation levels, indicated that the simulation results were not sensitive to these model selections.

7.3.4. Comparison to Field Observations

After the initial seepage parameters were estimated, results from the SEEP/W model were compared to pore water pressures measured in piezometers installed in Dike D. Data from 12 piezometers, at locations on three of the five modeled cross sections, were used in this evaluation. Nodes were placed in the model at the same location as the piezometer tip was installed in the field, then the total head predicted at the node was compared to the corresponding piezometer reading.

Considering the results for all 12 piezometers, the material properties in each modeled cross section were varied until a reasonable match was obtained between the predictions and field data. Specifically, the saturated hydraulic conductivity of the sandy silt to silty sand and the gravel to clayey gravel were varied, as was the k_h/k_v ratio for all materials. After several iterations, the final soil parameters were within expected ranges, based on soil type and laboratory data, and calibrated to give model predictions consistent with field measurements.

The comparison between the field measurements and SEEP/W predictions at each piezometer are plotted in Figure 2. The maximum difference between the predictions and measurements is 7.3 feet (a PZ9), while most differ by less than 3 feet. These differences are acceptable in a seepage model, given the typical differences between the modeled cross section and unknown details within the subsurface soil conditions.

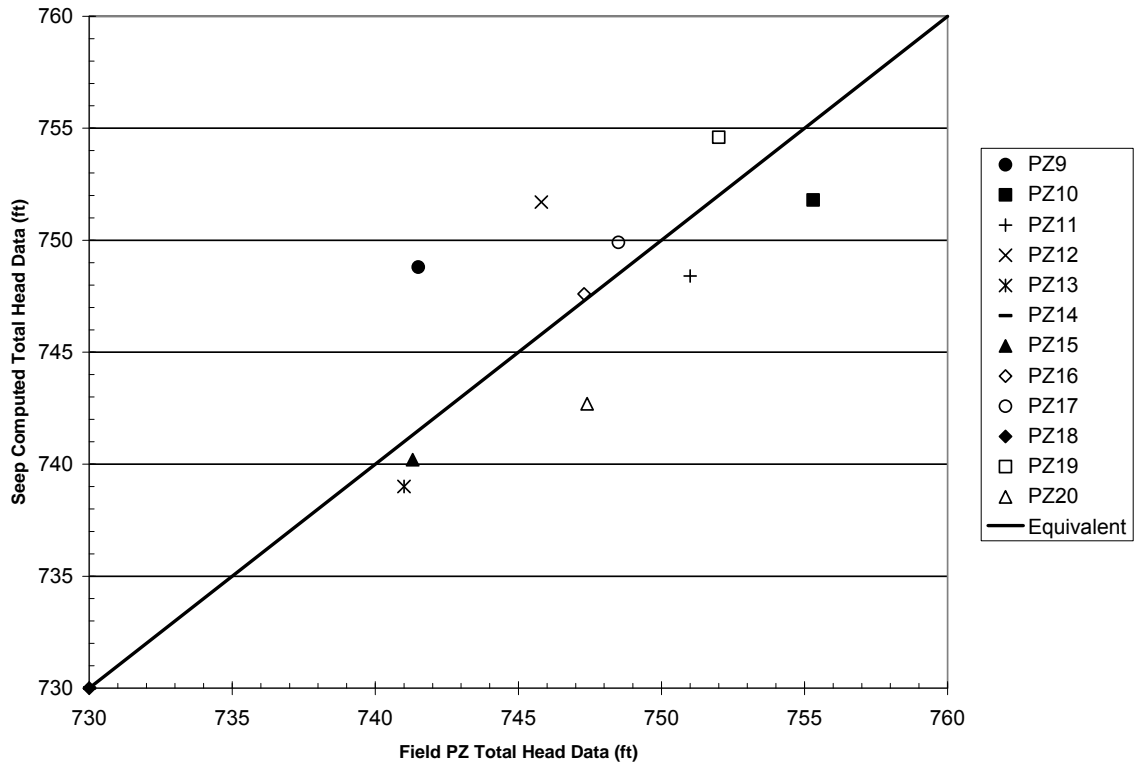


Figure 2. Comparison between the Field Piezometer Readings and Pore Water Pressures predicted in the SEEP/W Model

The results from the seepage model can also be compared to observations of water on the ground surface and within boreholes in the field. Following the recent removal of trees along the starter dike, standing water has been observed in areas where the tree stumps have been removed. The SEEP/W results (see plots in Appendix H) indicate seepage near the ground surface in these areas, consistent with these field observations. In Figure 3, the elevation of water in the 2009 boreholes are compared to the elevation of the phreatic surface (ground water table) predicted with the seepage model at the same location. With a couple of exceptions, the observed water levels are below the predicted phreatic surface. This may result from having insufficient time for the borehole water levels to reach equilibrium, as well as intercepting subsurface strata with varying piezometric levels.

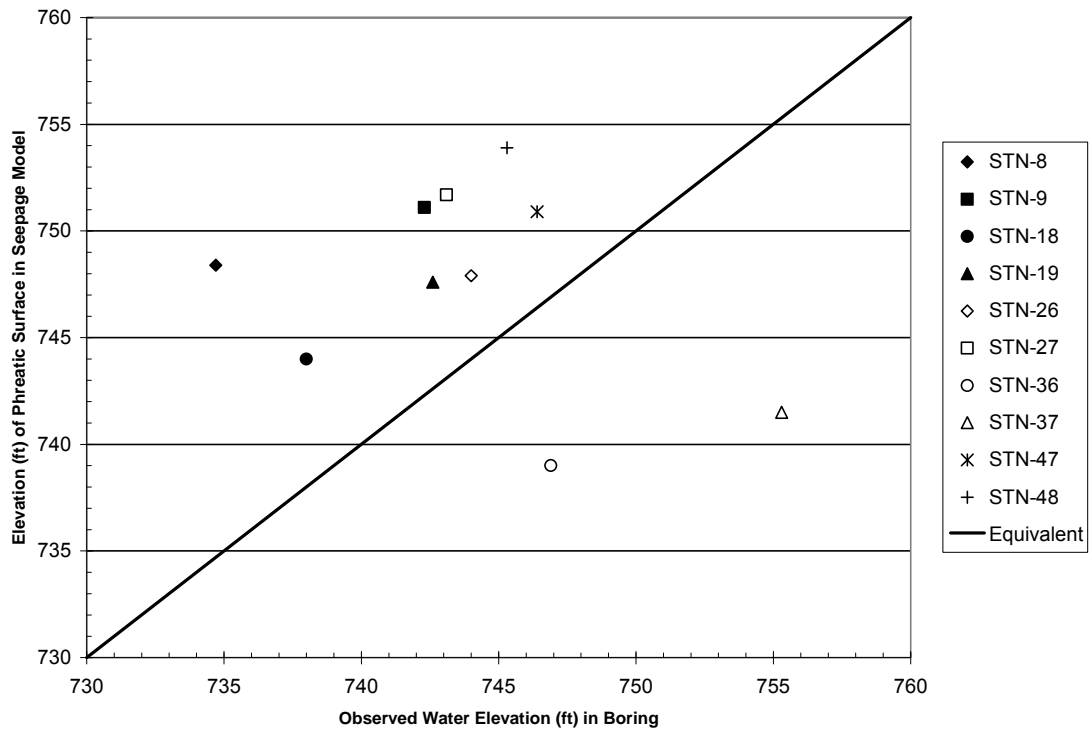


Figure 3. Comparison between the borehole water levels and the phreatic surface predicted in the SEEP/W Model

7.3.5. Results from Seepage Analyses

Plots from the SEEP/W analyses of the five cross sections through Dike C are presented in Appendix H. The plots show the finite element mesh, material zones, and boundary conditions used in each analysis. The results are depicted in contour plots of total head, pore water pressure, and seepage gradients. For the slope stability analyses (Section 7.5), the pore water pressures along the considered slip surfaces were determined by interpolation between the nodal pore pressures predicted with the SEEP/W model. The seepage gradients were assessed for maximum exit gradients and the potential for soil piping (Section 8.1).

The phreatic surface (groundwater table or line of zero pore water pressure) is shown on the plots in Appendix H. In several cases, the shape of the phreatic line may not meet one's initial expectations, particularly where more pervious materials are found below the dike zones near the ground surface. In SEEP/W, the location of the phreatic surface is found by interpolation between positive pore water pressures in the upper areas of saturated soil and negative or suction pore pressures in the unsaturated soil zone above. In the SEEP/W formulation, seepage flows are tracked in both the saturated and unsaturated zones. Hence, the top flow line in the SEEP/W results will be above the phreatic line. In more traditional seepage analyses, where unsaturated flows are ignored, the top flow line and the phreatic

surface coincide. Hence, while the more complete unsaturated flow formulation in SEEP/W gives a reasonable prediction of the phreatic surface location and shape, the results are often different than would be obtained with a solution that considers only saturated flow. Furthermore, the pore water pressures in the stability analysis are determined from the full finite element solution, and not just from the depth below phreatic surface.

7.3.6. Critical Exit Gradients

Seepage forces, resulting from hydrodynamic drag on the soil particles, can destabilize earthen structures. Excessive hydraulic gradients near the ground surface can lead to the initiation of soil erosion and piping, which has caused numerous dam failures in the past. Hydraulic gradients, computed where seepage flows to the ground surface, can be evaluated to understand the potential severity of this problem.

Where upward seepage through a uniform soil exits to the ground surface, the factor of safety with respect to soil piping (FS_{piping}) is defined as:

$$FS_{piping} = \frac{i_{crit}}{i} \quad \text{Eqn. 1}$$

where i is the vertical gradient in the soil at the exit point. The critical gradient (i_{crit}) is related to the submerged unit weight of the soil, and can be computed as:

$$i_{crit} = \frac{\gamma_{sub}}{\gamma_w} = \frac{G_s - 1}{1 + e} \quad \text{Eqn. 2}$$

where γ_{sub} is the submerged unit weight of the soil, γ_w is the unit weight of water, G_s is the specific gravity of the soil particles, and e is the void ratio. For nearly all soils, the critical gradient is between about 0.6 and 1.4, with a typical value near 1.0.

Where $FS_{piping} = 1$, the effective stress is zero and the near-surface soils are subject to piping or heaving. Note that Eqn. 1 is valid only if for vertical seepage that exits to the ground surface. If the phreatic surface is buried, then the FS_{piping} will be greater than 1.0 even when $i=i_{crit}$.

7.4. Strength Parameter Selection

The static stability of Dike C around the ash pond and stilling pond at the Kingston Fossil Plant were evaluated using the limit equilibrium slope stability methods. The soil parameters used in these stability analyses were established as follows.

Dike C was originally constructed in the mid 1950s and was raised in the mid 1970s. The dike has existed in its current cross sectional geometry (slopes and crest elevation) for at least 30 years. Hence, excess pore pressures generated in the underlying soil during construction have had sufficient time to dissipate and steady state seepage conditions have developed within the dike. In addition, the current analyses will focus only on static conditions (no earthquake or other dynamic loads). For these conditions, only soil unit weights and drained strength parameters (c' and ϕ') are needed. If stabilizing berms or other modifications to the dike cross section are built, then undrained, total stress stability analyses will be needed to assess stability during construction.

The soil parameters used for the dikes and existing foundation materials were derived using both current and historical data from laboratory consolidated undrained triaxial tests, direct simple shear tests, cone penetration data, standard penetration test data and classification test data. In addition, the strength parameters selected were further refined by comparisons with the strength parameters used in the historical design reports reviewed.

To select the representative strengths for each horizon, the methodology outlined in the US Army Corps of Engineers Engineer Manual EM 1110-2-1902 was used as a guide. Failure stresses measured in the laboratory tests were expressed in terms of "p'-q" values [$p' = 0.5(\sigma_1' + \sigma_3')$, $q = 0.5(\sigma_1' - \sigma_3')$], then envelopes were conservatively fit through the data. In general, the selected strength parameters represent a failure envelope where about two-thirds of the test data falls above the envelope.

7.4.1. Drained Soil Parameters

Excess (or deficient) pore water pressures, generated by changes in mean stress or shearing stress, will dissipate under static, long term conditions. Pore pressures within a soil can then be computed assuming hydrostatic conditions or from a solution for steady state seepage. As long as the distribution of pore pressure within the cross section can be quantified, effective stresses can be computed and the drained shear strength (S_d) of the soil can be determined from effective stress strength parameters (c' and ϕ'):

$$S_d = c' + \sigma' \tan \phi' \quad \text{Eqn. 3}$$

Uncemented soils exhibit no strength at $\sigma' = 0$, corresponding to $c' = 0$. In the case of unsaturated fine grained soils, suction results in apparent cohesion, but this component of strength is lost upon saturation. Over a large pressure range, most granular soils have a curved strength envelope. Fitting a straight line through segments of a curved failure envelope can result in $c' > 0$, but the values are applicable only over the specified range of effective stress.

The Mohr-Coulomb failure envelope for normally consolidated, saturated clays exhibits $c' = 0$. At effective stresses below the preconsolidation pressure, overconsolidated clays have a curved failure envelope that can be represented with a straight line having $c' > 0$. However, overconsolidated clays in the field are often fissured and the in situ c' is significantly smaller than values determined from testing of small samples in the laboratory. To avoid progressive failures in overconsolidated, stiff fissured clays, remolded soil samples are recommended for testing; this generally results in "fully softened" strengths with $c' = 0$.

Thus, in the absence of particle cementation/bonding, long term (drained) shearing resistance related to $c' > 0$ is considered unreliable. In routine geotechnical design practice, values of $c' = 0$ are usually assumed for both normally and overconsolidated saturated clays, and for uncemented granular soils. Detailed testing and characterization of a particular soil, coupled with careful application of the fitted strength envelopes, are necessary where values of c' are used in a stability evaluation.

When surficial soils have $c' = 0$, shallow sliding parallel to the ground surface will be the critical failure mechanism (lowest factor of safety) found in a slope stability analysis. However, apparent cohesion in unsaturated soils and/or weak cementation is often sufficient to prevent shallow sliding. This mode of failure, which might require periodic regrading and maintenance, is considered to be less critical in a stability analysis. For deep seated failures, the assumption of $c' = 0$ is routinely used for all soils.

7.4.2. Soil Parameters for Dike C

The shear strength parameters were conservatively estimated based on site-specific geotechnical data, published data/information and our experience with these materials in similar applications. Discussions regarding selection of the shear strength parameters are provided in the following paragraphs. Refer to Table 9 below for a summary of derived soil parameters.

The starter clay dike, raised clay dike, and lean clay foundation primarily consist of lean clay materials with occasional occurrences of fat clays. The cohesive soils sampled during the field exploration were subjected to CU triaxial tests. The results of triaxial testing were evaluated and effective stress p' versus q scatter plots were prepared using all of the data points. Failure was assumed to occur at the point of the maximum effective principal stress ratio (σ_1'/σ_3'). Once the p' versus q plots were prepared, a failure envelope was then selected such that about two-thirds of the plotted values were above the envelope. The p' versus q plots and selection of the failure envelope are shown for each soil horizon on the graphs presented in Appendix G. The resulting strength parameters were rounded down to the nearest degree for ϕ' and to the nearest 50 pounds per square foot for the cohesion intercept. Consistent with the discussions in Section 7.4.1, the measured cohesion intercept was neglected (assumed $c'=0$) in evaluating the dike stability. The unit wet weight was determined by taking the average unit weight of the samples that are included within a soil horizon.

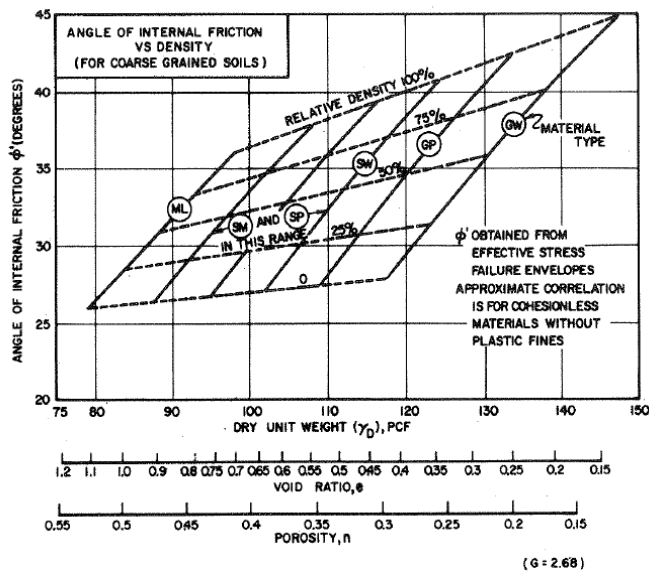
The constructed ash materials were primarily encountered in the upper portion of the eastern most starter dike. The material consists of a mix of fly ash and bottom ash. As a part of the Kingston Dredge Cell Closure Project, Stantec performed CU triaxial tests and the results were plotted on a scatter (Appendix G) plot as described above. The results compacted on samples of this material indicate that the ϕ' for the constructed ash is on the order of 38° . However, those tests were completed assuming the ash will be constructed using typical construction techniques with controlled compaction requirements associated with an engineered fill. The constructed ash material encountered in Dike C around the Ash Pond were placed several years ago and there is a lack of documentation on how the material was placed. Assuming this ash was not adequately compacted when placed in Dike C, it is prudent to assign a lower strength of $\phi' = 30^\circ$, which would be typical for an ML type material at medium density. The unit wet weight was determined by taking the results of the standard Proctor compaction tests conducted by Stantec and AECOM as a part of the projects associated with the dredge cell. It was then estimated that the material exists at a density corresponding to 90-percent of the standard Proctor maximum (75 pcf) and was near the optimum moisture content (24%).

The hydraulically placed ash materials were primarily encountered upstream of the starter dike and below the raised dike. As a part of the RCA, AECOM performed 25 triaxial compression tests with various consolidation techniques. In addition, six additional triaxial tests were completed by Law Engineering, Inc. in 1995, as a part of a testing program on ponded ash materials in Dredge Cell I and III. These results were plotted on a scatter plot (Appendix G), materials which indicate that ϕ' for the hydraulically placed ash is on the order of 25° . The unit wet weight was estimated using a dry unit weight at 90-percent of the standard Proctor maximum (75 pcf) and adjusting it based on the average in place moisture content (28%) of the hydraulically placed ash.

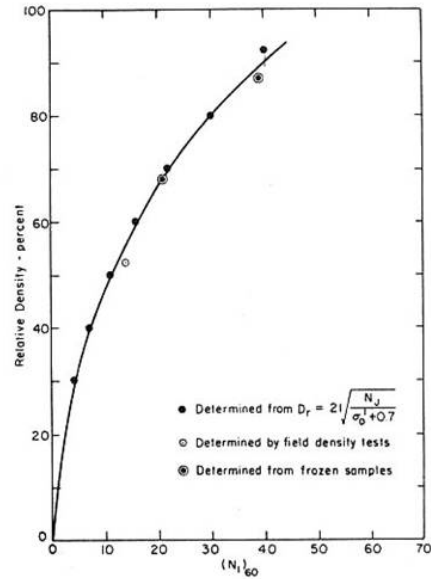
The gravel to clayey gravel layer was modeled just below the original dike. The layer was encountered during the field exploration and may have been placed below water levels as a working platform layer during initial construction of the starter dike. Strength and unit weight properties for this soil were estimated using correlations with measured SPT blowcounts. For a value of $(N_1)_{60} = 8$ in this soil horizon, the correlations in Figure 4 suggest $\phi' = 32^\circ$.

The sensitive silt/clay was modeled near the top of original ground. The layer was identified as a result of the RCA performed by AECOM and the results of Stantec's field exploration program. Under the direction of AECOM, the University of Massachusetts (UMass) Amherst performed 12 direct simple shear (DSS) tests on thin-walled tube specimens obtained within the Dredge Cell. In addition, Geotesting Express (under the direction of Stantec) performed five DSS tests on thin-walled tube specimens obtained within the Dredge Cell. These results were plotted on a scatter plot as described above and a value of $\phi' = 28^\circ$ was determined. The unit wet weight was determined by taking the average unit weight of the DSS test specimens obtained by Stantec.

The sandy silt to silty sand and fine grained sands were modeled at varying thicknesses within the foundation alluvium. Based on the results of the drilling program there appears to be variability in the results of the SPT N-values for these non-cohesive soil horizons. Therefore, the soil parameters were derived utilizing the SPT N-values encountered within the borings advanced for individual stability sections. The strength and unit weight parameters for these non-cohesive soil horizons were determined from published correlations between corrected blowcounts $(N_1)_{60}$, relative density and ϕ' . The corrected N-values were utilized to obtain relative densities based on relationships developed by Tokimatsu and Seed (1988) as shown in Figure 4 below. NAVFAC (1982) presents a relationship using relative density and of specific soil types to correlate angle of internal friction, unit weight, and void ratio as shown in Figure 4 below. The sandy silt to silty sand horizon contained SPT blowcounts in the range of weight of the sampling rods to 16, the unit weight of this soil horizon was estimated to vary between 105 to 113 pcf with a drained friction angle of 27° to 29° . The fine grained sand horizon contained SPT blowcounts in range of 4 to 60, the unit weight of this soil horizon was estimated to vary between 118 to 128 pcf with a drained friction angle of 31° to 36° .



From NAVFAC (1982)



From Tokimatsu and Seed (1988)

Figure 4. Charts Used to Correlate $(N_1)_{60}$ to ϕ'

Soil classifications for the correlations are based on laboratory testing results and field classifications performed during the drilling process. Once the relationships for the angle of internal friction, unit weight, and void ratio were established, the in situ unit weight was calculated based upon the natural moisture content. Refer to Table 9 below for a summary of derived soil parameters. Since a range is included for the sandy silt to silty sand and the fine grained sand layer refer to stability sections in Appendix F for specific alluvial deposit parameters.

Table 9. Selected Strength Parameters for Stability Analysis

Soil Horizon	Unit Weight (pcf)	Effective Stress Strength Parameters	
		c' (psf)	ϕ' (degrees)
Starter Clay Dike	129	0	30
Raised Clay Dike	125	0	30
Constructed Ash	93	0	30
Hydraulically Placed Ash	96	0	25
Gravel to Clayey Gravel	120	0	32
Sensitive Silt/Clay	127	0	28
Lean Clay Foundation Soil	129	0	30
Sandy Silt to Silty Sand	105 to 113	0	27 to 29
Fine Grained Sand to Sand with Silt	118 to 128	0	31 to 36

7.5. Slope Stability Analysis

The stability of the perimeter Dike C was evaluated using limit equilibrium methods as implemented in the SLOPE/W software, which is available from GEO-SLOPE International, Ltd., of Calgary, Alberta, Canada (www.geo-slope.com). Analyses were completed for static, long-term conditions with steady-state. SLOPE/W is a special-purpose computer code designed to analyze the stability of earth slopes using two-dimensional, limit equilibrium methods. With SLOPE/W, the distribution of pore water pressures within the earth mass can be mapped directly from a SEEP/W solution. In this study, steady-state pore pressures were obtained from the SEEP/W model described in Section 7.3. The unit weight and shear strength properties used in the stability analyses are detailed in Table 9 above.

7.5.1. Limit Equilibrium Methods in SLOPE/W

Limit equilibrium methods for evaluating slope stability consider the static equilibrium of a soil mass above a potential failure surface. For conventional, two-dimensional methods of analysis, the slide mass above an assumed failure surface is split into vertical slices and stresses are evaluated along the sides and base of each slice. The factor of safety against a slope failure (FS_{slope}) is defined as:

$$FS_{slope} = \frac{\text{shear strength of soil}}{\text{shear stress required for equilibrium}} \quad \text{Eqn. 4}$$

where the strengths and stresses are computed along a defined failure surface, on the base of the vertical slices. The shearing resistance at locations along the potential slip surface are computed, with appropriate Mohr-Coulomb strength parameters, as a function of the total or effective normal stress.

Spencer's solution procedure (Spencer 1967; USACE 2003; Duncan and Wright 2005), which satisfies all of the conditions of equilibrium for each slice, was used in this study. Spencer's procedure computes FS_{slope} for an assumed failure surface; a search must be made to find the critical slip surface corresponding to the lowest FS_{slope} . Both circular and noncircular potential failure surfaces can be evaluated.

7.5.2. Slope Stability of Dike C

The slope stability analyses were carried out using SLOPE/W 2007 on the upstream and downstream face of Dike C, as applicable. SLOPE/W incorporates various search routines to locate the critical slip surface; for the analyses presented here, the "Grid and Radius" method and the "Entrance and Exit" method were employed. Center points for the trial circles were confined to a specified range above the slope surface, while the trial radii were varied based on tangent horizontal lines within the soil. The minimum and maximum range for the center points and tangent lines were parametrically varied over a wide range to determine the likely solution region for the critical circle. In subsequent runs, the search was refined by narrowing the range and spacing for the candidate center points.

Where the surface slope is composed of cohesionless ($c' = 0$) materials, an infinite slope failure (shallow sliding parallel to the surface) will be critical. While solutions were obtained for this case, as reported below, there is less concern for this potential failure mechanism. Suction pressures in unsaturated surface soils will often create enough apparent cohesion to

prevent this type of failure. If shallow sliding does occur, the resulting deformations are unlikely to threaten the integrity of the dike and can be repaired. To force the search routine to evaluate deeper failure mechanisms, the "Entrance and Exit" method was employed to force the slip surface to enter at a point that was approximately 15 feet from the pond.

The upstream surface of Dike C was evaluated at Station 119+69 and Station 132+37, where the dike slope was immediately adjacent to the stilling pond. For these analyses, the "Grid and Radius" method was used to determine the minimum factor of safety with a minimum depth of slice depth equal to 10 feet. At the other sections along the dike, the ash in the pond has accumulated to a height approaching the crest of Dike C. At those locations, the upstream dike face is supported by the ash and there is negligible risk for an upstream failure. Therefore, the upstream stability of Dike C along the ash pond was not analyzed further.

8. Results

8.1. Seepage Gradients

Contour plots of the hydraulic gradients computed from the SEEP/W solutions are shown for each modeled cross section in Appendix H. Large gradients and significant seepage can be seen at various locations within the cross sections, but the concern is for areas where these gradients can initiate the erosion or piping of material. In general, areas of potential concern are where water seeps laterally out onto a sloping ground surface, or where vertical, upward seepage occurs at the ground surface. Away from the ground surface, the potential movement of material due to seepage forces is arrested by the adjacent soil. Hence, the evaluation of seepage gradients within Dike C is focused on areas near the ground surface on the downstream side of the dike.

Considering the SEEP/W results in Appendix H, the predicted phreatic surface is observed to intersect the sloping ground surface above the lake level near the toe of the starter dike. With the exception of Station 119+69, this condition is predicted for all cross sections analyzed. Ground water seeping through the saturated dike materials may be flowing out to the ground surface, even though direct observations might be obscured by vegetation, evaporation, or the submerged ground surface. In these locations, the seepage forces associated with the hydraulic exit gradients are acting in the same direction as gravity. Because of the high potential for initiating the movement of soil particles and piping, a condition of groundwater seeping to the sloping surface of the downstream face is usually considered unacceptable in the evaluation of earth dams.

The potential for piping due to vertical seepage to the ground surface was also evaluated using the factor of safety defined in Section 7.3.6. First, contour plots of vertical gradient (Appendix H) were examined to determine the general location of the maximum vertical exit gradient. In all five cross sections, the maximum upward gradient occurs near the toe of the starter dike.

For the factor of safety calculations, average vertical gradients were determined over a depth of 3 to 5 feet just below the ground surface. On the sections at Station 108+93, 119+69, and 149+14, these gradients were computed across the upper few feet of the foundation soil deposit. In the other two sections that were modeled, at Station 132+37 and 138+27, the maximum computed gradients occur at the very toe of the clay starter dike. The model

geometry converges to a sharp point at this location, such that the computed gradients in this small area are not reflective of the actual conditions in the field. However, to evaluate the potential for heaving of the dike toe in this area, gradients were taken across a thickness of no less than 3 feet.

The factors of safety against piping (Section 7.3.6), computed based on the exit gradients computed in the SEEP/W and the critical gradients determined from the soil properties, are summarized in Table 10. The lowest computed factor of safety is 1.3 on the section at Station 132+37. TVA does not currently have guidelines for FS piping. United States Army Corps of Engineers (USACE) design criteria (EM 1110-2-1901) indicates factors of safety against piping should be at least three. Hence, at some location on all five modeled cross sections, Dike C does not meet the design criteria for piping at the seepage exits.

Table 10. Summary of Computed Exit Gradients and Factors of Safety against Piping

Cross Section*	Vertical Gradient (i_v) at Critical Exit Point	Location of Critical Exit Point	Material	Critical Gradient (i_{crit})	FS_{piping}
108+93	0.15 – 0.38	Toe	Silty Sand to Sandy Silt	1.03	2.7
119+69	0.70 – 0.74	Toe	Lean Clay	1.05	1.4
132+37	0.73 – 0.84	Toe	Clay Starter Dike	1.05	1.3
138+27	0.30 – 0.42	Toe	Constructed Ash	0.71	1.7
149+14	0.45 – 0.50	Toe	Silty Sand to Sandy Silt	1.03	2.1

*Refer to Appendix F for Plan View of site with project baseline

8.2. Slope Stability Results

Using the strength parameters selected (c' and ϕ') listed in Table 9, in conjunction with the results of the seepage analyses, the existing dike configuration was analyzed at each of the five cross sections. Geo-Slope's Slope/W computer program was used for the analyses with pore pressures imported from the seepage analyses. Long term (effective stress), steady state seepage conditions were analyzed using Spencer's method. For the Spencer's method analyses, circular failure surfaces with optimization were conducted. Minor details of the geometry, such as various rip rap zones, were not represented in the stability model.

The stability analyses focused on the potential for failure in the upstream slope and downstream dike face. SLOPE/W failure surfaces from these analyses are presented on the drafted sheets in Appendix F. The results are summarized in Table 10 below.

Table 11. Summary of Computed Factors of Safety for Slope Stability

Location*	Deep Seated Slide	Shallow Slide in Starter Dike	Shallow Slide in Raised Dike	Upstream Slide
108+93	1.66	1.42	1.39	N/A
119+69	1.48	1.25	1.39	1.78
132+37	1.47	1.24	1.22	1.33
138+27	1.52	1.13	1.38	N/A
149+14	1.49	1.15	1.35	N/A

*Refer to Appendix F for plan view of site with project baseline

The Tennessee Department of Environment and Conservation (TDEC) "Rules and Regulations Applied to the Safe Dams Act of 1973" provides guidance and standards with regards to existing dams. The standards do not specifically address target factors of safety for slope stability, but instead merely indicate that the dam shall be "stable". Based on discussions with TVA and to be in accordance with current prevailing practice a minimum factor of safety of 1.5 was established for long term conditions using the guidelines presented in USACE Manual EM 1110-2-1902 "Slope Stability".

Considering only potential deep-seated failure mechanisms that would immediately impact the crest, the slope stability results show that Dike C meets this criteria. The surfaces were generated using the "Entrance and Exit" method to force the slip surface to enter the dike approximately 15 feet from the ponds. The difference between the minimum computed value of 1.47 and the required value of 1.5 is negligible, considering the uncertainty in the characterization of the soil strength. These results suggest that Dike C is stable with respect to the potential formation of large, deep-seated failures that would immediately compromise the retention of the ash pond. The critical slip surfaces are depicted in Appendix F.

At the same time, the results clearly show factors of safety less than 1.5 for shallow sliding on the downstream face along the full length of Dike C (plus the upstream face in the vicinity of Station 132+37). The shallow potential failure surfaces, which are generally about 10 ft below the ground surface, occur in the slopes of both the lower starter dike and the upper dike raise (see the cross sections in Appendix F). The lowest factors of safety are currently found along the eastern branch of Dike C, where factors of safety less than 1.2 were computed. Based on established design criteria, remedial measures are needed to increase the long-term factors of safety against shallow sliding to values of at least 1.5. Mitigation is needed on the downstream face (both the lower starter dike and the upper dike raise) along nearly the full length of Dike C, and in more limited areas on the upstream (pond side) slope.

Past shallow sliding of the downstream face of Dike C was reported in the project records, in an area along the perimeter of the dredge cell. This surficial slide was observed and repaired by TVA as part of their routine maintenance program. If additional shallow sliding were to develop again in Dike C, the failure would be initially confined to the sloping face of the dike. If not repaired and given enough time, these shallow slides could progress up the slope and endanger the ash pond. Because this progressive failure mechanism would be expected to

take months or longer to impact the crest, a robust monitoring program can reduce the risk of failure due to shallow sliding. Hence, in the interim while a permanent mitigation plan is developed, analyzed, and constructed, TVA should continue to monitor Dike C with routine inspections and instrument readings.

There was no indication in the slope stability analyses that a noncircular failure surface would give a factor of safety lower than obtained for circular surfaces. Overall, the geometry of the dike cross section and the foundation stratigraphy do not appear to be susceptible to sliding along a planar surface. The optimization scheme available within SLOPE/W was used to consider noncircular, curved slip surfaces. The results in Table 11 and Appendix F represent factors of safety computed from the optimized, circular slip surface routine.

A review of the stability analysis results indicates that while none of the projected failure surfaces represent true global failures of the dike system, it is likely that some of the modeled failures would subsequently progress toward the pond and could result in an eventual breach. Remedial engineering designs will need to be implemented to improve dike slope stability to meet USACE design criteria.

8.2.1. Conceptual Mitigation Evaluation

To aid in identifying potential mitigation options available for enhancing stability of the dike system, preliminary analyses of a slope buttress system were performed on each cross section. These preliminary analyses were performed to provide some indication of the level of mitigation needed to achieve factors of safety greater than or equal to 1.5 at each of the sections analyzed. The concept involved adding various thicknesses of rock to the outslopes on the starter dike and raised dike.

Based on the results of this conceptual mitigation analyses, achieving a factors of safety greater than or equal to 1.5 will ultimately require placement of a zone of a of rock blanket. The rock blanket starting from the crest of the raised could have a maximum regrade of 2½:1 (H:V) on the downstream face of the raised dike. It would then transition to a horizontal bench near the crest of the starter dike and extend to the river bank.

9. Limitations of Study

The scope of this evaluation was limited to consider only the potential risks at Dike C due to excessive seepage and slope instability. This assessment did not consider potential failure modes related to spillway capacity and overtopping, seepage along penetrations through the embankment (including the buried spillway pipes), erosion due to wave action or flood stage flows, vegetation on the dike face, performance of the internal divider dikes, or other possible mechanisms. The risks associated with these potential failure modes will be addressed in a Phase 2 facility assessment that is currently underway.

The stability of Dike C during a potential earthquake was not specifically analyzed. Data from the site explorations indicate low penetration resistance (low density) in saturated, sandy alluvium. In a strong earthquake, these foundation soils will be prone to liquefaction, which would undermine the stability of the dike. However, the seismic risk at this site (likelihood of experiencing a large magnitude earthquake) is quite low while the pond is in the conversion process to dry ash handling.

Stability analyses were not performed for rapid drawdown conditions:

- On the upstream side, a rapid drawdown condition would correspond to a failure of the ash pond, perhaps due to a breach in the dike or failure of the spillway. While the upstream dike slope may be vulnerable to sliding due to rapid drawdown, this mechanism would result from, and not cause, a pond failure. Hence, there is no need to evaluate the upstream slope for rapid drawdown.
- On the downstream side, rapid drawdown conditions would correspond to changes in the elevation of Watts Bar Lake. Preliminary information on the river conditions indicate that the lake might rise 11 ft, from a normal winter pool to 100-year flood stage, over a period of one to two days. Per the operational plan for Watts Bar Lake, the flood pool would then be drawn down over a period of seven days. Hence, high water conditions would not persist long enough to fully charge the dike slopes, and a fully undrained, rapid drawdown loading condition is unlikely to develop.
- Watts Bar Lake is also subject to annual drawdown from the normal summer pool (elevation 742 feet) to the normal winter pool (elevation 737 feet). Because the outslopes do not currently meet design criteria for long-term conditions, this rapid drawdown case was not analyzed in this study. Future engineering work to support the design of dike improvements should consider and evaluate the possibility of a rapid drawdown failure.

10. Conclusions

The conclusions and recommendations that follow are based upon Stantec's understanding of the facility as outlined herein. This understanding of the facility developed from reviews of historical information provided by TVA and discussions with TVA personnel throughout the course of this work and results of the geotechnical exploration and stability analysis.

The results from the seepage analyses were examined to identify conditions where piping and erosion of soil might develop due to seepage forces. The model results indicated a shallow phreatic surface (ground water table) within the starter dike; these results are generally confirmed by the observation of shallow water in areas where trees and stumps have been removed from the starter dike. On four of the five cross sections, the model indicated seepage flows to the sloping downstream face of the starter dike. This condition creates the potential for the initiation of soil piping, as seepage water will tend to erode material from the dike face at these locations.

Upward, vertical exit gradients in the area of the dike toe were also found to be excessive. Factors of safety against piping, computed for the surficial 3 to 5 feet of soil in these areas, ranged from 1.3 to 2.7. Based on USACE design criteria (EM 1110-2-1901), factors of safety against piping should be no less than three. The results from the seepage model thus demonstrate that Dike C does not meet current criteria for preventing soil piping due to seepage.

Current criteria for the long-term stability of Dike C requires a factor of safety for slope stability of at least 1.5. Considering only potential deep-seated failure mechanisms that would immediately impact the crest, the slope stability results show that Dike C meets this criteria. The difference between the minimum computed value of 1.47 and the required value of 1.5 is negligible, considering the uncertainty in the characterization of the soil strength. These results suggest that Dike C is stable with respect to the potential formation of large, deep-seated failures that would immediately compromise the retention of the ash pond.

At the same time, the results clearly show factors of safety less than 1.5 for shallow sliding on the downstream face along the full length of Dike C (plus the upstream face in the vicinity of Station 132+37). The shallow potential failure surfaces, which are generally about 10 ft below the ground surface, occur in the slopes of both the lower starter dike and the upper dike raise (see the cross sections in Appendix F). The lowest factors of safety are currently found along the eastern branch of Dike C, where factors of safety less than 1.2 were computed. Based on established design criteria, remedial measures are needed to increase the long-term factors of safety against shallow sliding to values of at least 1.5. Mitigation is needed on the downstream face (both the lower starter dike and the upper dike raise) along nearly the full length of Dike C, and in more limited areas on the upstream (pond side) slope.

Past shallow sliding of the downstream face of Dike C was reported in the project records, in an area along the perimeter of the dredge cell. This surficial slide was observed and repaired by TVA as part of their routine maintenance program. If additional shallow sliding were to develop again in Dike C, the failure would be initially confined to the sloping face of the dike. If not repaired and given enough time, these shallow slides could progress up the slope and endanger the ash pond. Because this progressive failure mechanism would be expected to take months or longer to impact the crest, a robust monitoring program can reduce the risk of failure due to shallow sliding. Hence, in the interim while a permanent mitigation plan is developed, analyzed, and constructed, TVA should continue to monitor Dike C with routine inspections and instrument readings.

Based on the design criteria, remedial measures are needed to increase the factors of safety against shallow sliding on the downstream face along nearly the full length of Dike C. The lowest factors of safety are currently found along the eastern branch of Dike C, where factors of safety less than 1.2 were computed for sliding about 10 ft below the surface of the starter dike (see the cross sections in Appendix F). Along the southern reaches of the dike, marginal factors of safety against shallow sliding were computed on the downstream face of the dike raise.

11. Recommendations

The current configuration of the pond dikes do not exhibit acceptable factors of safety for long-term stability. While this does not imply that the dike is in immediate danger of failure, TVA should undertake specific efforts to improve the safety of this facility. The following specific actions are recommended:

11.1. To improve the long-term stability of Dike C, TVA should initiate a mitigation design and construction program as soon as possible. The mitigation project should involve the placement of stabilizing berms on the downstream face of the dike, along the full length, and continued monitoring to ensure the structure's safety while permanent improvements are being completed.

11.2. Consistent with USACE design criteria, the berm dimensions should be selected to obtain factors of safety greater than 1.5 for sliding under long-term, drained conditions. For the period immediately after such construction, undrained stability analyses will be needed to demonstrate a factor of safety of at least 1.3 for short-term conditions.

11.3. The berm should also be designed to provide protection against seepage and piping failures, and increase the factor of safety against piping to meet the design guideline value of 3. Where the berm is built over areas subject to exit seepage (crest and downstream face of the starter dike), the gradation of the berm should be selected to filter the underlying material.

11.4. The outer surface of the berm should be stone rip rap, which will provide protection against erosion from surface runoff and wave action along the water line of Watts Bar Lake. A zoned berm cross section, consisting of multiple layers of sand to stone, may be needed to meet filter criteria for protecting the slope toe against piping.

11.5. Between now and the completion of the stabilizing berms, TVA should implement engineering solutions to reduce the risk of failure in Dike C. This should include continuation of the daily inspection program and instrumentation monitoring program, with renewed focus on identifying the initiation of potential surface slides. Additional inclinometers should be installed in critical areas of Dike C, positioned on the basis of the slope stability analyses reported herein. The inclinometers should be read on a weekly basis. This monitoring program be continued until permanent improvements to the dike have been completed to address long term stability.

11.6. Lowering the water levels in the ash pond and stilling basin would lessen the potential for failure due to seepage and piping under the dike, and might improve slope stability. Operating the ponds at lower water levels should be considered as an option in the overall mitigation plan for Dike C.

11.7. The surface of the dike faces, especially along the mid-slope bench (crest of the initial starter dike) should be re-graded to improve drainage and prevent the accumulation of surface water on the dike.

12. Closure

12.1. These conclusions and recommendations are based on data and subsurface conditions from the borings advanced during this investigation using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between borings.

12.2. The boring logs and related information presented in this report depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations.

12.3. It should be noted that construction records indicating the methods used to construct the dikes, as-built dike configurations, etc. were not available for review. In addition, the variable nature of the historical and current data shows some signs of inconsistencies in the construction of the dikes. As a result, consideration should be given to some of the generalizations made in this report with regards to dike construction and geometry prior to using this data in future evaluations.

13. References

The following is a list of historical documents that were used to evaluate the stability of Dike C and the Road Dike:

Root Cause Analysis of TVA Kingston Dredge Cell Pond Failure from December 22, 2008, AECOM, June 12, 2009

Kingston Fossil Plant Annual Ash Pond Dike Stability Inspection, TVA Engineering Design Services, 1967 to 2009

Additional Documents:

Slope Stability, Department of the Army, US Army Corps of Engineers, Engineering Manual EM 1110-2-1902, October 31, 2003.

Geotechnical Investigations, Department of the Army, US Army Corps of Engineers, Engineering Manual EM 1110-1-1804, January 1, 2001.

Evaluation of settlements in sands due to earthquake shaking, Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8, August, pp. 861-878, Tokimatsu, K., and Seed, H. B. (1987)

Soil Mechanics Design Manual 7.1, Department of the Navy – Navy Facilities Engineering Command, May 1982

Lambe, T.W and Whitman, R.V. Soil Mechanics. 3rd ed. New York: John Wiley and Sons. 1969

Rawls, W. J., Brakensiek, D. L., and Saxton, K. E. (1982). "Estimation of soil water properties," Transactions of the American Society of Agricultural Engineers. pp. 1316-1320.

Salgado, R. The Engineering of Foundations. Boston: McGraw Hill. 2008.

Appendix A

Typed Boring Logs



SUBSURFACE LOG

Project No.	175569042	Location	N 556804.57, E 2442329.32 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-2	Total Depth	41.0 ft
Location	Kingston, Tennessee	Surface Elevation	751.2 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/14/09	Completed	4/14/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	18.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
751.2'	0.0'	Top of Hole							
		LEAN CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	2-3-4	28	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-2	1.5 - 3.0	1.1	4-5-5	19	
747.7'	3.5'			SPT-3	3.0 - 4.5	1.1	11-13-17	14	
747.2'	4.0'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-4	4.5 - 6.0	1.3	8-11-15	19	
745.7'	5.5'	FAT CLAY (Fill), red brown, moist, medium stiff		SPT-5	6.0 - 7.5	1.1	10-9-9	15	
744.7'	6.5'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-6	7.5 - 9.0	1.3	9-9-11	20	
		LEAN CLAY (Fill), light brown, moist, soft to medium stiff, some fine grained sand		ST-1	9.0 - 11.0	1.6	--	--	
739.2'	12.0'			SPT-7	11.0 - 12.5	1.1	1-2-3	23	
		LEAN CLAY, red brown, moist, soft, trace silt, some fine grained sand		SPT-8	12.5 - 14.0	1.0	1-3-4	21	
				ST-2	14.0 - 16.0	1.8	--	--	
				SPT-9	16.0 - 17.5	1.2	1-2-2	17	
732.2'	19.0'			SPT-10	17.5 - 19.0	1.2	2-2-3	23	
		LEAN CLAY, light brown, saturated, very soft to soft, some silt		SPT-11	19.0 - 20.5	1.0	3-2-4	22	
				ST-3	20.5 - 22.5	2.0	--	--	
				SPT-12	22.5 - 24.0	1.3	1-2-2	28	
				SPT-13	24.0 - 25.5	1.1	WOH-1-2	27	
				SPT-14	25.5 - 27.0	1.4	WOH-2-2	24	
				SPT-15	27.0 - 28.5	1.2	2-3-2	28	
				SPT-16	28.5 - 30.0	1.3	WOH- WOH-WOH	28	
719.2'	32.0'			ST-4	30.0 - 32.0	2.0	--	--	ST-4: sand in bottom of tube
		SAND, light gray to gray, saturated, very loose to medium dense, fine to medium grained, trace silt		SPT-17	32.0 - 33.5	1.0	WOR- WOR-WOH	19	
				SPT-18	33.5 - 35.0	1.1	3-2-1	21	
				SPT-19	35.0 - 36.5	0.2	7-11-13	16	

RUSH_LEGACY_17148117 KINGSTON ASH POND.GPJ FASNLGDT_71608



SUBSURFACE LOG

Project No.	175569042	Location	N 556804.57, E 2442329.32 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-2	Total Depth 41.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
713.7'	37.5'	Sandstone, (Augered)		SPT-20	36.5 - 38.0	1.1	21-25-27	20	SPT-20: shale in tip of spoon Boring backfilled with bentonite cement grout from 0.0 ft to 41.0 ft
713.2'	38.0'			SPT-21	38.0 - 39.5	1.0	13-23-38	--	
710.2'	41.0'			SPT-22	39.5 - 40.4	0.8	31-50/0.4	--	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Split Samples: SPT-3 and 4

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SUBSURFACE LOG

Project No.	175569042	Location	N 556806.57, E 2442329.32 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-2A Total Depth 29.5 ft	
Location	Kingston, Tennessee	Surface Elevation	751.2 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/16/09	Completed 4/16/09
Supervisor	Ben Halada Driller Kent Clements	Depth to Water	N/A	Date/Time N/A
Logged By	Ben Halada	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
751.2'	0.0'	Top of Hole							
		OVERBURDEN, See log for STN-2							Boring advanced using 3 1/4 " Hollow Stem Augers
721.7'	29.5'								

No Refusal /
Bottom of Hole

FROM LEGACY: IT455117 KINGSTON ASH POND.GPJ CALSM.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 556806.57, E 2442329.32 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-2A	Total Depth 29.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		PZ Installed, tip at elevation 724.7'							
		Flushmount well cover and concrete pad installed.							

F:\MSL_LEGACY\17145817\KINGSTON ASH POND.GPJ FLUSHMOUNT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 556756.78, E 2442263.59 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-3	Total Depth	50.3 ft
Location	Kingston, Tennessee	Surface Elevation	763.7 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/14/09	Completed	4/15/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	19.5 ft	Date/Time	4/15/09
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input checked="" type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.7'	0.0'	Top of Hole							
763.2'	0.5'	CLAYEY GRAVEL (Fill), brown red yellow, dry to moist, stiff to very stiff, some gravel BOTTOM ASH (Fill), dark gray, moist to wet, dense to medium dense, some fly ash		SPT-1	0.0 - 1.5	1.0	17-19-22	12	Boring advanced using 3 1/4 " Hollow Stem Augers Wet at 4ft bgs
				SPT-2	1.5 - 3.0	1.0	8-18-18	13	
				SPT-3	3.0 - 4.5	0.8	13-8-9	18	
				SPT-4	4.5 - 6.0	1.0	9-7-7	21	
757.4'	6.3'	FAT CLAY (Fill), red brown, moist, medium stiff, some chert, some gravel, medium plasticity		SPT-5	6.0 - 7.5	1.0	6-6-6	23	
				SPT-6	7.5 - 9.0	0.8	2-3-4	31	
				SPT-7	9.0 - 10.5	1.0	2-3-5	22	
				ST-1	10.5 - 12.5	2.0		--	
				ST-2	12.5 - 14.5	2.0		--	
749.7'	14.0'	BOTTOM ASH (Fill), dark gray, moist, medium dense, some coal refuse		SPT-8	14.5 - 16.0	1.5	13-39-25	15	
				SPT-9	16.0 - 17.5	1.5	3-4-17	21	
746.7'	17.0'	BOTTOM ASH (Fill), dark gray to olive green, wet to saturated, loose to very loose, some fly ash		SPT-10	17.5 - 19.0	1.5	6-7-6	22	Saturated at 19.5 ft bgs Began adding water to limit blow-back
				SPT-11	19.0 - 20.5	1.0	5-5-5	20	
				SPT-12	20.5 - 22.0	1.5	2-2-2	18	
				SPT-13	22.0 - 23.5	1.2	4-3-2	27	
				SPT-14	23.5 - 25.0	1.4	6-5-3	30	
				SPT-15	25.0 - 26.5	0.8	3-4-2	18	
				SPT-16	26.5 - 28.0	1.2	3-2-3	20	
735.0'	28.8'	SANDY CLAY, brown, wet, soft to medium stiff, homogeneous		SPT-17	28.0 - 29.5	1.5	2-4-4	24	
				SPT-18	29.5 - 31.0	1.5	WOH-2-2	21	
732.5'	31.3'	LEAN CLAY, brown, saturated, soft, mottled		SPT-19	31.0 - 32.5	1.5	2-2-3	22	
				SPT-20	32.5 - 34.0	1.5	WOH- WOH-3	26	
				SPT-21	34.0 - 35.5	1.5	WOH-1-2	19	
				SPT-22	35.5 - 37.0	1.5	WOH-1-2	21	

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
726.7'	37.0'	SILTY SAND, tan, saturated, loose to very loose, fine to medium grained, well graded, trace clay <i>(Continued)</i> SAND, light brown, saturated, loose to very loose, fine grained, trace silt, homogeneous		SPT-23	37.0 - 38.5	1.5	WOH-1-1	20	
				SPT-24	38.5 - 40.0	1.5	WOH-1-2	18	
				SPT-25	40.0 - 41.5	1.5	WOR-WOR-WOR	20	
				SPT-26	41.5 - 43.0	1.5	2-2-2	21	
				SPT-27	43.0 - 44.5	1.5	WOR-2-2	18	
				SPT-28	44.5 - 46.0	1.5	3-3-4	21	
				SPT-29	46.0 - 47.5	1.5	WOR-WOR-WOR	20	
714.7'	49.0'			SPT-30	47.5 - 48.5		4-50+/-0.4	69	Wood fragments - 48.0 to 48.3 ft
713.4'	50.3'			SPT-31	49.0 - 50.3	0.8	40-44-16/0.3	--	
			Shale, (Augered)						
		Auger Refusal / Bottom of Hole							
		Top of Rock = 49.0' Elevation (714.7')							
			Boring backfilled with bentonite grout from 50.3ft to surface						

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SUBSURFACE LOG

Project No.	<u>175569042</u>	Location	<u>N 556761.99, E 2442259.75 (NAD27)</u>		
Project Name	<u>Kingston Ash Pond</u>	Boring No.	<u>STN-3A</u>	Total Depth	<u>30.0 ft</u>
Location	<u>Kingston, Tennessee</u>	Surface Elevation	<u>763.9 ft. (NGVD29)</u>		
Project Type	<u>Geotechnical Exploration</u>	Date Started	<u>4/27/09</u>	Completed	<u>5/1/09</u>
Supervisor	<u>Ben Halada</u>	Driller	<u>Steve Bradford</u>	Depth to Water	<u>N/A</u>
Logged By	<u>Adam Smith</u>	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.9'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers
		See Log for STN-3							
733.9'	30.0'								

No Refusal /
Bottom of Hole

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 556761.99, E 2442259.75 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-3A</u> Total Depth <u>30.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		Two PZ's installed, tip at elevation 751.9' and 737.9'							
		Protective well cover and concrete pad installed.							

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SUBSURFACE LOG

Project No.	<u>175569042</u>	Location	<u>N 556765.05, E 2442256.36 (NAD27)</u>		
Project Name	<u>Kingston Ash Pond</u>	Boring No.	<u>STN-3B</u>	Total Depth	<u>50.0 ft</u>
Location	<u>Kingston, Tennessee</u>	Surface Elevation	<u>763.8 ft. (NGVD29)</u>		
Project Type	<u>Geotechnical Exploration</u>	Date Started	<u>4/27/09</u>	Completed	<u>5/1/09</u>
Supervisor	<u>Ben Halada</u>	Driller	<u>Steve Bradford</u>	Depth to Water	<u>N/A</u>
Logged By	<u>Adam Smith</u>	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.8'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers
		See Log for STN-3							Revert used to keep augers clear

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 556765.05, E 2442256.36 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-3B</u> Total Depth <u>50.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
713.8'	50.0'	OVERBURDEN, (Augered without sampling) See Log for STN-3 (Continued)							

No Refusal /
Bottom of Hole

PZ Installed, tip at elevation 718.8'
Flushmount well cover and concrete pad installed.

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SUBSURFACE LOG

Project No.	175569042	Location	N 556763.50, E 2442257.42 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-3C	Total Depth	35.0 ft
Location	Kingston, Tennessee	Surface Elevation	763.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/1/09	Completed	5/1/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Adam Smith	Automatic Hammer <input type="checkbox"/> Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>			

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.8'	0.0'	Top of Hole							
		Overburden, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers Revert used to keep augers clear Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
738.8'	25.0'								
736.8'	27.0'	Bottom Ash, black, saturated		ST-1	25.0 - 27.0	0.5		--	ST-1: bottom ash fell out upon retrieval, should have had 1.5' recovery
		SILTY CLAY, light brown and red brown, moist, soft		ST-2	27.0 - 29.0	1.5		--	
				ST-3	29.0 - 31.0	2.0		24	Boring backfilled with bentonite cement grout from 0.0 ft to 35.0 ft
				ST-4	31.0 - 33.0	2.0		22	
				ST-5	33.0 - 35.0	2.0		24	
728.8'	35.0'								
No Refusal / Bottom of Hole									

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SUBSURFACE LOG

Project No.	175569042	Location	N 556762.50, E 2442258.42 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-3D	Total Depth	35.0 ft
Location	Kingston, Tennessee	Surface Elevation	763.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/4/09	Completed	5/4/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Brad Smiley	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.8'	0.0'	Top of Hole							
		Overburden, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers Revert used to keep augers clear Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
738.8'	25.0'								
736.8'	27.0'	Bottom Ash, black, saturated		ST-1	25.0 - 27.0			--	
		SILTY CLAY, light brown and red brown, moist, soft		ST-2	27.0 - 29.0			--	
				ST-3	29.0 - 31.0			--	
				ST-4	31.0 - 33.0			--	
				ST-5	33.0 - 35.0			--	
728.8'	35.0'								Boring backfilled with bentonite cement grout from 0.0 ft to 35.0 ft

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No Refusal /
Bottom of Hole



SUBSURFACE LOG

Project No.	175569042	Location	N 556625.56, E 2442047.01 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-4	Total Depth	83.0 ft
Location	Kingston, Tennessee	Surface Elevation	763.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/16/09	Completed	4/17/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	16.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.3'	0.0'	Top of Hole							
		BOTTOM ASH (Fill), black, moist, loose to medium dense		SPT-1	0.0 - 1.5	1.3	8-18-18	25	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-2	1.5 - 3.0	1.3	14-18-19	22	
				SPT-3	3.0 - 4.5	1.4	6-15-13	22	
				SPT-4	4.5 - 6.0	1.3	4-7-11	24	
				SPT-5	6.0 - 7.5	1.5	14-15-12	23	
				SPT-6	7.5 - 9.0	1.2	5-11-10	24	
				SPT-7	9.0 - 10.5	1.3	4-9-9	26	
				SPT-8	10.5 - 12.0	1.5	9-6-7	28	
				SPT-9	12.0 - 13.5	1.5	4-7-7	29	
749.3'	14.0'	FLY ASH (Fill), light gray to black, moist to saturated, very loose		SPT-10	13.5 - 15.0	1.5	2-2-5	28	
				SPT-11	15.0 - 16.5	1.5	1-1-WOH	41	
				SPT-12	16.5 - 18.0	1.3	WOR-WOR-WOH	29	
				SPT-13	18.0 - 19.5	1.5	WOR-1-1	31	
				SPT-14	19.5 - 21.0	1.4	WOR-WOH-2	35	
				SPT-15	21.0 - 22.5	1.5	2-2-WOH	32	
				SPT-16	22.5 - 24.0	1.4	WOR-WOH-WOH	32	
738.3'	25.0'	FAT CLAY, brown, saturated, very soft, some sandy silt		SPT-17	24.0 - 25.5	1.3	WOR-WOH-WOH	24	Water added at 24.0 ft to keep augers clear
				ST-1	25.5 - 27.5	2.0		--	
				SPT-18	27.5 - 29.0	1.3	WOR-WOR-1	23	
		SILTY SAND, brown, moist to saturated, very loose, fine to medium grained, trace clay		SPT-19	29.0 - 30.5	1.5	2-3-2	22	
731.8'	31.5'			SPT-20	30.5 - 32.0	1.5	1-2-3	22	
				SPT-21	32.0 - 33.5	1.2	1-1-2	21	
				SPT-22	33.5 - 35.0	0.9	WOR-WOH-1	22	
				SPT-23	35.0 - 36.5	1.1	1-2-1	24	

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SUBSURFACE LOG

Project No.	175569042	Location	N 556625.56, E 2442047.01 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-4	Total Depth 83.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
709.3'	54.0'	SILTY SAND, brown, moist to saturated, very loose, fine to medium grained, trace clay <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.1	3-3-2	21	
				SPT-25	38.0 - 39.5	0.0	WOR-WOR-WOR	--	
				SPT-26	39.5 - 41.0	1.0	WOR-1-1	21	
				SPT-27	41.0 - 42.5	1.2	3-1-2	27	
				SPT-28	42.5 - 44.0	1.3	3-1-1	21	
				SPT-29	44.0 - 45.5	1.1	1-1-2	21	
				SPT-30	45.5 - 47.0	1.1	WOR-WOH-1	25	
				SPT-31	47.0 - 48.5	1.1	WOH-1-1	20	
				SPT-32	48.5 - 50.0	1.0	WOR-WOH-1	21	
				SPT-33	50.0 - 51.5	1.2	WOH-1-1	22	
				SPT-34	51.5 - 53.0	1.5	4-6-4	23	
702.3'	61.0'	SAND, light gray, moist, medium dense, fine to medium grained		SPT-35	53.0 - 54.5	1.4	5-7-11	23	
				SPT-36	54.5 - 56.0	1.3	5-6-6	23	
				SPT-37	56.0 - 57.5	1.5	4-4-4	24	
				SPT-38	57.5 - 59.0	1.4	3-5-4	22	
				SPT-39	59.0 - 60.5	1.2	5-7-5	22	
700.3'	63.0'	Shale, (Augered)		SPT-40	60.5 - 61.4	0.8	50-50/0.4	--	SPT-40: shale in tip of spoon
		Shale, gray, soft, thin bedded, close fracture spacing, 30°, interbedded with very thin to thin limestone layers		0%	3.5	1.2	34	66.5	Began Core
				0%	6.5	3.2	49	73.0	
				0%	3.5	3.0	86	76.5	

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Project No. <u>175569042</u>		Location <u>N 556625.56, E 2442047.01 (NAD27)</u>						
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-4</u> Total Depth <u>83.0 ft</u>						
Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
680.3'	83.0'		55%	2.0	1.2	60	78.5	Boring backfilled with bentonite cement grout from 0.0 ft to 83.0 ft
			0%	4.5	2.9	64	83.0	
Bottom of Hole Top of Rock = 61.0' Elevation (702.3') WOH = Weight of Hammer WOR = Weight of Rods Split Samples: SPT-10, 17, 20, 35								

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Stantec

Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/17/2009
 Hole # STN-4 Rig # 710

Northing 556,625.56 Surface Elevation (ft.) 763.3

Crew Kent Clements / Greg Wilson

Easting 2,442,047.01 Top of Rock Elev. (ft.) 702.3

Inspector Benjamin A. Halada

Boring Size 3 1/4 Hollow Stem Augers

Pump Capacity 21 gpm

Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 16'

Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
64.5	73.0	35	0:00	1:00	1:00	256.63	256.63	0.00	0.00
		35	1:00	2:00	1:00	256.63	256.63	0.00	0.00
		35	2:00	3:00	1:00	256.63	256.63	0.00	0.00
		35	3:00	4:00	1:00	256.63	256.63	0.00	0.00
		35	4:00	5:00	1:00	256.63	256.63	0.00	0.00
73.0	83.0	40	0:00	1:00	1:00	257.11	257.11	0.00	0.00
		40	1:00	2:00	1:00	257.11	257.11	0.00	0.00
		40	2:00	3:00	1:00	257.11	257.11	0.00	0.00
		40	3:00	4:00	1:00	257.11	257.11	0.00	0.00
		40	4:00	5:00	1:00	257.11	257.11	0.00	0.00
						257.11	257.11	0.00	0.00



SUBSURFACE LOG

Project No.	175569042	Location	N 556611.15, E 2442365.31 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-5	Total Depth 54.0 ft
Location	Kingston, Tennessee	Surface Elevation	764.9 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/29/09	Completed 4/29/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	20.0 ft	Date/Time 4/29/09
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
764.9'	0.0'	Top of Hole							
		LEAN CLAY (Fill), brown, dry, stiff, with abundant tan chert, low plasticity		SPT-1	0.0 - 1.5	0.9	12-10-10	22	Boring advanced using 3 1/4" hollow stem augers
			SPT-2	1.5 - 3.0	0.9	10-11-11	28		
			SPT-3	3.0 - 4.5	1.5	6-7-14	30		
			ST-1	4.5 - 6.5	1.3	--	--		
			SPT-4	6.5 - 8.0	1.0	8-10-11	29		
			SPT-5	8.0 - 9.5	1.0	8-10-11	29		
			SPT-6	9.5 - 11.0	0.9	8-10-11	22		
			ST-2	11.0 - 13.0	1.7	--	--		
			SPT-7	13.0 - 14.5	1.1	4-4-5	25		
			SPT-8	14.5 - 16.0	1.3	7-9-10	25		
748.4'	16.5'			SPT-9	16.0 - 17.5	1.0	5-7-9	23	
747.4'	17.5'	BOTTOM ASH (Fill), gray to black, dry, medium dense		SPT-10	17.5 - 19.0	0.8	7-12-14	23	
		BOTTOM ASH (Fill), brown to gray, moist, medium dense, loose		SPT-11	19.0 - 20.5	1.1	10-8-6	25	Water added at 20 feet to keep augers clean
744.4'	20.5'			SPT-12	20.5 - 22.0	0.2	3-3-4	29	
		BOTTOM ASH (Fill), gray to black, saturated, loose, and fly ash		SPT-13	22.0 - 23.5	0.9	4-4-5	19	
				SPT-14	23.5 - 25.0	0.6	6-5-5	20	
				SPT-15	25.0 - 26.5	1.0	5-6-6	19	
738.4'	26.5'			SPT-16	26.5 - 28.0	0.4	5-4-1	21	
736.9'	28.0'	SANDY SILT, brown to gray, saturated, loose, mottled		SPT-17	28.0 - 29.5	1.5	2-3-3	20	
		LEAN CLAY, brown to gray, saturated, soft, with, trace very fine grained sand		SPT-18	29.5 - 31.0	1.0	1-1-1	23	
733.9'	31.0'			SPT-19	31.0 - 32.5	1.2	2-3-4	22	
		SILTY CLAY, brown, saturated, soft		SPT-20	32.5 - 34.0	1.0	WOR-WOR-WOR	23	
				SPT-21	34.0 - 35.5	1.5	3-3-5	26	
				SPT-22	35.5 - 37.0	1.5	4-3-4	26	

ENSHI LEGACY: 171488117 KINGSTON ASH POND.GPJ PLSM.GDT 7/16/09

Project No. <u>175569042</u>		Location <u>N 556611.15, E 2442365.31 (NAD27)</u>							
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-5</u> Total Depth <u>54.0 ft</u>							
Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
724.4'	40.5'	SILTY CLAY, brown, saturated, soft <i>(Continued)</i>		SPT-23	37.0 - 38.5	1.5	2-3-5	23	Boring backfilled with bentonite cement grout from 0.0 to 54.0 feet
				ST-3	38.5 - 40.5	2.0	--	--	
712.4'	52.5'	SILTY SAND, brown to gray, saturated, very loose to loose, fine to very fine grained		SPT-24	40.5 - 42.0	1.1	3-3-4	19	
				SPT-25	42.0 - 43.5	1.5	4-4-5	23	
				SPT-26	43.5 - 45.0	1.1	5-4-3	23	
				SPT-27	45.0 - 46.5	1.2	3-3-3	20	
				SPT-28	46.5 - 48.0	1.0	4-3-2	23	
				SPT-29	48.0 - 49.5	1.5	WOR-WOR-6	26	
				SPT-30	49.5 - 51.0	1.5	8-5-6	25	
710.9'	54.0'			SPT-31	51.0 - 52.5	0.7	WOR-WOR-WOR	27	
				SPT-32	52.5 - 53.5	1.0	34-50/0.5	--	
		Shale, (Augered)							
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rod							

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SUBSURFACE LOG

Project No.	175569042	Location	N 556416.17, E 2442407.10 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-6	Total Depth	64.5 ft
Location	Kingston, Tennessee	Surface Elevation	763.4 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/30/09	Completed	5/1/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	N/A	Date/Time	N/A
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input checked="" type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
763.4'	0.0'	Top of Hole								
761.9'	1.5'	LEAN CLAY (Fill), dark brown red, dry, stiff, grading to gray and black, bottom ash and coal refuse		SPT-1	0.0 - 1.5	1.0	6-6-40	19	Boring advanced using 3.25" hollow stem augers Water added at 11.0 ft. to keep augers clear	
				SPT-2	1.5 - 2.0	0.2	50/0.2	19		
758.9'	4.5'	FLY ASH (Fill), black to gray, dry, dense, with red, stiff, silty, clay		SPT-3	3.0 - 4.5	0.6	10-15-27	19		
		SANDY SILT (Fill), brown, dry, medium stiff		SPT-4	4.5 - 6.0	1.0	33-33-27	22		
					SPT-5	6.0 - 7.5	0.8	6-6-7		23
					SPT-6	7.5 - 9.0	1.0	5-3-4		25
					SPT-7	9.0 - 10.5	0.7	5-4-5.		25
					SPT-8	10.5 - 12.0	0.6	6-4-4		28
					SPT-9	12.0 - 13.5	1.1	3-5-5		28
748.4'	15.0'				SPT-10	13.5 - 15.0	0.5	2-3-5		26
		BOTTOM ASH (Fill), black to gray, saturated, dense to loose, with fly ash and coarse coal refuse		SPT-11	15.0 - 16.5	1.0	13-13-15	21		
					SPT-12	16.5 - 18.0	1.5	25-40-27	26	
					SPT-13	18.0 - 19.5	0.6	12-20-26	25	
					SPT-14	19.5 - 21.0	1.0	7-12-13	25	
					SPT-15	21.0 - 22.5	0.9	15-17-10	21	
					SPT-16	22.5 - 24.0	0.9	10-19-13	31	
					SPT-17	24.0 - 25.5	1.2	4-4-4	31	
					SPT-18	25.5 - 27.0	1.0	3-2-2	32	
					SPT-19	27.0 - 28.5	0.4	2-2-1	27	
					SPT-20	28.5 - 30.0	0.7	3-2-3	34	
731.9'	31.5'				SPT-21	30.0 - 31.5	1.5	10-15-10	21	
		FLY ASH (Fill), gray to brown, saturated, loose, very fine grained, silty		SPT-22	31.5 - 33.0	0.7	4-3-2	18		
					SPT-23	33.0 - 34.5	1.5	2-2-2	34	
					SPT-24	34.5 - 36.0	0.8	1-1-1	20	

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.9'	37.5'	SANDY SILT, brown, saturated, loose, very fine grained, mottled		SPT-25	36.0 - 37.5	1.2	5-4-2	27	Boring backfilled using bentonite cement grout from 0.0 to 64.5 feet
				SPT-26	37.5 - 39.0	0.8	4-6-6	19	
722.9'	40.5'			SPT-27	39.0 - 40.5	1.0	4-4-4	20	
		SILTY CLAY, gray to brown, saturated, soft to very soft, with trace very fine sand		SPT-28	40.5 - 42.0	1.5	WOH-2-2	22	
				SPT-29	42.0 - 43.5	1.0	3-2-3	27	
718.4'	45.0'			SPT-30	43.5 - 45.0	1.0	5-5-5	25	
		SANDY SILT, gray, saturated, soft		SPT-31	45.0 - 46.5	1.5	2-2-2	27	
				SPT-32	46.5 - 48.0	1.3	4-4-4	18	
712.4'	51.0'			SPT-33	48.0 - 49.5	1.1	3-3-3	17	
				SPT-34	49.5 - 51.0	1.5	WOH-3-3	19	
710.9'	52.5'	SILTY SAND, gray to brown, saturated, loose, fine grained, mottled		SPT-35	51.0 - 52.5	1.1	5-6-6	20	
				SPT-36	52.5 - 54.0	0.9	5-6-5	23	
		SAND, brown, saturated, medium dense to dense, fine grained, well rounded, well graded		SPT-37	54.0 - 55.5	1.1	6-8-10	23	
				SPT-38	55.5 - 57.0	1.0	6-12-14	22	
				SPT-39	57.0 - 58.5	1.5	10-32-50	22	
				SPT-40	58.5 - 60.0	1.2	10-14-10	23	
				SPT-41	60.0 - 61.5	1.5	4-5-6	23	
				SPT-42	61.5 - 63.0	1.5	7-15-20	24	
699.4'	64.0'			SPT-43	63.0 - 64.2	0.5	33-44-23/0.2	14	
698.9'	64.5'	Shale, (Augered)							
		Auger Refusal / Bottom of Hole							

FMSIA_LEGACY 171488117 KINGSTON ASH POND.GPJ FMSIA.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 556248.52, E 2442540.30 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-8	Total Depth	76.7 ft
Location	Kingston, Tennessee	Surface Elevation	752.2 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/13/09	Completed	4/13/09
Supervisor	Ben Halada Driller Kent Clements	Depth to Water	17.5 ft	Date/Time	4/13/09
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
752.2'	0.0'	Top of Hole								
		LEAN CLAY (Fill), red brown, moist, stiff		SPT-1	0.0 - 1.5	1.0	4-6-5	18	Boring advanced using 3 1/4 " Hollow Stem Augers	
749.7'	2.5'			SPT-2	1.5 - 3.0	0.7	4-8-10	16		
749.2'	3.0'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-3	3.0 - 4.5	1.5	9-16-22	17	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling	
748.2'	4.0'			SPT-4	4.5 - 6.0	1.3	6-11-13	13		
746.7'	5.5'	LEAN CLAY (Fill), red brown, moist, very stiff		SPT-5	6.0 - 7.5	1.0	11-13-14	14		
		BOTTOM ASH (Fill), black, moist, medium dense		SPT-6	7.5 - 9.0	1.0	11-15-14	16		
		LEAN CLAY (Fill), brown, moist, very stiff, some fine grained sand, some gravel		ST-1	9.0 - 11.0	1.2		--		ST-1: sandy clay in bottom of tube
741.2'	11.0'			SPT-7	11.0 - 12.5	1.2	WOR-WOH-WOH	20		
		SAND, light brown, dry, very loose, fine to medium grained, some silt		SPT-8	12.5 - 14.0	1.1	2-3-2	17		
738.2'	14.0'	LEAN CLAY, light red brown, moist, very soft, some fine grained sand		SPT-9	14.0 - 15.5	1.1	1-1-2	21		
					ST-2	15.5 - 17.5	2.0		--	
734.7'	17.5'	SAND, light brown, saturated, very loose, fine grained, trace clayey silt		SPT-10	17.5 - 19.0	1.3	WOR-1-1	20		
					SPT-11	19.0 - 20.5	1.1	WOR-WOH-1	18	
					SPT-12	20.5 - 22.0	1.3	WOH-1-1	21	
					SPT-13	22.0 - 23.5	1.1	1-WOH-WOH	17	
					SPT-14	23.5 - 25.0	1.4	1-WOH-WOH	21	
					SPT-15	25.0 - 26.5	1.3	1-1-WOH	22	
					SPT-16	26.5 - 28.0	1.1	WOH-WOH-1	24	
					SPT-17	28.0 - 29.5	1.3	1-1-1	20	
					SPT-18	29.5 - 31.0	1.2	1-WOH-1	19	
					SPT-19	31.0 - 32.5	1.1	WOH-WOH-WOH	17	
					SPT-20	32.5 - 34.0	1.0	WOH-1-1	21	
					SPT-21	34.0 - 35.5	1.3	1-2-3	24	
				SPT-22	35.5 - 37.0	1.0	1-2-1	21		

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
711.2'	41.0'	SAND, light brown, saturated, very loose, fine grained, trace clayey silt (Continued)		SPT-23	37.0 - 38.5	1.3	1-1-1	18	
				SPT-24	38.5 - 40.0	1.3	WOR-WOH-WOH	19	
				SPT-25	40.0 - 41.5	1.2	WOR-WOH-2	19	
703.2'	49.0'	SAND, light gray, saturated, medium dense, fine grained		SPT-26	41.5 - 43.0	1.4	4-3-4	17	
				SPT-27	43.0 - 44.5	1.1	WOR-WOH-3	19	
				SPT-28	44.5 - 46.0	1.2	2-3-5	16	
				SPT-29	46.0 - 47.5	1.1	4-3-2	19	
				SPT-30	47.5 - 49.0	1.3	2-3-6	21	
				SPT-31	49.0 - 50.5	1.3	6-11-22	21	
698.7'	53.5'	SAND, light brown to brown, moist, very dense, fine to medium grained, some medium to coarse gravel		SPT-32	50.5 - 52.0	1.0	18-17-12	21	
				SPT-33	52.0 - 53.5	1.1	6-7-13	22	
				SPT-34	53.5 - 53.9	0.4	50/0.4	--	
696.4'	55.8'	Shale, (Augered)		SPT-35	55.0 - 55.3	0.3	50/0.3	--	Began Core
675.5'	76.7'	Shale, gray, fine grained, very thin bedded, 45° bedding angle		0%	5.9	0.5	8	61.7	
				0%	5.0	2.0	40	66.7	
				0%	4.5	1.8	40	71.2	
				0%	5.5	2.3	42	76.7	
				0%	5.5	2.3	42	76.7	Boring backfilled with bentonite cement grout from 0.0 ft to 76.7 ft
Bottom of Hole									

FMSIA_LEGACY_171468117_KINGSTON_ASH_POND.GPJ FMSIA.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 556248.52, E 2442540.30 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-8	Total Depth 76.7 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		Top of Rock = 53.5' Elevation (698.7')							
		WOH = Weight of Hammer WOR = Weight of Rods							
		Split Samples: SPT-2, 3, 4 and 25							
		Slope Indicator (76.7 ft of pipe) installed with a concrete pad and flushmount cover							

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Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/13/2009
 Hole # STN-8 Rig # 710

Northing 556,248.52 Surface Elevation (ft.) 752.2 Crew Kent Clements / Greg Wilson

Easting 2,442,540.30 Top of Rock Elev. (ft.) 698.7 Inspector Benjamin A. Halada

Boring Size 3 1/4 Hollow Stem Augers Pump Capacity 21 gpm Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 17.5 Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
58.7	66.7	30	0:00	1:00	1:00	244.45	244.49	0.04	0.04
		30	1:00	2:00	1:00	244.49	244.52	0.03	0.03
		30	2:00	3:00	1:00	244.52	244.55	0.03	0.03
		30	3:00	4:00	1:00	244.55	244.55	0.00	0.00
		30	4:00	5:00	1:00	244.55	244.55	0.00	0.00
66.7	76.7	35	0:00	1:00	1:00	246.67	246.67	0.00	0.00
		35	1:00	2:00	1:00	246.67	246.67	0.00	0.00
		35	2:00	3:00	1:00	246.67	246.67	0.00	0.00
		35	3:00	4:00	1:00	246.67	246.67	0.00	0.00
		35	4:00	5:00	1:00	246.67	246.67	0.00	0.00



SUBSURFACE LOG

Project No.	175569042	Location	N 556233.82, E 2442499.72 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-9	Total Depth	63.4 ft
Location	Kingston, Tennessee	Surface Elevation	764.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/15/09	Completed	4/16/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	22.5 ft	Date/Time	4/15/09
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input checked="" type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.8'	0.0'	Top of Hole							
		LEAN CLAY (Fill), red, dry to moist, stiff to very stiff, little chert, trace gravel		SPT-1	0.0 - 1.5	1.0	7-7-10	19	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.2	9-12-16	21	
				SPT-3	3.0 - 4.5	1.2	10-7-8	20	
				ST-1	4.5 - 6.5	2.0		--	
				SPT-4	6.5 - 8.0	1.5	6-8-11	29	
				SPT-5	8.0 - 9.5	0.5	4-5-6	26	
				SPT-6	9.5 - 11.0	0.5	7-11-14	23	
				ST-2	11.0 - 13.0	2.0		--	
				SPT-7	13.0 - 14.5	1.5	4-7-13	27	
				SPT-8	14.5 - 16.0	1.5	4-7-8	25	
746.5'	18.3'	BOTTOM ASH (Fill), dark gray, moist to wet, loose, some fly ash		SPT-9	16.0 - 17.5	1.5	5-5-7	23	Saturated at 22.5ft
				SPT-10	17.5 - 19.0	1.5	10-12-8	22	
				SPT-11	19.0 - 20.5	1.0	4-8-5	26	
				SPT-12	20.5 - 22.0	1.5	8-8-7	22	
740.5'	24.3'	SILTY SAND (Fill), brown, saturated, loose		SPT-13	22.0 - 23.5	1.0	6-2-WOH	20	Begin adding water at 25ft bgs to control blow-back
				SPT-14	23.5 - 25.0	1.5	6-4-4	17	
				SPT-15	25.0 - 26.5	1.0	3-4-5	20	
				SPT-16	26.5 - 28.0	0.8	3-4-3	19	
				SPT-17	28.0 - 29.5	1.5	WOH-2-2	21	
				SPT-18	29.5 - 31.0	1.5	WOH-WOH	22	
733.8'	31.0'	SILTY SAND, brown, wet, medium dense to very loose, fine to medium grained, little clay		SPT-19	31.0 - 32.5	1.5	WOH-WOH	19	
				SPT-20	32.5 - 34.0	1.5	WOH-WOH	29	
				SPT-21	34.0 - 35.5	1.5	1-1-1	22	
				SPT-22	35.5 - 37.0	1.0	2-2-3	22	

PUBM LEGACY 17448177-KINGSTON ASH POND.GPJ PWSM.GDT 7/16/09

Project No. <u>175569042</u>	Location <u>N 556233.82, E 2442499.72 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-9</u> Total Depth <u>63.4 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks				
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth					
710.2'	54.6'	SILTY SAND, brown, wet, medium dense to very loose, fine to medium grained, little clay <i>(Continued)</i>		SPT-23	37.0 - 38.5	1.5	2-2-3	22					
				SPT-24	38.5 - 40.0	1.5	WOH-WOH-1	21					
				SPT-25	40.0 - 41.5	1.5	WOH-WOH-1	20					
				SPT-26	41.5 - 43.0	1.5	3-3-4	20					
				SPT-27	43.0 - 44.5	1.5	3-1-1	18					
				SPT-28	44.5 - 46.0	1.5	3-1-1	19					
				SPT-29	46.0 - 47.5	1.5	3-3-4	22					
				SPT-30	47.5 - 49.0	1.5	4-4-5	22					
				SPT-31	49.0 - 50.5	0.8	WOR-WOR-WOR	22					
				SPT-32	50.5 - 52.0	1.5	4-6-6	19					
				SPT-33	52.0 - 53.5	1.5	WOR-WOR-WOR	23					
				SPT-34	53.5 - 55.0	1.5	5-8-9	19					
			702.3'	62.5'	SAND, brown, saturated, loose to medium dense, fine grained, trace silt		SPT-35	55.0 - 56.5		1.5	4-5-2	20	
							SPT-36	56.5 - 58.0		1.5	8-8-9	24	
	SPT-37	58.0 - 59.5				1.0	12-14-17	22					
	SPT-38	59.5 - 61.0				1.0	6-4-12	20					
	SPT-39	61.0 - 62.5				1.0	8-8-8	23					
701.4'	63.4'			SPT-40	62.5 - 63.4		44-50/0.4	--	Boring backfilled with bentonite grout from 0.0 ft to 63.4 ft.				

Shale, (Augered)

Auger Refusal /
Bottom of Hole

Top of Rock = 62.5'
Elevation (702.3')

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
725.0'	40.0'	FLY ASH (Fill), light brown gray, saturated, soft, with some clayey silt, mottled <i>(Continued)</i>		SPT-25	37.0 - 38.5	1.5	WOR-WOR 4-4-4	18		
				SPT-26	38.5 - 40.0	1.0	WOR- WOR-WOR	20		
713.0'	52.0'	SILTY CLAY, light brown gray, saturated, soft, with trace fine grained sand, mottled		SPT-27	40.0 - 41.5	1.0	4-6-6	21		
				SPT-28	41.5 - 43.0	1.5	6-6-6	20		
				SPT-29	43.0 - 44.5	1.0	3-3-3	21		
				SPT-30	44.5 - 46.0	1.5	2-2-3	25		
				SPT-31	46.0 - 47.5	1.5	3-2-1	27		
				SPT-32	47.5 - 49.0	1.0	WOR- WOR-WOR	19		
				SPT-33	49.0 - 50.5	1.0	WOR- WOR-WOR	18		
				SPT-34	50.5 - 52.0	1.0	4-5-7	18		
709.5'	55.5'	SILTY SAND, gray, wet, loose		SPT-35	52.0 - 53.5	1.3	4-5-7	23		
				SPT-36	53.5 - 55.0	1.5	3-3-4	29		
708.5'	56.5'	SILTY SAND, gray, wet, medium dense, fine grained, rounded, well graded		SPT-37	55.0 - 56.5	1.5	3-3-4	20		
707.0'	58.0'			SPT-38	56.5 - 58.0	0.6	5-6-8	20		
705.5'	59.5'	SAND, gray, wet, medium dense, fine grained, rounded, well graded		SPT-39	58.0 - 59.5	0.9	12-20-14	22		
				SPT-40	59.5 - 60.4	0.5	12-50/0.4	27		
699.0'	66.0'	SAND, tan gray, wet, medium dense, fine grained, rounded, well graded, with Red, soft, clay at 59.5 feet, and gray weathered shale at 61 feet								Began Core
				0%	5.0	0.3	6	66.0		
				0%	2.0	2.0	100	68.0		
				0%	3.0	3.0	100	71.0		Artesian flow conditions
				0%	5.0	5.0	100	76.0		
		Shale, gray, very fine grained, very soft, thin bedded, argillaceous							Boring backfilled with bentonite cement	

FAISM_LEGACY_171468117_KINGSTON_ASH_POND.GPJ FMSM.GDT 7/16/09



Project No.	175569042	Location	N 556162.76, E 2442251.63 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-10	Total Depth 81.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
684.0'	81.0'			0%	5.0	5.0	100	81.0	grout from 0.0 feet to 81.0 feet

Bottom of Hole

Top of Rock = 59.5'
Elevation (705.5')

WOH = Weight of Hammer
WOR = Weight of Rod

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Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/21/2009
 Hole # STN-10 Rig # 705

Northing 556,162.76 Surface Elevation (ft.) 765.0 Crew Wilks / Clements

Easting 2,442,251.63 Top of Rock Elev. (ft.) 705.5 Inspector Greg Budd

Boring Size 3 1/4 Hollow Stem Augers Pump Capacity 21 gpm Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 9.0' Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
62.5	71.0	35	0:00	1:00	1:00	278.18	278.60	0.42	0.42
		35	1:00	2:00	1:00	278.60	279.02	0.42	0.42
		35	2:00	3:00	1:00	279.02	279.46	0.44	0.44
		35	3:00	4:00	1:00	279.46	279.82	0.36	0.36
		35	4:00	5:00	1:00	279.82	280.23	0.41	0.41
		35	5:00	6:00	1:00	280.23	280.64	0.41	0.41
		35	6:00	7:00	1:00	280.64	281.04	0.40	0.40
		35	7:00	8:00	1:00	281.04	281.44	0.40	0.40
		35	8:00	9:00	1:00	281.44	281.86	0.42	0.42
		35	9:00	10:00	1:00	281.86	282.16	0.30	0.30
		35	10:00	11:00	1:00	282.16	282.47	0.31	0.31
		35	11:00	12:00	1:00	282.47	282.77	0.30	0.30
		35	12:00	13:00	1:00	282.77	283.06	0.29	0.29
		35	13:00	14:00	1:00	283.06	283.35	0.29	0.29
		35	14:00	15:00	1:00	283.35	283.65	0.30	0.30
71.0	81.0	35	0:00	1:00	1:00	283.45	283.56	0.11	0.11
		35	1:00	2:00	1:00	283.56	283.66	0.10	0.10
		35	2:00	3:00	1:00	283.66	283.75	0.09	0.09
		35	3:00	4:00	1:00	283.75	283.86	0.11	0.11
		35	4:00	5:00	1:00	283.86	283.96	0.10	0.10

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
711.2'	52.0'	SILTY SAND with Clay, brown, saturated, loose to very loose, some clay <i>(Continued)</i>		SPT-25	36.0 - 37.5	0.7	1-1-WOH	20	
				SPT-26	37.5 - 39.0	1.3	WOH-WOH-WOH	20	
				SPT-27	39.0 - 40.5	1.5	WOH-WOH-WOH	24	
				SPT-28	40.5 - 42.0	1.5	WOR-WOR-WOR	23	
				SPT-29	42.0 - 43.5	1.5	WOH-WOH-WOH	21	
				SPT-30	43.5 - 45.0	1.2	WOH-WOH-WOH	18	
				SPT-31	45.0 - 46.5	1.0	WOH-WOH-WOH	23	
				SPT-32	46.5 - 48.0	1.5	WOH-WOH-WOH	24	
				SPT-33	48.0 - 49.5	1.5	WOR-WOR-2	22	
				SPT-34	49.5 - 51.0	1.5	WOR-WOR-WOH	22	
704.7'	58.5'	SAND, brown, saturated, medium dense to dense, fine to medium grained		SPT-35	51.0 - 52.5	1.5	WOH-WOH-4	19	
				SPT-36	52.5 - 54.0	1.0	4-8-6	20	
				SPT-37	54.0 - 55.5	1.5	4-6-9	23	
				SPT-38	55.5 - 57.0	1.5	2-3-2	22	
701.7'	61.5'	Sandstone (Augered)		SPT-39	57.0 - 58.5	1.5	3-7-7	--	Boring backfilled with bentonite cement grout from 0.0 ft to 62.0 ft
				SPT-40	58.5 - 60.0	1.5	4-14-19	--	
701.2'	62.0'	Shale (Augered)		SPT-41	60.0 - 61.5	1.5	27-30-34	--	
				SPT-42	61.5 - 62.0	0.3	50-10/0.0	--	
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rods							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555873.09, E 2442622.48 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-12	Total Depth	62.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/12/09	Completed	5/12/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.1'	0.0'	Top of Hole							
764.6'	0.5'	GRAVEL (Fill)							
		FAT CLAY (Fill), red brown to brown, moist, medium stiff to stiff, some chert		SPT-1	0.0 - 1.5	1.0	8-9-12	18	Boring advanced using 4 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
			SPT-2	1.5 - 3.0	0.7	12-16-15	19		
			SPT-3	3.0 - 4.5	1.5	10-14-12	27		
			SPT-4	4.5 - 6.0	0.9	9-8-7	24		
			SPT-5	6.0 - 7.5	1.5	9-11-10	28		
			SPT-6	7.5 - 9.0	0.3	3-4-5	22		
			SPT-7	9.0 - 10.5	1.2	11-11-12	27		
			SPT-8	10.5 - 12.0	1.2	2-5-6	20		
			ST-1	12.0 - 14.0	1.0		--		
			SPT-9	14.0 - 15.5	0.7	1-5-6	25		
			SPT-10	15.5 - 17.0	1.5	12-11-11	26		
			SPT-11	17.0 - 18.5	1.4	6-4-6	29		
			SPT-12	18.5 - 20.0	1.1	4-5-4	27		
			SPT-13	20.0 - 21.5	0.9	3-2-2	25		
			SPT-14	21.5 - 23.0	1.5	2-2-3	28		
740.6'	24.5'		SPT-15	23.0 - 24.5	1.4	7-10-11	23	SPT-15: bottom ash in tip of spoon	
		SAND (Fill), dark gray, moist to saturated, medium dense, fine grained, some clay, some silt		SPT-16	24.5 - 26.0	1.5	2-3-8	30	
			SPT-17	26.0 - 27.5	1.5	10-9-9	22		
			SPT-18	27.5 - 29.0	1.5	6-3-3	21		
			ST-2	29.0 - 31.0	0.0		--		
			SPT-19	31.0 - 32.5	1.3	2-1-1	21		
			SPT-20	32.5 - 34.0	1.1	1-WOR-WOR	18		
			SPT-21	34.0 - 35.5	1.5	WOR-1-3	20		
729.6'	35.5'		SPT-22	35.5 - 37.0	1.5	3-5-6	21	Water added at 35.0 ft to keep augers clear	

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
716.1'	49.0'	SILTY CLAY, brown to gray, saturated, soft to medium stiff, some fine grained sand <i>(Continued)</i>		SPT-23	37.0 - 38.5	1.5	3-5-7	23	Boring backfilled with bentonite cement grout from 0.0 ft to 62.0 ft
				SPT-24	38.5 - 40.0	1.5	WOR-3-3	21	
				SPT-25	40.0 - 41.5	1.5	3-4-5	23	
				SPT-26	41.5 - 43.0	1.5	3-4-4	24	
				SPT-27	43.0 - 44.5	1.5	3-3-4	19	
				SPT-28	44.5 - 46.0	1.5	WOH- WOH-WOH	20	
				SPT-29	46.0 - 47.5	1.5	WOH- WOH-WOH	23	
				SPT-30	47.5 - 49.0	1.2	3-4-4	22	
710.6'	54.5'	SAND, brown to light brown, saturated, loose, fine to coarse grained, some, clay		SPT-31	49.0 - 50.5	1.5	WOR- WOR-WOR	20	
				SPT-32	50.5 - 52.0	1.5	WOH- WOH-WOH	19	
				SPT-33	52.0 - 53.5	1.5	WOR- WOR-2	19	
				SPT-34	53.5 - 55.0	1.4	WOR- WOR-4	18	
709.6'	55.5'	SAND with Silt, dark gray, saturated, very loose		SPT-35	55.0 - 56.5	1.5	7-11-12	20	
704.1'	61.0'	SAND, brown to gray, saturated, medium dense, medium to coarse grained, some cobbles		SPT-36	56.5 - 58.0	1.3	7-11-13	21	
				SPT-37	58.0 - 59.5	1.5	3-5-9	20	
				SPT-38	59.5 - 61.0	0.8	7-7-7	19	
703.1'	62.0'			SPT-39	61.0 - 62.0	0.5	16-50/0.3	14	
		Shale, (Augered)							
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rods							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555685.58, E 2442733.21 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-14	Total Depth	51.0 ft
Location	Kingston, Tennessee	Surface Elevation	753.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/9/09	Completed	4/9/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	17.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
753.1'	0.0'	Top of Hole							
748.6'	4.5'	LEAN CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	3-3-4	20	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-2	1.5 - 3.0	1.0	3-5-9	19	
				SPT-3	3.0 - 4.5	1.2	4-9-9	22	
746.6'	6.5'	BOTTOM ASH (Fill), black, saturated, medium dense		SPT-4	4.5 - 6.0	1.3	4-19-28	13	
				SPT-5	6.0 - 7.5	1.0	17-15-15	16	
744.1'	9.0'	LEAN CLAY (Fill), light brown, moist, stiff, trace fine grained sand		SPT-6	7.5 - 9.0	0.8	10-11-12	19	
				ST-1	9.0 - 11.0	1.0	--	--	
735.1'	18.0'	LEAN CLAY (Fill), light brown, moist, soft, trace fine grained sand		SPT-7	11.0 - 12.5	0.5	1-1-2	21	
				SPT-8	12.5 - 14.0	0.5	1-2-1	22	
				ST-2	14.0 - 16.0	1.0	--	--	
734.1'	19.0'	SAND, light brown, saturated, very loose, fine grained		SPT-9	16.0 - 17.5	1.0	WOH-1-2	25	
	SPT-10		17.5 - 19.0	0.7	WOH-2-1	19			
732.1'	21.0'	SAND, light brown, saturated, very loose, fine grained, some clayey silt		SPT-11	19.0 - 20.5	1.0	WOR- WOH-WOH	21	
				SPT-12	20.5 - 22.0	1.3	1-2-3	25	
728.1'	25.0'	SILTY CLAY, brown, moist, soft, some fine grained sand		SPT-13	22.0 - 23.5	1.3	1-2-2	24	
				ST-3	23.5 - 25.5	2.0	--	--	
				SPT-14	25.5 - 27.0	1.2	WOH-2-3	19	
		SAND, light brown, saturated, very loose to loose, fine to medium grained, trace silt		SPT-15	27.0 - 28.5	1.1	WOH-1-1	21	
				SPT-16	28.5 - 30.0	1.3	1-1-1	20	
				SPT-17	30.0 - 31.5	1.2	WOR- WOH-1	22	
				SPT-18	31.5 - 33.0	1.1	WOH-1-1	20	
				SPT-19	33.0 - 34.5	1.0	WOR- WOH-2	22	
				SPT-20	34.5 - 36.0	1.1	WOH-1-1	24	

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
706.1'	47.0'	SAND, light brown, saturated, very loose to loose, fine to medium grained, trace silt <i>(Continued)</i>		SPT-21	36.0 - 37.5	1.2	2-4-3	19	
				SPT-22	37.5 - 39.0	1.3	1-3-4	20	
				SPT-23	39.0 - 40.5	1.3	WOH-2-3	20	
				SPT-24	40.5 - 42.0	0.9	WOH-1-2	22	
				SPT-25	42.0 - 43.5	1.0	2-3-2	26	
				SPT-26	43.5 - 45.0	0.8	2-1-5	22	
				SPT-27	45.0 - 46.5	1.3	2-6-11	20	
				SPT-28	46.5 - 48.0	1.4	22-39-29	--	
				SPT-29	48.0 - 49.5	0.1	16-25-35	--	
				SPT-30	49.5 - 50.9	1.2	29-49-50/0.4	--	
703.6'	49.5'	Sandstone, (Augered)							SPT-27: sandstone in tip of spoon SPT-29: shale in tip of spoon
702.1'	51.0'	Shale, (Augered)							Boring backfilled with bentonite cement grout from 0.0 ft to 51.0 ft
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rods							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555687.58, E 2442734.21 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-14A	Total Depth	18.5 ft
Location	Kingston, Tennessee	Surface Elevation	753.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/16/09	Completed	4/16/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	N/A
Logged By	Ben Halada	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
753.1'	0.0'	Top of Hole							
		OVERBURDEN, See log for STN-14							Boring advanced using 3 1/4 " Hollow Stem Augers
734.6'	18.5'	No Refusal / Bottom of Hole							
		PZ Installed, tip at elevation 737.6'							
		Flushmount well cover and concrete pad installed.							

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Project No. <u>175569042</u>		Location <u>N 555662.69, E 2442667.52 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-15</u> Total Depth <u>58.9 ft</u>	
Location <u>Kingston, Tennessee</u>		Surface Elevation <u>763.7 ft. (NGVD29)</u>	
Project Type <u>Geotechnical Exploration</u>		Date Started <u>4/16/09</u> Completed <u>4/17/09</u>	
Supervisor <u>Ben Halada</u> Driller <u>Sam Wilks</u>		Depth to Water <u>15.0 ft</u> Date/Time <u>4/16/09</u>	
Logged By <u>Briggs Evans</u>		Automatic Hammer <input type="checkbox"/> Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
763.7'	0.0'	Top of Hole							
763.2'	0.5'	LEAN CLAY (Fill), red brown, dry to moist, stiff to very stiff, little chert, trace gravel		SPT-1	0.0 - 1.5	1.2	6-31-40	18	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 1.9	0.4	50/0.4	18	
		FLY ASH (Fill), dark gray, dry to moist, dense		SPT-3	3.0 - 4.4	1.0	22-45-33/0.4	18	
				SPT-4	4.5 - 6.0	1.0	12-31-31	19	
757.0'	6.8'			SPT-5	6.0 - 7.5	1.5	6-6-21	16	
756.2'	7.5'	LEAN CLAY (Fill), red brown, moist, stiff, little chert, trace gravel		SPT-6	7.5 - 9.0	1.5	5-5-5	18	
754.7'	9.0'	FLY ASH (Fill), dark gray, moist, dense		SPT-7	9.0 - 10.5	0.8	4-4-4	22	
				SPT-8	10.5 - 12.0	1.2	4-7-9	31	
		FAT CLAY (Fill), red, moist, stiff, little chert, trace gravel		ST-1	12.0 - 14.0	2.0		--	
749.2'	14.5'			SPT-9	14.0 - 15.5	1.5	21-43-36	16	
		BOTTOM ASH (Fill), dark gray, wet to saturated, medium dense to loose, some fly ash		SPT-10	15.5 - 17.0	1.5	6-13-13	17	
				SPT-11	17.0 - 18.5	1.5	13-15-8	28	
				SPT-12	18.5 - 20.0	1.5	WOH-2-3	29	
				SPT-13	20.0 - 21.5	1.5	2-3-3	30	
				SPT-14	21.5 - 23.0	1.0	1-1-1	26	
				SPT-15	23.0 - 24.5	1.5	3-3-4	26	
				SPT-16	24.5 - 26.0	0.5	3-1-2	35	
				SPT-17	26.0 - 27.5	1.5	3-1-2	39	
				SPT-18	27.5 - 29.0	1.0	10-6-8	21	
733.7'	30.0'			SPT-19	29.0 - 30.5	1.5	7-5-5	21	
733.2'	30.5'	SANDY SILT, brown, saturated, soft to very soft, with fine grained sand		SPT-20	30.5 - 32.0	1.0	2-3-3	22	
				SPT-21	32.0 - 33.5	0.8	3-2-2	20	
730.2'	33.5'	SILTY SAND, brown, wet, medium dense to very loose, fine to medium grained, trace clay		SPT-22	33.5 - 35.0	1.0	3-3-5	22	
				SPT-23	35.0 - 36.5	1.5	5-5-7	21	

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
724.2'	39.5'	SANDY SILT, brown, saturated, soft to medium stiff, with fine grained sand, trace clay <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.5	5-5-7	19	
				SPT-25	38.0 - 39.5	1.5	3-3-5	17	
712.7'	51.0'	SAND, brown, saturated, loose to very loose, fine grained, some silt		SPT-26	39.5 - 41.0	1.5	4-3-1	18	
				SPT-27	41.0 - 42.5	1.5	4-3-2	20	
				SPT-28	42.5 - 44.0	1.5	4-4-3	22	
				SPT-29	44.0 - 45.5	1.5	4-5-7	21	
				SPT-30	45.5 - 47.0	1.5	3-3-7	22	
				SPT-31	47.0 - 48.5	1.5	3-5-5	23	
				SPT-32	48.5 - 50.0	1.5	WOR- WOR-WOR	23	
				SPT-33	50.0 - 51.5	1.5	8-9-8	24	
706.2'	57.5'	SAND, brown, saturated, loose to medium dense, fine grained, trace silt		SPT-34	51.5 - 53.0	0.8	5-5-4	21	
				SPT-35	53.0 - 54.5	0.8	29-27-18	21	Sandstone layer 53.5 to 53.6 ft bgs
				SPT-36	54.5 - 56.0	1.0	7-12-10	23	
				SPT-37	56.0 - 57.4	1.4	7-30-50/0.4	15	Sandstone layers - 57.0 to 57.1 & 57.3 to 57.4 ft bgs
704.8'	58.9'		SPT-38	57.5 - 58.9	1.4	33-40- 27/0.4	--		
		Sandstone, (Augered)							
		Auger Refusal / Bottom of Hole							
		Top of Rock = 57.5' Elevation (706.2')							
									Boring backfilled with bentonite grout from 58.9ft to surface

FINISH LEGACY: 17-1-08117 KINGSTON ASH POND.GPJ F:\ASL\GDT_7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 555669.72, E 2442691.43 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-15A	Total Depth	30.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/29/09	Completed	5/1/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Adam Smith	Automatic Hammer <input type="checkbox"/>		Safety Hammer <input type="checkbox"/>	Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers
		See Log for STN-15							
735.3'	30.0'								

No Refusal /
Bottom of Hole

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SUBSURFACE LOG

Project No.	175569042	Location	N 555669.72, E 2442691.43 (NAD27)
Project Name	Kingston Ash Pond	Boring No.	STN-15A Total Depth 30.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		Two PZ's Installed, tip at elevation 753.3' and 738.3'							
		Flushmount well cover and concrete pad installed.							

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SUBSURFACE LOG

Project No.	<u>175569042</u>	Location	<u>N 555672.20, E 2442690.32 (NAD27)</u>		
Project Name	<u>Kingston Ash Pond</u>	Boring No.	STN-15B	Total Depth	<u>58.0 ft</u>
Location	<u>Kingston, Tennessee</u>	Surface Elevation	<u>765.3 ft. (NGVD29)</u>		
Project Type	<u>Geotechnical Exploration</u>	Date Started	<u>4/29/09</u>	Completed	<u>5/1/09</u>
Supervisor	<u>Ben Halada</u>	Driller	<u>Steve Bradford</u>	Depth to Water	<u>N/A</u>
Logged By	<u>Adam Smith</u>	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							
		See Log for STN-15							

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 555672.20, E 2442690.32 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-15B</u> Total Depth <u>58.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
707.3'	58.0'	OVERBURDEN, (Augered without sampling) See Log for STN-15 (Continued)							
		No Refusal / Bottom of Hole							
		PZ Installed, tip at elevation 710.3'							
		Flushmount well cover and concrete pad installed.							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555671.50, E 2442690.88 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-15C	Total Depth	35.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/7/09	Completed	5/7/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Brad Smiley	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling) See Log for STN-15							Boring advanced using 4 1/4" Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
740.3'	25.0'								
		SILT, dark brown to red brown, saturated, soft, some fine grained sand, some clay		ST-1	25.0 - 27.0	1.1		--	
				ST-2	27.0 - 29.0	2.0		--	
734.3'	31.0'			ST-3	29.0 - 31.0	2.0		--	
		LEAN CLAY, dark gray to brown, saturated, soft, some silt, trace fine grained sand		ST-4	31.0 - 33.0	1.7		--	
730.3'	35.0'			ST-5	33.0 - 35.0	2.0		--	Boring backfilled with bentonite cement grout from 0.0 ft to 35.0 ft

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No Refusal /
Bottom of Hole



SUBSURFACE LOG

Project No.		175569042			Location		N 555665.72, E 244289.78 (NAD27)				
Project Name		Kingston Ash Pond			Boring No.		STN-15D		Total Depth		35.0 ft
Location		Kingston, Tennessee			Surface Elevation		765.3 ft. (NGVD29)				
Project Type		Geotechnical Exploration			Date Started		5/8/09	Completed		5/8/09	
Supervisor		Ben Halada			Driller		Steve Bradford		Depth to Water		N/A
Logged By		Brad Smiley			Automatic Hammer		<input type="checkbox"/>		Safety Hammer		<input type="checkbox"/>
Other		<input type="checkbox"/>									

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks		
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth			
765.3'	0.0'	Top of Hole									
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers		
		See Log for STN-15							Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling		
740.3'	25.0'										
		Bottom Ash, black, saturated, loose		ST-1	25.0 - 27.0	0.7		--			
				ST-2	27.0 - 29.0	1.7		--			
736.3'	29.0'										
		LEAN CLAY, gray to dark brown, saturated, soft, some silt		ST-3	29.0 - 31.0	1.7		--			
				ST-4	31.0 - 33.0	2.0		--			
				ST-5	33.0 - 35.0	2.0		--			
730.3'	35.0'								Boring backfilled with bentonite cement grout from 0.0 ft to 35.0 ft		
		No Refusal / Bottom of Hole									

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SUBSURFACE LOG

Project No.	175569042	Location	N 555501.40, E 2442725.94 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-16	Total Depth 58.5 ft
Location	Kingston, Tennessee	Surface Elevation	764.5 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	5/12/09	Completed 5/13/09
Supervisor	Ben Halada	Driller	Sam Wilks	Depth to Water 21.0 ft
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.5'	0.0'							Top of Hole
764.3'	0.2'		SPT-1	0.0 - 1.5	0.9	3-9-32	23	GRAVEL (Fill), light gray, dry, road material
763.5'	1.0'		SPT-2	1.5 - 1.9	0.2	50/0.4	19	
								LEAN CLAY (Fill), red, dry, very stiff, hard
			SPT-3	3.0 - 4.5	0.5	10-13-27	19	BOTTOM ASH (Fill), gray black, dry, loose to medium dense, with fly ash
			SPT-4	4.5 - 6.0	0.5	14-14-20	18	
758.0'	6.5'		SPT-5	6.0 - 7.5	1.0	3-4-5	25	FAT CLAY (Fill), red, stiff, with tan and white chert, dry to moist
			SPT-6	7.5 - 9.0	1.0	6-6-10	27	
			SPT-7	9.0 - 10.5	1.5	7-8-8	30	
			SPT-8	10.5 - 12.0	1.3	10-12-13	32	
			SPT-9	12.0 - 13.5	0.6	3-3-5	23	
			SPT-10	13.5 - 15.0	0.8	10-10-10	27	
			SPT-11	15.0 - 16.2	0.0	35-32-33/0.2	--	
			SPT-12	16.5 - 17.9	0.1	49-44-7/0.4	22	
746.0'	18.5'		SPT-13	18.0 - 19.5	0.1	4-3-8	20	BOTTOM ASH (Fill), black gray, saturated, loose to medium dense, with fly ash, and gravel size coal refuse
			SPT-14	19.5 - 21.0	0.1	WOR-WOR	18	
			SPT-15	21.0 - 22.5	1.5	5-4-4	25	
			SPT-16	22.5 - 24.0	1.5	4-3-3	22	
			SPT-17	24.0 - 25.5	0.7	2-2-2	18	
			SPT-18	25.5 - 27.0	0.5	6-4-3	16	
			SPT-19	27.0 - 28.5	1.0	4-3-3	19	
			SPT-20	28.5 - 30.0	1.0	5-5-5	18	
734.0'	30.5'		SPT-21	30.0 - 31.5	1.5	4-4-6	25	
			SPT-22	31.5 - 33.0	1.1	3-4-5	21	
731.5'	33.0'		SPT-23	33.0 - 34.5	1.5	3-5-5	20	
			SPT-24	34.5 - 36.0	0.7	3-5-6	19	

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
723.5'	41.0'	SILTY SAND, light brown, saturated, soft to medium dense, with fine grained sand <i>(Continued)</i>		SPT-25	36.0 - 37.5	1.5	3-3-5	17	
				SPT-26	37.5 - 39.0	1.2	3-4-5	20	
				ST-ST-1	39.0 - 41.0	2.0	--	--	
706.5'	58.0'	SAND, brown, saturated, loose to very dense, fine grained, well rounded, well graded, trace silt		SPT-27	41.0 - 42.5	1.5	3-2-4	18	
				SPT-28	42.5 - 44.0	1.5	1-1-2	20	
				SPT-29	44.0 - 45.5	1.5	5-8-9	20	
				SPT-30	45.5 - 47.0	1.5	8-8-9	21	
				SPT-31	47.0 - 48.5	1.5	5-5-6	22	
				SPT-32	48.5 - 50.0	1.5	5-6-6	24	
				SPT-33	50.0 - 51.5	1.5	10-15-12	22	
				SPT-34	51.5 - 53.0	1.5	6-8-10	21	
				SPT-35	53.0 - 54.5	1.5	7-9-11	20	
				SPT-36	54.5 - 56.0	1.5	11-15-17	22	
				SPT-37	56.0 - 57.5	1.5	9-12-14	22	
706.0'	58.5'			SPT-38	57.5 - 58.5	1.0	49-50/0.5	--	
		Sandstone, (augered)							
		Auger Refusal / Bottom of Hole							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555204.87, E 2442894.11 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-18	Total Depth	71.5 ft
Location	Kingston, Tennessee	Surface Elevation	751.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/14/09	Completed	4/15/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	13.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
751.0'	0.0'	Top of Hole							
748.5'	2.5'	LEAN CLAY (Fill), red brown, moist, soft to medium stiff		SPT-1	0.0 - 1.5	1.1	4-4-4	23	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.2	9-10-22	18	
735.0'	16.0'	BOTTOM ASH 65% / FLY ASH 35% (Fill), black, moist to saturated, loose to medium dense		SPT-3	3.0 - 4.5	1.0	10-11-11	13	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-4	4.5 - 6.0	1.1	3-7-6	9	
				SPT-5	6.0 - 7.5	1.0	3-7-15	7	
				SPT-6	7.5 - 9.0	1.0	5-7-13	12	
				SPT-7	9.0 - 10.5	1.1	3-4-3	9	
				SPT-8	10.5 - 12.0	1.0	6-6-7	13	
				SPT-9	12.0 - 13.5	1.0	3-4-4	14	
				SPT-10	13.5 - 15.0	0.9	2-3-3	16	
				SPT-11	15.0 - 16.5	0.9	4-3-1	26	
			727.0'	24.0'	SAND, light brown, saturated, very loose, fine grained, trace silt		SPT-12	16.5 - 18.0	
	SPT-13	18.0 - 19.5				0.2	1-WOH-WOH	18	
	SPT-14	19.5 - 21.0				0.9	1-WOH-1	17	
	SPT-15	21.0 - 22.5				1.0	1-WOH-WOH	17	
	SPT-16	22.5 - 24.0				1.1	2-1-1	16	
	SPT-17	24.0 - 25.5				0.3	2-WOH-1	23	
723.5'	27.5'	SILTY CLAY, light brown, saturated, very soft, some fine grained sand, some silt		ST-1	25.5 - 27.5	2.0		--	
				SPT-18	27.5 - 29.0	1.5	2-3-3	18	
719.0'	32.0'	SAND, light brown, saturated, loose, fine to medium grained, trace silt		SPT-19	29.0 - 30.5	1.4	2-5-4	22	
				SPT-20	30.5 - 32.0	1.1	4-5-4	19	
				SPT-21	32.0 - 33.5	1.2	4-4-3	20	
717.0'	34.0'	SAND, brown, saturated, loose, fine grained, some silt, some clay		SPT-22	33.5 - 35.0	1.3	WOH-WOH-WOH	19	
				SPT-23	35.0 - 36.5	1.0	WOH-WOH-WOH	19	

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Project No. <u>175569042</u>		Location <u>N 555204.87, E 2442894.11 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-18</u> Total Depth <u>71.5 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
707.0'	44.0'	SAND, light gray to gray, saturated, very loose, fine grained, some silt <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.5	WOH-1-1	18	
				SPT-25	38.0 - 39.5	1.0	1-2-2	18	
				SPT-26	39.5 - 41.0	1.1	2-3-1	18	
				SPT-27	41.0 - 42.5	0.7	1-3-1	18	
				SPT-28	42.5 - 44.0	0.8	2-3-4	21	
702.5'	48.5'	SAND, light gray to gray, moist, dense to very dense, fine grained, some fine to medium gravel		SPT-29	44.0 - 45.5	1.1	4-12-16	12	SPT-30: sandstone in tip of spoon
				SPT-30	45.5 - 47.0	0.9	33-32-31	12	
				SPT-31	47.0 - 48.5	1.1	25-27-30	12	
				SPT-32	48.5 - 49.0	0.5	50-10/0.0	8	
700.5'	50.5'	Shale, (Augered)							Began Core
		Shale, dark gray, very fine to fine grained, very soft, very thin bedded, with very thin to thin limestone layers, 30° to 45° bedding angle		0%	6.0	0.7	12	56.5	Boring backfilled with bentonite cement grout from 0.0 ft to 71.5 ft
				0%	5.0	1.3	26	61.5	
				0%	5.0	0.0	0	66.5	
				8%	5.0	1.4	28	71.5	
			679.5'	71.5'	Bottom of Hole				
		Top of Rock = 48.5' Elevation (702.5')							

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 555204.87, E 2442894.11 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-18</u> Total Depth <u>71.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	

WOH = Weight of Hammer
 WOR = Weight of Rods

Split Samples: SPT-2, 11 and 22

Slope Indicator (60 ft of pipe) installed with a concrete pad and flushmount cover

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Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/15/2009
 Hole # STN-18 Rig # 710

Northing 555,204.87 Surface Elevation (ft.) 751.0 Crew Kent Clements / Greg Wilson

Easting 2,442,894.11 Top of Rock Elev. (ft.) 702.5 Inspector Benjamin A. Halada

Boring Size 3 1/4 Hollow Stem Augers Pump Capacity 21 gpm Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 13.0' Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
52.0	61.5	30	0:00	1:00	1:00	246.20	246.64	0.44	0.44
		30	1:00	2:00	1:00	246.64	247.07	0.43	0.43
		30	2:00	3:00	1:00	247.07	247.49	0.42	0.42
		30	3:00	4:00	1:00	247.49	247.91	0.42	0.42
		30	4:00	5:00	1:00	247.91	248.34	0.43	0.43
		30	5:00	6:00	1:00	248.34	248.76	0.42	0.42
		30	6:00	7:00	1:00	248.76	249.25	0.49	0.49
		30	7:00	8:00	1:00	249.25	249.78	0.53	0.53
		30	8:00	9:00	1:00	249.78	250.28	0.50	0.50
		30	9:00	10:00	1:00	250.28	250.79	0.51	0.51
		30	10:00	11:00	1:00	250.79	251.29	0.50	0.50
		30	11:00	12:00	1:00	251.29	251.79	0.50	0.50
		30	12:00	13:00	1:00	251.79	252.29	0.50	0.50
		30	13:00	14:00	1:00	252.29	252.80	0.51	0.51
		30	14:00	15:00	1:00	252.80	253.30	0.5	0.5
61.5	71.5	35	0:00	1:00	1:00	253.15	253.15	0.00	0.00
		35	1:00	2:00	1:00	253.15	253.16	0.01	0.01
		35	2:00	3:00	1:00	253.16	253.16	0.00	0.00
		35	3:00	4:00	1:00	253.16	253.16	0.00	0.00
		35	4:00	5:00	1:00	253.16	253.17	0.01	0.01

Project No.	175569042	Location	N 555204.68, E 2442842.94 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-19	Total Depth	65.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.6 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/1/09	Completed	4/1/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	23.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
765.6'	0.0'	Top of Hole							
765.1'	0.5'	GRAVEL (Fill)							
764.1'	1.5'	BOTTOM ASH (Fill), black, moist, loose		SPT-1	0.5 - 2.0	1.1	5-7-10	20	Boring advanced using 3 1/4 " Hollow Stem Augers
		LEAN CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-2	2.0 - 3.5	1.1	5-5-5	7	
			SPT-3	3.5 - 5.0	1.4	5-6-8	25		
			ST-1	5.0 - 7.0	2.0	--	--		
			SPT-4	7.0 - 8.5	1.0	6-9-11	25		
			SPT-5	8.5 - 10.0	0.3	4-4-7	18		
			SPT-6	10.0 - 11.5	1.0	4-3-4	29		
			SPT-7	11.5 - 13.0	1.1	2-4-4	28		
			ST-2	13.0 - 15.0	1.5	--	--		
			SPT-8	15.0 - 16.5	0.2	4-6-4	24		
		SPT-9	16.5 - 18.0	0.0	10-15-16	--			
747.1'	18.5'			SPT-10	18.0 - 19.5	1.3	11-18-20	12	
746.6'	19.0'	GRAVEL (Fill), gray, moist, dense		SPT-11	19.5 - 21.0	1.1	6-10-13	12	
		Bottom Ash 65% / Fly Ash 35% (Fill), black, saturated, medium dense		SPT-12	21.0 - 22.5	1.0	9-10-14	13	
743.6'	22.0'			SPT-13	22.5 - 24.0	1.2	6-6-5	22	Water added at 22.0 ft to keep augers clear
		BOTTOM ASH (Fill), black, saturated, very loose to loose		SPT-14	24.0 - 25.5	1.1	3-5-6	19	
				SPT-15	25.5 - 27.0	1.1	4-3-2	24	
		SAND, light brown, saturated, very loose to loose, fine grained		SPT-16	27.0 - 28.5	0.8	3-2-4	25	
				SPT-17	28.5 - 30.0	1.0	4-5-5	21	
				SPT-18	30.0 - 31.5	1.1	3-3-1	22	
				SPT-19	31.5 - 33.0	1.2	3-2-3	23	
739.1'	26.5'			SPT-20	33.0 - 34.5	1.1	WOR-WOR	17	
730.6'	35.0'	SAND, light brown, saturated, very loose, fine grained, trace silty clay		SPT-21	34.5 - 36.0	1.0	WOR-WOH-1	20	

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Project No. <u>175569042</u>		Location <u>N 555204.68, E 2442842.94 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-19</u> Total Depth <u>65.0 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
728.1'	37.5'	SAND, light brown, saturated, very loose, fine grained, clayey sand (Continued)		SPT-22	36.0 - 37.5	1.2	WOH- WOH-WOH	18	ST-3: sand in bottom to tube
				SPT-23	37.5 - 39.0	1.5	WOH- WOH-WOH	23	
724.6'	41.0'	SILTY CLAY, light red brown, saturated, very soft, trace fine grained sand		ST-3	39.0 - 41.0	2.0		--	
722.6'	43.0'	SAND, light brown, saturated, very loose, fine grained		SPT-24	41.0 - 42.5	1.2	WOR-4-5	19	
				SPT-25	42.5 - 44.0	1.1	2-4-5	17	
		SAND, light brown, saturated, loose, fine grained, clayey silt		SPT-26	44.0 - 45.5	1.0	1-2-3	19	
				SPT-27	45.5 - 47.0	1.3	1-2-2	18	
716.6'	49.0'			SPT-28	47.0 - 48.5	1.2	2-4-4	19	
				SPT-29	48.5 - 50.0	1.2	6-9-3	20	
714.6'	51.0'	SAND, light brown, saturated, loose, fine grained, trace silt		SPT-30	50.0 - 51.5	1.3	1-2-2	19	
		SAND, light brown, saturated, loose, fine grained		SPT-31	51.5 - 53.0	1.0	2-3-5	20	
				SPT-32	53.0 - 54.5	0.2	WOH- WOH-WOH	22	
710.6'	55.0'	SAND, light brown, saturated, loose, fine grained, trace silt		SPT-33	54.5 - 56.0	1.0	WOH- WOH-WOH	21	
				SPT-34	56.0 - 57.5	1.0	WOR-1-1	21	
707.6'	58.0'			SPT-35	57.5 - 59.0	1.2	4-4-34	23	
		SAND, dark gray, saturated, dense, fine to coarse grained, some fine to coarse gravel		SPT-36	59.0 - 60.5	1.2	6-35-50	18	
				SPT-37	60.5 - 62.0	1.1	13-24-29	14	
				SPT-38	62.0 - 63.5	1.1	19-22-24	16	
701.1'	64.5'			SPT-39	63.5 - 64.9	0.9	14-28- 50/0.4	11	
700.6'	65.0'	Shale, (Augered)							
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rods							

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SUBSURFACE LOG

Project No.	175569042	Location	N 555168.84, E 2442666.59 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-20	Total Depth	61.0 ft
Location	Kingston, Tennessee	Surface Elevation	762.9 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/19/09	Completed	3/20/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	6.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
762.9'	0.0'	Top of Hole							
760.9'	2.0'	OVERBURDEN (Fill), consisted of gravel, clay, sand and ash		SPT-1	0.0 - 1.5	0.1	3-8-6	18	Boring advanced using 3 1/4 " Hollow Stem Augers
		FLY ASH (Fill), gray, moist, loose to medium dense, some coarse gravel, non-plastic		SPT-2	1.5 - 3.0	1.1	7-15-19	14	
				SPT-3	3.0 - 4.5	1.3	10-5-6	15	
				SPT-4	4.5 - 6.0	0.7	9-9-8	21	
756.9'	6.0'			SPT-5	6.0 - 7.5	0.1	5-5-6	27	
		Bottom Ash 55% / Fly Ash 45% (Fill), dark gray, saturated, very loose to loose, non-plastic		SPT-6	7.5 - 9.0	1.1	3-2-1	19	
				SPT-7	9.0 - 10.5	0.5	1-1-1	21	
				SPT-8	10.5 - 12.0	1.3	WOH-1-1	29	
750.4'	12.5'			SPT-9	12.0 - 13.5	1.2	3-15-16	23	
749.9'	13.0'			SPT-10	13.5 - 15.0	0.0	9-12-13	--	
		GRAVEL (Fill), gray, saturated, medium dense, coarse grained		SPT-11	15.0 - 16.5	0.5	9-10-10	17	
				SPT-12	16.5 - 18.0	0.8	7-8-11	28	
				SPT-13	18.0 - 19.5	0.8	5-4-4	29	
				SPT-14	19.5 - 21.0	1.3	2-3-4	28	
				SPT-15	21.0 - 22.5	1.3	6-6-5	26	
				SPT-16	22.5 - 24.0	1.2	1-2-2	30	
				SPT-17	24.0 - 25.5	1.3	1-1-1	29	
				SPT-18	25.5 - 27.0	1.5	3-2-2	31	
				SPT-19	27.0 - 28.5	0.4	2-2-2	23	
733.9'	29.0'			SPT-20	28.5 - 30.0	0.7	WOR-WOR-WOR	19	
731.9'	31.0'	SAND, light brown, saturated, very loose, fine grained		SPT-21	30.0 - 31.5	0.9	1-WOH-WOH	19	
		SILT, light brown, saturated, very soft, some sand		SPT-22	31.5 - 33.0	1.2	WOH-1-1	18	
				SPT-23	33.0 - 34.5	1.1	WOR-WOR-WOR	23	
727.9'	35.0'			ST-1	35.0 - 37.0	2.0	--	--	

FILE# LEGACY: 171468117 KINGSTON ASH POND.GPJ P18X1.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 555168.84, E 2442666.59 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-20	Total Depth 61.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
721.9'	41.0'	LEAN CLAY, light brown, saturated, very soft to soft, some fine grained sand, some silt <i>(Continued)</i>		ST-2	37.0 - 39.0	1.7		--	
				SPT-24	39.0 - 40.5	1.3	2-5-6	21	
716.9'	46.0'	SAND, light brown, saturated, loose, fine grained, some silt		SPT-25	40.5 - 42.0	1.4	3-5-6	18	
				SPT-26	42.0 - 43.5	0.9	3-5-6	17	
				SPT-27	43.5 - 45.0	1.3	3-2-2	21	
				SPT-28	45.0 - 46.5	1.0	WOR-1-1	21	
713.9'	49.0'	SAND, light gray, saturated, very loose, fine grained		SPT-29	46.5 - 48.0	1.3	WOR- WOR-WOH	19	
				SPT-30	48.0 - 49.5	1.4	WOR- WOR-WOR	20	
707.9'	55.0'	SAND, light brown, saturated, very loose to medium dense, fine grained, some silt		SPT-31	49.5 - 51.0	1.2	WOH-1-1	22	
				SPT-32	51.0 - 52.5	1.3	WOR- WOR-WOR	22	
				SPT-33	52.5 - 54.0	0.3	WOR-22-27	13	
				SPT-34	54.0 - 55.5	0.5	9-6-7	18	
703.9'	59.0'	SAND, light gray, saturated, loose to medium dense, fine grained, some fine to medium gravel		SPT-35	55.5 - 57.0	1.0	3-1-2	20	SPT-37: shale in tip of spoon
				SPT-36	57.0 - 58.5	1.1	15-18-20	17	Boring backfilled with bentonite cement grout from 0.0 ft to 61.0 ft
				SPT-37	58.5 - 58.9	0.4	50/0.4	11	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 555076.61, E 2442149.85 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-21	Total Depth 77.5 ft
Location	Kingston, Tennessee	Surface Elevation	765.0 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/23/09	Completed 4/24/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	11.0 ft	Date/Time 4/23/09
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.0'	0.0'	Top of Hole							
759.0'	6.0'	BOTTOM ASH (Fill), gray black, dry, very dense, with gray fine fly ash		SPT-1	0.0 - 1.5	1.0	1-14-17	24	Boring advanced using 3.25" hollow stem augers
				SPT-2	1.5 - 3.0	1.0	17-19-25	25	
				SPT-3	3.0 - 4.5	0.8	24-28-26	29	
				SPT-4	4.5 - 6.0	0.8	8-12-14	26	
756.0'	9.0'	FLY ASH (Fill), gray, dry, very dense		SPT-5	6.0 - 7.5	1.0	18-19-22	25	
				SPT-6	7.5 - 9.0	1.0	12-14-16	28	
754.0'	11.0'	FLY ASH (Fill), gray, wet, loose, and bottom ash		SPT-7	9.0 - 10.5	1.1	2-2-3	31	
				SPT-8	10.5 - 12.0	1.2	3-4-4	32	
747.0'	18.0'	BOTTOM ASH (Fill), gray black, saturated, loose to very loose, and fine fly ash		SPT-9	12.0 - 13.5	1.0	2-2-3	30	
				SPT-10	13.5 - 15.0	1.0	3-3-2	32	
				SPT-11	15.0 - 16.5	0.8	3-3-2	28	
				SPT-12	16.5 - 18.0	1.1	2-1-1	24	
744.0'	21.0'	FLY ASH (Fill), gray, saturated, very loose, with some fine grained black bottom ash		SPT-13	18.0 - 19.5	1.1	WOR-WOR-WOR	34	
				SPT-14	19.5 - 21.0	0.7	WOR-WOR-WOR	33	
733.5'	31.5'	FLY ASH (Fill), gray, saturated, very loose		SPT-15	21.0 - 22.5	0.2	WOR-WOR-WOR	38	
				SPT-16	22.5 - 24.0	1.2	WOR-WOR-WOR	28	
				SPT-17	24.0 - 25.5	1.5	2-1-1	26	
				SPT-18	25.5 - 27.0	1.1	3-3-4	28	
				SPT-19	27.0 - 28.5	1.5	2-1-WOH	29	
				SPT-20	28.5 - 30.0	1.5	WOR-WOR-WOR	29	
729.0'	36.0'	FLY ASH (Fill), brown gray, wet, very loose, clayey		SPT-21	30.0 - 31.5	1.5	WOR-WOR-WOR	27	
				SPT-22	31.5 - 33.0	1.2	WOR-WOR-WOR	24	
				SPT-23	33.0 - 34.5	0.4	WOR-WOR-WOR	27	
				SPT-24	34.5 - 36.0	0.8	1-2-2	24	

FMSL LEGACY: 175569042 KINGSTON ASH POND.GPJ, FMSL.GDT, 7/16/09

Project No. <u>175569042</u>		Location <u>N 555076.61, E 2442149.85 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-21</u> Total Depth <u>77.5 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
727.0'	38.0'	SILTY CLAY, red brown, wet, soft <i>(Continued)</i>		ST-1	36.0 - 38.0	0.0		--	
		SILTY SAND, tan and red brown, wet, soft, mottled very fine to fine grained		SPT-25	38.0 - 39.5	1.2	WOR- WOR-WOR	20	
			SPT-26	39.5 - 41.0	1.1	7-7-8	18		
			SPT-27	41.0 - 42.5	1.1	7-5-3	18		
			SPT-28	42.5 - 44.0	1.5	3-3-4	20		
719.5'	45.5'		SPT-29	44.0 - 45.5	1.5	3-1-1	19		
		SILT, gray, wet, very soft, with fine grained sand		SPT-30	45.5 - 47.0	0.8	WOR- WOR-WOR	16	
			SPT-31	47.0 - 48.5	0.9	WOR- WOR-WOR	20		
			SPT-32	48.5 - 50.0	0.7	WOR- WOR-WOR	17		
			SPT-33	50.0 - 51.5	0.7	WOR- WOR-WOR	21		
712.0'	53.0'		SPT-34	51.5 - 53.0	0.6	WOR- WOR-WOR	21		
710.5'	54.5'	SAND, gray, wet, loose, fine grained		SPT-35	53.0 - 54.5	1.0	8-6-3	22	
709.0'	56.0'	SAND, gray, dense, fine to medium grained, rounded, with gravel sandstone fragments		SPT-36	54.5 - 56.0	1.5	8-12-25	21	
		Sandstone, gray, fine grained, hard, thin bedded							Began Core
702.5'	62.5'		0%	5.0	1.8	36	62.5		
		Shale, gray, very fine grained, soft, argillaceous, weathered grading to hard gray shale with quartzite veins from 67.5 to 73.5							
			0%	5.0	2.7	54	67.5		
691.5'	73.5'			0%	6.0	3.0	50	73.5	Boring backfilled using bentonite cement grout from 0.0 to 77.5 feet
687.5'	77.5'	Shale, gray, clay-like, very soft		0%	4.0	3.2	80	77.5	

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SUBSURFACE LOG

Project No.	175569042	Location	N 555076.61, E 2442149.85 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-21	Total Depth	77.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		Bottom of Hole							
		Top of Rock = 56.0' Elevation (709.0')							
		WOH = Weight of Hammer WOR = Weight of Rod							

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Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/24/2009
 Hole # STN-21 Rig # 705

Northing 555,076.61 Surface Elevation (ft.) 765.0 Crew Wilks / Clements

Easting 2,442,149.85 Top of Rock Elev. (ft.) 709.0 Inspector Greg Budd

Boring Size 3 1/4 Hollow Stem Augers Pump Capacity 21 gpm Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 11.0' Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
59.0	67.5	32	0:00	1:00	1:00	287.91	289.56	1.65	1.65
		32	1:00	2:00	1:00	289.56	291.12	1.56	1.56
		32	2:00	3:00	1:00	291.12	292.76	1.64	1.64
		32	3:00	4:00	1:00	292.76	294.37	1.61	1.61
		32	4:00	5:00	1:00	294.37	295.99	1.62	1.62
		32	5:00	6:00	1:00	295.99	297.61	1.62	1.62
		32	6:00	7:00	1:00	297.61	299.26	1.65	1.65
		32	7:00	8:00	1:00	299.26	300.89	1.63	1.63
		32	8:00	9:00	1:00	300.89	302.54	1.65	1.65
		32	9:00	10:00	1:00	302.54	304.18	1.64	1.64
		32	10:00	11:00	1:00	304.18	305.83	1.65	1.65
		32	11:00	12:00	1:00	305.83	307.47	1.64	1.64
		32	12:00	13:00	1:00	307.47	309.12	1.65	1.65
		32	13:00	14:00	1:00	309.12	310.78	1.66	1.66
		32	14:00	15:00	1:00	310.78	312.38	1.60	1.60
67.5	77.5	37	0:00	1:00	1:00	312.97	313.51	0.54	0.54
		37	1:00	2:00	1:00	313.51	314.04	0.53	0.53
		37	2:00	3:00	1:00	314.04	314.56	0.52	0.52
		37	3:00	4:00	1:00	314.56	315.08	0.52	0.52
		37	4:00	5:00	1:00	315.08	315.60	0.52	0.52
		37	5:00	6:00	1:00	315.60	316.12	0.52	0.52
		37	6:00	7:00	1:00	316.12	316.63	0.51	0.51
		37	7:00	8:00	1:00	316.63	317.40	0.77	0.77
		37	8:00	9:00	1:00	317.40	318.22	0.82	0.82
		37	9:00	10:00	1:00	318.22	319.04	0.82	0.82
		37	10:00	11:00	1:00	319.04	319.86	0.82	0.82
		37	11:00	12:00	1:00	319.86	320.68	0.82	0.82
		37	12:00	13:00	1:00	320.68	321.50	0.82	0.82
		37	13:00	14:00	1:00	321.50	322.33	0.83	0.83
		37	14:00	15:00	1:00	322.33	323.14	0.81	0.81

Project # 171468117 Hole # STN-21 Inspector Greg Budd Date 4/24/2009



SUBSURFACE LOG

Project No.	175569042	Location	N 554990.27, E 2441723.40 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-22	Total Depth	79.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/27/09	Completed	4/28/09
Supervisor	Ben Halada	Driller	Sam Wilks	Depth to Water	9.5 ft
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input checked="" type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
765.0'	0.0'	Top of Hole								
763.5'	1.5'	BOTTOM ASH (Fill), gray black, dry, medium dense		SPT-1	0.0 - 1.5	1.2	3-6-5	35	Boring advanced using 3 1/4" hollow stem augers	
762.0'	3.0'	BOTTOM ASH (Fill), gray black, dry, medium dense		SPT-2	1.5 - 3.0	1.0	6-9-8	32		
		FLY ASH (Fill), gray, dry, medium dense, very fine grained		SPT-3	3.0 - 4.5	0.7	9-9-9	30		
759.0'	6.0'			SPT-4	4.5 - 6.0	0.7	7-3-4	31		
		FLY ASH (Fill), gray, wet, very loose, very fine grained, silty		SPT-5	6.0 - 7.5	1.0	WOR-1-1	36		
756.0'	9.0'			SPT-6	7.5 - 9.0	0.9	2-2-3	36		
		FLY ASH (Fill), gray, saturated, very loose, very fine grained		SPT-7	9.0 - 10.5	1.5	1-1-1	36		Water added at 9.0 feet to keep augers clean
				SPT-8	10.5 - 12.0	1.5	1-WOR-WOR	34		
				SPT-9	12.0 - 13.5	1.5	WOR-WOR-WOR	33		
				SPT-10	13.5 - 15.0	1.1	WOR-WOR-WOR	32		
				SPT-11	15.0 - 16.5	1.5	WOR-WOR-WOR	27		
				SPT-12	16.5 - 18.0	1.5	WOR-WOR-WOR	36		
				SPT-13	18.0 - 19.5	1.5	1-WOR-WOR	31		
				SPT-14	19.5 - 21.0	1.5	WOR-WOR-WOR	30		
				SPT-15	21.0 - 22.5	0.5	WOR-WOR-WOR	34		
				SPT-16	22.5 - 24.0	1.0	WOH-WOH-WOH	32		
				SPT-17	24.0 - 25.5	0.8	WOR-WOR-WOR	28		
				SPT-18	25.5 - 27.0	0.9	WOR-3-3	28		
738.0'	27.0'			SPT-19	27.0 - 28.5	1.0	WOR-1-1	29		
		FLY ASH (Fill), black gray, saturated, very loose to loose, with bottom ash and gravel size coal, coal refuse		SPT-20	28.5 - 30.0	0.5	1-1-1	31		
				SPT-21	30.0 - 31.5	0.8	3-2-1	26		
				SPT-22	31.5 - 33.0	1.0	1-1-WOH	26		
				SPT-23	33.0 - 34.5	0.9	WOR-WOR-WOR	32		
				SPT-24	34.5 - 36.0	0.9	WOR-WOR-WOR	28		

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SUBSURFACE LOG

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
727.5'	37.5'	FLY ASH (Fill), gray, saturated, very loose, very fine grained, silty		SPT-25	36.0 - 37.5	1.0	WOR- WOR-WOR	30	Began Core
				SPT-26	37.5 - 39.0	0.3	WOR- WOR-WOR	25	
				SPT-27	39.0 - 40.5	0.9	WOR- WOR-1	32	
				SPT-28	40.5 - 42.0	1.5	2-1-1	26	
721.5'	43.5'			SPT-29	42.0 - 43.5	1.2	7-5-8	19	
		CLAYEY FLY ASH, brown gray, saturated, medium stiff, compacted, mottled		SPT-30	43.5 - 45.0	1.0	5-5-6	21	
719.0'	46.0'			SPT-31	45.0 - 46.5	0.7	5-8-10	20	
		LEAN CLAY, gray brown, saturated, stiff, mottled		SPT-32	46.5 - 48.0	0.9	5-7-6	23	
				SPT-33	48.0 - 49.5	1.5	5-6-7	21	
713.5'	51.5'			ST-1	49.5 - 51.5	1.3		--	
		SILTY SAND, gray, saturated, loose, fine grained		SPT-34	51.5 - 53.0	1.0	6-4-2	19	
710.5'	54.5'			SPT-35	53.0 - 54.5	0.9	WOR- WOR-WOR	20	
		SAND, gray, saturated, very loose, fine grained		SPT-36	54.5 - 56.0	0.3	WOR- WOR-WOR	22	
				SPT-37	56.0 - 57.5	0.6	2-2-5	23	
707.0'	58.0'			SPT-38	57.5 - 58.0	0.4	50/0.4	17	
		Sandstone, gray, fine grained, very hard, thin to medium bedded, quartz, grading to gray, soft, weathered, shale							
701.0'	64.0'			0%	5.0	0.6	12	64.0	
		Shale, gray, soft, grading to weathered, brittle, soft, gray, shale to 67.5 feet. No recovery from 67.5 to 69 feet							
697.5'	67.5'			0%	3.5	3.1	89	67.5	
				0%	1.5	0.0	0	69.0	
		Limestone, gray, fine grained, very hard, thin to medium bedded							
				0%	5.0	0.3	5	74.0	
								Boring backfilled using bentonite cement grout from 0.0 feet to 79.0 feet	

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SUBSURFACE LOG

Project No.		175569042			Location		N 554990.27, E 2441723.40 (NAD27)				
Project Name		Kingston Ash Pond			Boring No.		STN-22		Total Depth		79.0 ft
Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks		
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth			
686.0'	79.0'			0%	5.0	0.0	0	79.0			
<p>Bottom of Hole</p> <p>Top of Rock = 58.0' Elevation (707.0')</p> <p>WOH = Weight of Hammer WOR = Weight of Rod</p>											

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Project 171468117 Kingston Ash Pond
 Sheet No. 1 of 1 Date 4/28/2009
 Hole # STN-22 Rig # 705

Northing 554,990.27 Surface Elevation (ft.) 765.0 Crew Wilks / Clements

Easting 2,441,723.40 Top of Rock Elev. (ft.) 707.0 Inspector Greg Budd

Boring Size 3 1/4 Hollow Stem Augers Pump Capacity 21 gpm Meter Type Sensus 5/8" SR II

Test Method US Bureau of Reclamation Static Water Level 9.0' Meter # 67290595

Test Section		Gauge Reading (PSI)	Time of Test			Meter Reading		Total Water (Gal / Cu Ft)	CFM
Top Depth	Bottom Depth		Start	End	Interval (min-sec)	Start of Test	End of Test		
63.0	69.0	35	0:00	1:00	1:00	322.97	322.99	0.02	0.02
		35	1:00	2:00	1:00	322.99	323.00	0.01	0.01
		35	2:00	3:00	1:00	323.00	323.01	0.01	0.01
		35	3:00	4:00	1:00	323.01	323.01	0.00	0.00
		35	4:00	5:00	1:00	323.01	323.01	0.00	0.00
69.0	79.0	39	0:00	1:00	1:00	325.66	325.96	0.30	0.30
		39	1:00	2:00	1:00	325.96	326.26	0.30	0.30
		39	2:00	3:00	1:00	326.26	326.54	0.28	0.28
		39	3:00	4:00	1:00	326.54	326.74	0.20	0.20
		39	4:00	5:00	1:00	326.74	326.90	0.16	0.16
		39	5:00	6:00	1:00	326.90	326.97	0.07	0.07
		39	6:00	7:00	1:00	326.97	327.19	0.22	0.22
		39	7:00	8:00	1:00	327.19	327.33	0.14	0.14
		39	8:00	9:00	1:00	327.33	327.40	0.07	0.07
		39	9:00	10:00	1:00	327.40	327.63	0.23	0.23
		39	10:00	11:00	1:00	327.63	327.72	0.09	0.09
		39	11:00	12:00	1:00	327.72	328.12	0.40	0.40
		39	12:00	13:00	1:00	328.12	328.53	0.41	0.41
		39	13:00	14:00	1:00	328.53	328.95	0.42	0.42
39	14:00	15:00	1:00	328.95	329.39	0.44	0.44		
*** NOTE: Pressure gauge broke at minute 9:00									



SUBSURFACE LOG

Project No.	175569042	Location	N 555020.22, E 2442857.46 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-23	Total Depth 62.0 ft
Location	Kingston, Tennessee	Surface Elevation	764.7 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	5/11/09	Completed 5/12/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	8.0 ft	Date/Time 5/11/09
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core						
764.7'	0.0'	Top of Hole							
764.5'	0.2'	GRAVEL (Fill), light gray, dry, road material		SPT-1	0.0 - 1.5	0.5	19-17-10	14	
763.2'	1.5'			SPT-2	1.5 - 3.0	0.9	9-7-7	27	
		BOTTOM ASH (Fill), gray black, dry, dense		SPT-3	3.0 - 4.5	0.9	7-7-7	26	
				SPT-4	4.5 - 6.0	0.4	4-4-5	24	
		LEAN CLAY (Fill), red brown, dry, stiff, with chert		SPT-5	6.0 - 7.5	1.0	6-6-4	26	
				SPT-6	7.5 - 9.0	0.3	8-8-8	22	
				SPT-7	9.0 - 10.5	0.7	7-7-7	28	
				SPT-8	10.5 - 12.0	0.7	6-6-10	25	
				SPT-9	12.0 - 13.5	0.4	3-4-9	19	
				SPT-10	13.5 - 15.0	0.9	7-7-8	28	
				SPT-11	15.0 - 16.5	1.0	3-8-8	22	
				SPT-12	16.5 - 18.0	1.3	8-8-9	25	
				SPT-13	18.0 - 19.5	1.0	8-8-9	28	
				SPT-14	19.5 - 21.0	0.2	5-5-4	16	
				SPT-15	21.0 - 22.5	1.0	6-6-6	27	
741.7'	23.0'		BOTTOM ASH (Fill), black gray, saturated, dense, with fly ash		SPT-16	22.5 - 24.0	1.5	8-13-13	25
739.7'	25.0'			SPT-17	24.0 - 25.5	0.9	13-11-13	17	
		SAND (Fill), brown gray, saturated, dense, fine grained, well rounded, well graded, with trace silt		SPT-18	25.5 - 27.0	1.5	14-16-14	18	
737.2'	27.5'			SPT-19	27.0 - 28.5	1.5	9-9-6	20	
		BOTTOM ASH (Fill), black, saturated, medium dense, fine to coarse grained		SPT-20	28.5 - 30.0	1.5	2-4-4	24	
734.7'	30.0'			SPT-21	30.0 - 31.5	0.2	1-1-1	20	
733.2'	31.5'	SAND, gray brown, saturated, very loose, fine grained, with fly ash, silty		SPT-22	31.5 - 33.0	1.0	1-WOH-WOH	17	
				SPT-23	33.0 - 34.5	1.0	1-1-1	17	
		SAND, light brown, saturated, very loose, fine grained, well rounded, well graded, with trace silt		SPT-24	34.5 - 36.0	1.5	2-2-2	18	
728.7'	36.0'								

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
724.2'	40.5'	SAND, brown, saturated, very loose, fine grained, well rounded, well graded, with trace silt and gravelly (Continued)		SPT-25	36.0 - 37.5	1.5	1-1-1	17	
				SPT-26	37.5 - 39.0	1.5	WOR-WOR-WOR	20	
				SPT-27	39.0 - 40.5	1.5	3-2-2	23	
				SPT-28	40.5 - 42.0	1.5	WOR-WOR-2	26	
719.7'	45.0'	SILTY CLAY, brown gray, saturated, soft, mottled		SPT-29	42.0 - 43.5	1.0	3-3-4	25	
				ST-1	43.5 - 45.5	2.0		--	
				SPT-30	45.5 - 47.0	1.0	WOH-WOH-5	16	
716.2'	48.5'	SILTY SAND, brown gray, saturated, very loose, fine grained, well rounded		SPT-31	47.0 - 48.5	1.0	WOR-WOR-WOR	20	
				SPT-32	48.5 - 50.0	1.5	WOH-WOH-WOH	21	
713.2'	51.5'	SANDY SILT, gray, saturated, very soft		SPT-33	50.0 - 51.5	1.5	WOR-WOR-WOR	22	
				SPT-34	51.5 - 53.0	1.0	WOR-WOR-WOR	22	
703.7'	61.0'	SAND, gray, saturated, very loose to loose, fine grained, well rounded, well graded, with, trace silt		SPT-35	53.0 - 54.5	1.0	2-2-2	21	
				SPT-36	54.5 - 56.0	1.0	3-1-WOH	20	
				SPT-37	56.0 - 57.5	1.5	1-2-5	22	
				SPT-38	57.5 - 59.0	1.1	WOH-4-5	20	
				SPT-39	59.0 - 60.5	1.0	6-2-3	24	
				SPT-40	60.5 - 61.9	1.4	12-25-50/0.4	--	
703.2'	61.5'								
702.7'	62.0'								
		Sandstone, (augered)							
		Shale, (augered)							
		Auger Refusal / Bottom of Hole							

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Project No. <u>175569042</u>	Location <u>N 554803.45, E 2442843.16 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-24</u> Total Depth <u>64.2 ft</u>
Location <u>Kingston, Tennessee</u>	Surface Elevation <u>765.1 ft. (NGVD29)</u>
Project Type <u>Geotechnical Exploration</u>	Date Started <u>5/7/09</u> Completed <u>5/11/09</u>
Supervisor <u>Ben Halada</u> Driller <u>Sam Wilks</u>	Depth to Water <u>18.0 ft</u> Date/Time <u>5/7/09</u>
Logged By <u>Briggs Evans</u>	Automatic Hammer <input type="checkbox"/> Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.1'	0.0'	Top of Hole							
764.4'	0.8'	CRUSHED STONE (Fill)							
		LEAN CLAY (Fill), red, dry to moist, soft to very stiff, some chert, trace gravel		SPT-1	0.0 - 1.5	1.8	14-12-7	9	Boring advanced using 3 1/4" hollow stem augers
			SPT-2	1.5 - 3.0	0.8	9-8-4	20		
			SPT-3	3.0 - 4.5	0.5	9-9-10	21		
			SPT-4	4.5 - 6.0	1.0	5-6-7	28		
			SPT-5	6.0 - 7.5	1.4	15-15-15	22		
			SPT-6	7.5 - 9.0	1.1	6-5-4	28		
			SPT-7	9.0 - 10.5	0.8	8-9-11	23		
			SPT-8	10.5 - 12.0	0.8	5-7-9	24		
			SPT-9	12.0 - 13.5	1.5	11-11-9	26		
			SPT-10	13.5 - 15.0	1.0	3-4-6	24		
			SPT-11	15.0 - 16.5	1.3	7-9-10	30		
747.7'	17.4'		SPT-12	16.5 - 18.0	1.0	7-9-11	25		
		BOTTOM ASH (Fill), dark gray, wet to saturated, loose to dense, with fly ash		SPT-13	18.0 - 19.5	1.2	16-10-4	25	Wet at 18 ft bgs
			SPT-14	19.5 - 21.0	1.2	22-26-21	26		
			SPT-15	21.0 - 22.5	0.0	WOR-WOR-2	--	Begin adding water to control blowback	
			SPT-16	22.5 - 24.0	0.5	3-3-3	24		
			SPT-17	24.0 - 25.5	1.0	6-7-9	21		
			SPT-18	25.5 - 27.0	1.2	8-8-11	21		
738.1'	27.0'			SPT-19	27.0 - 28.5	1.5	10-12-14		
736.7'	28.4'	GRAVELLY BOTTOM ASH (Fill), dark gray, saturated, medium dense		SPT-20	28.5 - 30.0	1.0	4-4-7	20	
			SPT-21	30.0 - 31.5	0.5	1-1-2	19		
		SAND, brown, wet, loose to very loose, fine to medium grained, some silt		SPT-22	31.5 - 33.0	1.0	4-4-6	22	
			SPT-23	33.0 - 34.5	1.3	1-WOH-WOH	17		
730.6'	34.5'			SPT-24	34.5 - 36.0	1.5	WOH-WOH-WOH	20	
729.1'	36.0'	SANDY SILT, brown, saturated, very soft, with fine grained sand							

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		SILTY SAND, tan, wet to saturated, very loose to loose, fine to medium grained, well graded, little silt, homogeneous <i>(Continued)</i>		SPT-25	36.0 - 37.5	1.5	1-WOH-WOH	12	
			SPT-26	37.5 - 39.0	1.5	WOR-WOR	19		
			SPT-27	39.0 - 40.5	1.5	WOR-3-2	17		
			SPT-28	40.5 - 42.0	1.0	WOH-WOH-WOH	18		
			SPT-29	42.0 - 43.5	1.3	5-5-9	18		
			SPT-30	43.5 - 45.0	1.5	5-4-2	19		
			SPT-31	45.0 - 46.5	1.5	5-6-6	20		
			SPT-32	46.5 - 48.0	1.0	4-5-5	18		
			SPT-33	48.0 - 49.5	1.5	WOH-WOH-2	20		
			SPT-34	49.5 - 51.0	1.2	WOR-WOR	18		
			SPT-35	51.0 - 52.5	1.5	2-1-1	19		
			SPT-36	52.5 - 54.0	1.0	WOR-WOR	17		
			SPT-37	54.0 - 55.5	1.5	WOR-WOR	17		
			SPT-38	55.5 - 57.0	1.5	WOR-WOR	20		
			SPT-39	57.0 - 58.5	1.5	WOR-WOR	21		
			SPT-40	58.5 - 60.0	1.5	WOR-9-10	25		
			SPT-41	60.0 - 61.5	1.5	14-14-10	21		
701.6'	63.5'			SPT-42	61.5 - 63.0	1.5	3-3-4	20	
700.9'	64.2'			SPT-43	63.0 - 63.7	0.7	7-50/0.2	19	
		Sandstone, (Augered)							
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rod							

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SUBSURFACE LOG

Project No.	175569042	Location	N 554624.86, E 2442889.00 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-26	Total Depth	57.3 ft
Location	Kingston, Tennessee	Surface Elevation	750.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/23/09	Completed	3/23/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	6.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks		
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth			
750.0'	0.0'	Top of Hole									
748.0'	2.0'	LEAN CLAY (Fill), red brown to brown, moist, soft		SPT-1	0.0 - 1.5	1.2	2-3-4	24	Boring advanced using 3 1/4 " Hollow Stem Augers		
				SPT-2	1.5 - 3.0	1.3	45-15-20	16			
				SPT-3	3.0 - 4.5	1.2	30-31-20	19			
				SPT-4	4.5 - 6.0	1.1	10-12-10	21			
				SPT-5	6.0 - 7.5	1.0	10-9-6	18			
743.0'	7.0'	Bottom Ash 60% / Fly Ash 40% (Fill), dark gray, saturated, dense to very dense		SPT-6	7.5 - 9.0	0.8	3-3-4	22			
				ST-1	9.0 - 11.0	1.0		--			
				SPT-7	11.0 - 12.5	1.1	3-3-4	18			
				SPT-8	12.5 - 14.0	1.0	4-5-6	20			
				SPT-9	14.0 - 15.5	1.3	3-4-6	20			
				SPT-10	15.5 - 17.0	0.2	WOH- WOH-WOH	19			
				SPT-11	17.0 - 18.5	1.3	WOH- WOH-WOH	21			
				SPT-12	18.5 - 20.0	1.1	WOH- WOH-WOH	21			
			730.0'	20.0'	LEAN CLAY with Silt, dark gray, saturated, very soft		ST-2	20.0 - 22.0	2.0		--
							SPT-13	22.0 - 23.5	1.4	WOH- WOH-WOH	24
							SPT-14	23.5 - 25.0	0.2	WOR- WOH-WOH	23
							SPT-15	25.0 - 26.5	1.4	WOR- WOH-1	23
	SPT-16	26.5 - 28.0				1.1	1-1-1	22			
	SPT-17	28.0 - 29.5				1.4	WOH- WOH-2	22			
727.0'	23.0'	SILTY SAND with Clay, brown, saturated, very soft, some fine grained sand		SPT-18	29.5 - 31.0	1.1	WOH- WOH-WOH	24			
				SPT-19	31.0 - 32.5	1.3	WOH-2-2	25			
				SPT-20	32.5 - 34.0	1.0	WOH-1-2	25			
				SPT-21	34.0 - 35.5	1.2	WOH- WOH-WOH	18			
				SPT-22	35.5 - 37.0	1.2	WOH-	19			
716.0'	34.0'	SAND, gray, saturated, very loose, some silt									

FMSL_LEGACY: 171468117 KINGSTON ASH POND.GPJ FMSL.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554624.86, E 2442889.00 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-26	Total Depth 57.3 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
706.0'	44.0'	SAND, gray, saturated, very loose, some silt <i>(Continued)</i>		SPT-23	37.0 - 38.5	1.3	WOH-WOH WOH-1-1	20	
				SPT-24	38.5 - 40.0	1.1	WOH- WOH-1	19	
				SPT-25	40.0 - 41.5	1.1	WOR- WOH-WOH	20	
				SPT-26	41.5 - 43.0	1.1	WOR- WOH-1	21	
				SPT-27	43.0 - 44.5	1.3	2-2-6	21	
				SPT-28	44.5 - 46.0	1.4	3-2-3	27	
				SPT-29	46.0 - 47.5	1.0	3-4-5	26	
701.0'	49.0'	SAND, light gray, saturated, very loose to loose, fine grained, trace fine to medium grained gravel		SPT-30	47.5 - 49.0	1.4	3-3-4	33	SPT-30: wood fragments in sample
				SPT-31	49.0 - 50.5	1.1	3-4-4	19	
				SPT-32	50.5 - 52.0	1.5	5-6-7	23	
696.0'	54.0'	SAND, light gray, saturated, loose to medium dense, fine to coarse grained, some fine to medium gravel		SPT-33	52.0 - 53.5	1.1	6-12-8	15	SPT-34: shale in spoon
				SPT-34	53.5 - 55.0	1.1	14-15-15	12	Boring backfilled with bentonite cement grout from 0.0 ft to 57.3 ft
				SPT-35	55.0 - 55.9	0.9	23-50/0.4	12	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

P:\BIL LEGACY\1742817 KINGSTON ASH POND.GPJ F:\S\K\GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554604.66, E 2442904.17 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-26A	Total Depth	20.0 ft
Location	Kingston, Tennessee	Surface Elevation	750.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/16/09	Completed	4/16/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	N/A
Logged By	Ben Halada	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
750.0'	0.0'	Top of Hole							
		OVERBURDEN, See log for STN-26							Boring advanced using 3 1/4 " Hollow Stem Augers
730.0'	20.0'								

No Refusal /
Bottom of Hole

PZ Installed, tip at elevation 733'

Flushmount well cover and concrete pad installed.

FILED LEGACY - 17445817 KINGSTON ASH POND.GPJ F:\MSM.GDT 7/16/09

Project No.	175569042	Location	N 554601.77, E 2442850.67 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-27	Total Depth	67.5 ft
Location	Kingston, Tennessee	Surface Elevation	765.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/30/09	Completed	3/30/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	22.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
765.1'	0.0'	Top of Hole							
764.6'	0.5'	GRAVEL (Fill), gray, moist, loose		SPT-1	0.0 - 1.5	1.3	10-7-9	13	Boring advanced using 3 1/4" Hollow Stem Augers All ST samples recovered using a fixed head piston sampler
		LEAN CLAY (Fill), red brown, moist, medium stiff to stiff, some chert		SPT-2	1.5 - 3.0	1.1	6-7-12	22	
			SPT-3	3.0 - 4.5	1.1	13-11-17	24		
			ST-1	4.5 - 6.5	1.5	--	--		
			SPT-4	6.5 - 8.0	1.3	4-5-7	23		
			SPT-5	8.0 - 9.5	1.3	10-10-12	28		
			SPT-6	9.5 - 11.0	1.3	3-5-5	27		
			SPT-7	11.0 - 12.5	0.9	7-6-8	25		
			ST-2	12.5 - 14.5	1.5	--	--		
			SPT-8	14.5 - 16.0	1.2	2-5-5	29		
			SPT-9	16.0 - 17.5	1.3	6-7-9	23		
		SPT-10	17.5 - 19.0	1.0	1-2-3	29			
		ST-3	19.0 - 21.0	1.3	--	--			
743.1'	22.0'	Bottom Ash 60% / Fly Ash 40% (Fill), dark gray, saturated, loose		SPT-11	21.0 - 22.5	1.1	2-4-7	25	
			SPT-12	22.5 - 24.0	1.3	4-3-6	21		
			SPT-13	24.0 - 25.5	1.1	7-5-9	16		
			SPT-14	25.5 - 27.0	1.1	4-6-9	21		
737.1'	28.0'	SAND (Fill), brown, saturated, loose, fine to medium grained		SPT-15	27.0 - 28.5	1.1	7-9-9	20	
735.6'	29.5'		SPT-16	28.5 - 30.0	1.3	5-4-2	25		
733.1'	32.0'	SILT with clay (Fill), dark gray, saturated, soft, some fine grained sand		ST-4	30.0 - 32.0	1.0	--	--	ST-4: sand in bottom of tube
		Bottom Ash 70% / Fly Ash 30% (Fill), dark gray, saturated, very loose		SPT-17	32.0 - 33.5	1.2	WOH-2-3	20	
730.6'	34.5'		SPT-18	33.5 - 35.0	1.1	3-3-2	19		
730.1'	35.0'		SPT-19	35.0 - 36.5	1.4	1-1-1	25		
		SAND, brown, saturated, very loose, fine grained							

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
721.1'	44.0'	SILT, dark gray, saturated, very soft to soft, trace clay (Continued)		SPT-20	36.5 - 38.0	1.2	WOH-1-1	27	
				SPT-21	38.0 - 39.5	1.1	WOR-WOR-WOR	25	
				SPT-22	39.5 - 41.0	1.4	WOH-WOH-WOH	25	
				SPT-23	41.0 - 42.5	1.0	WOH-1-1	20	
				SPT-24	42.5 - 44.0	1.3	WOH-1-WOH	22	
718.1'	47.0'	SAND, light brown, saturated, very loose to loose, fine grained		ST-5	44.0 - 46.0	1.3		--	ST-5: sand in tube
				SPT-25	46.0 - 47.5	1.3	1-1-WOH	20	Water added at 45.0 ft to keep sand out of augers
706.1'	59.0'	SILT, gray, saturated, very soft, some fine grained sand		SPT-26	47.5 - 49.0	1.3	WOH-WOH-1	20	
				SPT-27	49.0 - 50.5	1.0	WOH-WOH-WOH	21	
				SPT-28	50.5 - 52.0	1.1	WOR-WOR-WOR	21	
				SPT-29	52.0 - 53.5	1.2	WOR-WOR-WOR	21	
				SPT-30	53.5 - 55.0	1.2	WOR-WOR-WOR	21	
				SPT-31	55.0 - 56.5	1.1	WOR-WOH-WOH	20	
				SPT-32	56.5 - 58.0	1.3	WOR-WOH-1	20	
				SPT-33	58.0 - 59.5	1.1	WOR-WOR-WOR	25	
			700.1'	65.0'	SAND, light gray, saturated, loose, fine grained, some fine to coarse gravel		SPT-34	59.5 - 61.0	
	SPT-35	61.0 - 62.5				1.3	3-2-5	26	
	SPT-36	62.5 - 64.0				1.1	WOR-2-5	38	
	SPT-37	64.0 - 65.5				1.0	WOH-6-26	25	
697.6'	67.5'	Shale, (Augered)		SPT-38	65.5 - 66.2	0.6	80-20/0.2	--	Boring backfilled with bentonite cement grout from 0.0 ft to 67.5 ft
Auger Refusal / Bottom of Hole									
WOH = Weight of Hammer WOR = Weight of Rods									

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SUBSURFACE LOG

Project No.	175569042	Location	N 554601.77, E 2442850.67 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-27	Total Depth 67.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
<p>Boring located 8 ft toward center of dike from river side of dike</p>									

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SUBSURFACE LOG

Project No.	175569042	Location	N 554600.64, E 2442840.21 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-27A	Total Depth	60.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/6/09	Completed	5/6/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Brad Smiley	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.0'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4" Hollow Stem Augers
		See Log for STN-27							Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
737.0'	28.0'			ST-1	26.0 - 28.0	1.4		--	
		FLY ASH, dark gray, saturated, dense		ST-2	28.0 - 30.0	2.0		--	
				ST-3	30.0 - 32.0	1.9		--	
				ST-4	32.0 - 34.0	2.0		--	
731.0'	34.0'			ST-5	34.0 - 36.0	2.0		--	
		CLAY, gray brown to tan, moist, medium stiff, some silty sand							

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 554600.64, E 2442840.21 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-27A</u> Total Depth <u>60.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
727.0'	38.0'	(Augered without sampling) See Log for STN-27							
705.0'	60.0'								

No Refusal /
Bottom of Hole

Two PZ's Installed, tip at elevation 752.2' and 708.2'
Flushmount well cover and concrete pad installed.

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SUBSURFACE LOG

Project No.	175569042	Location	N 554606.18, E 2442840.52 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-27B	Total Depth	36.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/6/09	Completed	5/6/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Brad Smiley	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.0'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling) See Log for STN-27							Boring advanced using 4 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
739.0'	26.0'								
		FLY ASH, gray to dark gray, saturated, loose, some silt		ST-1	26.0 - 28.0	1.6		--	
				ST-2	28.0 - 30.0	1.4		--	
733.0'	32.0'			ST-3	30.0 - 32.0	1.7		--	
		FAT CLAY, gray brown to brown, moist, medium stiff, some sand		ST-4	32.0 - 34.0	1.9		--	
729.0'	36.0'			ST-5	34.0 - 36.0	1.9		--	

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 554606.18, E 2442840.52 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-27B</u> Total Depth <u>36.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		No Refusal / Bottom of Hole							
		PZ Installed, tip at elevation 735.2'							
		Flushmount well cover and concrete pad installed.							

FINISH LEGACY 7/16/09 171428117 KINGSTON ASH POND.SP.J. FINISH.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554406.25, E 2442841.10 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-28	Total Depth 64.6 ft
Location	Kingston, Tennessee	Surface Elevation	764.8 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	5/5/09	Completed 5/7/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	20.5 ft	Date/Time 5/6/09
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.8'	0.0'	Top of Hole							
764.3'	0.5'	CRUSHED STONE (Fill)		SPT-1	0.0 - 1.5	1.0	25-12-10	19	Boring advanced using 3 1/4" hollow stem augers
		LEAN CLAY (Fill), red brown, dry to moist, soft to very stiff, some chert, trace gravel, medium plasticity		SPT-3	3.0 - 4.5	0.8	8-8-8	22	
			SPT-4	4.5 - 6.0	0.5	18-7-7	20		
			SPT-5	6.0 - 7.5	0.3	9-8-9	25		
			SPT-6	7.5 - 9.0	1.3	5-5-6	25		
			SPT-7	9.0 - 10.5	1.2	8-8-9	25		
			SPT-8	10.5 - 12.0	1.0	9-14-13	25		
			SPT-9	12.0 - 13.5	0.0	3-5-5	24		
			SPT-10	13.5 - 15.0	0.5	3-5-5	--		
			SPT-11	15.0 - 16.5	1.0	8-7-8	28		
747.1'	17.7'		SPT-12	16.5 - 18.0	1.5	5-16-30	27		
			BOTTOM ASH (Fill), dark gray to gray, moist to saturated, loose to very dense, with fly ash		SPT-13	18.0 - 19.0	0.8	35-50/0.4	
				SPT-14	19.5 - 21.0	1.2	26-18-18	23	
				SPT-15	21.0 - 22.5	1.0	6-8-4	20	
741.3'	23.5'			SPT-16	22.5 - 24.0	1.5	7-6-4	22	
		FLY ASH (Fill), gray to light gray, wet to saturated, loose to medium dense, some bottom ash, some silt		SPT-17	24.0 - 25.5	1.3	15-19-20	24	
				SPT-18	25.5 - 27.0	1.0	9-12-12	24	
				SPT-19	27.0 - 28.5	1.5	7-9-12	32	
				SPT-20	28.5 - 30.0	1.5	8-8-7	30	
				SPT-21	30.0 - 31.5	1.5	17-15-15	27	Very soft, saturated layer 30.3 to 31.0
731.8'	33.0'			SPT-22	31.5 - 33.0	1.5	3-3-3	25	
		LEAN CLAY, brown, wet to saturated, soft to very soft, with fine to medium grained sand, mottled		SPT-23	33.0 - 34.5	1.5	2-3-4	28	
				SPT-24	34.5 - 36.0	1.5	2-4-3	28	

ENR LEGACY 17-46817 KINGSTON ASH POND.GPJ ENR.M.GDT 7/16/09

Project No.	175569042	Location	N 554406.25, E 2442841.10 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-28	Total Depth 64.6 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
716.5'	48.3'	LEAN CLAY, brown, wet to saturated, soft to very soft, with fine to medium grained sand, mottled (Continued)		SPT-25	36.0 - 37.5	1.5	1-1-1	26	bottom ash and fly ash
				ST-1	37.5 - 39.5	2.0		--	
				SPT-26	39.5 - 41.0	1.5	3-2-3	26	
				SPT-27	41.0 - 42.5	1.5	3-2-3	26	
				SPT-28	42.5 - 44.0	1.5	2-1-1	31	
				SPT-29	44.0 - 45.5	1.5	3-3-3	26	
				ST-2	45.5 - 47.5	2.0		--	
711.3'	53.5'	SILTY SAND, gray to brown, wet to saturated, loose to very loose, fine to medium grained, well graded, some silt, some		SPT-30	47.5 - 49.0	1.5	3-2-2	25	
				SPT-31	49.0 - 50.5	0.5	2-1-1	19	
				SPT-32	50.5 - 52.0	1.5	WOR-WOR-WOR	25	
706.8'	58.0'	CLAYEY SAND, brown, saturated, very loose to loose, fine to medium grained		SPT-33	52.0 - 53.5	1.5	WOR-WOR-WOR	20	Wood fragments at 53.5
				SPT-34	53.5 - 55.0	0.5	1-WOH-WOH	19	
				SPT-35	55.0 - 56.5	1.5	WOH-WOH-WOH	23	
				SPT-36	56.5 - 58.0	1.5	3-2-3	22	
700.5'	64.3'	SAND, gray, saturated, loose, fine grained, trace silt		SPT-37	58.0 - 59.5	1.2	4-4-6	27	Wood 57 to 57.2
				SPT-38	59.5 - 61.0	1.5	4-6-7	27	Wood 59 to 59.2
				SPT-39	61.0 - 62.5	1.5	3-4-6	52	Wood 60.5 to 61.0
				SPT-40	62.5 - 64.0	1.5	2-3-4	25	Boring backfilled with bentonite grout from 0.0 ft to 64.6 ft
				SPT-41	64.0 - 64.3	0.3	50/0.3	25	

700.2' 64.6' Shale (Augered)
Auger Refusal / Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

FMSH_LEGACY: 17468117 KINGSTON ASH POND.GPJ PUSM.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554155.15, E 2442854.72 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-29	Total Depth 67.7 ft
Location	Kingston, Tennessee	Surface Elevation	764.7 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	5/4/09	Completed 5/12/09
Supervisor	Ben Halada	Driller	Sam Wilks	Depth to Water 27.0 ft
Logged By	Briggs Evans	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.7'	0.0'	Top of Hole							
761.7'	3.0'	CRUSHED STONE (Fill)		SPT-1	0.0 - 1.5	0.8	15-19-22	5	Boring advanced using 3 1/4" hollow stem augers Perched water at the gravel - clay interface
				SPT-2	1.5 - 3.0	0.8	22-25-12	12	
		LEAN CLAY (Fill), red brown, dry to moist, soft to very stiff, some chert, trace gravel, medium plasticity		SPT-3	3.0 - 4.5	1.0	12-9-5	22	
				ST-1	4.5 - 6.5	1.2	--	--	
				SPT-4	6.5 - 8.0	1.0	12-12-15	26	
				SPT-5	8.0 - 9.5	1.5	7-9-10	22	
				SPT-6	9.5 - 11.0	1.5	11-12-14	23	
				ST-2	11.0 - 13.0	1.0	--	--	
				SPT-7	13.0 - 14.5	1.3	5-8-9	30	
				SPT-8	14.5 - 16.0	1.3	5-7-8	24	
				SPT-9	16.0 - 17.5	1.2	9-12-13	27	
				ST-3	17.5 - 19.5	1.2	--	--	
741.7'	23.0'	BOTTOM ASH (Fill), dark gray, wet to saturated, loose to medium dense, with fly ash		SPT-10	19.5 - 21.0	1.2	1-3-4	29	Water at 20 ft
				SPT-11	21.0 - 22.5	1.0	1-3-4	28	
				SPT-12	22.5 - 24.0	1.3	2-3-1	27	
				ST-4	24.0 - 26.0	1.0	--	--	
				SPT-13	26.0 - 27.5	1.5	20-20-21	20	Begin adding water to control blowback Coal fragments at 27.5 ft
				SPT-14	27.5 - 29.0	1.5	8-7-8	33	
				SPT-15	29.0 - 30.5	1.5	10-10-11	25	
	SPT-16	30.5 - 32.0	1.0	12-14-16	35				
729.9'	34.8'			SPT-17	32.0 - 33.5	1.5	7-9-10	34	
				SPT-18	33.5 - 35.0	1.5	1-1-3	32	
				SPT-19	35.0 - 36.5	0.9	2-2-3	24	

FMSH_LEGACY 17468117.KINGSTON.ASH.POND.GPJ FMSH.GDT 7/16/09

Project No. <u>175569042</u>		Location <u>N 554155.15, E 2442854.72 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-29</u> Total Depth <u>67.7 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.7'	39.0'	SANDY SILT, brown, wet to saturated, soft to very soft, with fly ash, with bottom ash <i>(Continued)</i>		SPT-20	36.5 - 38.0	1.0	1-3-4	21	
				SPT-21	38.0 - 39.5	1.0	WOH-1-2	22	
717.7'	47.0'	SILT, dark gray, moist, very soft, with fine grained sand, some wood		SPT-22	39.5 - 41.0	1.0	3-3-3	25	
				SPT-23	41.0 - 42.5	1.5	WOR- WOR-WOR	26	
				SPT-24	42.5 - 44.0	1.2	WOH- WOH-WOH	26	
				ST-5	44.0 - 46.0	1.5		--	
				SPT-25	46.0 - 47.5	0.5	WOR- WOR-WOR	24	
				SPT-26	47.5 - 49.0	1.5	10-9-7	21	
				SPT-27	49.0 - 50.5	1.5	7-9-11	22	
702.9'	61.8'	LEAN CLAY, brown to gray, moist, very soft, with manganese, mottled		SPT-28	50.5 - 52.0	1.0	7-6-6	27	
				ST-6	52.0 - 54.0	1.0		--	
				SPT-29	54.0 - 55.5	1.3	3-3-4	24	
				SPT-30	55.5 - 57.0	1.5	WOR- WOR-WOR	25	
				SPT-31	57.0 - 58.5	1.5	WOR-2-3	26	
				SPT-32	58.5 - 60.0	1.5	WOR-3-4	32	
				ST-7	60.0 - 62.0	2.0		--	
				SPT-33	62.0 - 63.5	1.3	7-7-7	54	Wood 63.1 to 63.4 ft
697.2'	67.5'	SAND, gray, wet, loose to medium dense, fine to medium grained, well graded, some silt, some wood		SPT-34	63.5 - 65.0	1.4	9-9-7	26	Boring backfilled with bentonite grout from 0.0 ft to 67.7 ft
				SPT-35	65.0 - 66.5	1.0	11-12-14	18	
				SPT-36	66.5 - 67.7	1.2	10-14- 50/0-2	18	
697.0'	67.7'	Shale, (augered)							
		Auger Refusal / Bottom of Hole							

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553954.94, E 2442758.22 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-31	Total Depth	54.0 ft
Location	Kingston, Tennessee	Surface Elevation	749.5 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/24/09	Completed	3/25/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	8.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core						
749.5'	0.0'	Top of Hole							
		Overburden (Fill), consisted of gravel, clay, sand and ash		SPT-1	0.0 - 1.5	1.1	5-12-16	18	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.3	15-10-23	15	
746.5'	3.0'								
746.0'	3.5'	Overburden (Fill), Auger advancement difficult - possible concrete slab		SPT-3	3.5 - 5.0	0.8	11-12-6	8	
				SPT-4	5.0 - 6.5	0.0	5-3-4	--	
		GRAVEL (Fill), gray, moist, medium dense		SPT-5	6.5 - 8.0	0.1	6-17-14	2	
				SPT-6	8.0 - 9.5	0.1	6-3-3	18	
739.5'	10.0'			SPT-7	9.5 - 11.0	0.5	3-1-4	39	
		FAT CLAY (Fill), light brown and red brown, moist, very soft, some fine to coarse gravel		SPT-8	11.0 - 12.5	1.3	2-1-3	43	
				ST-1	12.5 - 14.5	1.3		--	
				SPT-9	14.5 - 16.0	0.3	1-1-3	22	
				SPT-10	16.0 - 17.5	0.8	1-2-2	39	
				SPT-11	17.5 - 19.0	1.1	1-2-3	31	
				SPT-12	19.0 - 20.5	1.4	1-1-2	38	
				ST-2	20.5 - 22.5	1.0		--	
				SPT-13	22.5 - 24.0	1.2	WOH-1-1	37	
724.5'	25.0'			SPT-14	24.0 - 25.5	1.5	1-1-2	29	
		SILT, gray and brown, saturated, very soft, some clay, some fine grained sand		SPT-15	25.5 - 27.0	1.3	WOR-WOH-1	25	
				SPT-16	27.0 - 28.5	1.3	WOH-WOH	23	
				SPT-17	28.5 - 30.0	1.1	WOH-WOH	28	
				SPT-18	30.0 - 31.5	1.3	WOH-WOH	26	
717.5'	32.0'			SPT-19	31.5 - 33.0	1.1	1-2-4	23	
		LEAN CLAY, light brown, saturated, soft to medium stiff, some fine grained sand		ST-3	33.0 - 35.0	2.0		--	
				SPT-20	35.0 - 36.5	1.3	2-2-7	22	

FMSM_LEGACY 17448117 KINGSTON ASH POND.GPJ FMSM.GDT 7/16/09

Project No. <u>175569042</u>	Location <u>N 553954.94, E 2442758.22 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-31</u> Total Depth <u>54.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
707.0'	42.5'	LEAN CLAY, light brown, saturated, soft to medium stiff, some fine grained sand <i>(Continued)</i>		SPT-21	36.5 - 38.0	1.2	3-3-5	23	
				ST-4	38.0 - 40.0	2.0		--	
				SPT-22	40.0 - 41.5	1.3	4-4-4	25	
				SPT-23	41.5 - 43.0	1.2	1-1-3	29	
697.0'	52.5'	SILT, dark gray, saturated, soft, some clay		SPT-24	43.0 - 44.5	1.3	WOH- WOH-WOH	27	
				SPT-25	44.5 - 46.0	1.1	1-3-2	28	
				SPT-26	46.0 - 47.5	1.2	4-3-3	33	
				SPT-27	47.5 - 49.0	1.1	3-3-4	38	
				SPT-28	49.0 - 50.5	1.3	2-2-2	36	SPT-29: sand/gravel in tip of spoon
				SPT-29	50.5 - 52.0	1.0	WOH-2-2	31	Boring backfilled with bentonite cement grout from 0.0 ft to 54.0 ft
				SPT-30	52.0 - 53.2	1.1	5-13-50	16	
696.5'	53.0'	SAND, light brown, saturated, dense, medium to coarse grained, some fine to medium gravel							
695.5'	54.0'								

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

FILE# LEGACY 1748817 KINGSTON ASH POND.GPJ F:\SM.GDT 7/16/08

Project No. <u>175569042</u>		Location <u>N 553994.90, E 2442746.44 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-32</u> Total Depth <u>69.0 ft</u>	
Location <u>Kingston, Tennessee</u>		Surface Elevation <u>764.8 ft. (NGVD29)</u>	
Project Type <u>Geotechnical Exploration</u>		Date Started <u>4/1/09</u> Completed <u>4/1/09</u>	
Supervisor <u>Ben Halada</u> Driller <u>Kent Clements</u>		Depth to Water <u>20.0 ft</u> Date/Time <u>4/1/09</u>	
Logged By <u>Ben Halada</u>		Automatic Hammer <input checked="" type="checkbox"/> Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
764.8'	0.0'	Top of Hole							
763.3'	1.5'	GRAVEL (Fill), gray, moist, dense		SPT-1	0.0 - 1.5	1.2	18-24-30	4	Boring advanced using 3 1/4 " Hollow Stem Augers All ST samples recovered using a fixed head piston sampler
		LEAN CLAY (Fill), red brown, moist, soft to medium stiff, chert		SPT-2	1.5 - 3.0	1.0	3-5-7	23	
			SPT-3	3.0 - 4.5	1.2	8-10-10	27		
			ST-1	4.5 - 6.5	1.5	--	--		
			SPT-4	6.5 - 8.0	0.1	3-4-3	18		
			SPT-5	8.0 - 9.5	1.2	4-6-8	21		
			SPT-6	9.5 - 11.0	1.1	4-6-7	25		
			SPT-7	11.0 - 12.5	1.3	9-10-12	29		
			SPT-8	12.5 - 14.0	1.0	8-10-11	31		
			ST-2	14.0 - 16.0	1.5	--	--		
746.8'	18.0'			SPT-9	16.0 - 17.5	1.2	7-7-6	34	
		FAT CLAY (Fill), dark red brown, moist, soft, some clay		SPT-10	17.5 - 19.0	1.2	4-3-5	24	
			SPT-11	19.0 - 20.5	1.0	2-2-2	29	SPT-12: ash in tip of spoon	
			SPT-12	20.5 - 22.0	1.1	2-1-2	29		
742.3'	22.5'			SPT-13	22.0 - 23.5	0.8	8-13-10	14	
		Bottom Ash 55% / Fly Ash 45% (Fill), black, saturated, very loose to loose		SPT-14	23.5 - 25.0	0.8	6-4-4	21	
			SPT-15	25.0 - 26.5	0.8	3-2-2	24	SPT-16: gravel in tip of spoon	
737.8'	27.0'				SPT-16	26.5 - 28.0	1.0		2-5-4
		FAT CLAY (Fill), brown, saturated, very soft to soft		SPT-17	28.0 - 29.5	0.2	WOH-WOH-2	28	
			SPT-18	29.5 - 31.0	0.1	5-5-5	18		
			SPT-19	31.0 - 32.5	0.1	5-4-3	24	SPT-19: rock and wood in tip of spoon	
			SPT-20	32.5 - 34.0	0.2	5-3-4	44		
			SPT-21	34.0 - 35.5	0.0	4-1-2	--		
			SPT-22	35.5 - 37.0	0.0	3-1-1	--		

FHSH LEGACY: 17148817.KINGSTON.ASH.POND.GPJ FMSM.GDT 7/16/09

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
723.8'	41.0'	FAT CLAY (Fill), brown, saturated, very soft to soft <i>(Continued)</i>		SPT-23	37.0 - 38.5	0.2	2-1-1	38	
				SPT-24	38.5 - 40.0	1.0	WOR-WOR-1	34	
				SPT-25	40.0 - 41.5	1.0	1-2-1	38	
721.8'	43.0'	SILT, dark gray, saturated, very soft, trace clay, trace fine grained sand		SPT-26	41.5 - 43.0	1.5	WOR-2-2	25	
				SPT-27	43.0 - 44.5	1.2	WOR-WOR-WOR	27	
717.3'	47.5'	SILT, light brown, saturated, very soft, some clay		SPT-28	44.5 - 46.0	1.2	WOH-WOH-WOH	30	
				SPT-29	46.0 - 47.5	1.1	2-2-2	25	
				SPT-30	47.5 - 49.0	1.3	2-1-1	25	
708.8'	56.0'	LEAN CLAY, gray, saturated, very soft to medium stiff, trace fine grained sand, trace silt		ST-3	49.0 - 51.0	2.0		--	
				SPT-31	51.0 - 52.5	1.2	1-2-2	20	
				SPT-32	52.5 - 54.0	1.3	5-4-5	22	
				SPT-33	54.0 - 55.5	1.2	7-7-8	23	
				SPT-34	55.5 - 57.0	1.2	4-4-5	26	
				SPT-35	57.0 - 58.5	1.1	WOR-1-1	26	
703.3'	61.5'	SILT, gray, saturated, very soft to soft, some clay		SPT-36	58.5 - 60.0	1.5	WOH-WOH-WOH	29	
				SPT-37	60.0 - 61.5	1.2	2-2-2	29	
				SPT-38	61.5 - 63.0	1.1	4-2-1	33	
696.8'	68.0'	SILT, dark gray, saturated, soft, trace clay, some fine grained sand		SPT-39	63.0 - 64.5	1.2	4-4-4	43	Sand lenses at 61.5 ft to bottom. Very thin, < 0.05 ft
				SPT-40	64.5 - 66.0	1.5	2-2-3	34	
				SPT-41	66.0 - 67.5	1.1	4-5-6	40	
				SPT-42	67.5 - 68.5	1.0	30-50/0.5	18	
696.3'	68.5'	SAND, dark gray, saturated, medium dense, fine to coarse grained, some fine to medium gravel						Boring backfilled with bentonite cement grout from 0.0 ft to 69.0 ft	
695.8'	69.0'								
		Shale, (Augered)							
		Auger Refusal / Bottom of Hole							

WOH = Weight of Hammer



SUBSURFACE LOG

Project No.	175569042	Location	N 553994.90, E 2442746.44 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-32	Total Depth 69.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
<p>WOR = Weight of Rods</p>									

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Project No.	175569042	Location	N 553853.66, E 2442184.35 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-34	Total Depth	76.0 ft
Location	Kingston, Tennessee	Surface Elevation	764.7 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/20/09	Completed	5/21/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	21.0 ft
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.7'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-1	0.0 - 1.5	0.8	2-2-2	24	Boring advanced using 4 1/4" Hollow Stem Augers
			SPT-2	1.5 - 3.0	0.8	2-3-4	27		
			SPT-3	3.0 - 4.5	0.9	3-4-4	27		
			SPT-4	4.5 - 6.0	0.9	2-2-2	32		
			SPT-5	6.0 - 7.5	1.0	2-4-5	27		
			SPT-6	7.5 - 9.0	1.2	5-4-6	29		
			SPT-7	9.0 - 10.5	1.1	5-6-5	27		
			SPT-8	10.5 - 12.0	1.4	4-6-6	27		
			SPT-9	12.0 - 13.5	1.5	6-10-10	30		
			SPT-10	13.5 - 15.0	1.3	7-8-8	25		
			SPT-11	15.0 - 16.5	1.3	3-5-4	29		
			SPT-12	16.5 - 18.0	1.2	4-5-4	33		
745.2'	19.5'			SPT-13	18.0 - 19.3	0.7	5-10-50/0.3	3	
		BOTTOM ASH (Fill), black, saturated, medium dense		SPT-14	19.5 - 21.0	0.9	3-5-2	21	Water added at 20.0 ft to keep sand out of augers
			SPT-15	21.0 - 22.5	0.8	3-7-7	19		
			SPT-16	22.5 - 24.0	0.9	7-8-8	13		
			SPT-17	24.0 - 25.5	1.3	4-4-4	21		
739.2'	25.5'			SPT-18	25.5 - 27.0	0.9	3-3-3	21	
737.7'	27.0'	FLY ASH (Fill), black, saturated, loose		SPT-19	27.0 - 28.5	0.4	3-8-19	7	
		SAND (Fill), dark gray, moist, medium dense, fine to medium grained, some silty clay		SPT-20	28.5 - 30.0	0.5	3-7-5	24	
			ST-1	30.0 - 32.0	0.0	--	--		
732.7'	32.0'			SPT-21	32.0 - 33.5	1.2	31-16-6	12	
		BOTTOM ASH (Fill), dark gray, saturated, medium dense to dense		SPT-22	33.5 - 35.0	1.0	7-16-10	17	
			SPT-23	35.0 - 36.5	0.4	13-16-11	11		

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Project No. <u>175569042</u>		Location <u>N 553853.66, E 2442184.35 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-34</u> Total Depth <u>76.0 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.2'	39.5'	BOTTOM ASH (Fill), dark gray, saturated, medium dense to dense <i>(Continued)</i>		SPT-24	36.5 - 38.0	0.9	13-10-11	14	
				SPT-25	38.0 - 39.5	0.9	4-6-5	19	
719.2'	45.5'	LEAN CLAY, gray to brown, moist, soft, some clay, trace fine grained sand		SPT-26	39.5 - 41.0	0.7	4-2-2	22	
				SPT-27	41.0 - 42.5	0.0	2-2-4	--	
				SPT-28	42.5 - 44.0	0.7	2-4-4	22	
				SPT-29	44.0 - 45.5	1.5	4-6-7	25	
714.7'	50.0'	SAND, light brown, saturated, loose to medium dense, fine grained, some clay		SPT-30	45.5 - 47.0	0.4	1-2-4	30	
				SPT-31	47.0 - 48.5	1.4	6-6-6	24	
				SPT-32	48.5 - 50.0	1.1	4-6-6	26	
701.2'	63.5'	SAND, gray to dark gray, saturated, loose to medium dense, medium to coarse grained, some clay		SPT-33	50.0 - 51.5	1.5	WOR- WOR-WOR	19	
				SPT-34	51.5 - 53.0	0.8	1-1-3	22	
				SPT-35	53.0 - 54.5	1.3	2-3-3	19	
				SPT-36	54.5 - 56.0	0.9	2-2-2	21	
				SPT-37	56.0 - 57.5	1.2	3-3-7	20	
				SPT-38	57.5 - 59.0	1.4	3-3-3	21	
				SPT-39	59.0 - 60.5	1.2	4-3-4	24	
				SPT-40	60.5 - 62.0	1.3	4-5-11	25	
699.7'	65.0'	SAND, dark gray, saturated, dense, medium grained, some coarse gravel		SPT-41	62.0 - 63.5	1.2	7-7-8	21	
		Shale (Augered)		SPT-42	63.5 - 65.0	1.3	7-19-31	21	
				SPT-43	65.0 - 66.2	1.1	17-42- 41/0.2	--	
688.7'	76.0'	Auger Refusal / Bottom of Hole							

Boring backfilled with bentonite cement grout from 0.0 ft to 76.0 ft

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SUBSURFACE LOG

Project No.	175569042	Location	N 553853.66, E 2442184.35 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-34	Total Depth 76.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
<p>WOH = Weight of Hammer WOR = Weight of Rods</p> <p>Slope Indicator (79 ft of pipe) installed with a concrete pad and protective cover</p>									

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SUBSURFACE LOG

Project No.	175569042	Location	N 553776.74, E 2442198.78 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-36	Total Depth	44.0 ft
Location	Kingston, Tennessee	Surface Elevation	751.9 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/24/09	Completed	3/24/09
Supervisor	Ben Halada Driller Kent Clements	Depth to Water	5.0 ft	Date/Time	3/24/09
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
751.9'	0.0'	Top of Hole							
750.9'	1.0'	LEAN CLAY (Fill), red brown, moist, stiff		SPT-1	0.0 - 1.5	1.3	5-7-18	20	Boring advanced using 3 1/4 " Hollow Stem Augers
750.7'	1.2'	BOTTOM ASH (Fill), dark gray, moist, medium dense		SPT-2	1.5 - 3.0	1.3	22-14-12	11	
		LEAN CLAY (Fill), light brown to gray, moist, medium stiff to stiff, some coarse gravel		SPT-3	3.0 - 4.5	1.0	9-10-12	15	
				SPT-4	4.5 - 6.0	0.4	3-4-4	17	
				SPT-5	6.0 - 7.5	0.5	10-7-8	15	
				SPT-6	7.5 - 9.0	0.0	6-6-12	--	
742.4'	9.5'			SPT-7	9.0 - 10.5	1.3	12-8-15	10	
741.9'	10.0'	GRAVEL (Fill), gray, moist, medium dense		SPT-8	10.5 - 12.0	1.0	8-28-17	12	
		LEAN CLAY (Fill), light brown, moist, medium stiff, some shale		SPT-9	12.0 - 13.5	0.0	12-8-8	--	
738.4'	13.5'			SPT-10	13.5 - 15.0	0.0	21-35-10	--	
		GRAVEL (Fill), gray, moist, medium dense, boulders		SPT-11	15.0 - 16.5	0.6	2-2-3	10	
				SPT-12	16.5 - 18.0	0.8	5-3-2	22	
		SILTY CLAY, dark gray, saturated, very soft to soft		SPT-13	18.0 - 19.5	1.1	3-2-1	27	
				SPT-14	19.5 - 21.0	1.3	1-1-1	24	
730.4'	21.5'			SPT-15	21.0 - 22.5	1.2	1-2-2	25	
		LEAN CLAY, light brown, moist, soft to medium stiff, some fine grained sand		ST-1	22.5 - 24.5	2.0		--	
				SPT-16	24.5 - 26.0	1.5	3-5-6	24	
				SPT-17	26.0 - 27.5	1.5	4-6-7	19	
				SPT-18	27.5 - 29.0	1.1	4-6-8	21	
				ST-2	29.0 - 31.0	2.0		--	ST-2: sand in bottom of tube
721.4'	30.5'	SAND, brown, saturated, very loose, fine to medium grained		SPT-19	31.0 - 32.5	1.3	1-1-2	23	
				SPT-20	32.5 - 34.0	1.3	3-13-21	15	
718.9'	33.0'			SPT-21	34.0 - 35.5	1.3	13-28-28	11	
		SAND, brown, saturated, loose to medium dense, fine to medium grained, some fine to coarse gravel		SPT-22	35.5 - 37.0	0.5	8-7-5	20	

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 553776.74, E 2442198.78 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-36</u> Total Depth <u>44.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
712.4'	39.5'	Shale, (Augered)		SPT-23	37.0 - 38.5	1.1	7-8-11	14	Boring backfilled with bentonite cement grout from 0.0 ft to 44.0 ft
				SPT-24	38.5 - 40.0	1.4	7-13-13	32	
	SPT-25		40.0 - 41.5	1.3	6-29-31	17			
	SPT-26		41.5 - 43.0	0.8	27-31-36	18			
707.9'	44.0'								

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553766.08, E 2442199.97 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-36A	Total Depth	15.0 ft
Location	Kingston, Tennessee	Surface Elevation	751.9 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/30/09	Completed	4/30/09
Supervisor	Ben Halada	Driller	Sam Wilks	Depth to Water	N/A
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
751.9'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 3 1/4 " Hollow Stem Augers
736.9'	15.0'								

No Refusal /
Bottom of Hole

PZ Installed, tip at elevation 738.4'

Protective well cover and concrete pad installed.

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SUBSURFACE LOG

Project No.	175569042	Location	N 553799.90, E 2442184.40 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-37	Total Depth	54.2 ft
Location	Kingston, Tennessee	Surface Elevation	763.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/25/09	Completed	3/26/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	8.5 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.8'	0.0'	Top of Hole							
762.8'	1.0'	GRAVEL (Fill), gray, moist, dense		SPT-1	0.0 - 1.5	1.0	15-6-7	5	Boring advanced using 3 1/4 " Hollow Stem Augers
		LEAN CLAY (Fill), red brown, moist, soft to stiff, some chert, some ash		SPT-2	1.5 - 3.0	1.3	6-7-9	23	
			SPT-3	3.0 - 4.5	1.3	11-11-11	24		
			SPT-4	4.5 - 6.0	1.1	8-4-5	22		
			SPT-5	6.0 - 7.5	0.9	8-6-10	28		
			SPT-6	7.5 - 9.0	1.1	5-7-9	22		
754.8'	9.0'	FAT CLAY (Fill), red brown, moist, soft to stiff, some chert		SPT-7	9.0 - 10.5	1.0	4-6-6	27	
			SPT-8	10.5 - 12.0	1.1	2-2-3	33		
			SPT-9	12.0 - 13.5	1.3	4-5-7	27		
			ST-1	13.5 - 15.5	2.0	--	--		
			SPT-10	15.5 - 17.0	1.2	3-3-3	24		
			SPT-11	17.0 - 18.5	1.1	1-3-7	28		
			SPT-12	18.5 - 20.0	1.0	2-3-3	23		
			ST-2	20.0 - 22.0	1.7	--	--		
			SPT-13	22.0 - 23.5	1.3	2-2-3	22		
			SPT-14	23.5 - 25.0	1.0	3-3-4	20		
738.8'	25.0'	CLAYEY GRAVEL (Fill), gray, moist, medium dense, some shale		SPT-15	25.0 - 26.5	0.2	9-11-12	16	
			SPT-16	26.5 - 28.0	0.2	4-10-11	19		
735.8'	28.0'	LEAN CLAY, light brown, saturated, very soft to soft		SPT-17	28.0 - 29.5	0.3	4-2-1	25	
			SPT-18	29.5 - 31.0	1.3	1-1-2	26		
			SPT-19	31.0 - 32.5	1.2	1-3-5	23		
			ST-3	32.5 - 34.5	1.0	--	--		
			SPT-20	34.5 - 36.0	1.2	WOH-2-3	21		
729.3'	34.5'								

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SUBSURFACE LOG

Project No.	175569042	Location	N 553799.90, E 2442184.40 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-37	Total Depth 54.2 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
717.3'	46.5'	SAND, light brown, saturated, loose to medium dense, fine to medium grained, some silty clay <i>(Continued)</i>		SPT-21	36.0 - 37.5	1.1	2-3-4	21	
				SPT-22	37.5 - 39.0	1.1	6-8-8	22	
				SPT-23	39.0 - 40.5	1.3	5-4-4	18	
				SPT-24	40.5 - 42.0	1.0	WOH-3-4	24	
				SPT-25	42.0 - 43.5	1.4	5-15-18	22	
				SPT-26	43.5 - 45.0	1.1	10-14-18	20	
				SPT-27	45.0 - 46.5	1.0	1-5-15	17	
709.6'	54.2'	Shale, (Augered)		SPT-28	46.5 - 48.0	1.1	5-20-20	16	Water added at 44.0 ft to keep sand out of augers
				SPT-29	48.0 - 49.5	1.1	10-30-33	14	
				SPT-30	49.5 - 51.0	1.1	17-34-32	21	
				SPT-31	51.0 - 52.0	1.0	37-50/0.5	16	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	<u>175569042</u>	Location	<u>N 553799.38, E 2442182.40 (NAD27)</u>		
Project Name	<u>Kingston Ash Pond</u>	Boring No.	<u>STN-37A</u>	Total Depth	<u>29.0 ft</u>
Location	<u>Kingston, Tennessee</u>	Surface Elevation	<u>763.8 ft. (NGVD29)</u>		
Project Type	<u>Geotechnical Exploration</u>	Date Started	<u>4/22/09</u>	Completed	<u>4/22/09</u>
Supervisor	<u>Ben Halada</u>	Driller	<u>Steve Bradford</u>	Depth to Water	<u>N/A</u>
Logged By	<u>Adam Smith</u>	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.8'	0.0'	Top of Hole							
		OVERBURDEN, See log for STN-37							Boring advanced using 3 1/4" Hollow Stem Augers
734.8'	29.0'								

No Refusal /
Bottom of Hole

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Project No. <u>175569042</u>	Location <u>N 553799.38, E 2442182.40 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-37A</u> Total Depth <u>29.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
<p>Two PZ's Installed, tip at elevation 753.1' and 738.1'</p> <p>Flushmount well cover and concrete pad installed.</p>									

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 553800.49, E 2442186.20 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-37B</u> Total Depth <u>52.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
711.7'	52.0'	OVERBURDEN, See log for STN-37 (Continued)							

No Refusal /
Bottom of Hole

PZ Installed, tip at elevation 715'
Flushmount well cover and concrete pad installed.

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SUBSURFACE LOG

Project No.	175569042	Location	N 553798.81, E 2442171.01 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-37C	Total Depth	33.5 ft
Location	Kingston, Tennessee	Surface Elevation	763.6 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/30/09	Completed	4/30/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Adam Smith	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.6'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
740.8'	22.8'								
		FAT CLAY, red to dark brown, moist, stiff, with chert		ST-1	22.8 - 24.8	1.8		--	Chert boulder present at 25.3' ST-2: tube crushed, no recovery Gravelly zone from 25.3' to 29.5'. Attempted to clear gravelly zone to 27.5' ST-3: tube crushed, no recovery Boring backfilled with bentonite cement grout from 0.0 ft to 33.5 ft
736.8'	26.8'			ST-2	24.8 - 26.8	0.0		--	
736.1'	27.5'	(Auger without sample)						--	
734.1'	29.5'	GRAVELLY FAT CLAY, dark gray, moist, very stiff, cobbles greater than 3"		ST-3	27.5 - 29.5	0.0		--	
		LEAN CLAY with sand, light brown to tan, moist, soft		ST-4	29.5 - 31.5	1.5		--	
730.1'	33.5'			ST-5	31.5 - 33.5	1.7		--	

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No Refusal /
Bottom of Hole



SUBSURFACE LOG

Project No.	175569042	Location	N 553798.26, E 2442168.95 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-37D	Total Depth	33.0 ft
Location	Kingston, Tennessee	Surface Elevation	763.6 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/30/09	Completed	5/1/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Adam Smith	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
763.6'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 4 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
740.9'	22.7'								
		FAT CLAY, dark brown to red, moist, stiff		ST-1	22.7 - 24.7	2.0		--	ST-2: tube crushed, no recovery Gravelly zone from 25.5' to 31.0' ST-3: cobbles, no recovery Boring backfilled with bentonite cement grout from 0.0 ft to 33.0 ft
738.1'	25.5'			ST-2	24.7 - 25.5	0.8		--	
		LEAN CLAY with gravel, dark gray, moist, stiff, some cobbles		ST-3	28.0 - 28.4	0.0		--	
732.6'	31.0'			ST-4	31.0 - 33.0	2.0		--	
730.6'	33.0'	LEAN CLAY with sand, light brown, wet, soft							

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No Refusal /
Bottom of Hole



SUBSURFACE LOG

Project No.	175569042	Location	N 553730.83, E 2441988.70 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-38	Total Depth	51.3 ft
Location	Kingston, Tennessee	Surface Elevation	764.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/21/09	Completed	5/22/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	30.0 ft
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
764.1'	0.0'	Top of Hole							
763.4'	0.7'	GRAVEL (Fill)							
		LEAN CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-1	0.0 - 1.5	1.2	8-6-6	15	Boring advanced using 4 1/4" Hollow Stem Augers
			SPT-2	1.5 - 3.0	1.4	6-8-12	20		
			SPT-3	3.0 - 4.5	1.2	12-12-10	18		
			SPT-4	4.5 - 6.0	0.5	6-4-5	30		
			SPT-5	6.0 - 7.5	1.0	6-7-9	23		
			SPT-6	7.5 - 9.0	1.0	9-10-11	22		
			SPT-7	9.0 - 10.5	0.9	9-11-11	26		
			SPT-8	10.5 - 12.0	0.9	3-3-9	21		
			SPT-9	12.0 - 13.5	0.0	9-10-13	--		
			SPT-10	13.5 - 15.0	0.1	13-16-14	26		
			SPT-11	15.0 - 16.5	1.2	2-3-3	31		
			SPT-12	16.5 - 18.0	1.1	3-4-4	23		
			SPT-13	18.0 - 19.5	1.5	3-4-4	33		
			SPT-14	19.5 - 21.0	1.5	2-3-4	32		
			SPT-15	21.0 - 22.5	1.5	3-4-5	35		
			SPT-16	22.5 - 24.0	1.5	4-5-6	28		
			SPT-17	24.0 - 25.5	0.9	3-4-3	26		
			SPT-18	25.5 - 27.0	0.8	1-1-4	24		
735.6'	28.5'			SPT-19	27.0 - 28.5	1.4	2-3-4	23	
		FAT CLAY, light brown, moist, medium stiff, some fly ash	SPT-20	28.5 - 30.0	1.1	3-4-4	26		
			SPT-21	30.0 - 31.5	1.5	4-5-7	26		
			SPT-22	31.5 - 33.0	1.5	6-7-9	25		
731.1'	33.0'	SILTY SAND, light brown, saturated, loose to medium dense, fine to medium grained, some clay	SPT-23	33.0 - 34.5	1.5	7-9-7	20		
			SPT-24	34.5 - 36.0	1.2	1-2-4	20		

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Project No. <u>175569042</u>	Location <u>N 553730.83, E 2441988.70 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-38</u> Total Depth <u>51.3 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
717.6'	46.5'	SILTY SAND, light brown, saturated, loose to medium dense, fine to medium grained, some clay <i>(Continued)</i>		SPT-25	36.0 - 37.5	1.3	4-5-4	23	Boring backfilled with bentonite cement grout from 0.0 ft to 51.3 ft
				SPT-26	37.5 - 39.0	1.5	1-1-2	21	
				SPT-27	39.0 - 40.5	1.2	4-6-4	22	
				SPT-28	40.5 - 42.0	0.9	WOH- WOH-1	23	
				SPT-29	42.0 - 43.5	1.0	WOR-2-4	22	
				SPT-30	43.5 - 45.0	1.0	WOR-2-4	23	
				SPT-31	45.0 - 46.5	1.2	3-5-5	20	
715.1'	49.0'	SAND, light gray, saturated, dense, fine to medium grained, trace gravel		SPT-32	46.5 - 48.0	1.2	5-7-11	20	
				SPT-33	48.0 - 49.5	1.0	21-22-12	18	
712.8'	51.3'	Shale (Augered)		SPT-34	49.5 - 51.0	1.3	8-9-8	--	
				SPT-35	51.0 - 51.3	0.3	50/0.3	--	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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Project No. <u>175569042</u>	Location <u>N 553583.10, E 2441510.71 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-41</u> Total Depth <u>63.0 ft</u>
Location <u>Kingston, Tennessee</u>	Surface Elevation <u>752.7 ft. (NGVD29)</u>
Project Type <u>Geotechnical Exploration</u>	Date Started <u>4/21/09</u> Completed <u>4/21/09</u>
Supervisor <u>Ben Halada</u> Driller <u>Kent Clements</u>	Depth to Water <u>15.0 ft</u> Date/Time <u>4/21/09</u>
Logged By <u>Ben Halada</u>	Automatic Hammer <input checked="" type="checkbox"/> Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
752.7'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, soft		SPT-1	0.0 - 1.5	1.0	2-4-4	28	Boring advanced using 3 1/4 " Hollow Stem Augers
750.2'	2.5'			SPT-2	1.5 - 3.0	1.3	5-6-6	23	
749.7'	3.0'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-3	3.0 - 4.5	1.3	11-12-7	19	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling SPT-4: gravel in spoon
		FAT CLAY (Fill), red brown and brown, moist, stiff to very stiff, some gravel		SPT-4	4.5 - 6.0	0.2	6-6-11	15	
				SPT-5	6.0 - 7.5	1.0	9-8-7	16	
743.7'	9.0'			SPT-6	7.5 - 9.0	1.3	17-34-26	13	
		LEAN CLAY (Fill), red brown and brown, moist, medium stiff, some gravel		SPT-7	9.0 - 10.5	1.1	4-5-5	19	SPT-8: gravel in spoon
740.7'	12.0'			SPT-8	10.5 - 12.0	1.1	2-4-6	17	
		FAT CLAY, brown, moist, soft, some fine grained sand		SPT-9	12.0 - 13.5	1.2	9-11-8	19	ST-1: sand in bottom of tube
				SPT-10	13.5 - 15.0	1.3	2-2-2	21	
735.7'	17.0'			ST-1	15.0 - 17.0	1.0		--	
		SAND, gray, saturated, very loose, fine to medium grained, some clay		SPT-11	17.0 - 18.5	1.0	1-1-1	18	Water added at 17.0 ft to keep augers clear
				SPT-12	18.5 - 20.0	1.3	WOH-WOH-1	19	
				SPT-13	20.0 - 21.5	1.0	WOH-WOH-WOH	23	
				SPT-14	21.5 - 23.0	1.5	WOH-1-1	21	
				SPT-15	23.0 - 24.5	1.3	WOH-1-2	20	
				SPT-16	24.5 - 26.0	1.4	WOH-1-1	18	
				SPT-17	26.0 - 27.5	1.3	WOH-1-1	23	
				SPT-18	27.5 - 29.0	1.4	WOH-1-1	20	
				SPT-19	29.0 - 30.5	1.5	1-WOH-1	19	
720.7'	32.0'			SPT-20	30.5 - 32.0	1.3	1-1-1	24	
		SAND, light gray, saturated, medium dense, medium grained		SPT-21	32.0 - 33.5	1.3	4-5-5	18	
				SPT-22	33.5 - 35.0	1.3	4-4-6	19	
				SPT-23	35.0 - 36.5	1.3	1-3-5	20	

PASM_LEGACY 171468117 KINGSTON ASH POND.GPJ PASM.GDT 7/16/09

Project No. <u>175569042</u>		Location <u>N 553583.10, E 2441510.71 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-41</u> Total Depth <u>63.0 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
714.7'	38.0'	Shale, (Augered)		SPT-24	36.5 - 38.0	0.0	4-5-9	23	SPT-24: shale in tip of spoon
				SPT-25	38.0 - 39.5	1.0	9-12-21	--	
				SPT-26	39.5 - 41.0	1.1	11-16-23	--	
709.7'	43.0'	Shale, dark gray, silty, very soft, very thin bedded, with very thin to thin limestone layers							Began Core
			0%		3.7	0.7	19	46.7	
			0%		6.3	0.8	13	53.0	
			0%		10.0	2.0	20	63.0	
689.7'	63.0'								Boring backfilled with bentonite cement grout from 0.0 ft to 63.0 ft
Bottom of Hole Top of Rock = 38.0' Elevation (714.7') WOH = Weight of Hammer WOR = Weight of Rods Split Samples: SPT-2									

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SUBSURFACE LOG

Project No.	175569042	Location	N 553623.48, E 2441513.69 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-42	Total Depth	51.5 ft
Location	Kingston, Tennessee	Surface Elevation	764.7 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/16/09	Completed	4/17/09
Supervisor	Ben Phillips	Driller	Steve Bradford	Depth to Water	27.0 ft
Logged By	Ben Phillips	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
764.7'	0.0'	Top of Hole							
763.4'	1.3'	GRAVEL (Fill), Gravel		SPT-1	0.0 - 1.5	1.1	3-5-7	20	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
		FAT CLAY (Fill), brown, moist, medium stiff to stiff, some silt		SPT-2	1.5 - 3.0	1.3	8-10-11	17	
			SPT-3	3.0 - 4.5	1.1	8-8-8	21		
			SPT-4	4.5 - 6.0	1.2	3-4-5	19		
			SPT-5	6.0 - 7.5	1.1	6-8-10	23		
			SPT-6	7.5 - 9.0	0.5	6-8-8	25		
			SPT-7	9.0 - 10.5	1.5	8-10-13	28		
			SPT-8	10.5 - 12.0	1.5	10-13-18	19		
			ST-1	12.0 - 14.0	1.6	--	--		
			SPT-9	14.0 - 15.5	1.5	3-4-4	28		
			SPT-10	15.5 - 17.0	1.5	3-5-5	29		
746.3'	18.4'			SPT-11	17.0 - 18.5	1.0	3-5-5	22	
		BOTTOM ASH (Fill), black, moist, medium dense		SPT-12	18.5 - 20.0	1.3	1-2-2	23	
742.7'	22.0'			SPT-13	20.0 - 21.5	1.5	9-11-6	16	
741.7'	23.0'	FLY ASH (Fill), black, wet, very loose		SPT-14	21.5 - 23.0	1.5	6-27-9	31	
				SPT-15	23.0 - 24.5	1.5	5-7-7	24	
739.5'	25.2'	BOTTOM ASH (Fill), black, saturated, medium dense		SPT-16	24.5 - 26.0	1.5	3-2-1	14	
738.2'	26.5'	FLY ASH (Fill), black, saturated, very loose		SPT-17	26.0 - 27.5	1.3	3-4-4	22	
		SAND with Clay, brown, wet, loose, some silt		SPT-18	27.5 - 29.0	1.5	3-3-3	23	
				SPT-19	29.0 - 30.5	1.4	2-4-2	19	
				SPT-20	30.5 - 32.0	1.3	3-4-4	20	
731.4'	33.3'			SPT-21	32.0 - 33.5	1.5	2-3-3	23	
		SAND, brown, wet, loose to very dense		SPT-22	33.5 - 35.0	1.5	3-4-5	23	
				SPT-23	35.0 - 36.5	1.5	5-6-6	23	

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Project No. <u>175569042</u>	Location <u>N 553623.48, E 2441513.69 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-42</u> Total Depth <u>51.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		SAND, brown, wet, loose to very dense <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.5	3-4-4	21	
			SPT-25	38.0 - 39.5	1.5	4-3-2	23		
			SPT-26	39.5 - 41.0	1.5	2-4-6	22		
			SPT-27	41.0 - 42.5	1.5	4-5-5	22		
			SPT-28	42.5 - 44.0	1.5	9-3-2	22		
			SPT-29	44.0 - 45.5	1.5	4-5-5	20		
			SPT-30	45.5 - 47.0	1.5	3-4-4	22		
			SPT-31	47.0 - 48.5	1.5	14-22-27	22	Boring backfilled with bentonite cement grout from 0.0 ft to 51.5 ft	
			SPT-32	48.5 - 50.0	1.5	20-32-45	21		
713.7'	51.0'		SPT-33	50.0 - 51.5	1.5	11-27-40	21		

713.2' 51.5' Shale, (Augered)

Auger Refusal /
Bottom of Hole

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Project No. <u>175569042</u>	Location <u>N 554004.68, E 2441548.50 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-43</u> Total Depth <u>54.0 ft</u>
Location <u>Kingston, Tennessee</u>	Surface Elevation <u>765.9 ft. (NGVD29)</u>
Project Type <u>Geotechnical Exploration</u>	Date Started <u>4/6/09</u> Completed <u>4/7/09</u>
Supervisor <u>Ben Halada</u> Driller <u>Kent Clements</u>	Depth to Water <u>11.0 ft</u> Date/Time <u>4/7/09</u>
Logged By <u>Ben Halada</u>	Automatic Hammer <input checked="" type="checkbox"/> Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
765.9'	0.0'	Top of Hole							
765.7'	0.2'	GRAVEL (Fill), gray, moist, dense		SPT-1	0.0 - 1.5	1.3	15-26-25	12	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
763.4'	2.5'	Overburden (Fill), mix of clay, ash, gravel and sand		SPT-2	1.5 - 3.0	1.1	25-14-9	14	
762.4'	3.5'	BOTTOM ASH (Fill), black, moist, medium dense, some fine grained sand		SPT-3	3.0 - 4.5	1.3	5-4-11	21	
761.4'	4.5'			SPT-4	4.5 - 6.0	1.1	4-14-19	10	
		FAT CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-5	6.0 - 6.8	0.8	50-50/0.3	12	
		BOTTOM ASH 55% / FLY ASH 45% (Fill), black, saturated, medium dense to dense		SPT-6	7.5 - 9.0	1.5	14-35-34	21	
				SPT-7	9.0 - 10.5	1.4	15-17-19	20	
				SPT-8	10.5 - 12.0	1.4	6-8-19	17	
				SPT-9	12.0 - 13.5	1.2	12-15-14	23	
				SPT-10	13.5 - 15.0	1.1	3-8-7	19	
				SPT-11	15.0 - 16.5	1.1	7-5-3	26	
				SPT-12	16.5 - 18.0	1.0	2-2-2	28	
				SPT-13	18.0 - 19.5	1.3	1-2-2	24	
				SPT-14	19.5 - 21.0	0.5	3-2-1	24	
744.9'	21.0'	FLY ASH (Fill), black, saturated, very loose		SPT-15	21.0 - 22.5	1.3	2-1-2	29	SPT-15: wood fragments in sample
				SPT-16	22.5 - 24.0	0.4	WOH-WOH-2	30	
				SPT-17	24.0 - 25.5	0.6	4-2-1	23	
				SPT-18	25.5 - 27.0	0.0	WOH-WOH-WOH	--	
				SPT-19	27.0 - 28.5	1.2	1-2-3	30	SPT-19: wood fragments in sample
737.9'	28.0'	SILTY CLAY, brown, moist, soft		ST-1	28.5 - 30.5	2.0		--	
				SPT-20	30.5 - 32.0	0.8	WOH-WOH-WOH	27	
733.9'	32.0'		FAT CLAY, brown, moist, very soft to soft, some fine grained sand		SPT-21	32.0 - 33.5	1.4	WOH-1-1	23
				SPT-22	33.5 - 35.0	1.0	4-4-3	23	
				SPT-23	35.0 - 36.5	1.0	1-1-1	22	

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Project No. <u>175569042</u>		Location <u>N 554004.68, E 2441548.50 (NAD27)</u>							
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-43</u> Total Depth <u>54.0 ft</u>							
Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.9'	40.0'	FAT CLAY, brown, moist, very soft to soft, some fine grained sand <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.0	3-4-4	23	ST-2: sand in bottom to tube
				ST-2	38.0 - 40.0	1.7	--	--	
718.9'	47.0'	SAND, light brown, saturated, loose, fine grained, trace clay		SPT-25	40.0 - 41.5	1.3	1-1-2	22	SPT-27: sandstone in tip of spoon
				SPT-26	41.5 - 43.0	1.0	4-4-3	21	
				SPT-27	43.0 - 43.5	0.5	50-10/0.0	25	
				SPT-28	44.5 - 46.0	1.0	11-30-35	18	
				SPT-29	46.0 - 47.4	1.3	4-50-46/0.4	14	
716.9'	49.0'	Sandstone, (Augered)		SPT-30	47.5 - 49.0	0.5	13-14-15	24	SPT-30: shale in tip of spoon
711.9'	54.0'		Shale, (Augered)		SPT-31	49.0 - 50.5	0.5	5-14-15	--
				SPT-32	50.5 - 52.0	1.3	7-14-16	--	Boring backfilled with bentonite cement grout from 0.0 ft to 54.0 ft
				SPT-33	52.0 - 53.5	1.1	13-16-18	--	
Auger Refusal / Bottom of Hole									
WOH = Weight of Hammer WOR = Weight of Rods									

FILE# LEGACY: 17488117 KINGSTON ASH POND.GPJ FINISH.GDT 7/16/09

Project No. <u>175569042</u>	Location <u>N 553740.50, E 2441308.40 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-45</u> Total Depth <u>48.5 ft</u>
Location <u>Kingston, Tennessee</u>	Surface Elevation <u>763.9 ft. (NGVD29)</u>
Project Type <u>Geotechnical Exploration</u>	Date Started <u>5/12/09</u> Completed <u>5/13/09</u>
Supervisor <u>Ben Halada</u> Driller <u>Sam Wilks</u>	Depth to Water <u>8.0 ft</u> Date/Time <u>5/12/09</u>
Logged By <u>Greg Budd</u>	Automatic Hammer <input type="checkbox"/> Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core						
763.9'	0.0'	Top of Hole							
763.7'	0.2'	GRAVEL (Fill), light gray, dry, road material		SPT-1	0.0 - 1.5	0.9	6-7-20	22	
762.9'	1.0'								
760.4'	3.5'	LEAN CLAY (Fill), red, dry, stiff, with chert		SPT-2	1.5 - 3.0	1.0	12-20-13	22	
		BOTTOM ASH (Fill), gray black, dry, dense, with Fly ash		SPT-3	3.0 - 4.5	1.5	7-3-3	22	
758.4'	5.5'			SPT-4	4.5 - 6.0	0.8	8-7-12	21	
757.4'	6.5'	LEAN CLAY (Fill), brown, dry, soft to stiff, with chert		SPT-5	6.0 - 7.5	1.5	25-45-24	19	
		BOTTOM ASH (Fill), gray black, dry, dense		SPT-6	7.5 - 9.0	0.9	20-8-7	19	
		LEAN CLAY (Fill), red brown, dry, stiff, with chert		SPT-7	9.0 - 10.5	0.7	6-4-8	30	
				SPT-8	10.5 - 12.0	0.5	2-2-2	33	
751.4'	12.5'	BOTTOM ASH (Fill), gray black, saturated, loose to very dense, with fly ash		SPT-9	12.0 - 13.5	1.5	4-8-15	26	
				SPT-10	13.5 - 14.9	1.4	32-40-28/0.4	20	
				SPT-11	15.0 - 16.5	1.5	20-20-16	26	
746.9'	17.0'	FLY ASH (Fill), gray, saturated, loose to medium dense, silty, very fine grained		SPT-12	16.5 - 18.0	1.5	15-19-21	25	
				SPT-13	18.0 - 19.5	0.5	4-5-10	26	
				SPT-14	19.5 - 21.0	0.9	6-6-6	29	
741.9'	22.0'			SPT-15	21.0 - 22.5	1.0	5-8-7	32	
		BOTTOM ASH (Fill), gray black, saturated, medium dense, with some coarse black coal refuse		SPT-16	22.5 - 24.0	0.8	5-8-7	27	
738.9'	25.0'			SPT-17	24.0 - 25.5	1.5	3-1-2	32	
		FLY ASH (Fill), gray, saturated, loose to medium dense, very fine grained, silty with coarse black coal refuse		SPT-18	25.5 - 27.0	1.5	3-4-5	33	
735.4'	28.5'			SPT-19	27.0 - 28.5	1.5	6-7-7	23	
733.9'	30.0'	SILT, light brown, saturated, soft, trace fine grained sand		SPT-20	28.5 - 30.0	0.4	5-4-2	25	
		LEAN CLAY with Silt, brown, saturated, soft to medium stiff		SPT-21	30.0 - 31.5	1.5	6-6-6	24	
				SPT-22	31.5 - 33.0	1.5	5-7-5	23	
				SPT-23	33.0 - 34.5	1.5	5-4-3	26	
				ST-1	34.5 - 36.5	2.0	--	--	

FMSAL_LEGACY: 174698117_KINGSTON_ASH_POND.GPJ FMSAL_GDT: 7/16/09

Project No. <u>175569042</u>	Location <u>N 553740.50, E 2441308.40 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-45</u> Total Depth <u>48.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
723.9'	40.0'	LEAN CLAY with Silt, brown, saturated, soft to medium stiff <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.5	2-3-4	25	
				SPT-25	38.0 - 39.5	1.5	WOH- WOH-6	26	
716.4'	47.5'	SILTY SAND, brown, saturated, loose to dense, fine grained, well rounded, well graded, with manganese stained sandstone, fragments from 45.5 to 47.0		SPT-26	39.5 - 41.0	1.5	WOH-7-6	24	
				SPT-27	41.0 - 42.5	0.5	3-5-5	22	
				SPT-28	42.5 - 44.0	1.0	5-7-7	22	
				SPT-29	44.0 - 45.5	0.8	7-5-7	25	
				SPT-30	45.5 - 47.0	0.5	18-28-18	19	
715.4'	48.5'			SPT-31	47.0 - 48.4	0.3	20-50- 30/0.4	--	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

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Project No. <u>175569042</u>	Location <u>N 553747.39, E 2441146.83 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-47</u> Total Depth <u>39.5 ft</u>
Location <u>Kingston, Tennessee</u>	Surface Elevation <u>753.4 ft. (NGVD29)</u>
Project Type <u>Geotechnical Exploration</u>	Date Started <u>3/30/09</u> Completed <u>3/31/09</u>
Supervisor <u>Ben Halada</u> Driller <u>Kent Clements</u>	Depth to Water <u>7.0 ft</u> Date/Time <u>3/31/09</u>
Logged By <u>Ben Halada</u>	Automatic Hammer <input checked="" type="checkbox"/> Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
753.4'	0.0'	Top of Hole							
751.9'	1.5'	LEAN CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.2	1-7-10	18	Boring advanced using 3 1/4 " Hollow Stem Augers
		Bottom Ash 40% / Fly Ash 60% (Fill), black, moist, medium dense		SPT-2	1.5 - 3.0	1.5	19-19-19	18	
749.9'	3.5'			SPT-3	3.0 - 4.5	1.2	4-7-11	18	All ST samples recovered using a fixed head piston sampler
749.4'	4.0'	LEAN CLAY (Fill), light brown, moist, medium stiff		SPT-4	4.5 - 6.0	1.0	5-7-7	16	
748.9'	4.5'			SPT-5	6.0 - 7.5	1.1	5-7-8	17	
745.9'	7.5'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-6	7.5 - 9.0	1.3	32-16-9	8	
745.4'	8.0'	LEAN CLAY (Fill), light brown, moist, medium stiff		ST-1	9.0 - 11.0	1.0		--	
		GRAVEL (Fill), gray, moist, dense		SPT-7	11.0 - 12.5	1.1	3-2-2	17	
740.9'	12.5'	LEAN CLAY, light brown, saturated, soft, some fine grained sand, some gravel		SPT-8	12.5 - 14.0	1.5	WOH-1-1	19	
		SAND, light brown, saturated, very loose to loose, fine grained, trace clay		SPT-9	14.0 - 15.5	1.1	2-2-2	18	
				SPT-10	15.5 - 17.0	1.2	1-1-1	19	
				SPT-11	17.0 - 18.5	1.3	WOH-1-1	17	
				SPT-12	18.5 - 20.0	1.3	WOH-1-1	20	
				SPT-13	20.0 - 21.5	1.4	WOH-1-1	18	
				SPT-14	21.5 - 23.0	1.2	WOR- WOH-1	20	
				SPT-15	23.0 - 24.5	1.3	1-1-1	18	
				SPT-16	24.5 - 26.0	1.4	1-1-1	19	
				SPT-17	26.0 - 27.5	1.1	1-1-1	19	
725.4'	28.0'			SPT-18	27.5 - 29.0	1.3	1-3-2	21	
		SAND, light brown and gray, saturated, very loose, fine grained		SPT-19	29.0 - 30.5	1.2	1-3-3	21	
				SPT-20	30.5 - 32.0	1.3	1-2-2	18	
720.4'	33.0'			SPT-21	32.0 - 33.5	1.2	2-3-3	20	
		SAND, light gray, saturated, very loose to medium dense, fine to medium grained		SPT-22	33.5 - 35.0	0.1	WOH-2-3	21	
717.4'	36.0'			SPT-23	35.0 - 36.5	1.2	2-9-12	23	

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SUBSURFACE LOG

Project No.	175569042	Location	N 553747.39, E 2441146.83 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-47	Total Depth 39.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
713.9'	39.5'	Shale, (Augered) (Continued)		SPT-24	36.5 - 38.0	1.1	10-12-30	--	39.5 ft
				SPT-25	38.0 - 38.9	0.8	12-50/0.4	--	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553733.63, E 2441141.18 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-47A	Total Depth	7.5 ft
Location	Kingston, Tennessee	Surface Elevation	753.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/30/09	Completed	4/30/09
Supervisor	Ben Halada	Driller	Sam Wilks	Depth to Water	N/A
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
753.1'	0.0'	Top of Hole							
		OVERBURDEN, (Augered without sampling)							Boring advanced using 3 1/4 " Hollow Stem Augers
745.6'	7.5'								

No Refusal /
Bottom of Hole

PZ Installed, tip at elevation 746.9'
Flushmount well cover and concrete pad installed.

FASAL_LEGACY 17108117 KINGSTON ASH POND.GPJ FASAL.GDT 7/16/09



SUBSURFACE LOG

Project No.	<u>175569042</u>	Location	<u>N 553771.75, E 2441159.01 (NAD27)</u>		
Project Name	<u>Kingston Ash Pond</u>	Boring No.	STN-48A	Total Depth	<u>22.5 ft</u>
Location	<u>Kingston, Tennessee</u>	Surface Elevation	<u>765.3 ft. (NGVD29)</u>		
Project Type	<u>Geotechnical Exploration</u>	Date Started	<u>4/21/09</u>	Completed	<u>4/21/09</u>
Supervisor	<u>Ben Halada</u>	Driller	<u>Steve Bradford</u>	Depth to Water	<u>N/A</u>
Logged By	<u>Adam Smith</u>	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		Overburden, See log for STN-48							Boring advanced using 3 1/4 " Hollow Stem Augers
742.8'	22.5'	No Refusal / Bottom of Hole							

Two PZ's Installed, tip at elevation 757.1' and 746.1'
 Flushmount well cover and concrete pad installed.

FMSU LEGACY 171408117 KINGSTON ASH POND.GPJ FMSU.LGDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 553769.40, E 2441163.30 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-48B	Total Depth	48.2 ft
Location	Kingston, Tennessee	Surface Elevation	765.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/21/09	Completed	4/21/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Adam Smith	Automatic Hammer	<input type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		Overburden, See log for STN-48							Boring advanced using 3 1/4 " Hollow Stem Augers

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Project No. <u>175569042</u>		Location <u>N 553769.40, E 2441163.30 (NAD27)</u>						
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-48B</u> Total Depth <u>48.2 ft</u>						
Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
717.1'	48.2'	Overburden, See log for STN-48 (Continued)						
<p>No Refusal / Bottom of Hole</p> <p>PZ Installed, tip at elevation 720.1'</p> <p>Protective well cover and concrete pad installed.</p>								

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SUBSURFACE LOG

Project No.	175569042	Location	N 553773.29, E 2441154.53 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-48	Total Depth	54.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/31/09	Completed	3/31/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	20.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.3'	0.0'	Top of Hole							
		LEAN CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-1	0.0 - 1.5	1.2	1-3-3	25	Boring advanced using 3 1/4 " Hollow Stem Augers All ST samples recovered using a fixed head piston sampler
				SPT-2	1.5 - 3.0	1.4	3-4-5	22	
				SPT-3	3.0 - 4.5	1.1	5-6-7	21	
				ST-1	4.5 - 6.5	1.7	--	--	
				SPT-4	6.5 - 8.0	1.3	5-7-7	24	
755.8'	9.5'	FAT CLAY (Fill), red brown, saturated, very soft, little chert		SPT-5	8.0 - 9.5	1.2	3-5-7	25	
				SPT-6	9.5 - 11.0	1.1	3-5-5	28	
				SPT-7	11.0 - 12.5	1.3	3-7-5	31	
				SPT-8	12.5 - 14.0	1.0	6-6-7	28	
				ST-2	14.0 - 16.0	1.0	--	--	
				SPT-9	16.0 - 17.5	0.8	WOR-1-2	30	
745.3'	20.0'	Bottom Ash 60% / Fly Ash 40% (Fill), black, saturated, loose		SPT-10	17.5 - 19.0	1.2	WOR-2-2	32	ST-3: refused at 1.0 ft, ash in bottom of tube
				ST-3	19.0 - 21.0	1.0	--	--	
				SPT-11	20.0 - 21.5	1.3	6-7-7	25	
741.3'	24.0'	LEAN CLAY, light brown, saturated, very soft, some silt, some fine grained sand		SPT-12	21.5 - 23.0	1.2	7-9-3	29	SPT-14: roots in tip of spoon
				SPT-13	23.0 - 24.5	1.1	1-WOH-WOH	24	
				SPT-14	24.5 - 26.0	1.4	WOR-WOR-WOR	21	
737.8'	27.5'	SAND with Clay, light brown, saturated, very loose to loose, some silt		SPT-15	26.0 - 27.5	1.0	WOR-1-2	23	
				SPT-16	27.5 - 29.0	1.1	2-2-2	22	
				SPT-17	29.0 - 30.5	1.4	3-1-2	21	
				SPT-18	30.5 - 32.0	1.2	2-2-3	21	
				SPT-19	32.0 - 33.5	0.9	WOR-1-1	20	
				ST-4	33.5 - 35.5	1.8	--	--	
	SPT-20	35.5 - 37.0	1.3	1-1-1	19	ST-4: sand in bottom of tube			

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 553773.29, E 2441154.53 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-48</u> Total Depth <u>54.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
728.3'	37.0'	SAND, light brown, saturated, very loose, fine grained, trace clay		SPT-21	37.0 - 38.5	1.3	WOR- WOR-WOR	21	Water added at 38.0 ft to keep augers clear
				SPT-22	38.5 - 40.0	1.1	WOR- WOH-1	23	
				SPT-23	40.0 - 41.5	1.3	1-2-2	21	
				SPT-24	41.5 - 43.0	1.2	1-1-2	23	
				SPT-25	43.0 - 44.5	1.3	WOR-1-1	21	
				SPT-26	44.5 - 46.0	1.2	5-6-10	21	
719.8'	45.5'	SAND, light gray, saturated, loose, fine grained		SPT-27	46.0 - 47.5	1.1	4-5-5	24	SPT-28: sandstone in tip of spoon
				SPT-28	47.5 - 48.3	0.8	6-50	19	
716.3'	49.0'	Shale, (Augered)		SPT-29	49.0 - 50.5	1.0	9-11-17	--	Boring backfilled with bentonite cement grout from 0.0 ft to 54.0 ft
				SPT-30	50.5 - 52.0	1.0	15-18-17	--	
				SPT-31	52.0 - 52.9	0.6	35-50/0.4	--	
711.3'	54.0'								

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553921.85, E 2441024.39 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-49	Total Depth	47.5 ft
Location	Kingston, Tennessee	Surface Elevation	763.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/14/09	Completed	5/15/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	9.0 ft
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
				Other	<input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
763.1'	0.0'	Top of Hole							
761.6'	1.5'	GRAVEL (Fill)		SPT-1	0.0 - 1.5	1.5	8-10-14	16	Boring advanced using 4 1/4 " Hollow Stem Augers
		FLY ASH (Fill), dark gray to black, moist, medium dense to dense		SPT-2	1.5 - 3.0	1.2	11-12-14	21	
			SPT-3	3.0 - 4.5	1.1	17-15-12	15		
			SPT-4	4.5 - 6.0	1.0	7-6-7	19		
			SPT-5	6.0 - 7.5	1.0	7-7-7	17		
			SPT-6	7.5 - 9.0	1.1	7-7-7	14		
			SPT-7	9.0 - 10.5	1.3	3-5-2	18		
752.6'	10.5'	FAT CLAY (Fill), brown, moist, soft		SPT-8	10.5 - 12.0	0.2	1-1-1	22	Water added at 12.0 ft to keep augers clear
		BOTTOM ASH (Fill), black, moist, medium dense		SPT-9	12.0 - 13.5	1.0	1-5-8	21	
749.6'	13.5'		SPT-10	13.5 - 15.0	1.3	9-11-16	17		
			SPT-11	15.0 - 16.5	0.7	2-4-8	22		
		SPT-12	16.5 - 18.0	0.8	5-4-2	22			
		SPT-13	18.0 - 19.5	1.1	1-1-2	25			
743.6'	19.5'	FLY ASH (Fill), black, moist, medium dense, trace clay		SPT-14	19.5 - 21.0	1.5	7-6-5	32	
			SPT-15	21.0 - 22.5	0.6	7-7-7	32		
		BOTTOM ASH (Fill), black, moist, loose to medium dense		SPT-16	22.5 - 24.0	1.0	7-6-6	26	
			SPT-17	24.0 - 25.5	0.6	3-2-1	27		
740.6'	22.5'		SPT-18	25.5 - 27.0	1.5	1-1-1	22		
		LEAN CLAY, brown, moist, very soft to medium stiff		SPT-19	27.0 - 28.5	0.6	WOR-WOR	21	
			SPT-20	28.5 - 30.0	1.2	2-3-5	25		
			SPT-21	30.0 - 31.5	1.4	4-5-6	24		
			SPT-22	31.5 - 33.0	1.4	4-7-9	22		
			SPT-23	33.0 - 34.5	1.1	2-4-6	23		
			SPT-24	34.5 - 36.0	1.5	3-4-5	24		

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Project No.	175569042	Location	N 553921.85, E 2441024.39 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-49	Total Depth 47.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
724.1'	39.0'	LEAN CLAY, brown, moist, very soft to medium stiff <i>(Continued)</i>		SPT-25	36.0 - 37.5	1.5	4-5-4	24	SPT-31: sandstone in tip of spoon Boring backfilled with bentonite cement grout from 0.0 ft to 47.5 ft
				SPT-26	37.5 - 39.0	1.5	4-5-4	25	
721.1'	42.0'	SAND, brown, moist, loose, fine to medium grained, some clay		SPT-27	39.0 - 40.5	1.5	3-5-6	21	
				SPT-28	40.5 - 42.0	1.5	3-3-3	20	
718.1'	45.0'	SAND, brown, saturated, medium dense, fine to medium grained		SPT-29	42.0 - 43.5	1.5	3-4-8	21	
				SPT-30	43.5 - 45.0	1.5	4-5-6	22	
716.6'	46.5'	Sandstone (Augered)		SPT-31	45.0 - 46.5	1.4	27-20-25	--	
715.6'	47.5'	Shale (Augered)		SPT-32	46.5 - 47.5	0.5	26-50/0.5	--	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

FAUSA_LEGACY_171488117_KINGSTON_ASH_POND.GPJ_FINSALGDT_7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 553631.96, E 2440496.85 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-50	Total Depth 57.0 ft
Location	Kingston, Tennessee	Surface Elevation	741.6 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/15/09	Completed 4/16/09
Supervisor	Ben Phillips	Driller	Steve Bradford	Depth to Water 4.6 ft
Logged By	Ben Phillips	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
741.6'	0.0'	Top of Hole							
733.1'	8.5'	FAT CLAY (Fill), brown, moist, soft, some fine grained sand		SPT-1	0.0 - 1.5	1.2	3-5-5	48	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-2	1.5 - 3.0	0.9	2-2-3	22	
				SPT-3	3.0 - 4.5	1.1	3-2-3	23	
				SPT-4	4.5 - 6.0	0.6	2-3-4	16	
				SPT-5	6.0 - 7.5	1.2	1-3-3	17	
				SPT-6	7.5 - 9.0	0.7	WOH- WOH-WOH	23	
729.1'	12.5'	FLY ASH (Fill), black, moist, very loose		ST-1	9.0 - 11.0	1.3		--	
				SPT-7	11.0 - 12.5	1.5	WOH- WOH-WOH	26	
				SPT-8	12.5 - 14.0	1.3	3-4-3	22	
727.6'	14.0'	LEAN CLAY (Fill), brown, wet, soft		SPT-9	14.0 - 15.5	1.0	WOH- WOH-2	24	
723.6'	18.0'	FLY ASH (Fill), black, wet, very loose		SPT-10	15.5 - 17.0	1.5	WOH- WOH-WOH	26	
				SPT-11	17.0 - 18.5	1.5	3-4-5	27	
				SPT-12	18.5 - 20.0	1.5	WOH- WOH-3	32	
				ST-2	20.0 - 22.0	1.8		--	
718.1'	23.5'	LEAN CLAY, brown, wet, soft, some fine grained sand and silt		SPT-13	22.0 - 23.5	1.5	3-3-3	30	
				SPT-14	23.5 - 25.0	1.2	WOH- WOH-WOH	27	
				SPT-15	25.0 - 26.5	0.7	WOH- WOH-WOH	27	
				SPT-16	26.5 - 28.0	1.5	1-1-1	20	
				SPT-17	28.0 - 29.5	1.5	2-4-5	22	
				SPT-18	29.5 - 31.0	1.5	3-6-5	17	
				SPT-19	31.0 - 32.5	1.5	1-5-7	17	
705.9'	35.7'	SAND, gray, saturated, loose, some silt		SPT-20	32.5 - 34.0	1.5	WOR-2-4	21	
				SPT-21	34.0 - 35.5	1.5	3-4-4	19	
				SPT-22	35.5 - 37.0	1.5	25-20-10	--	

FLASH LEGACY 17168117 KINGSTON ASH POND.GPJ FNSM.GDT 7/16/09



SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 553631.96, E 2440496.85 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-50</u> Total Depth <u>57.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
695.4'	46.2'	Limestone, gray, fine grained, hard, with shale partings, 35° to 45° bedding angle <i>(Continued)</i>							Began Core
				0%	4.0	0.6	15	41.0	
				0%	5.0	2.4	48	46.0	
684.6'	57.0'	Shale, gray, soft, with occasional limestone partings, slickensides throughout, 35° to 45° bedding angle							Boring backfilled with bentonite cement grout from 0.0 ft to 57.0 ft
				0%	5.0	3.5	70	51.0	
				0%	6.0	3.9	65	57.0	

Bottom of Hole

Top of Rock = 35.7'
Elevation (705.9')

WOH = Weight of Hammer
WOR = Weight of Rods

FASBL_LEGACY 171068117 KINGSTON ASH POND.GPJ FASBL.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 553696.02, E 2440548.46 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-51	Total Depth	49.6 ft
Location	Kingston, Tennessee	Surface Elevation	750.4 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/14/09	Completed	4/15/09
Supervisor	Ben Phillips	Driller	Steve Bradford	Depth to Water	N/A
Logged By	Ben Phillips	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
				Other	<input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core		Run	Rec. Ft.	Rec. %	Run Depth	
750.4'	0.0'	Top of Hole							
748.3'	2.1'	GRAVEL (Fill)		SPT-1	0.0 - 1.5	1.0	2-2-3	6	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.2	6-6-7	11	
740.7'	9.7'	FAT CLAY (Fill), brown, moist, medium stiff, some chert fragments		SPT-3	3.0 - 4.5	1.5	4-6-6	21	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-4	4.5 - 6.0	0.7	6-3-3	26	
				SPT-5	6.0 - 7.5	0.9	5-4-6	27	
				SPT-6	7.5 - 9.0	0.7	2-2-5	29	
				SPT-7	9.0 - 10.5	1.2	7-7-7	20	
				SPT-8	10.5 - 12.0	1.1	5-6-5	17	
				ST-1	12.0 - 13.5	0.0	--	--	
725.4'	25.0'	LEAN CLAY (Fill), brown, moist, medium stiff, silty, some areas of fly ash		SPT-9	13.5 - 15.0	0.5	3-4-3	21	
				SPT-10	15.0 - 16.5	0.7	3-4-3	25	
				SPT-11	16.5 - 18.0	1.1	4-13-4	20	
				ST-2	18.0 - 20.0	1.1	--	--	
				SPT-12	20.0 - 21.5	1.3	1-3-3	21	
				SPT-13	21.5 - 23.0	1.1	3-6-8	21	
				ST-3	23.0 - 25.0	2.0	--	--	
				SPT-14	25.0 - 26.5	1.3	2-1-4	25	
				SPT-15	26.5 - 28.0	1.5	5-4-5	25	
				SPT-16	28.0 - 29.5	1.3	2-3-3	25	
719.0'	31.4'	FAT CLAY, brown, moist, soft to medium stiff, sandy		SPT-17	29.5 - 31.0	1.5	2-4-5	23	
				SPT-18	31.0 - 32.5	1.2	2-2-2	20	
				SPT-19	32.5 - 34.0	1.5	WOR-WOR-WOR	20	
				SPT-20	34.0 - 35.5	1.5	1-1-2	23	
				SPT-21	35.5 - 37.0	1.5	WOH-	20	

RMSL_LEGACY - 17168117 KINGSTON ASH POND.GPJ F:\MSL\GDT_71609



SUBSURFACE LOG

Project No.	175569042	Location	N 553696.02, E 2440548.46 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-51	Total Depth 49.6 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
709.9'	40.5'	SILTY SAND, brown, saturated, very loose (Continued)		SPT-22	37.0 - 38.5	1.5	WOH-WOH	24	
				SPT-23	38.5 - 40.0	1.5	WOH-WOH		
				SPT-24	40.0 - 41.5	1.5	WOR-5-9		
701.5'	48.9'	SAND, gray, saturated, very loose to medium dense, with silt		SPT-25	41.5 - 43.0	1.1	4-3-3	26	Boring backfilled with bentonite cement grout from 0.0 ft to 49.6 ft
				SPT-26	43.0 - 44.5	1.3	4-7-7	28	
				SPT-27	44.5 - 46.0	1.5	4-25-13	21	
				SPT-28	46.0 - 47.5	0.6	4-3-2	23	
				SPT-29	47.5 - 49.0	1.5	14-22-28	22	
				SPT-30	49.0 - 49.6		29-50/0.1	--	
700.8'	49.6'								

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553992.98, E 2440817.40 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-52	Total Depth	39.5 ft
Location	Kingston, Tennessee	Surface Elevation	753.2 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/20/09	Completed	4/20/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	15.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
753.2'	0.0'	Top of Hole							
		GRAVEL (Fill), gray, moist, loose to medium dense		SPT-1	0.0 - 1.5	0.1	4-6-5	9	Boring advanced using 3 1/4 " Hollow Stem Augers
750.2'	3.0'		SPT-2	1.5 - 3.0	0.0	5-9-7	--		
		LEAN CLAY with Gravel (Fill), brown, moist, medium stiff, with ash		SPT-3	3.0 - 4.5	1.2	6-5-4	20	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
748.7'	4.5'		SPT-4	4.5 - 6.0	1.2	3-2-3	27		
		SAND with Gravel and Clay (Fill), light brown, moist, loose		SPT-5	6.0 - 7.5	1.0	5-9-5	14	
			SPT-6	7.5 - 9.0	1.0	4-6-7	17		
			SPT-7	9.0 - 10.5	1.3	11-9-4	15		
742.2'	11.0'			SPT-8	10.5 - 12.0	0.8	5-3-3	22	
		SAND, brown, moist, very loose to loose, fine to medium grained, some clay		SPT-9	12.0 - 13.5	1.3	1-2-2	19	
			SPT-10	13.5 - 15.0	1.2	2-1-1	19		
738.2'	15.0'			SPT-11	15.0 - 16.5	1.0	2-1-2	21	
		SAND, brown, saturated, very loose, fine to medium grained, trace clay		SPT-12	16.5 - 18.0	1.2	WOH-WOH-1	24	Water added at 16.0 ft to keep augers clear
			SPT-13	18.0 - 19.5	1.5	WOH-WOH	25		
			SPT-14	19.5 - 21.0	1.2	WOH-WOH-1	22		
			SPT-15	21.0 - 22.5	0.2	WOH-WOH	21		
			SPT-16	22.5 - 24.0	0.5	WOH-1-1	22		
729.2'	24.0'			ST-1	24.0 - 26.0	2.0		--	
		LEAN CLAY, light brown, moist, very soft, some fine to medium grained sand		SPT-17	26.0 - 27.5	1.2	WOR-WOH-WOH	21	
			SPT-18	27.5 - 29.0	1.3	WOH-WOH-1	21		
724.2'	29.0'			SPT-19	29.0 - 30.5	1.2	WOR-WOR-WOH	22	
		SAND, brown, moist, very loose, fine to medium grained, some clay		SPT-20	30.5 - 32.0	1.0	WOR-WOH-1	22	
			SPT-21	32.0 - 33.5	1.2	WOH-1-1	22		
			SPT-22	33.5 - 35.0	1.2	WOH-4-3	19		
719.2'	34.0'			SPT-23	35.0 - 36.5	1.2	2-3-5	26	
		SAND, light gray, moist, loose, fine to medium grained							Boring backfilled with-

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SUBSURFACE LOG

Project No.	175569042	Location	N 553992.98, E 2440817.40 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-52	Total Depth 39.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
714.2'	39.0'	SAND, light gray, moist, loose, fine to medium grained <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.2	2-1-2	18	bentonite cement grout from 0.0 ft to 39.5 ft
713.7'	39.5'			SPT-25	38.0 - 39.5	1.3	22-24-37	11	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Split Samples: SPT-25

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SUBSURFACE LOG

Project No.	175569042	Location	N 554011.12, E 2440902.46 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-53	Total Depth	51.5 ft
Location	Kingston, Tennessee	Surface Elevation	763.9 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/21/09	Completed	4/21/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	6.0 ft
Logged By	Adam Smith	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
763.9'	0.0'	Top of Hole								
		BOTTOM ASH (Fill), black, moist to saturated, dense		SPT-1	0.0 - 1.5	1.2	9-9-8	23	Boring advanced using 3 1/4 " Hollow Stem Augers	
				SPT-2	1.5 - 3.0	1.3	14-17-22	17		
				SPT-3	3.0 - 4.5	1.1	20-22-14	13		
				SPT-4	4.5 - 6.0	1.2	6-9-6	19		
757.3'	6.6'	FAT CLAY (Fill), red to dark brown, moist, soft, some sand		SPT-5	6.0 - 7.5	1.2	4-3-3	26		
	SPT-6		7.5 - 9.0	1.0	1-2-2	27				
	SPT-7		9.0 - 10.5	0.6	2-3-1	34				
	SPT-8		10.5 - 12.0	1.1	2-4-2	30				
				ST-1	12.0 - 14.0	1.2		--		
749.3'	14.6'	BOTTOM ASH (Fill), black, moist, dense		SPT-9	14.0 - 15.5	1.2	4-6-6	22		
				SPT-10	15.5 - 17.0	1.1	14-22-32	18		
				SPT-11	17.0 - 18.5	1.2	14-22-41	23		
				SPT-12	18.5 - 20.0	1.0	1-2-18	19		
				SPT-13	20.0 - 21.5	1.5	6-18-32	21		
				SPT-14	21.5 - 23.0	0.2	1-4-16	18		
740.9'	23.0'		SILTY SAND, gray, moist to wet, loose		SPT-15	23.0 - 24.5	1.1	2-1-1	24	
					SPT-16	24.5 - 26.0	0.9	WOH- WOH-2	20	
				SPT-17	26.0 - 27.5	1.3	2-3-3	22		
				SPT-18	27.5 - 29.0	0.8	7-5-5	25		
				SPT-19	29.0 - 30.5	1.4	6-2-3	23		
				SPT-20	30.5 - 32.0	1.2	2-3-3	22		
				SPT-21	32.0 - 33.5	1.3	2-5-3	23		
				SPT-22	33.5 - 35.0	0.8	3-4-4	23		
				SPT-23	35.0 - 36.5	0.8	3-4-3	23		

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Project No. <u>175569042</u>	Location <u>N 554011.12, E 2440902.46 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-53</u> Total Depth <u>51.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.9'	38.0'	SAND, light brown, saturated, loose to dense, fine to medium grained, well graded		SPT-24	36.5 - 38.0	1.0	2-4-6	23	Boring backfilled with bentonite cement grout from 0.0 ft to 51.5 ft SPT-32: shale in tip of spoon
				SPT-25	38.0 - 39.5	1.1	1-2-5	22	
				SPT-26	39.5 - 41.0	0.7	6-8-8	21	
				SPT-27	41.0 - 42.5	0.7	3-1-1	17	
				SPT-28	42.5 - 44.0	1.0	1-1-2	20	
				SPT-29	44.0 - 45.5	1.0	6-8-10	30	
				SPT-30	45.5 - 47.0	0.5	4-8-16	22	
				SPT-31	47.0 - 48.5	0.7	3-19-10	19	
713.9'	50.0'			SPT-32	48.5 - 50.0	1.0	14-15-12	19	
712.4'	51.5'			SPT-33	50.0 - 51.5	0.2	16-15-20	--	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Elevation is an estimate, need to be surveyed

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SUBSURFACE LOG

Project No.	175569042	Location	N 555263.94, E 2441476.12 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-54	Total Depth 59.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.0 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/22/09	Completed 4/22/09
Supervisor	Ben Halada Driller Sam Wilks	Depth to Water	9.0 ft	Date/Time 4/22/09
Logged By	Greg Budd	Automatic Hammer	<input type="checkbox"/>	Safety Hammer <input checked="" type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
765.0'	0.0'	Top of Hole							
763.5'	1.5'	BOTTOM ASH (Fill), black gray, moist, loose		SPT-1	0.0 - 1.5	1.0	1-4-4	37	Boring advanced using 3 1/4" hollow stem augers
		FLY ASH (Fill), gray, wet, loose, silty		SPT-2	1.5 - 3.0	1.0	4-6-7	31	
			SPT-3	3.0 - 4.5	0.7	7-7-6	31		
			SPT-4	4.5 - 6.0	0.9	3-2-2	34		
			SPT-5	6.0 - 7.5	0.9	2-2-5	31		
			SPT-6	7.5 - 9.0	1.3	6-6-5	31		
756.0'	9.0'	FLY ASH (Fill), gray, saturated, loose to very loose, silty		SPT-7	9.0 - 10.5	1.2	2-2-2	28	Water added at 9.0 feet to keep augers clean
			SPT-8	10.5 - 12.0	1.2	2-2-3	29		
			SPT-9	12.0 - 13.5	1.5	2-1-1	28		
			SPT-10	13.5 - 15.0	1.0	WOR-WOR-1	33		
			SPT-11	15.0 - 16.5	1.5	WOH-WOH-1	30		
			SPT-12	16.5 - 18.0	1.5	WOH-WOH-WOH	28		
			SPT-13	18.0 - 19.5	1.0	WOR-WOR-WOR	29		
			SPT-14	19.5 - 21.0	1.5	WOR-WOR-WOR	27		
			SPT-15	21.0 - 22.5	1.5	1-WOH-WOH	27		
			SPT-16	22.5 - 24.0	1.0	3-4-3	27		
		SPT-17	24.0 - 25.5	1.5	6-5-4	25			
		SPT-18	25.5 - 27.0	1.3	1-1-2	25			
738.0'	27.0'	FLY ASH (Fill), gray, saturated, loose, with, trace black bottom ash		SPT-19	27.0 - 28.5	1.0	2-2-3	25	
735.0'	30.0'		SPT-20	28.5 - 30.0	0.8	3-3-3	24		
		FLY ASH (Fill), black gray, saturated, loose to very loose, with, some fine to coarse bottom ash		SPT-21	30.0 - 31.5	0.8	3-3-2	25	
			SPT-22	31.5 - 33.0	1.5	1-WOH-WOH	25		
			SPT-23	33.0 - 34.5	1.0	WOH-WOH-2	32		
730.0'	35.0'		SPT-24	34.5 - 36.0	1.4	2-2-1	26		

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
727.5'	37.5'	FLY ASH (Fill), tan gray, saturated, loose, with, some clayey silt (Continued) LEAN CLAY, tan gray, saturated, soft, orange brown and tan grey, mottled		SPT-25	36.0 - 37.5	0.9	WOR-WOR-WOR	25	Boring backfilled with bentonite cement grout from 0.0 feet to 59.0 feet
				SPT-26	37.5 - 39.0	1.5	6-6-7	20	
				ST-1	39.0 - 41.0	2.0		--	
				SPT-27	41.0 - 42.5	0.9	3-3-5	21	
721.0'	44.0'	SILT with Sand, brown gray, saturated, loose to very loose, brown and gray, with trace fine grained sand, mottled		SPT-28	42.5 - 44.0	1.5	3-3-4	22	
				SPT-29	44.0 - 45.5	1.5	3-3-3	18	
				SPT-30	45.5 - 47.0	1.5	3-2-1	19	
716.5'	48.5'	SILTY SAND, gray, saturated, very loose to medium dense, with, some fine grained sand		SPT-31	47.0 - 48.5	1.5	3-1-2	19	
				SPT-32	48.5 - 50.0	1.5	WOR-WOR-WOR	19	
				SPT-33	50.0 - 51.5	1.5	WOR-WOR-WOR	19	
				SPT-34	51.5 - 53.0	0.8	2-1-1	17	
				SPT-35	53.0 - 54.5	1.0	WOR-WOH-2	16	
				SPT-36	54.5 - 56.0	1.2	4-4-4	17	
707.0'	58.0'			SPT-37	56.0 - 57.5	0.0	7-12-12	34	
706.0'	59.0'			SPT-38	57.5 - 58.0	0.3	50/0.3	17	
		Shale, (Augered)							
		Auger Refusal / Bottom of Hole							
		WOH = Weight of Hammer WOR = Weight of Rod							

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SUBSURFACE LOG

Project No.	175569042	Location	N 554943.73, E 2442287.49 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-55	Total Depth	64.2 ft
Location	Kingston, Tennessee	Surface Elevation	764.1 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/20/09	Completed	3/20/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	4.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
764.1'	0.0'	Top of Hole							
762.6'	1.5'	OVERBURDEN (Fill), consisted of gravel, clay, sand and ash		SPT-1	0.0 - 1.5	1.3	8-12-19	18	Boring advanced using 3 1/4 " Hollow Stem Augers
		Bottom Ash 55% / Fly Ash 45% (Fill), dark gray, moist, loose to medium dense, non-plastic		SPT-2	1.5 - 3.0	1.1	20-18-16	17	
				SPT-3	3.0 - 4.5	1.2	12-10-10	26	
758.6'	5.5'			SPT-4	4.5 - 6.0	1.4	8-9-3	26	
		FLY ASH (Fill), dark gray, saturated, very loose to medium dense, non-plastic		SPT-5	6.0 - 7.5	1.1	3-2-2	27	
				SPT-6	7.5 - 9.0	1.1	11-14-30	27	
				SPT-7	9.0 - 10.5	1.1	7-14-23	24	
753.1'	11.0'			SPT-8	10.5 - 12.0	1.2	4-9-15	26	
752.6'	11.5'	LEAN CLAY (Fill), dark red brown, moist, stiff to very stiff, trace chert		SPT-9	12.0 - 13.5	1.3	18-20-20	25	
		Bottom Ash 55% / Fly Ash 45% (Fill), dark gray, saturated, medium dense to very loose, non-plastic		SPT-10	13.5 - 15.0	1.4	4-3-2	24	
				SPT-11	15.0 - 16.5	1.1	2-2-2	28	
				SPT-12	16.5 - 18.0	1.0	2-2-2	24	
				SPT-13	18.0 - 19.5	1.0	3-2-4	26	
744.1'	20.0'			SPT-14	19.5 - 21.0	1.1	4-5-6	35	
		FLY ASH (Fill), gray, saturated, very loose to loose, non-plastic. Layer placed by sedimentation		SPT-15	21.0 - 22.5	1.2	5-7-5	35	
				SPT-16	22.5 - 24.0	1.2	3-2-3	32	
				SPT-17	24.0 - 25.5	1.0	4-4-4	27	
				SPT-18	25.5 - 27.0	0.9	3-3-4	38	
				SPT-19	27.0 - 28.5	1.1	5-5-7	34	
				SPT-20	28.5 - 30.0	1.3	4-5-6	31	
				SPT-21	30.0 - 31.5	1.2	2-2-3	34	
				SPT-22	31.5 - 33.0	1.1	2-1-1	30	
				SPT-23	33.0 - 34.5	1.1	2-1-1	31	
				SPT-24	34.5 - 36.0	1.1	WOR-WOH-1	33	

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Project No. <u>175569042</u>		Location <u>N 554943.73, E 2442287.49 (NAD27)</u>	
Project Name <u>Kingston Ash Pond</u>		Boring No. <u>STN-55</u> Total Depth <u>64.2 ft</u>	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
726.1'	38.0'	SILT, dark brown, saturated, very soft to soft, some clay		SPT-25	36.0 - 37.5	1.3	WOH-1-1	39	
724.1'	40.0'		SPT-26	37.5 - 39.0	1.3	WOH-WOH-WOH	41		
			SPT-27	39.0 - 40.5	1.4	WOR-WOH-1	30		
709.1'	55.0'	LEAN CLAY, light gray and brown, saturated, very soft to soft, some silt, some fine grained sand	SPT-28	40.5 - 42.0	1.2	WOR-WOR-WOR	21		
			ST-1	42.0 - 44.0	2.0		--		
			ST-2	44.0 - 46.0	2.0		--		
			SPT-29	46.0 - 47.5	1.1	4-4-4	21		
			SPT-30	47.5 - 49.0	1.3	2-2-1	24		
			SPT-31	49.0 - 50.5	1.1	WOH-1-2	23		
			SPT-32	50.5 - 52.0	1.2	WOH-1-2	24		
			SPT-33	52.0 - 53.5	0.9	WOH-WOH-WOH	20		
			SPT-34	53.5 - 55.0	1.1	WOR-WOH-1	21		
			706.1'	58.0'	SAND, gray, saturated, loose, fine grained, trace clayey silt	SPT-35	55.0 - 56.5	1.4	1-2-3
SPT-36	56.5 - 58.0	1.3				3-8-10	24		
703.1'	61.0'	SILTY SAND with Gravel, gray, saturated, loose, fine grained, trace clayey silt, medium to coarse angular gravel	SPT-37	58.0 - 59.4	1.1	10-44-46/0.4	17		
			SPT-38	59.5 - 60.2	0.7	20-50/0.2	12		
			SPT-39	60.5 - 61.4	0.9	50-50/0.4	12		
699.9'	64.2'	Shale, (Augered)		SPT-40	62.0 - 63.1	1.1	44-50-6/0.1	9	Boring backfilled with bentonite cement grout from 0.0 ft to 64.2 ft
Auger Refusal / Bottom of Hole									

WOH = Weight of Hammer
WOR = Weight of Rods

FLSH LEGACY 171408117 KINGSTON ASH POND.GPJ FLSH.MGD 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554555.61, E 2441998.50 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-56	Total Depth	82.0 ft
Location	Kingston, Tennessee	Surface Elevation	765.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	3/17/09	Completed	3/18/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	7.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
765.8'	0.0'	Top of Hole							
763.3'	2.5'	OVERBURDEN (Fill), consisted of gravel, clay, sand and ash		SPT-1	0.0 - 1.5	1.2	5-8-8	20	Boring advanced using 3 1/4" Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.0	9-17-20	15	
		Bottom Ash 55% / Fly Ash 45% (Fill), dark gray to black, moist, medium dense, non-plastic		SPT-3	3.0 - 4.5	1.1	10-19-19	19	
759.8'	6.0'			SPT-4	4.5 - 6.0	1.3	8-13-15	16	
		Bottom Ash (Fill), dark gray, moist, medium dense to very dense, non-plastic		SPT-5	6.0 - 7.5	1.0	11-19-17	15	
				SPT-6	7.5 - 8.9	1.4	13-44-43/0.4	21	
755.8'	10.0'			SPT-7	9.0 - 9.7	0.7	25-50/0.2	20	
		Bottom Ash 55% / Fly Ash 45% (Fill), black, saturated, medium dense to dense, non-plastic		SPT-8	10.5 - 12.0	1.0	18-27-35	19	
				SPT-9	12.0 - 13.5	1.3	12-12-15	26	
752.3'	13.5'			SPT-10	13.5 - 15.0	1.3	10-14-11	21	
		Bottom Ash (Fill), dark gray, saturated, medium dense to very loose, non-plastic		SPT-11	15.0 - 16.5	1.1	4-3-2	19	
				SPT-12	16.5 - 18.0	1.2	WOH-1-WOH	24	
				SPT-13	18.0 - 19.5	0.5	WOR-WOR-WOR	22	
745.3'	20.5'			SPT-14	19.5 - 21.0	1.2	10-3-2	32	
		Fly Ash (Fill), dark gray, saturated, very loose to loose, non-plastic		SPT-15	21.0 - 22.5	1.0	WOR-WOH-2	33	
				SPT-16	22.5 - 24.0	1.5	3-2-2	32	
				SPT-17	24.0 - 25.5	1.1	1-2-3	31	
				SPT-18	25.5 - 27.0	1.0	4-5-7	28	
				SPT-19	27.0 - 28.5	1.0	3-4-4	35	
				SPT-20	28.5 - 30.0	1.3	1-1-2	43	
				SPT-21	30.0 - 31.5	1.3	2-2-3	40	
				SPT-22	31.5 - 33.0	1.5	4-5-6	37	
				SPT-23	33.0 - 34.5	1.5	2-2-3	34	
				SPT-24	34.5 - 36.0	1.3	WOR-WOH-WOH	31	

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
725.8'	40.0'	Fly Ash (Fill), dark gray, saturated, very loose to loose, non-plastic (Continued)		SPT-25	36.0 - 37.5	1.5	WOR-WOR-2	30	40 ft - augering brought up water that has remained
				SPT-26	37.5 - 39.0	1.5	WOH-1-1	26	
				SPT-27	39.0 - 40.5	1.5	WOH-WOH-WOH	28	
722.8'	43.0'	SILTY CLAY, gray, saturated, soft, some fine grained sand		SPT-28	40.5 - 42.0	1.0	WOR-WOH-1	21	
				SPT-29	42.0 - 43.5	1.0	4-5-6	21	
				SPT-30	43.5 - 45.0	1.0	3-4-3	21	
719.8'	46.0'	SILTY SAND, gray with brown, saturated, loose		SPT-31	45.0 - 46.5	1.0	2-4-5	19	
				SPT-32	46.5 - 48.0	1.0	WOH-WOH-1	24	
				SPT-33	48.0 - 49.5	1.0	WOR-WOR-WOH	23	
704.8'	61.0'	SAND, light gray to brown, saturated, loose to medium dense, fine to medium grained, some silt		SPT-34	49.5 - 51.0	1.0	1-1-1	19	
				SPT-35	51.0 - 52.5	1.4	WOH-WOH-WOH	21	
				SPT-36	52.5 - 54.0	1.0	2-2-2	19	
				SPT-37	54.0 - 55.5	1.2	WOH-1-1	22	
				SPT-38	55.5 - 57.0	1.1	3-3-3	19	
				SPT-39	57.0 - 58.5	1.3	2-4-5	19	
				SPT-40	58.5 - 60.0	1.3	3-2-3	20	
				SPT-41	60.0 - 61.5	1.3	4-3-7	22	
703.7'	62.1'	SAND, light gray, saturated, loose to medium dense, fine grained, some medium grained sand, some fine to medium rounded gravel		SPT-42	61.5 - 62.1	0.6	5-50/0.1	11	Began Core
693.6'	72.2'	Shale, dark gray, very fine grained, very soft, thin bedded, highly weathered, calcareous, 45 deg to 60 deg bedding angle	0%		2.2	2.2	100	64.3	
			0%		2.4	2.3	96	66.7	
			0%		2.3	2.2	96	69.0	
			0%		3.0	2.8	93	72.0	
			0%		2.3	2.1	91	74.3	
691.8'	74.0'	Limestone, light gray, fine to medium grained, hard, thin bedded, moderately weathered, 45 deg to 60 deg bedding angle	0%		1.5	1.2	80	75.8	
			0%						

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SUBSURFACE LOG

Project No.	175569042	Location	N 554555.61, E 2441998.50 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-56	Total Depth 82.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
683.8'	82.0'	Shale, dark gray, very fine grained, very soft, thin bedded, moderately to highly weathered, calcareous, 45 deg to 60 deg bedding angle 0.5' of limestone at 79.0 ft <i>(Continued)</i> Bottom of Hole Top of Rock = 61.0' Elevation (704.8') WOH = Weight of Hammer WOR = Weight of Rods		13%	3.2	3.0	94	79.0	Boring backfilled with bentonite cement grout from 0.0 ft to 82.0 ft
				0%	3.0	2.9	97	82.0	

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Project No.	175569042	Location	N 556075.53, E 2442603.06 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-59	Total Depth	51.5 ft
Location	Kingston, Tennessee	Surface Elevation	752.2 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/27/09	Completed	5/27/09
Supervisor	Ben Halada Driller Kent Clements	Depth to Water	17.0 ft	Date/Time	5/27/09
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
752.2'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.2	3-3-4	19	Boring advanced using 3 1/4 " Hollow Stem Augers SPT-2: ash in tip of spoon
749.2'	3.0'			SPT-2	1.5 - 3.0	1.0	3-7-11	18	
748.7'	3.5'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-3	3.0 - 4.5	1.3	12-13-25	13	
748.2'	4.0'			SPT-4	4.5 - 6.0	1.0	5-14-12	13	
747.2'	5.0'	FAT CLAY (Fill), red brown, moist, medium stiff		SPT-5	6.0 - 7.5	1.3	8-10-12	16	
		BOTTOM ASH (Fill), black, moist, medium dense		SPT-6	7.5 - 9.0	0.7	11-13-11	18	
		LEAN CLAY (Fill), light gray to brown, moist, soft to medium stiff		ST-1	9.0 - 11.0	2.0		--	
				SPT-7	11.0 - 12.5	1.2	3-3-4	20	
738.2'	14.0'			SPT-8	12.5 - 14.0	0.7	1-2-5	17	
		SAND, light brown to dark gray, moist, medium dense, fine to medium grained, trace silty clay		SPT-9	14.0 - 15.5	1.3	WOH-WOH	21	
736.2'	16.0'			SPT-10	15.5 - 17.0	1.3	WOH-WOH	20	
		SILTY SAND, red brown, moist, medium dense, with some clay		SPT-11	17.0 - 18.5	1.5	1-2-3	22	
				SPT-12	18.5 - 20.0	1.3	1-2-4	22	
				SPT-13	20.0 - 21.5	1.2	1-1-3	24	
				SPT-14	21.5 - 23.0	1.0	3-3-5	19	
				SPT-15	23.0 - 24.5	1.3	WOH-WOH-2	20	
726.2'	26.0'			SPT-16	24.5 - 26.0	1.0	2-1-1	20	
		SAND, light brown, moist, very loose to loose, fine to medium grained, some clay		SPT-17	26.0 - 27.5	1.2	WOH-1-1	20	Water added to 26.0 ft to keep augers clear
				SPT-18	27.5 - 29.0	1.4	WOH-1-1	22	
				SPT-19	29.0 - 30.5	1.0	WOR-WOR	20	
				SPT-20	30.5 - 32.0	1.3	WOR-WOR-1	21	
				SPT-21	32.0 - 33.5	1.4	WOR-WOR-1	26	
				SPT-22	33.5 - 35.0	1.1	WOR-WOH	22	
				SPT-23	35.0 - 36.5	1.2	WOH-1-1	21	

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Project No.	175569042	Location	N 556075.53, E 2442603.06 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-59	Total Depth	51.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
712.7'	39.5'	SAND, light brown, moist, very loose to loose, fine to medium grained, some clay <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.5	WOH-1-1	21	SPT-27: light gray sand in tip of spoon Boring backfilled with bentonite cement grout from 0.0 ft to 51.5 ft
				SPT-25	38.0 - 39.5	1.0	WOH-WOH-1	22	
711.2'	41.0'	LEAN CLAY, light brown and gray, moist, medium stiff, some fine to medium grained sand		SPT-26	39.5 - 41.0	1.0	2-2-3	20	
708.2'	44.0'	SAND, light brown, moist, very loose to loose, fine to medium grained, some clay		SPT-27	41.0 - 42.5	1.2	2-1-3	19	
				SPT-28	42.5 - 44.0	1.2	3-7-9	22	
				SPT-29	44.0 - 45.5	1.3	WOH-6-11	23	
				SPT-30	45.5 - 47.0	1.3	2-6-11	24	
				SPT-31	47.0 - 48.5	1.5	9-13-21	24	
701.2'	51.0'	SAND, brown to red brown, moist, dense, fine to coarse grained		SPT-32	48.5 - 50.0	1.2	1-6-8	26	
700.7'	51.5'			SPT-33	50.0 - 51.5	1.4	10-13-32	22	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Split Samples: SPT-3, 4 and 33

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SUBSURFACE LOG

Project No.	175569042	Location	N 555886.92, E 2442663.31 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-60	Total Depth	53.5 ft
Location	Kingston, Tennessee	Surface Elevation	752.5 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/26/09	Completed	5/26/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	20.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
752.5'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	5-4-3	22	Boring advanced using 3 1/4" Hollow Stem Augers SPT-2: ash in tip of spoon
				SPT-2	1.5 - 3.0	1.1	3-6-12	18	
748.5'	4.0'			SPT-3	3.0 - 4.5	1.2	12-13-20	15	
747.5'	5.0'	BOTTOM ASH (Fill), black, moist, dense		SPT-4	4.5 - 6.0	1.1	6-8-11	15	
		LEAN CLAY (Fill), red brown to brown, moist, medium stiff, some fine gravel		SPT-5	6.0 - 7.5	1.3	13-15-16	16	
				SPT-6	7.5 - 9.0	1.2	16-15-19	18	
				ST-1	9.0 - 11.0	2.0		--	
				SPT-7	11.0 - 12.5	1.3	4-6-9	19	
738.5'	14.0'	LEAN CLAY, light brown to brown, moist, soft, some fine grained sand		SPT-8	12.5 - 14.0	1.0	5-8-11	17	
				SPT-9	14.0 - 15.5	1.1	2-2-2	20	
				SPT-10	15.5 - 17.0	1.0	2-3-3	19	
734.5'	18.0'	SAND, dark gray, moist, medium, fine to medium grained, some clay		SPT-11	17.0 - 18.5	1.2	3-8-11	20	
				SPT-12	18.5 - 20.0	0.0	7-5-2	--	
732.5'	20.0'	LEAN CLAY, light brown, moist, soft, some silt, some fine grained sand		SPT-13	20.0 - 21.5	0.9	WOH-1-2	21	
				SPT-14	21.5 - 23.0	1.5	WOH-WOH-2	23	
				ST-2	23.0 - 25.0	1.0		--	
				SPT-15	25.0 - 26.5	1.4	WOH-2-3	22	
726.0'	26.5'	SILTY SAND, brown, moist, very loose to loose		SPT-16	26.5 - 28.0	1.3	WOH-2-4	23	
				SPT-17	28.0 - 29.5	1.3	WOH-2-3	21	
				SPT-18	29.5 - 31.0	1.4	WOH-1-3	22	
				SPT-19	31.0 - 32.5	1.5	1-1-3	22	
				SPT-20	32.5 - 34.0	1.3	WOH-3-5	21	
				SPT-21	34.0 - 35.5	1.3	WOH-WOH-1	23	
				SPT-22	35.5 - 37.0	1.1	3-6-5	21	SPT-22: fine sand in

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
715.5'	37.0'	SAND, light brown and gray, moist, medium dense, fine to medium grained, some clay		SPT-23	37.0 - 38.5	1.5	2-3-4	21	tip of spoon
			SPT-24	38.5 - 40.0	0.5	WOR-WOH-1	24	SPT-24: fine to medium sand in tip of spoon	
712.5'	40.0'	SAND, light gray, saturated, medium dense, fine to medium grained		SPT-25	40.0 - 41.5	1.3	1-2-2	21	Water added to 40.0 ft to keep augers clear
			SPT-26	41.5 - 43.0	1.5	1-2-2	19		
			SPT-27	43.0 - 44.5	0.5	WOH-2-3	20		
			SPT-28	44.5 - 46.0	1.0	WOH-6-8	27		
			SPT-29	46.0 - 47.5	1.5	6-8-17	19	SPT-31: sandstone in tip of spoon	
704.5'	48.0'		SPT-30	47.5 - 49.0	1.1	17-13-15	22		
		SAND, light brown, moist, medium dense to dense, fine to coarse grained		SPT-31	49.0 - 50.5	0.1	9-8-12	9	Boring backfilled with bentonite cement grout from 0.0 ft to 53.5 ft
701.0'	51.5'		SPT-32	50.5 - 52.0	1.3	9-11-13	19		
			SPT-33	52.0 - 53.4	0.4	31-38-31/0.4	--		
699.0'	53.5'	Shale, (Augered)							
		Auger Refusal / Bottom of Hole							

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Project No.	175569042	Location	N 555513.59, E 2442792.80 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-61	Total Depth 51.5 ft
Location	Kingston, Tennessee	Surface Elevation	752.5 ft. (NGVD29)	
Project Type	Geotechnical Exploration	Date Started	4/15/09	Completed 4/15/09
Supervisor	Ben Halada Driller Kent Clements	Depth to Water	15.0 ft	Date/Time 4/15/09
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer <input type="checkbox"/> Other <input type="checkbox"/>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core						
752.5'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	3-3-3	20	Boring advanced using 3 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.1	4-6-7	18	
				SPT-3	3.0 - 4.5	1.1	4-7-7	32	
746.5'	6.0'	BOTTOM ASH 60% / FLY ASH 40% (Fill), black, moist to saturated, loose to medium dense		ST-1	4.5 - 6.0	1.0		--	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling ST-1: refused at 1.5 ft
				SPT-4	6.0 - 7.5	1.3	9-14-13	21	
				SPT-5	7.5 - 9.0	1.1	4-7-7	8	
				SPT-6	9.0 - 10.5	1.3	15-16-10	10	
				SPT-7	10.5 - 12.0	1.0	2-5-7	13	
				SPT-8	12.0 - 13.5	0.8	4-5-5	18	
				SPT-9	13.5 - 15.0	0.7	1-3-1	16	
				SPT-10	15.0 - 16.5	0.8	1-5-3	21	
735.5'	17.0'	SAND, light brown, saturated, very loose, fine grained, trace silt		SPT-11	16.5 - 18.0	1.4	3-WOH-WOH	19	Water added at 21.0 ft to keep augers clear
734.5'	18.0'			SPT-12	18.0 - 19.5	1.0	WOR-WOH-WOH	21	
		LEAN CLAY, light brown, moist, very soft, trace fine grained sand, some silt		SPT-13	19.5 - 21.0	1.1	WOR-WOH-WOH	23	
				SPT-14	21.0 - 22.5	1.3	3-2-1	22	
				ST-2	22.5 - 24.5	2.0		--	
				SPT-15	24.5 - 26.0	1.3	WOR-WOH-1	18	
725.5'	27.0'	SAND, brown, saturated, loose to medium dense, fine grained, trace silt		SPT-16	26.0 - 27.5	1.3	3-2-1	18	
				SPT-17	27.5 - 29.0	1.3	1-2-1	16	
				SPT-18	29.0 - 30.5	1.3	WOR-WOH-2	19	
				SPT-19	30.5 - 32.0	1.0	1-3-2	19	
				SPT-20	32.0 - 33.5	1.1	3-1-1	19	
				SPT-21	33.5 - 35.0	0.9	1-1-1	20	
				SPT-22	35.0 - 36.5	1.4	2-1-2	20	

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Project No. <u>175569042</u>	Location <u>N 555513.59, E 2442792.80 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-61</u> Total Depth <u>51.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
706.5'	46.0'	SAND, brown, saturated, loose to medium dense, fine grained, trace silt <i>(Continued)</i>		SPT-23	36.5 - 38.0	1.5	4-5-4	19	
				SPT-24	38.0 - 39.5	1.0	5-6-4	21	
				SPT-25	39.5 - 41.0	1.1	4-3-5	23	
				SPT-26	41.0 - 42.5	1.2	4-6-5	19	
				SPT-27	42.5 - 44.0	1.1	6-11-10	20	
				SPT-28	44.0 - 45.5	0.5	3-4-5	24	
				SPT-29	45.5 - 46.9	1.4	29-37-34/0.4	--	SPT-29: sandstone in tip of spoon
702.5'	50.0'	Sandstone, (Augered)		SPT-30	47.0 - 48.4	1.4	37-42-21/0.4	--	SPT-31: shale in tip of spoon
				SPT-31	48.5 - 50.0	0.3	17-22-50	--	Boring backfilled with bentonite cement grout from 0.0 ft to 51.5 ft
				SPT-32	50.0 - 50.8	0.8	17-50/0.3	--	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Split Samples: SPT-11 and 16

FINSH_LEGACY_175569042_KINGSTON_ASH_POND.GPJ_FINSH_LGD_7/16/09

Project No.	175569042	Location	N 555020.69, E 2442907.23 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-62	Total Depth	49.0 ft
Location	Kingston, Tennessee	Surface Elevation	749.8 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/8/09	Completed	4/9/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	10.5 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
749.8'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, medium stiff, some chert		SPT-1	0.0 - 1.5	1.0	2-3-5	24	Boring advanced using 3 1/4 " Hollow Stem Augers
747.3'	2.5'			SPT-2	1.5 - 3.0	1.2	7-15-13	17	
746.8'	3.0'	GRAVEL (Fill), gray, moist, dense		SPT-3	3.0 - 4.5	1.5	4-5-6	19	
		BOTTOM ASH 60% / FLY ASH 40% (Fill), black, moist to saturated, loose to medium dense		SPT-4	4.5 - 6.0	1.3	7-14-15	14	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-5	6.0 - 7.5	1.0	9-8-6	8	
				SPT-6	7.5 - 9.0	1.0	5-8-6	8	
				SPT-7	9.0 - 10.5	1.1	4-5-5	13	
				SPT-8	10.5 - 12.0	1.1	3-4-4	15	
				SPT-9	12.0 - 13.5	0.8	4-3-3	12	
734.8'	15.0'			SPT-10	13.5 - 15.0	0.2	3-2-2	14	
		SAND, light brown, saturated, very loose, fine grained		SPT-11	15.0 - 16.5	1.5	3-1-1	20	
				SPT-12	16.5 - 18.0	1.3	WOH- WOH-WOH	20	
				SPT-13	18.0 - 19.5	1.0	WOR- WOR-WOR	18	
729.8'	20.0'			SPT-14	19.5 - 21.0	1.0	WOR-1-1	20	
		SAND, light brown, saturated, very loose, fine grained, some silt		SPT-15	21.0 - 22.5	1.1	WOR- WOR-1	21	
				SPT-16	22.5 - 24.0	1.1	WOH- WOH-WOH	23	
724.8'	25.0'			SPT-17	24.0 - 25.5	1.1	WOH- WOH-WOH	24	
		LEAN CLAY, light brown and gray, moist, very soft, some fine grained sand		SPT-18	25.5 - 27.0	1.1	WOH-1-1	23	
				SPT-19	27.0 - 28.5	1.2	WOH-1-2	25	
				ST-1	28.5 - 30.5	2.0		--	
				SPT-20	30.5 - 32.0	1.4	WOH-1-1	22	
716.8'	33.0'			SPT-21	32.0 - 33.5	1.1	4-3-2	25	Water added at 35.0 ft to keep augers clear
715.3'	34.5'	SAND, light brown and light gray, saturated, very loose, fine grained, some clay		SPT-22	33.5 - 35.0	1.3	WOH- WOH-WOH	26	
				SPT-23	35.0 - 36.5	1.1	WOH- WOH-WOH	24	

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Project No. <u>175569042</u>	Location <u>N 555020.69, E 2442907.23 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-62</u> Total Depth <u>49.0 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
705.8'	44.0'	SAND, light gray, saturated, very loose, fine grained, some silt <i>(Continued)</i>		SPT-24	36.5 - 38.0	1.1	WOH- WOH-WOH	20	
				SPT-25	38.0 - 39.5	1.3	WOH- WOH-1	20	
				SPT-26	39.5 - 41.0	1.3	2-2-2	21	
				SPT-27	41.0 - 42.5	1.3	WOH-1-1	21	
				SPT-28	42.5 - 44.0	1.3	WOH-1-2	22	
702.8'	47.0'	SAND, gray, saturated, medium dense, fine grained, trace silt		SPT-29	44.0 - 45.5	1.1	7-9-15	19	SPT-30: shale in tip of spoon
				SPT-30	45.5 - 47.0	0.8	40-32-25	16	Boring backfilled with bentonite cement grout from 0.0 ft to 49.0 ft
700.8'	49.0'			SPT-31	47.0 - 47.9	0.7	45-50/0.4	--	

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

FMSL_LEGACY: 175569117 KINGSTON ASH POND.GPJ, FMSL.GDT, 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554822.75, E 2442910.57 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-63	Total Depth	49.0 ft
Location	Kingston, Tennessee	Surface Elevation	750.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/2/09	Completed	4/2/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	10.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
750.0'	0.0'	Top of Hole							
748.0'	2.0'	LEAN CLAY (Fill), red brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.1	1-4-9	17	Boring advanced using 3 1/4 " Hollow Stem Augers All ST samples recovered using a fixed head piston sampler ST-2: sand in bottom to tube Water added at 23.5 ft to keep augers clear
				SPT-2	1.5 - 3.0	1.3	8-16-14	18	
743.0'	7.0'	BOTTOM ASH (Fill), black, moist, medium dense		SPT-3	3.0 - 4.5	1.3	10-21-14	13	
				SPT-4	4.5 - 6.0	1.1	5-6-12	13	
				SPT-5	6.0 - 7.5	1.1	7-9-11	18	
				SPT-6	7.5 - 9.0	0.9	5-6-6	24	
				ST-1	9.0 - 11.0	1.2	--	--	
734.0'	16.0'	LEAN CLAY (Fill), light brown, moist, soft to medium stiff, some		SPT-7	11.0 - 12.5	0.7	1-1-2	24	
				SPT-8	12.5 - 14.0	0.7	1-2-2	24	
				ST-2	14.0 - 16.0	2.0	--	--	
				SPT-9	16.0 - 17.5	0.4	WOR-WOR-WOR	30	
				SPT-10	17.5 - 19.0	1.0	WOR-WOH-1	25	
728.0'	22.0'	SAND, gray, saturated, very loose, fine grained		SPT-11	19.0 - 20.5	1.3	WOR-WOR-WOR	21	
				SPT-12	20.5 - 22.0	0.0	WOH-WOH-WOH	--	
				SPT-13	22.0 - 23.5	1.1	WOH-1-1	21	
726.0'	24.0'	SILT, brown, saturated, very soft, some fine grained sand, trace clay		SPT-14	23.5 - 25.0	1.0	WOR-WOR-1	19	
725.0'	25.0'			SPT-15	25.0 - 26.5	1.3	1-1-1	23	
719.5'	30.5'	SAND, light brown to brown, saturated, very loose, fine grained, some clay		SPT-16	26.5 - 28.0	1.2	WOH-1-1	20	
				SPT-17	28.0 - 29.5	1.1	WOR-WOR-WOR	24	
				SPT-18	29.5 - 31.0	1.1	WOR-WOH-2	27	
716.0'	34.0'	SILT, dark gray, saturated, very soft, trace clay		SPT-19	31.0 - 32.5	1.1	WOH-WOH-WOH	23	
				SPT-20	32.5 - 34.0	0.5	WOH-WOH-WOH	25	
				SPT-21	34.0 - 35.5	1.0	WOH-WOH-2	27	
714.0'	36.0'	SAND, brown, saturated, very loose, fine grained, some silt		SPT-22	35.5 - 37.0	1.4	WOH-	23	

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SUBSURFACE LOG

Project No.	175569042	Location	N 554822.75, E 2442910.57 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-63	Total Depth 49.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois. Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
702.5'	47.5'	SAND, light gray, saturated, very loose, fine grained, trace silt (Continued)		SPT-23	37.0 - 38.5	1.1	WOH-WOH	22		
				SPT-24	38.5 - 40.0	1.1	WOH-WOH	19		
				SPT-25	40.0 - 41.5	1.4	WOR-WOR	22		
				SPT-26	41.5 - 43.0	1.1	WOR-WOH-1	25		
				SPT-27	43.0 - 44.5	1.1	WOR-WOH-2	32		
				SPT-28	44.5 - 46.0	1.3	1-3-7	27	SPT-28: sandstone in tip of spoon	
				SPT-29	46.0 - 47.5	1.1	3-5-14	18	SPT-29: shale in tip of spoon	
				SPT-30	47.5 - 48.9	0.9	10-24-28		Boring backfilled with bentonite cement grout from 0.0 ft to 49.0 ft	
									20-44-36/0.4	
			701.0'	49.0'						

Shale, (Augered)

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 554411.29, E 2442911.08 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-64	Total Depth	55.5 ft
Location	Kingston, Tennessee	Surface Elevation	749.4 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/3/09	Completed	4/6/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	8.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
749.4'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, soft to medium stiff, some gravel		SPT-1	0.0 - 1.5	0.7	2-2-3	24	Boring advanced using 3 1/4" Hollow Stem Augers Slope indicator installed with a concrete pad and protective cover, 60.0 ft total (5.0 ft stickup) Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling Water added to 30.0 ft to keep augers clear
746.4'	3.0'			SPT-2	1.5 - 3.0	1.1	3-5-5	23	
		FAT CLAY (Fill), light brown, moist, soft, some bottom ash		SPT-3	3.0 - 4.5	1.1	5-6-6	20	
743.4'	6.0'			SPT-4	4.5 - 6.0	1.0	5-3-4	21	
		BOTTOM ASH (Fill), black, saturated, loose		SPT-5	6.0 - 7.5	1.2	8-6-5	17	
741.4'	8.0'			SPT-6	7.5 - 9.0	0.5	2-2-2	24	
		LEAN CLAY (Fill), light brown, moist, soft to very soft, some fine grained sand		SPT-7	9.0 - 10.5	1.0	WOH-1-2	23	
				SPT-8	10.5 - 12.0	1.1	2-2-3	20	
				SPT-9	12.0 - 13.5	1.0	2-2-5	21	
				ST-1	13.5 - 15.5	1.5		--	
				SPT-10	15.5 - 17.0	0.4	WOH-WOH	23	
				SPT-11	17.0 - 18.5	1.2	WOH-WOH	25	
				SPT-12	18.5 - 20.0	1.1	WOH-WOH	27	
				ST-2	20.0 - 22.0	2.0		--	
726.4'	23.0'			SPT-13	22.0 - 23.5	1.1	WOH-1-1	33	
		SILT, dark gray, saturated, very soft, trace clay		SPT-14	23.5 - 25.0	1.4	WOH-1-2	29	
		LEAN CLAY, gray and brown, saturated, very soft, some silt		SPT-15	25.0 - 26.5	1.1	WOH-WOH	26	
				SPT-16	26.5 - 28.0	1.1	WOH-1-2	27	
				SPT-17	28.0 - 29.5	1.4	1-2-3	27	
				ST-3	29.5 - 31.5	2.0		--	
				SPT-18	31.5 - 33.0	1.3	1-2-2	25	
				SPT-19	33.0 - 34.5	1.1	1-2-1	22	
714.4'	35.0'			SPT-20	34.5 - 36.0	1.0	WOH-WOH	21	
		SAND, gray, saturated, loose to very loose, fine grained, trace silt							

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SUBSURFACE LOG

Project No. <u>175569042</u>	Location <u>N 554411.29, E 2442911.08 (NAD27)</u>
Project Name <u>Kingston Ash Pond</u>	Boring No. <u>STN-64</u> Total Depth <u>55.5 ft</u>

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks	
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth		
702.9'	46.5'	SAND, gray, saturated, loose to very loose, fine grained, trace silt <i>(Continued)</i>		SPT-21	36.0 - 37.5	1.1	WOH- WOH-WOH	20		
				SPT-22	37.5 - 39.0	1.2	WOR- WOR-WOR	22		
				SPT-23	39.0 - 40.5	1.1	2-1-2	19		
				SPT-24	40.5 - 42.0	1.1	WOH- WOH-WOH	20		
				SPT-25	42.0 - 43.5	1.1	2-1-1	22		
				SPT-26	43.5 - 45.0	1.2	2-2-3	28		
				SPT-27	45.0 - 46.5	1.4	5-6-6	22		SPT-26, 27: wood fragments in sample
				SPT-28	46.5 - 46.8	0.3	50/0.3	--		SPT-28: wood fragments in sample, shale in tip of spoon
693.9'	55.5'	Shale, (Augered)		SPT-29	50.0 - 50.5	0.5	50-10/0.0	--	Boring backfilled with bentonite cement grout from 0.0 ft to 55.5 ft	

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

FMSBL_LEGACY_171426117_KINGSTON_ASH_POND.GPJ_FMSBL.GDT_7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 554147.51, E 2442915.09 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-65	Total Depth	50.0 ft
Location	Kingston, Tennessee	Surface Elevation	748.6 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/7/09	Completed	4/7/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	12.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
748.6'	0.0'	Top of Hole							
747.1'	1.5'	GRAVEL (Fill), gray, moist, dense, with clay		SPT-1	0.0 - 1.5	0.2	5-4-7	10	Boring advanced using 3 1/4 " Hollow Stem Augers
		BOTTOM ASH 40% / FLY ASH 60% (Fill), black, saturated, loose		SPT-2	1.5 - 3.0	1.2	8-13-16	20	
				SPT-3	3.0 - 4.5	1.2	9-11-13	18	Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-4	4.5 - 6.0	1.3	8-7-5	20	
				SPT-5	6.0 - 7.5	1.1	5-7-11	15	
740.1'	8.5'			SPT-6	7.5 - 9.0	1.1	4-6-11	21	
		LEAN CLAY (Fill), brown, moist, very soft to soft		SPT-7	9.0 - 10.5	0.3	3-5-4	19	
				SPT-8	10.5 - 12.0	1.0	5-4-3	20	
				SPT-9	12.0 - 13.5	1.0	4-3-3	19	
				ST-1	13.5 - 15.5	1.9	--	--	
				SPT-10	15.5 - 17.0	1.2	2-1-1	22	
				SPT-11	17.0 - 18.5	1.0	1-1-2	25	
				ST-2	18.5 - 20.5	1.8	--	--	
				SPT-12	20.5 - 22.0	1.3	WOH-1-1	25	
				SPT-13	22.0 - 23.5	1.3	WOH- WOH-2	26	SPT-13: wood fragments in sample
724.1'	24.5'			SPT-14	23.5 - 25.0	1.3	WOR- WOH-1	24	
		SILT, gray, moist, very soft		SPT-15	25.0 - 26.5	1.2	WOH- WOH-2	27	
722.1'	26.5'			SPT-16	26.5 - 28.0	1.1	WOH-2-1	29	
		SILT, brown, saturated, very soft, some clay		SPT-17	28.0 - 29.5	1.1	WOH- WOH-WOH	26	SPT-17: wood fragments in sample
719.1'	29.5'			SPT-18	29.5 - 31.0	1.0	WOH- WOH-1	28	
				SPT-19	31.0 - 32.5	1.1	4-2-3	29	
		LEAN CLAY, light brown to brown, moist, very soft		ST-3	32.5 - 34.5	2.0	--	--	
				SPT-20	34.5 - 36.0	1.0	WOH- WOH-WOH	29	

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Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
703.6'	45.0'	LEAN CLAY, light brown to brown, moist, very soft <i>(Continued)</i>		SPT-21	36.0 - 37.5	1.3	WOH- WOH-WOH	27	SPT-26: sand in tip of spoon SPT-27: wood fragments in sample SPT-28: wood fragments in sample, shale in tip of spoon Boring backfilled with bentonite cement grout from 0.0 ft to 50.0 ft
				SPT-22	37.5 - 39.0	1.2	WOH- WOH-WOH	27	
				SPT-23	39.0 - 40.5	1.5	WOH- WOH-1	25	
				SPT-24	40.5 - 42.0	1.3	WOH- WOH-WOH	29	
				SPT-25	42.0 - 43.5	1.4	WOH- WOH-WOH	27	
				SPT-26	43.5 - 45.0	1.1	WOR- WOR-WOR	30	
700.6'	48.0'	SAND, light gray, saturated, very loose to loose, fine to medium grained, some fine to medium gravel		SPT-27	45.0 - 46.5	1.1	WOR-2-4	52	
				SPT-28	46.5 - 48.0	1.4	WOH- WOH-WOH	25	
				SPT-29	48.0 - 48.7	0.5	20-50/0.2	--	
698.6'	50.0'	Shale, (Augered)							
Auger Refusal / Bottom of Hole									
WOH = Weight of Hammer WOR = Weight of Rods									

FMSIA_LEGACY - 17/08/17 KINGSTON ASH POND.GPJ FMSIA.GDT 7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 553888.83, E 2442564.24 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-66	Total Depth	57.0 ft
Location	Kingston, Tennessee	Surface Elevation	750.9 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	4/8/09	Completed	4/8/09
Supervisor	Ben Halada	Driller	Kent Clements	Depth to Water	10.0 ft
Logged By	Ben Halada	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
750.9'	0.0'	Top of Hole							
		FAT CLAY (Fill), red brown, moist, very soft to soft, some chert		SPT-1	0.0 - 1.5	1.0	5-3-3	15	Boring advanced using 3 1/4 " Hollow Stem Augers Piston sampler and sucker rods were utilized to obtain recovery during Shelby Tube sampling
				SPT-2	1.5 - 3.0	1.2	4-2-3	24	
				SPT-3	3.0 - 4.5	1.3	3-5-4	30	
				ST-1	4.5 - 6.5	1.0	--	--	
				SPT-4	6.5 - 8.0	1.0	6-4-4	28	
				SPT-5	8.0 - 9.5	1.3	2-3-4	31	
				SPT-6	9.5 - 11.0	1.0	2-3-3	32	
				SPT-7	11.0 - 12.5	1.2	5-5-5	28	
				SPT-8	12.5 - 14.0	1.1	1-2-1	28	
735.9'	15.0'	LEAN CLAY (Fill), brown, moist, soft, some gravel, some		SPT-9	14.0 - 15.5	0.8	WOH-1-1	34	
				SPT-10	15.5 - 17.0	0.5	2-2-4	15	
				SPT-11	17.0 - 18.5	0.8	2-3-4	17	
				SPT-12	18.5 - 20.0	0.5	2-3-12	20	
729.9'	21.0'	FAT CLAY, light brown, saturated, very soft		SPT-13	20.0 - 21.5	0.5	2-2-2	26	
727.9'	23.0'			SPT-14	21.5 - 23.0	0.4	1-1-2	30	
		SILT, gray, saturated, very soft, some clay		SPT-15	23.0 - 24.5	1.1	WOH-WOH	31	
				SPT-16	24.5 - 26.0	1.2	WOH-WOH-1	27	
723.4'	27.5'			SPT-17	26.0 - 27.5	1.1	WOH-1-2	25	
		SAND, light brown, saturated, very loose, fine grained, some clayey silt		SPT-18	27.5 - 29.0	1.2	1-1-2	22	
				SPT-19	29.0 - 30.5	1.2	WOH-WOH-1	25	
				SPT-20	30.5 - 32.0	1.3	5-4-4	22	
				SPT-21	32.0 - 33.5	1.0	WOH-1-2	22	
715.9'	35.0'	SAND, brown, saturated, very loose, fine grained, trace silt		ST-2	33.5 - 35.5	2.0	--	--	
				SPT-22	35.5 - 37.0	1.5	WOH-1-1	21	

FMSH_LEGACY_171468117_KINGSTON_ASH_POND.GPJ_FMSH_GDT_7/16/09



SUBSURFACE LOG

Project No.	175569042	Location	N 553888.83, E 2442564.24 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-66	Total Depth 57.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
711.9'	39.0'	SAND, brown, saturated, very loose, fine grained, trace silt <i>(Continued)</i>		SPT-23	37.0 - 38.5	1.4	WOR- WOH-1	20	
				SPT-24	38.5 - 40.0	1.3	WOR- WOH-WOH	21	
				SPT-25	40.0 - 41.5	1.3	WOR- WOH-WOH	20	
				SPT-26	41.5 - 43.0	1.2	WOH- WOH-WOH	19	
				SPT-27	43.0 - 44.5	1.3	WOH- WOH-WOH	22	
				SPT-28	44.5 - 46.0	1.2	1-2-1	19	
				SPT-29	46.0 - 47.5	1.3	1-WOH-1	21	
				SPT-30	47.5 - 49.0	1.0	2-1-1	29	Wood fragments present in SPT-30, 31, 32 and 34
				SPT-31	49.0 - 50.5	1.4	2-3-3	45	SPT-31: silt lenses
				SPT-32	50.5 - 52.0	1.5	WOR-3-4	36	
				SPT-33	52.0 - 53.5	1.2	WOR-2-2	30	
				SPT-34	53.5 - 55.0	1.2	WOH-2-3	35	
			695.9'	55.0'			SPT-35	55.0 - 55.5	0.4
693.9'	57.0'	Sandstone, (Augered)							

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

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SUBSURFACE LOG

Project No.	175569042	Location	N 553607.58, E 2441718.01 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-69	Total Depth	59.5 ft
Location	Kingston, Tennessee	Surface Elevation	752.3 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/18/09	Completed	5/20/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	19.5 ft
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
752.3'	0.0'	Top of Hole							
744.8'	7.5'	FAT CLAY with Gravel (Fill), red brown, moist, medium stiff, some gravel, trace		SPT-1	0.0 - 1.5	0.8	3-5-6	22	Boring advanced using 4 1/4 " Hollow Stem Augers
				SPT-2	1.5 - 3.0	1.0	5-6-4	23	
				SPT-3	3.0 - 4.5	1.2	4-8-6	29	
				SPT-4	4.5 - 6.0	1.2	3-3-5	21	
				SPT-5	6.0 - 7.4	0.8	4-50-46/0.4	18	
				SPT-6	7.5 - 7.7	0.2	50/0.2	3	
738.8'	13.5'	LEAN CLAY (Fill), light gray to dark gray, moist, stiff, some shale		SPT-7	9.0 - 10.5	1.3	23-16-16	8	
				SPT-8	10.5 - 12.0	1.1	10-16-8	10	
				SPT-9	12.0 - 13.5	1.0	6-8-11	19	
732.8'	19.5'	LEAN CLAY, red to brown, moist, medium stiff, some chert		SPT-10	13.5 - 15.0	0.4	5-6-5	17	
				SPT-11	15.0 - 16.5	1.2	1-2-3	22	
				SPT-12	16.5 - 18.0	1.5	2-3-4	21	
				SPT-13	18.0 - 19.5	1.5	2-3-3	22	
717.8'	34.5'	SAND, light brown to brown, saturated, loose to medium dense, fine to medium grained, some clay		SPT-14	19.5 - 21.0	1.2	1-2-2	21	
				SPT-15	21.0 - 22.5	1.2	1-1-1	22	
				SPT-16	22.5 - 24.0	1.5	1-1-2	20	
				SPT-17	24.0 - 25.5	1.0	1-1-3	16	Water added at 24.0 ft to keep sand out of augers
				SPT-18	25.5 - 27.0	0.8	1-1-2	24	
				SPT-19	27.0 - 28.5	1.3	WOR-1-2	17	
				SPT-20	28.5 - 30.0	1.0	1-1-1	23	
				SPT-21	30.0 - 31.5	0.9	1-1-1	18	
				SPT-22	31.5 - 33.0	1.2	4-5-5	20	
				SPT-23	33.0 - 34.5	1.5	2-2-4	18	
				SPT-24	34.5 - 36.0	1.5	2-2-5	20	

FMSM_LEGACY 17468117 KINGSTON ASH POND.GPJ FMSM.GDT 7/16/09

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
707.3'	45.0'	SAND, brown, moist, medium dense to dense, fine to medium grained (Continued)		SPT-25	36.0 - 37.5	1.3	5-8-16	18	
				SPT-26	37.5 - 39.0	1.5	14-8-9	19	
				SPT-27	39.0 - 40.5	0.3	8-9-11	18	
				SPT-28	40.5 - 42.0	1.4	11-17-15	19	
				SPT-29	42.0 - 43.5	1.5	6-5-1	20	
				SPT-30	43.5 - 45.0	1.3	2-2-10	36	
692.8'	59.5'	Shale (Augered)		SPT-31	45.0 - 46.5	0.6	2-8-13	--	Boring backfilled with bentonite cement grout from 0.0 ft to 59.5 ft
				SPT-32	46.5 - 48.0	0.8	27-28-38	--	
				SPT-33	48.0 - 49.3	0.8	38-47-15/0.3	--	
Auger Refusal / Bottom of Hole									
WOH = Weight of Hammer WOR = Weight of Rods Slope Indicator (62.5 ft of pipe) installed with a concrete pad and protective cover									

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SUBSURFACE LOG

Project No.	175569042	Location	N 553840.20, E 2440981.04 (NAD27)		
Project Name	Kingston Ash Pond	Boring No.	STN-71	Total Depth	45.5 ft
Location	Kingston, Tennessee	Surface Elevation	752.0 ft. (NGVD29)		
Project Type	Geotechnical Exploration	Date Started	5/13/09	Completed	5/14/09
Supervisor	Ben Halada	Driller	Steve Bradford	Depth to Water	13.0 ft
Logged By	Brad Smiley	Automatic Hammer	<input checked="" type="checkbox"/>	Safety Hammer	<input type="checkbox"/>
		Other	<input type="checkbox"/>		

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
752.0'	0.0'	Top of Hole							
750.5'	1.5'	TOPSOIL (Fill)		SPT-1	0.0 - 1.5	1.5	3-4-5	23	Boring advanced using 4 1/4 " Hollow Stem Augers
749.0'	3.0'	SAND (Fill), brown, moist, medium dense, fine to coarse grained, some silt		SPT-2	1.5 - 3.0	0.9	8-6-6	16	
		LEAN CLAY with Gravel (Fill), red brown and gray, moist, soft to medium stiff		SPT-3	3.0 - 4.5	1.4	4-5-4	18	
			SPT-4	4.5 - 6.0	1.4	3-3-2	19		
			SPT-5	6.0 - 7.5	1.5	8-7-9	15		
			SPT-6	7.5 - 9.0	1.4	7-11-9	18		
743.0'	9.0'	FAT CLAY, brown, saturated, soft, some fine to coarse gravel		SPT-7	9.0 - 10.5	1.4	9-11-10	17	
			SPT-8	10.5 - 12.0	1.1	1-1-1	21		
			SPT-9	12.0 - 13.5	1.5	1-1-2	21		
			SPT-10	13.5 - 15.0	1.5	1-4-1	22		
737.0'	15.0'	SILTY SAND, brown, saturated, very loose to loose, fine to medium grained, some clay		SPT-11	15.0 - 16.5	1.5	1-1-1	20	Water added at 15.0 ft to keep augers clear
			SPT-12	16.5 - 18.0	1.5	WOR-1-1	21		
			SPT-13	18.0 - 19.5	1.5	WOR-1-1	20		
			SPT-14	19.5 - 21.0	1.4	1-1-1	19		
			SPT-15	21.0 - 22.5	1.5	1-1-2	20		
			SPT-16	22.5 - 24.0	0.8	1-1-2	25		
			SPT-17	24.0 - 25.5	1.5	1-1-WOH	22		
			SPT-18	25.5 - 27.0	1.5	1-2-3	20		
			SPT-19	27.0 - 28.5	0.7	WOR-WOR-3	19		
			SPT-20	28.5 - 30.0	1.5	2-3-5	20		
		SPT-21	30.0 - 31.5	1.4	2-5-3	20	SPT-24: sandstone in tip of spoon		
719.0'	33.0'	SPT-22	31.5 - 33.0	1.5	4-11-4	19			
717.0'	35.0'	SPT-23	33.0 - 34.5	1.5	11-15-13	19			
		SPT-24	34.5 - 36.0	1.4	5-20-22	--			
715.5'	36.5'		SPT-25	36.0 - 36.8	0.8	26-50/0.3	--		

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SUBSURFACE LOG

Project No.	175569042	Location	N 553840.20, E 2440981.04 (NAD27)	
Project Name	Kingston Ash Pond	Boring No.	STN-71	Total Depth 45.5 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
706.5'	45.5'	Sandstone, (Augered) Shale, (Augered) (Continued)							Boring backfilled with bentonite cement grout from 0.0 ft to 45.5 ft

Auger Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Slope Indicator (45.5 ft of pipe) installed with a concrete pad and protective cover

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Appendix B

CPT Boring Plots



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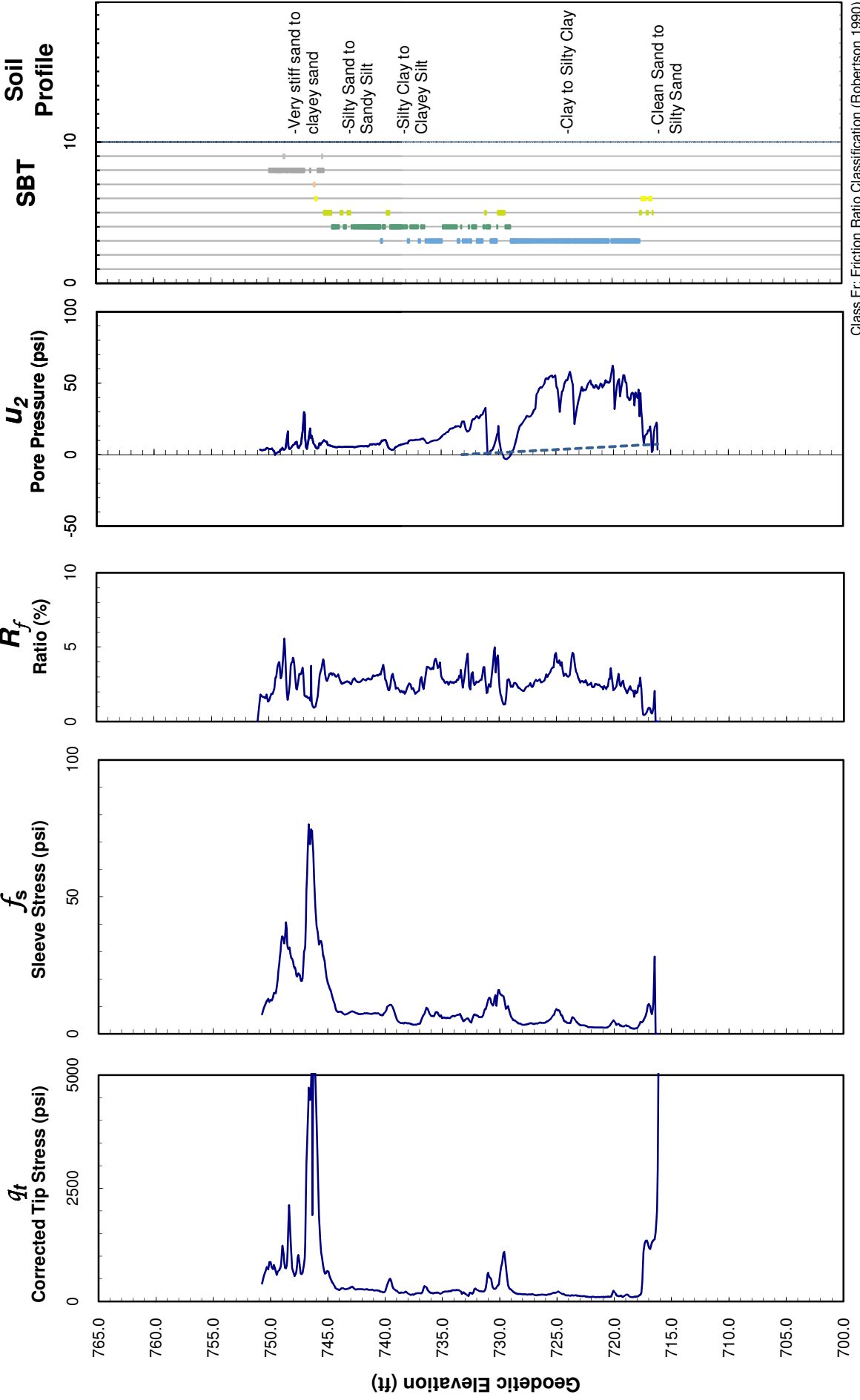
Elevation: 751.00 ft
SCPTu Start Elevation: 751.00 ft
Groundwater Elevation: 733.20 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 22, 2009
Project No. 175569042

STN-2B



Class Fr: Friction Ratio Classification (Robertson 1990)

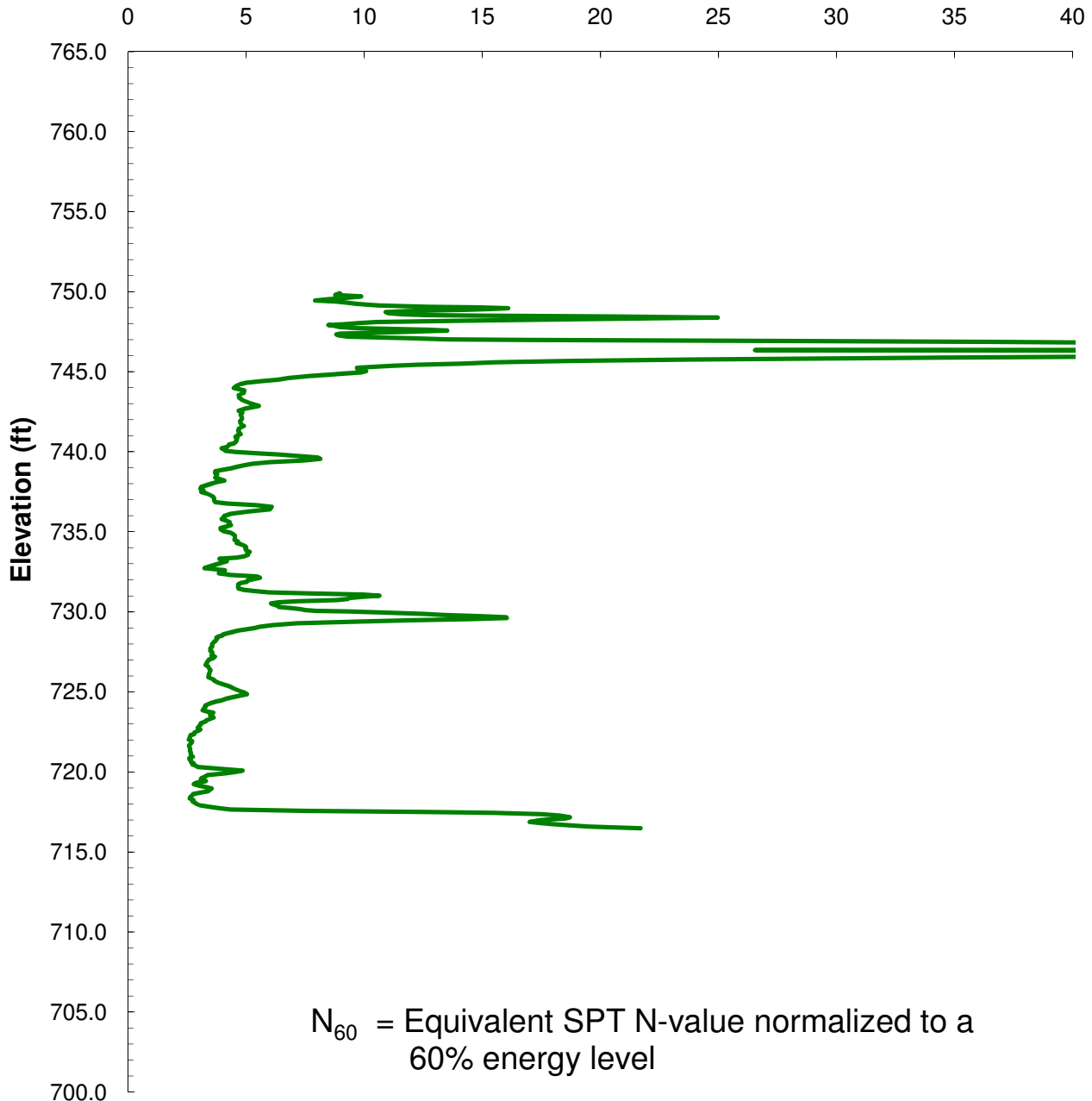


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

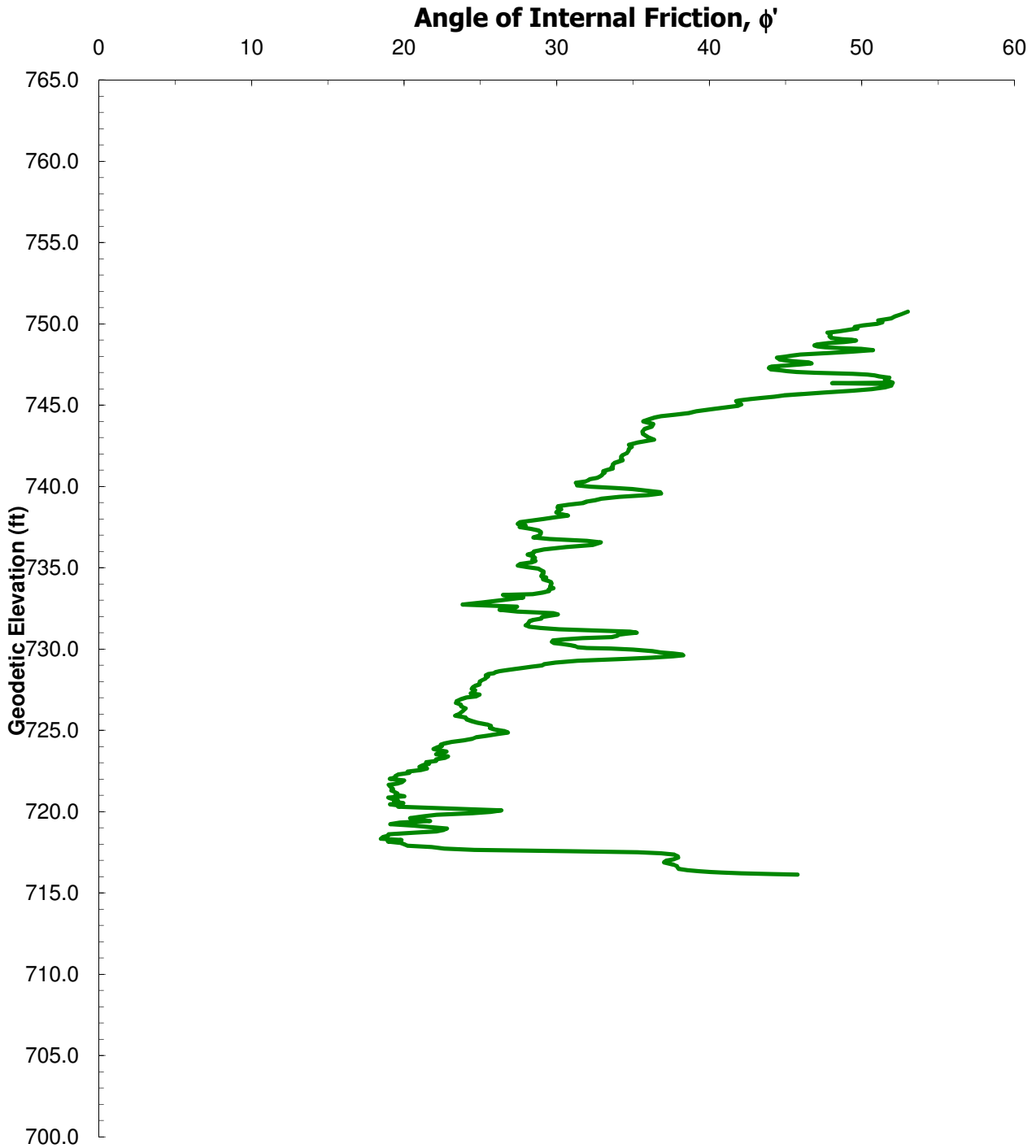
Project No. 175569042
STN-2B



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



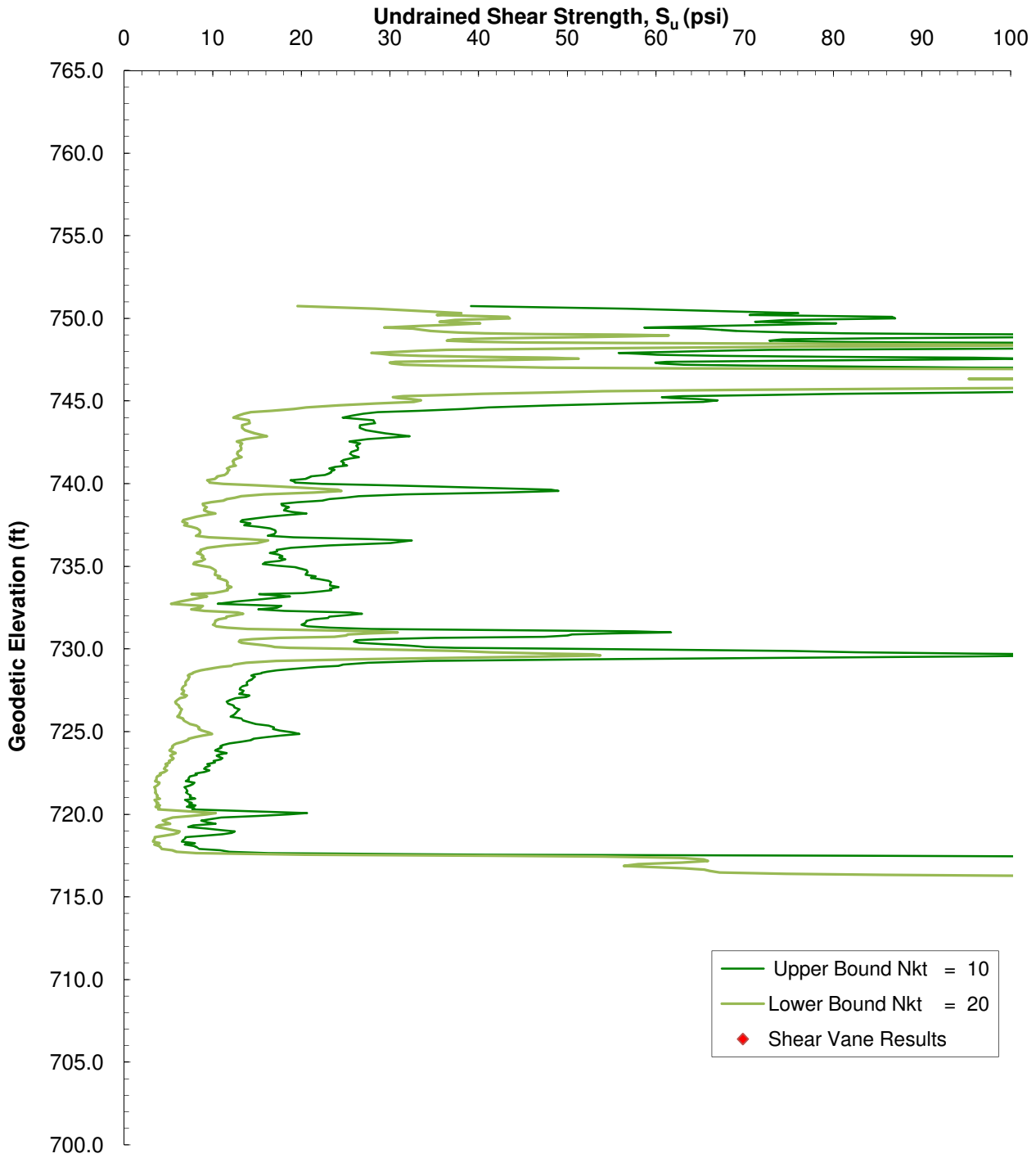
Project No. 175569042
STN-2B



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SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-2B

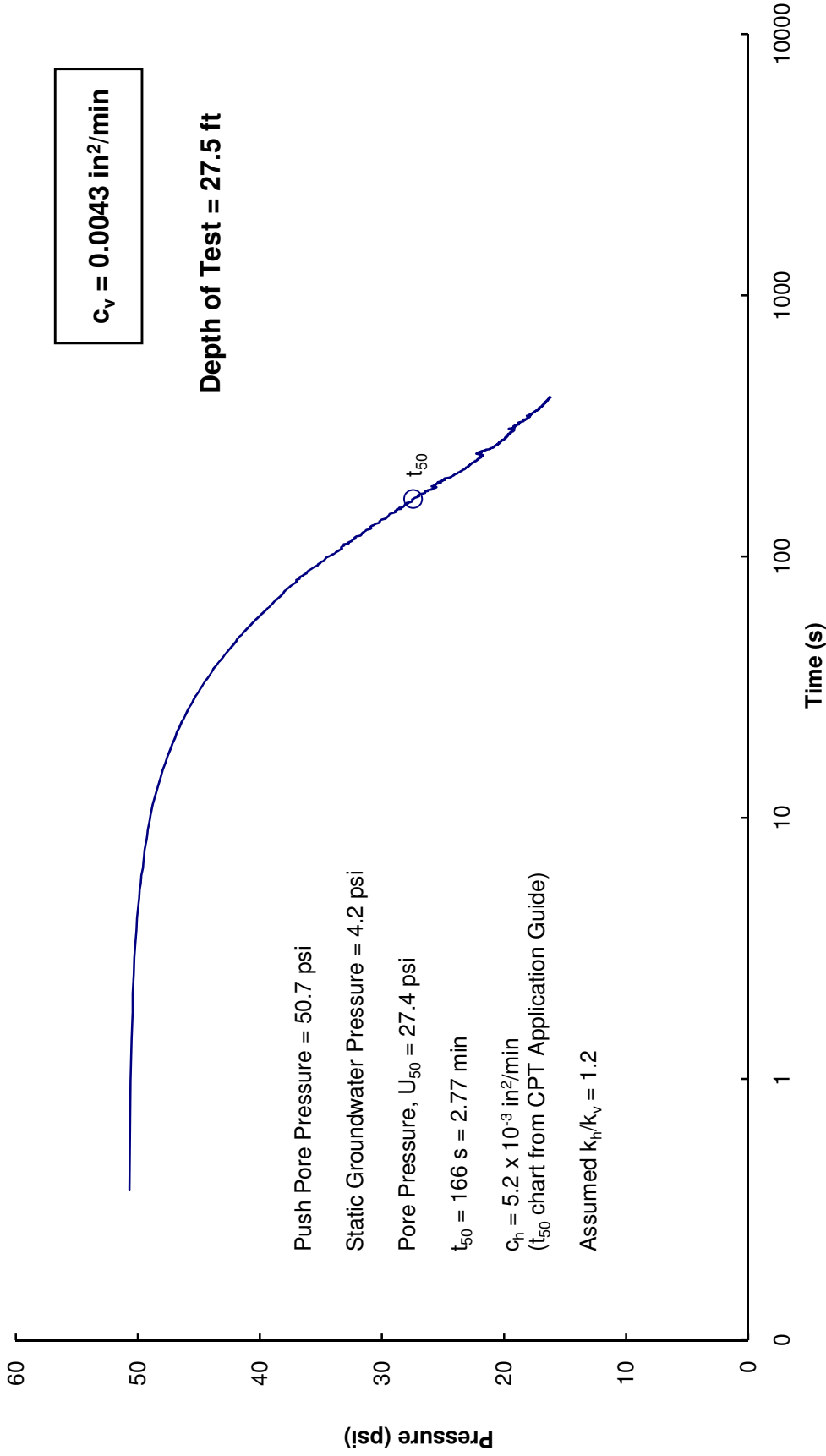


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Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-2B



**Stantec Consulting
Inc.**

Stantec

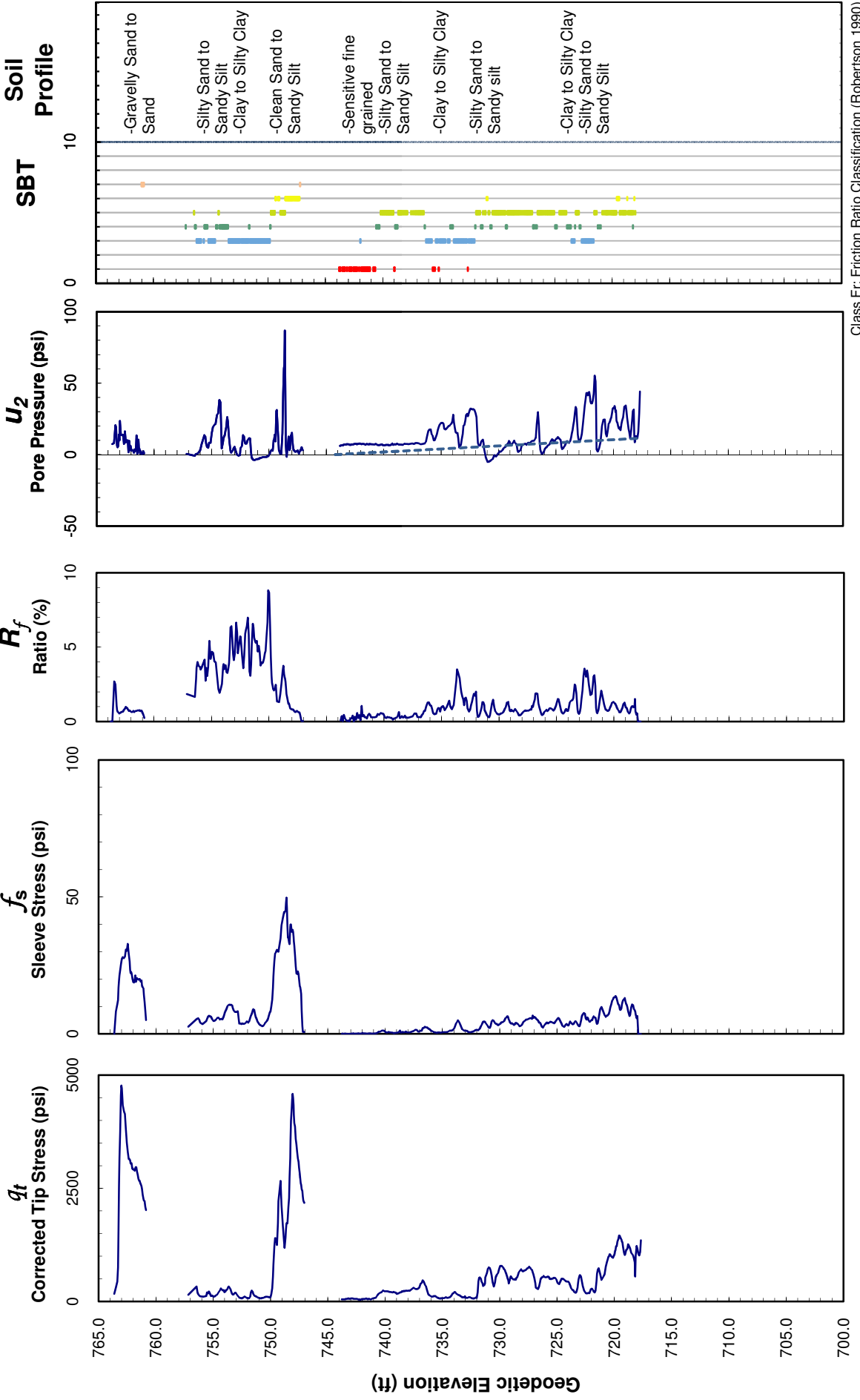
Elevation: 763.80 ft
SCPTu Start Elevation: 763.80 ft
Groundwater Elevation: 744.20 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 19, 2009
Project No. 175569042

STN-3E



Class Fr: Friction Ratio Classification (Robertson 1990)

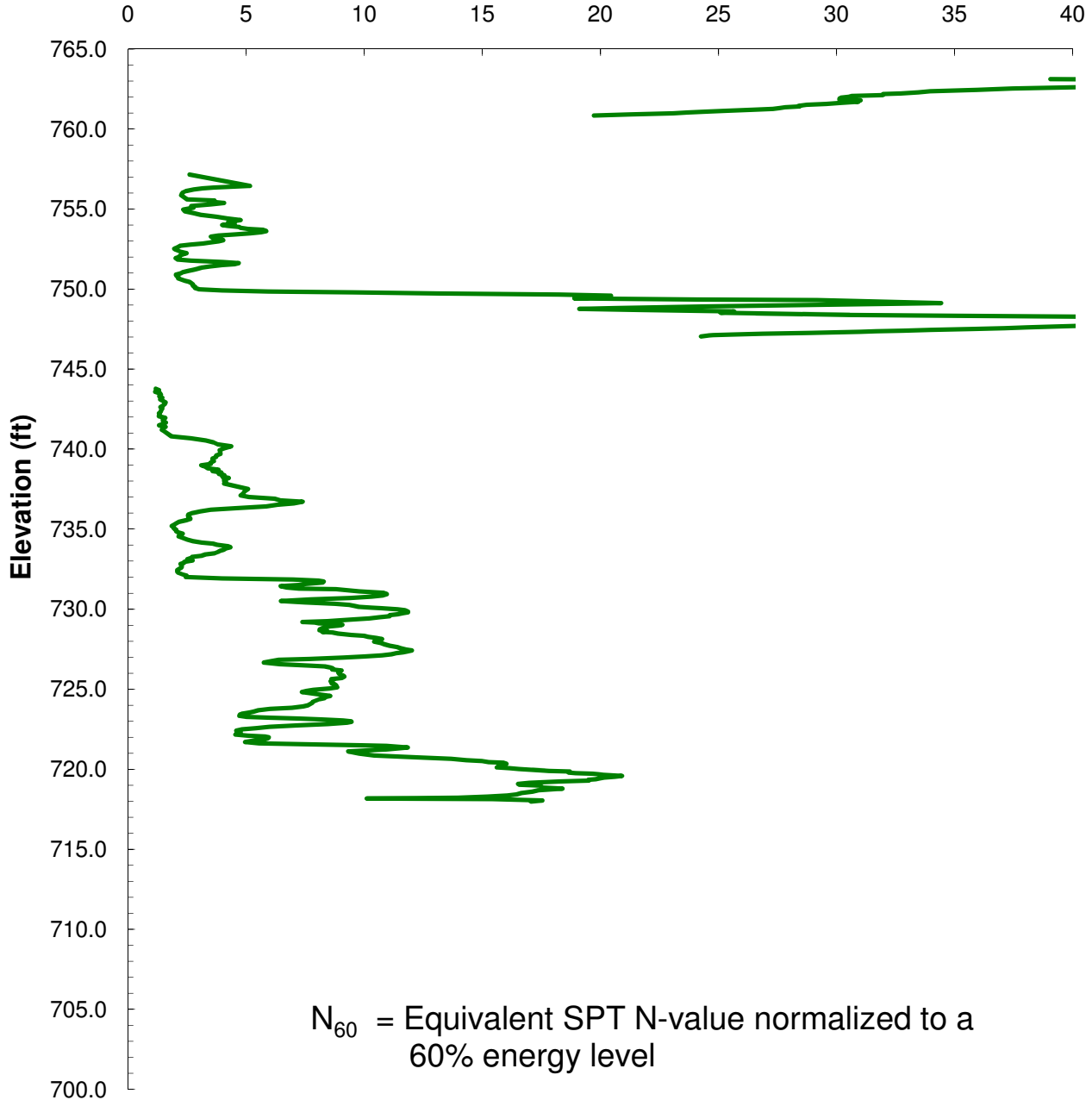


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

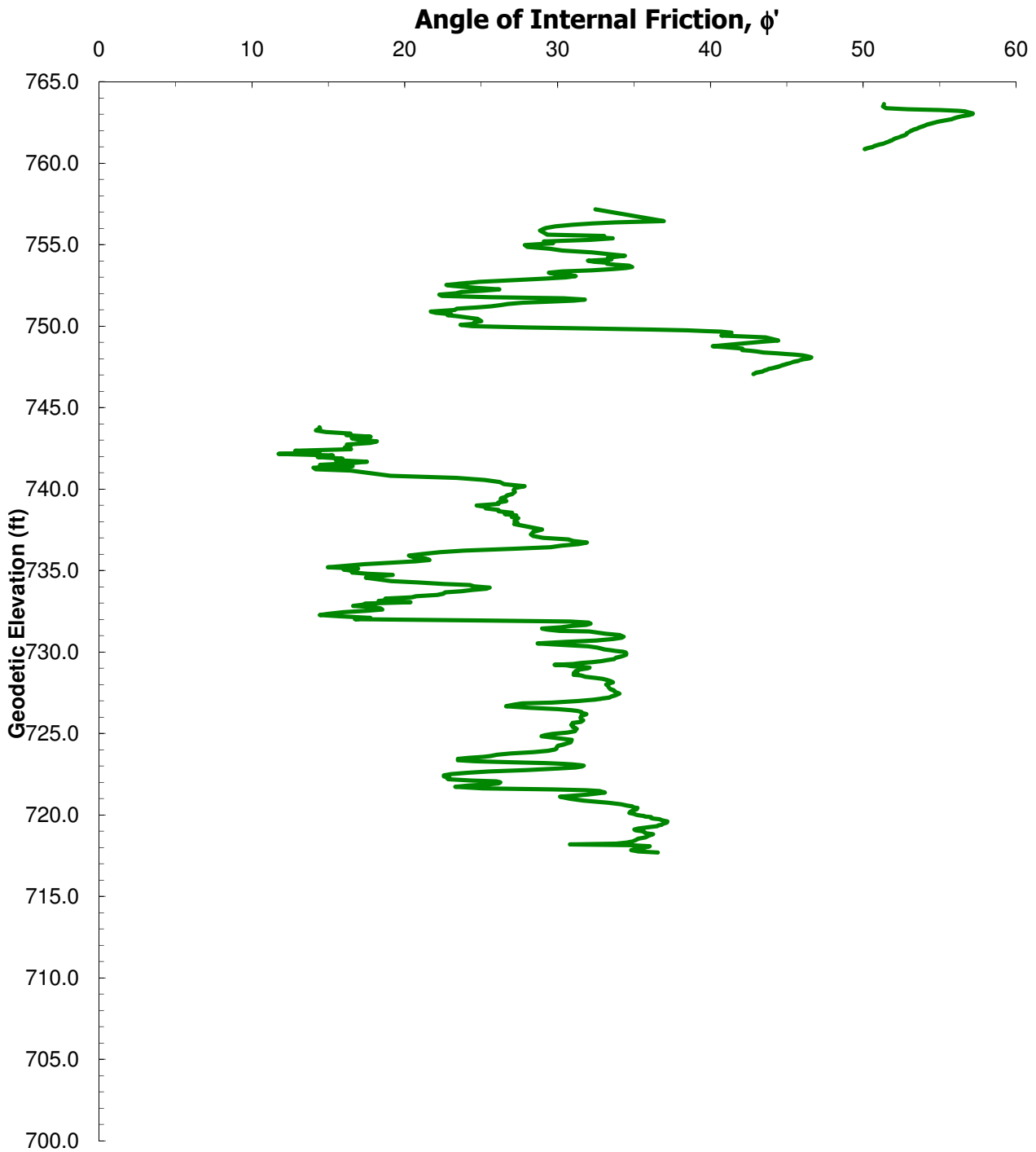
Project No. 175569042
STN-3E



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



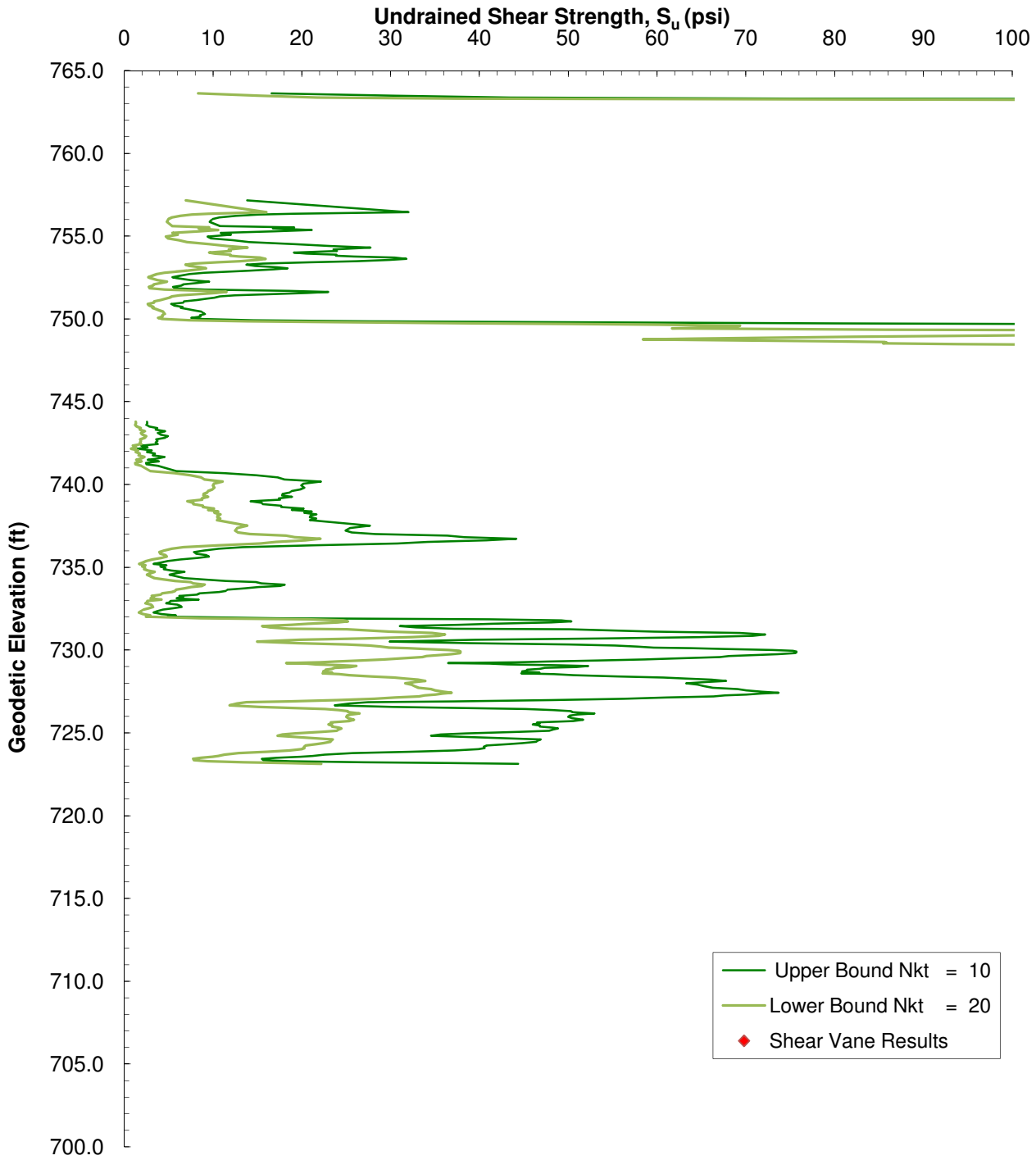
Project No. 175569042
STN-3E



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-3E

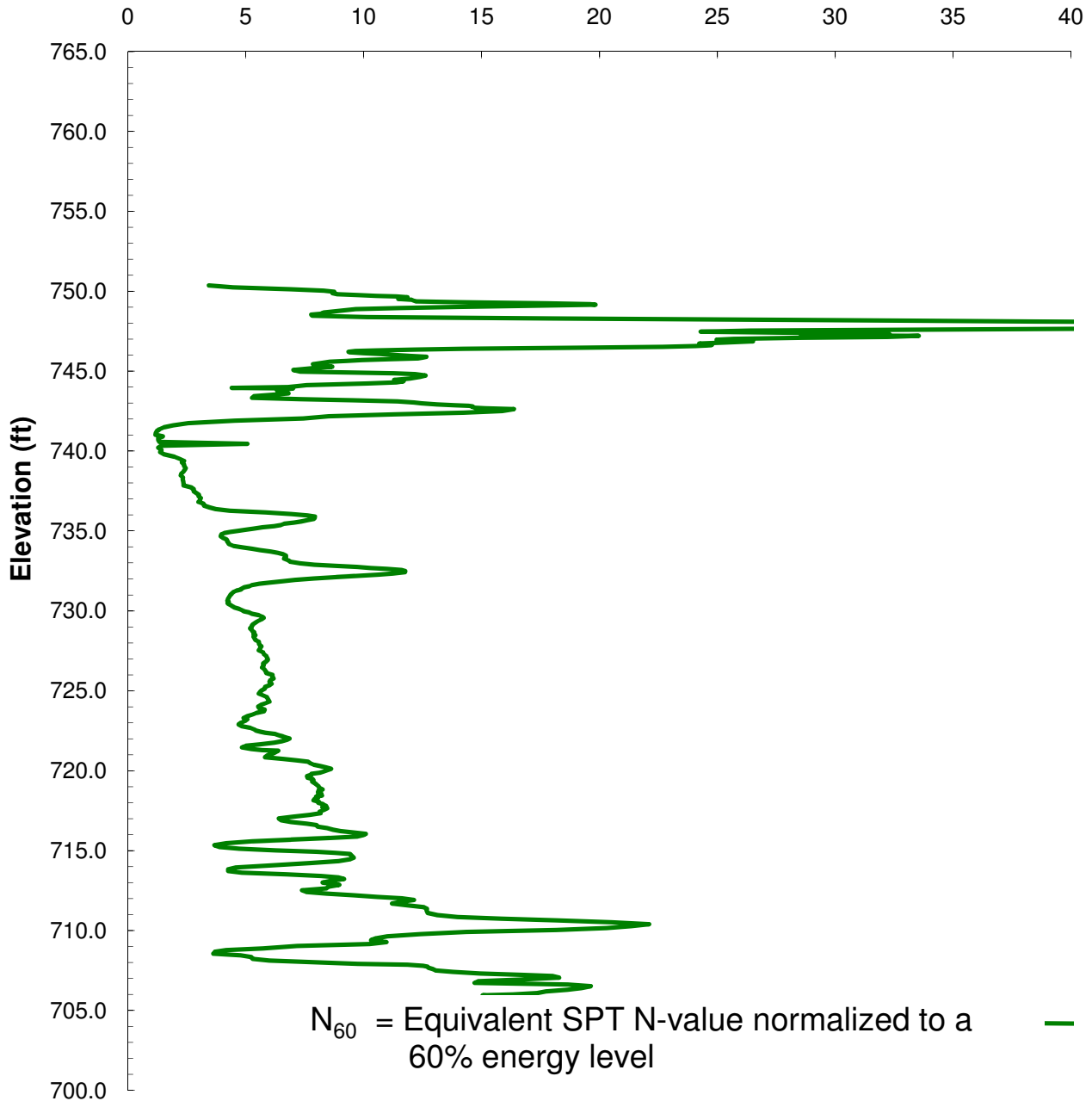


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

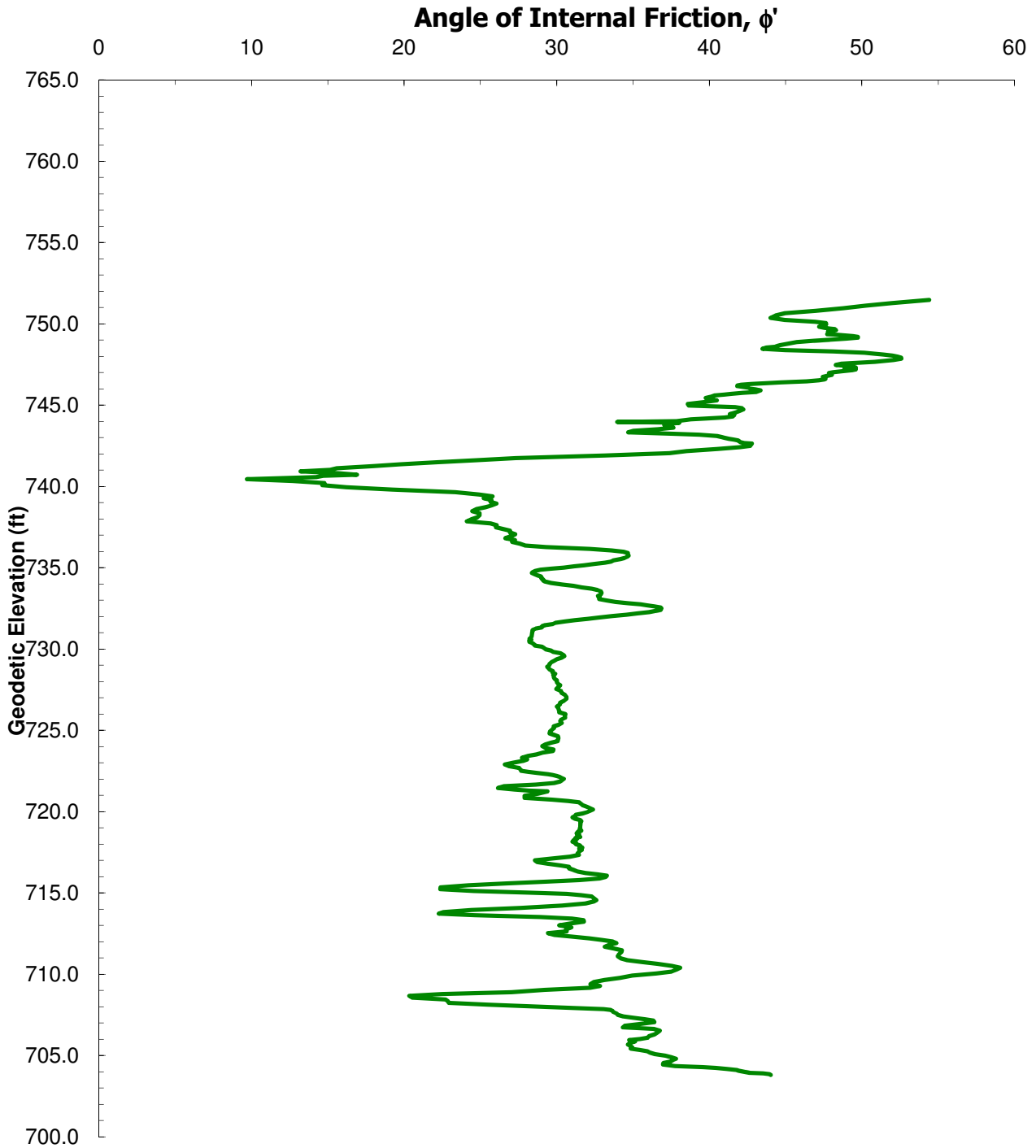
Project No. 175569042
STN-8A



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SCPTu RESULTS

Effective Angle of Internal Friction



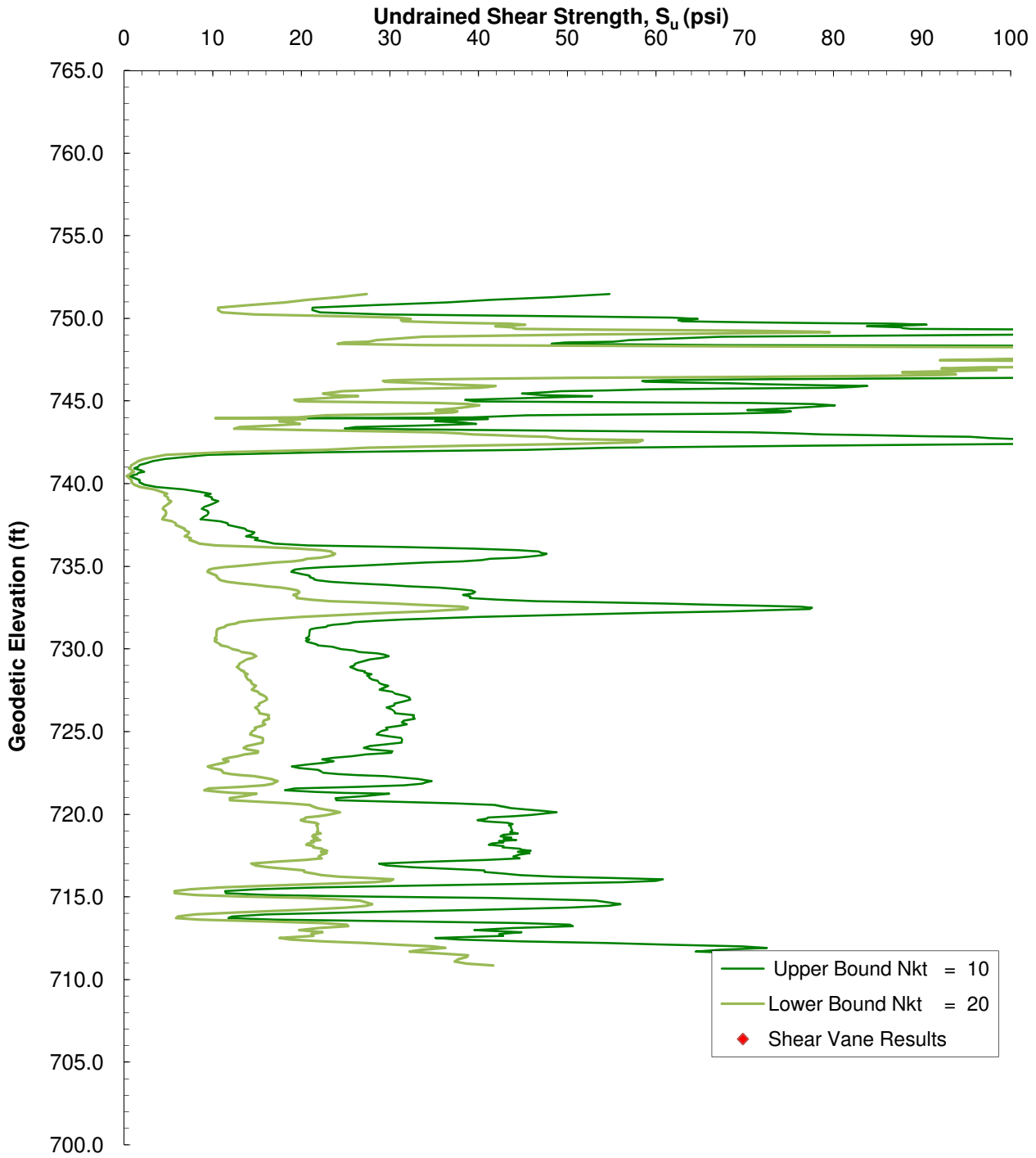
Project No. 175569042
STN-8A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-8A



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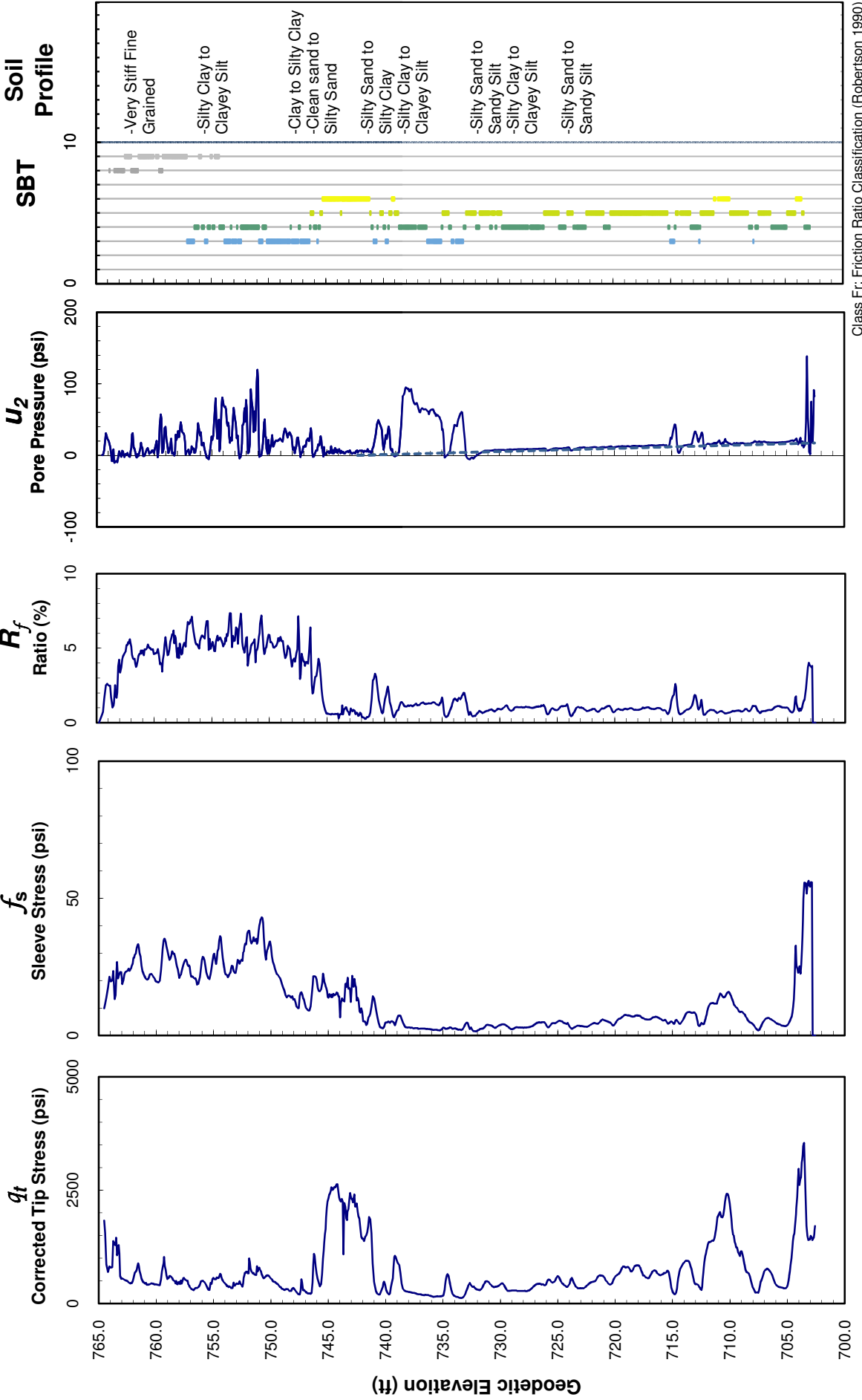
Elevation: 764.80 ft
SCPTu Start Elevation: 764.80 ft
Groundwater Elevation: 742.30 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 20, 2009
Project No. 175569042

STN-9A



Class Fr: Friction Ratio Classification (Robertson 1990)

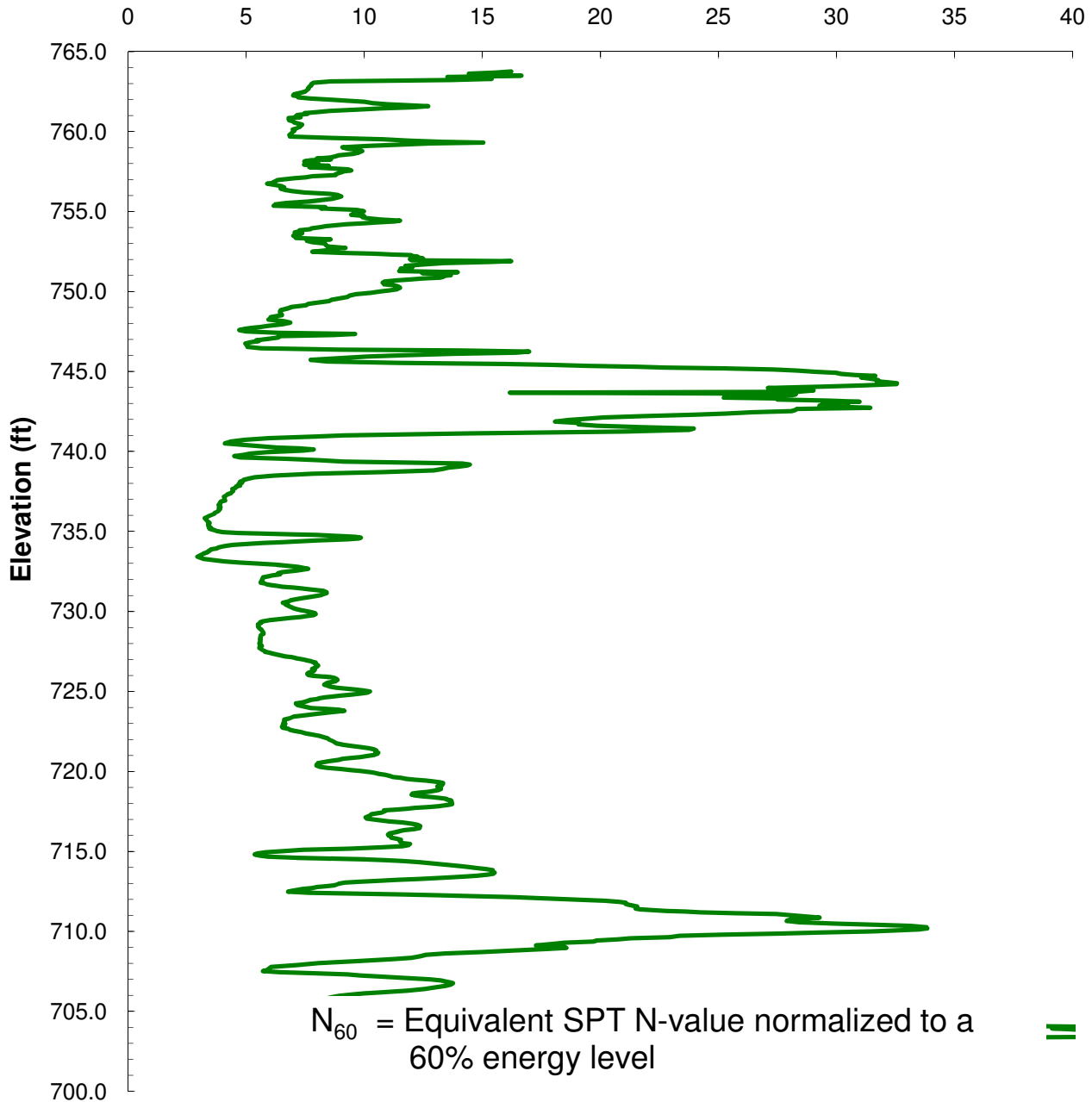


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

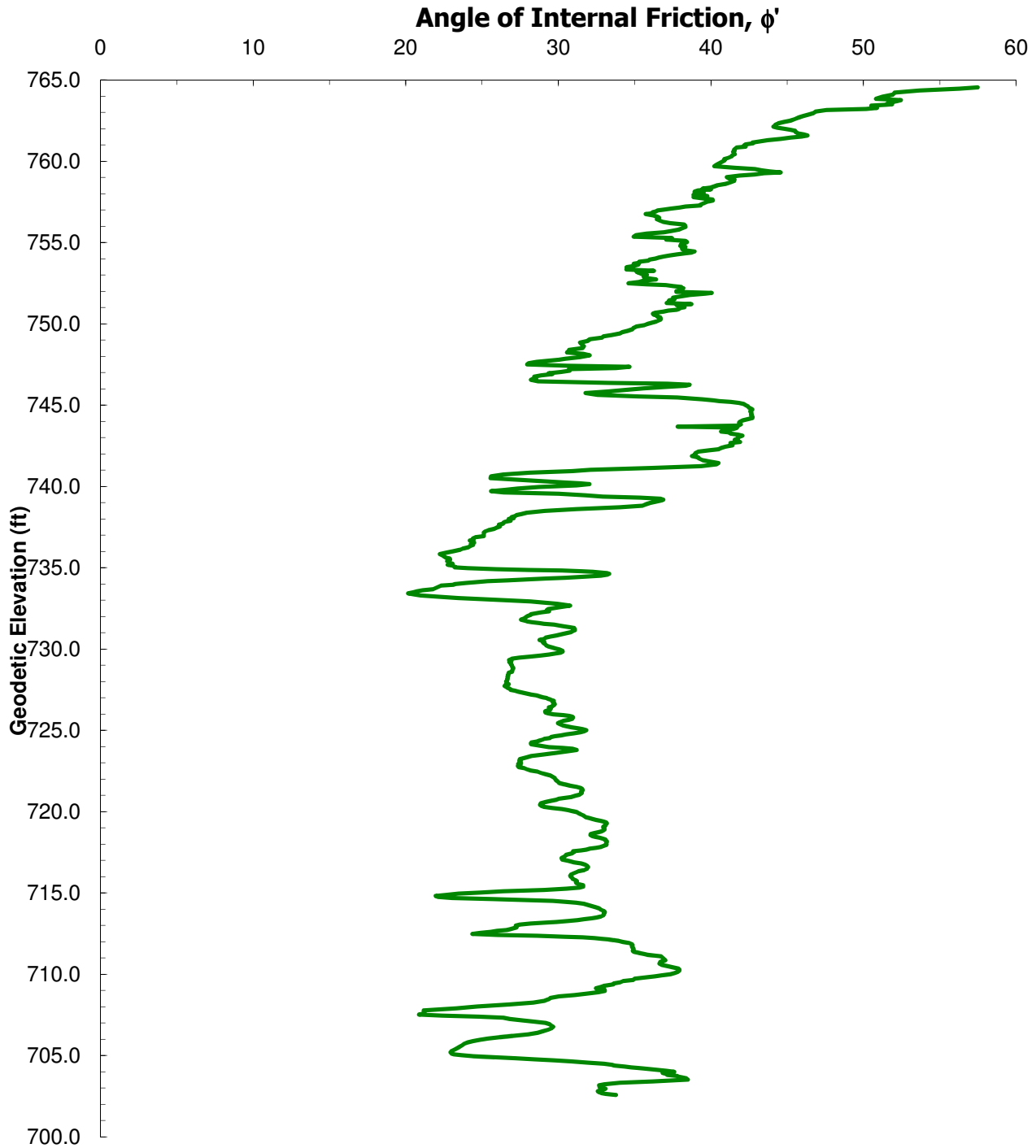
Project No. 175569042
STN-9A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



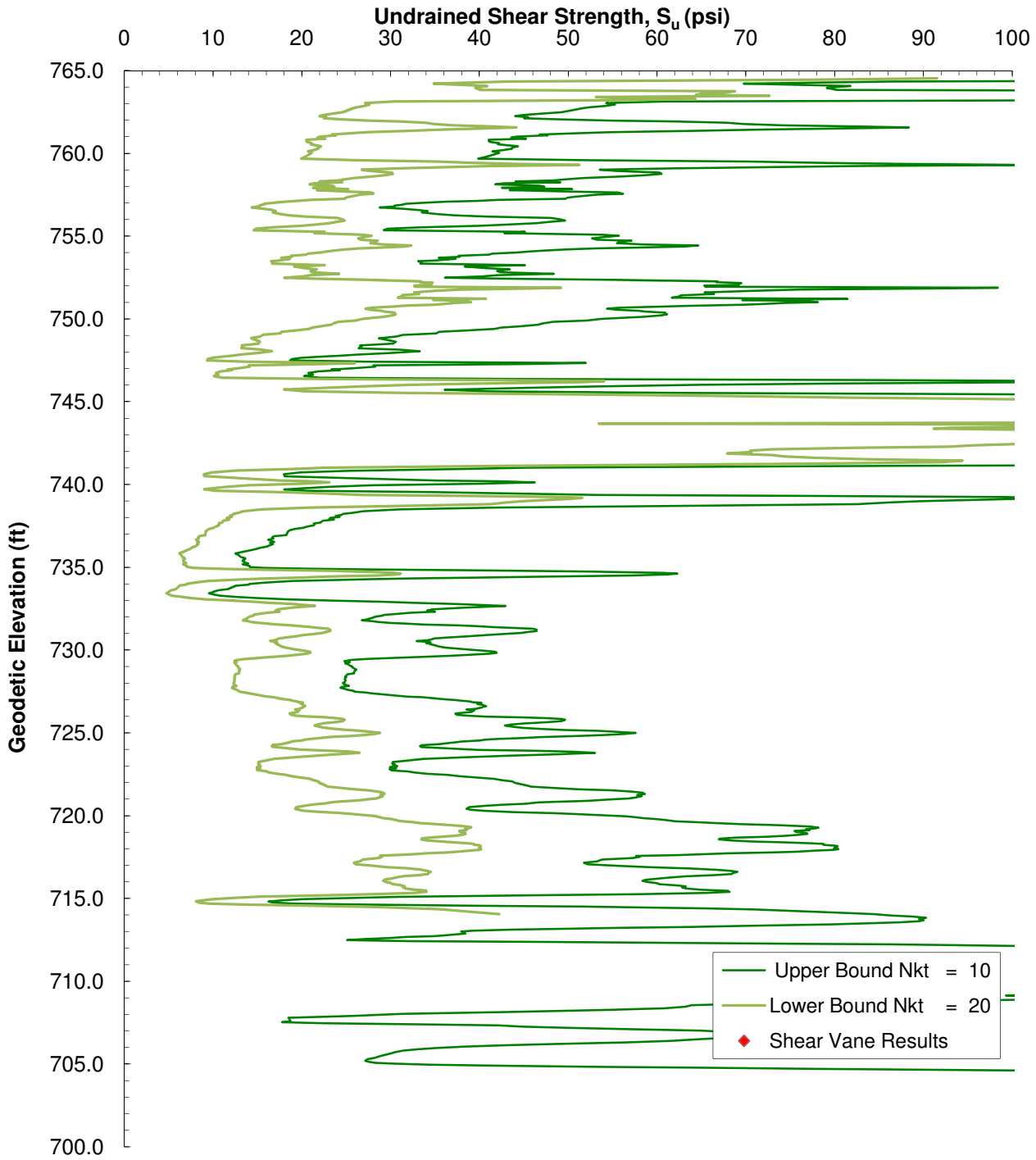
Project No. 175569042
STN-9A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-9A



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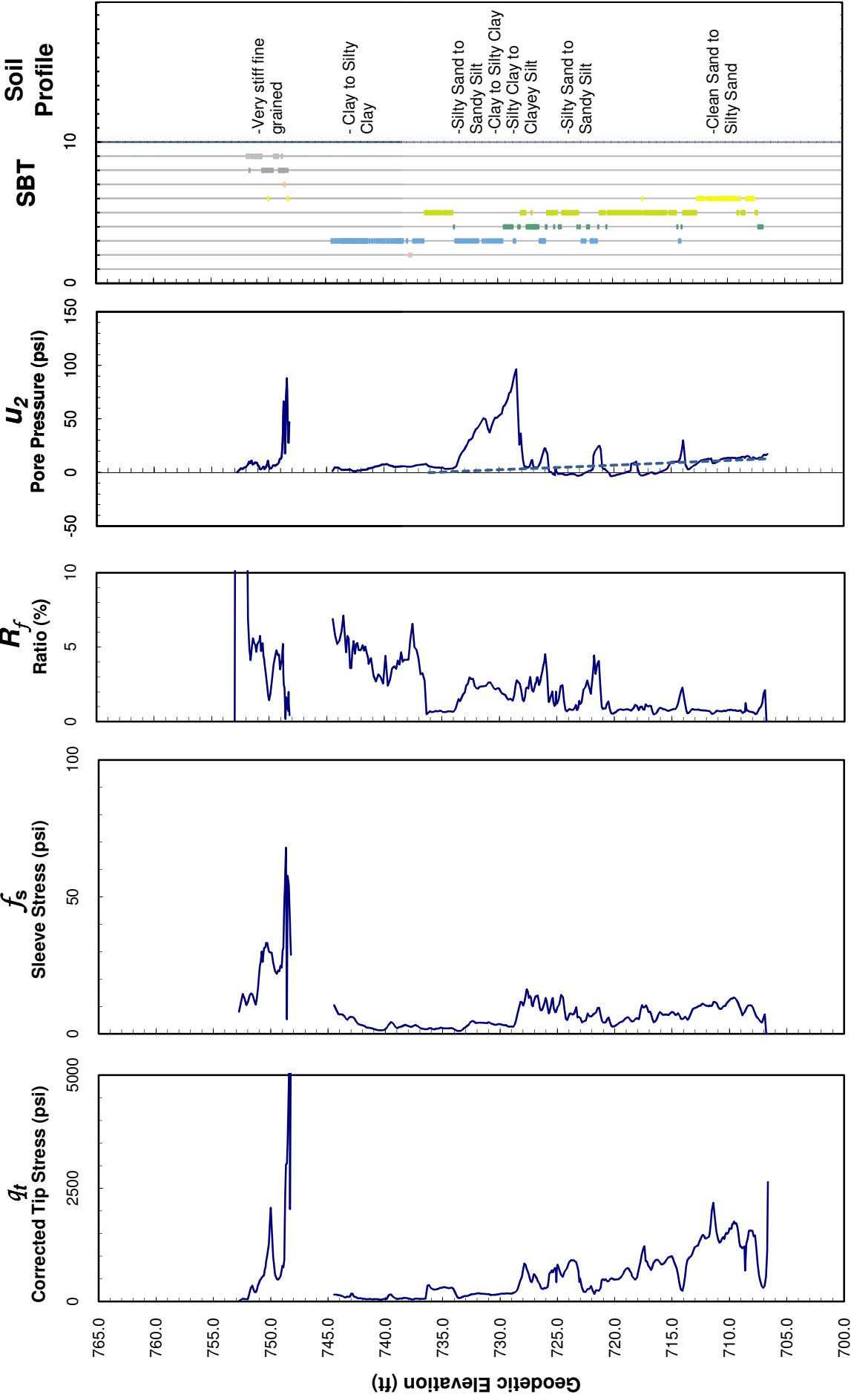
Stantec

Elevation: 753.00 ft
 SCPTu Start Elevation: 753.00 ft
 Groundwater Elevation: 736.10 ft

Client: TVA
 Project: Kingston Ash Pond

Test Date: May 22, 2009
 Project No. 175569042

STN-14B



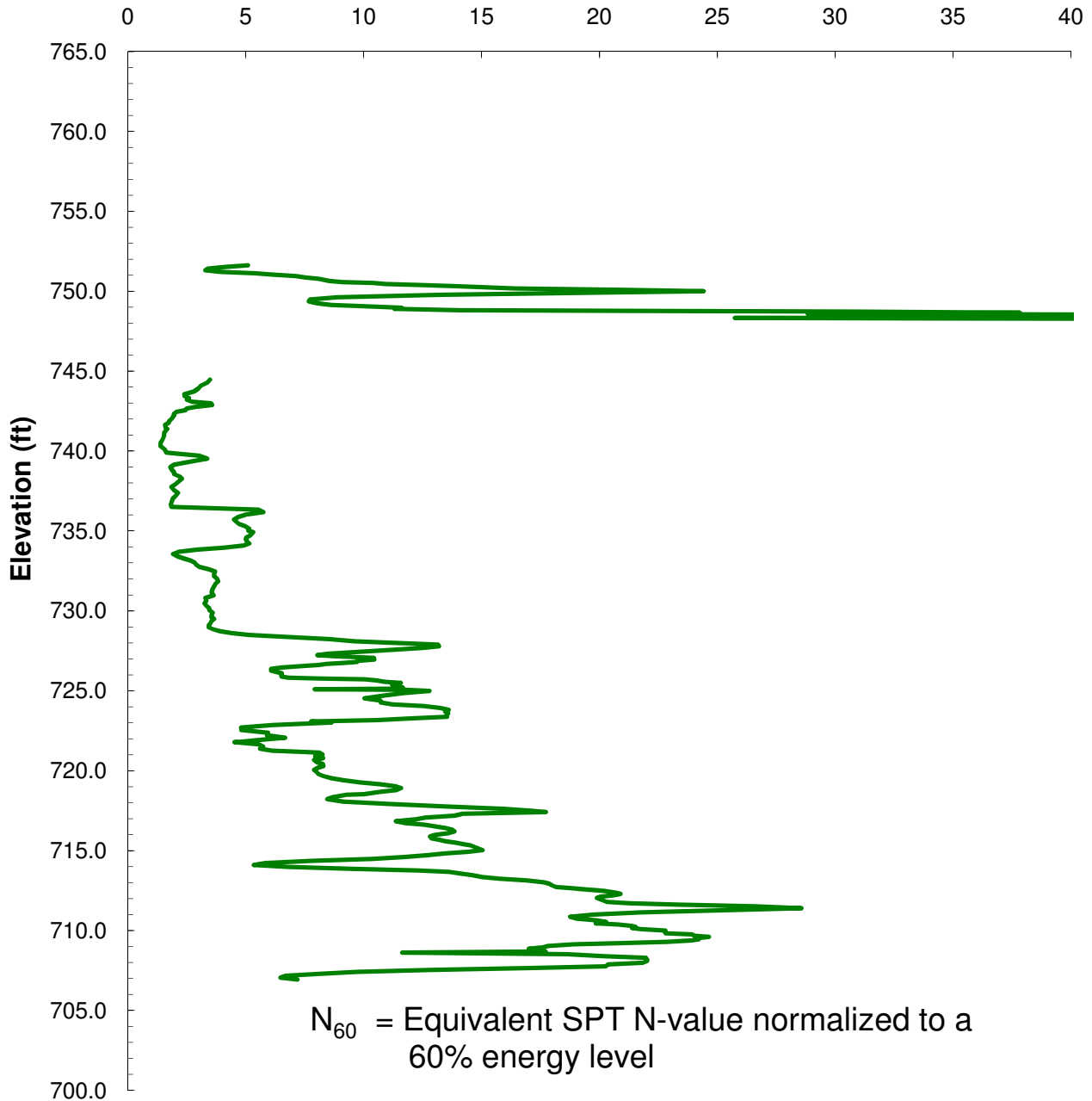


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

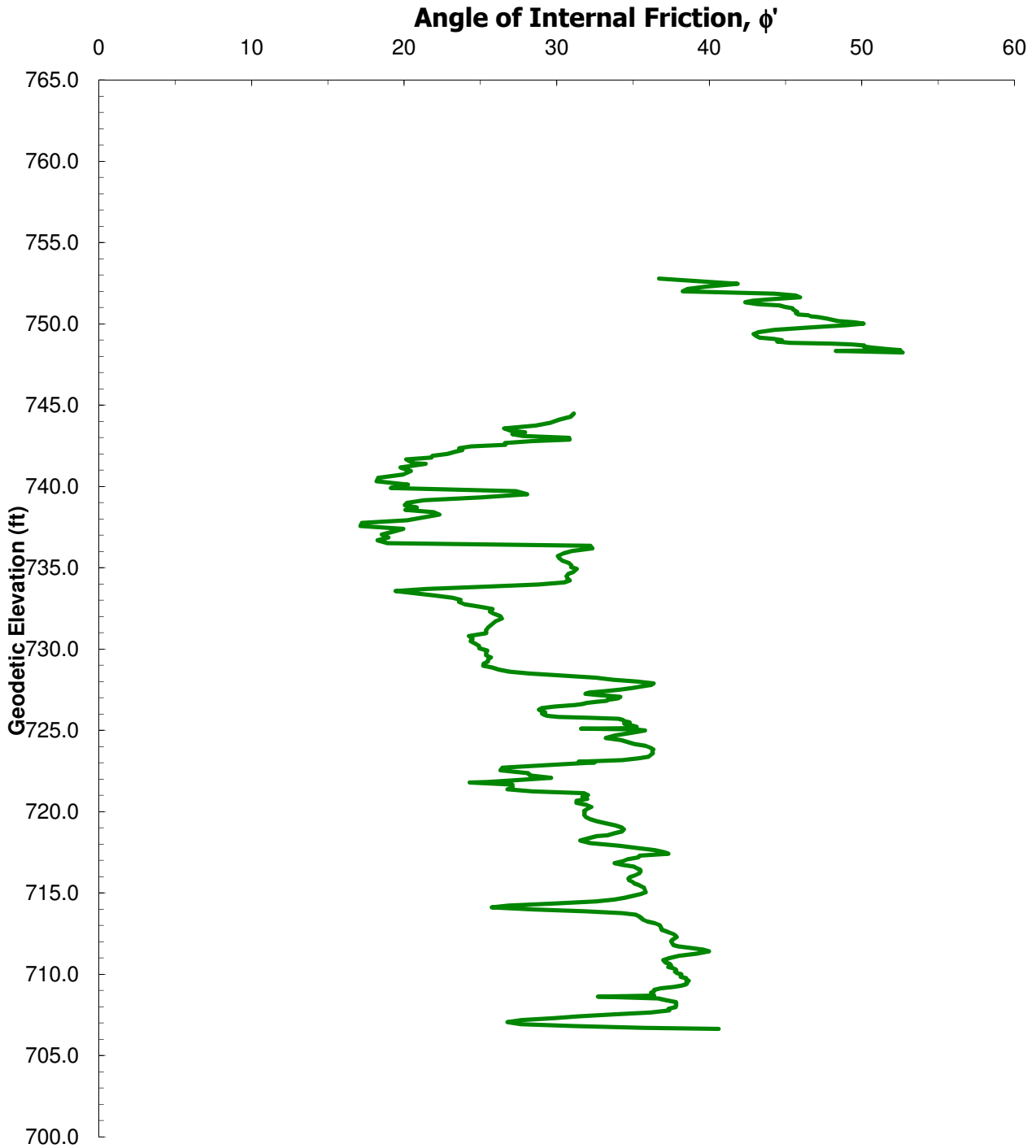
Project No. 175569042
STN-14B



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



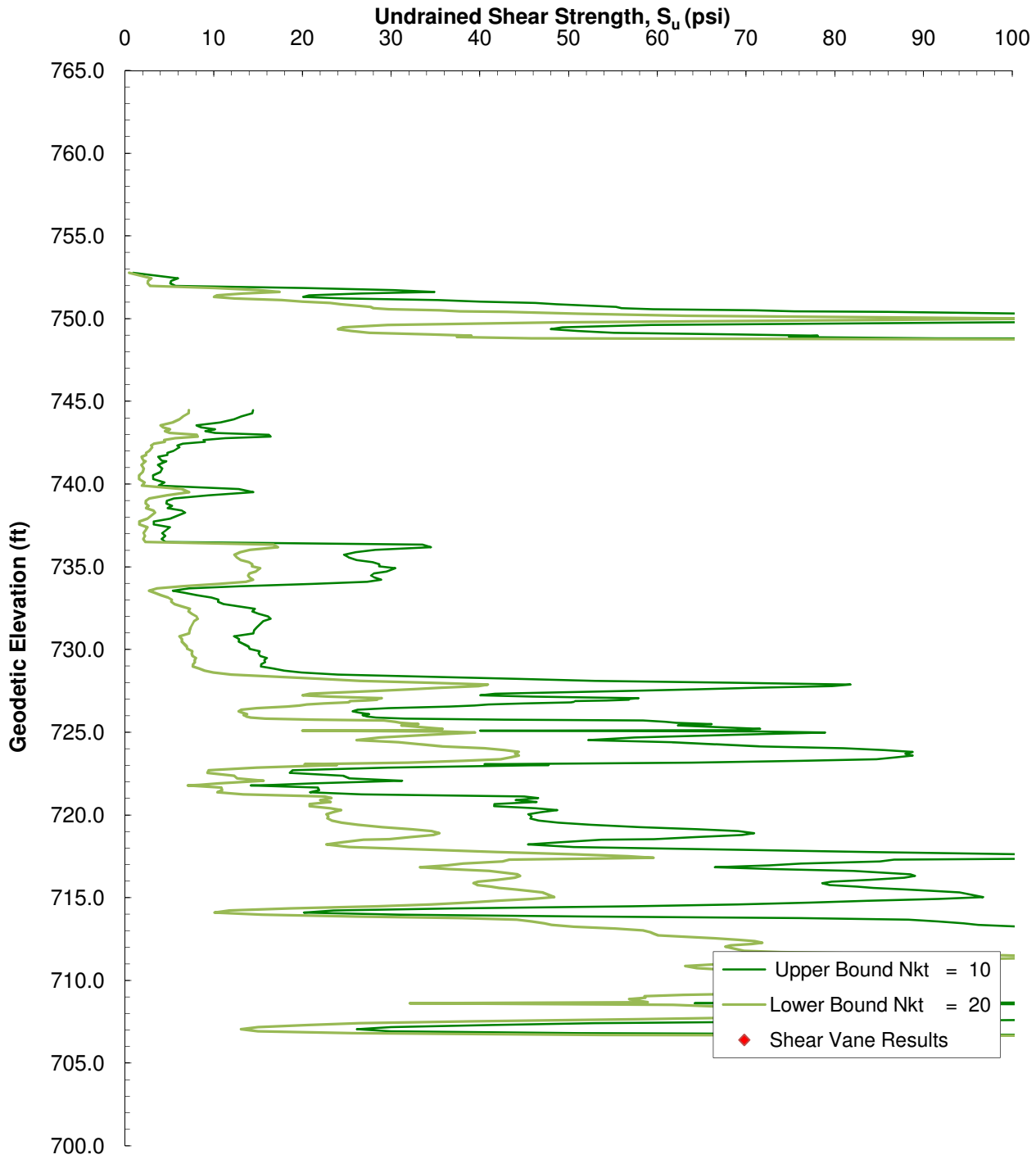
Project No. 175569042
STN-14B



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-14B



**Stantec Consulting
Inc.**

Stantec

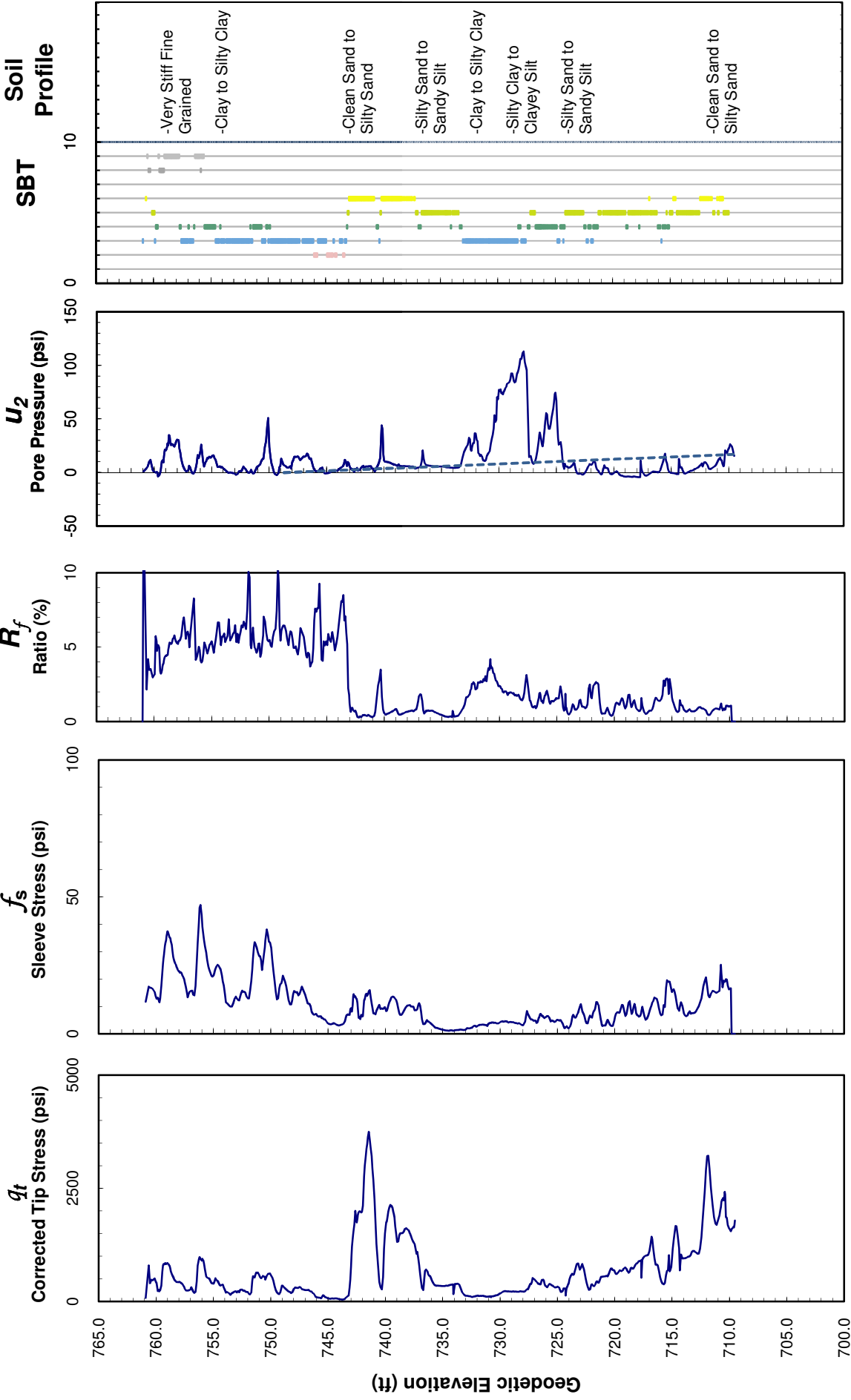
Elevation: 765.00 ft
 SCPTu Start Elevation: 761.00 ft
 Groundwater Elevation: 748.70 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 20, 2009
 Project No. 175569042

STN-15E



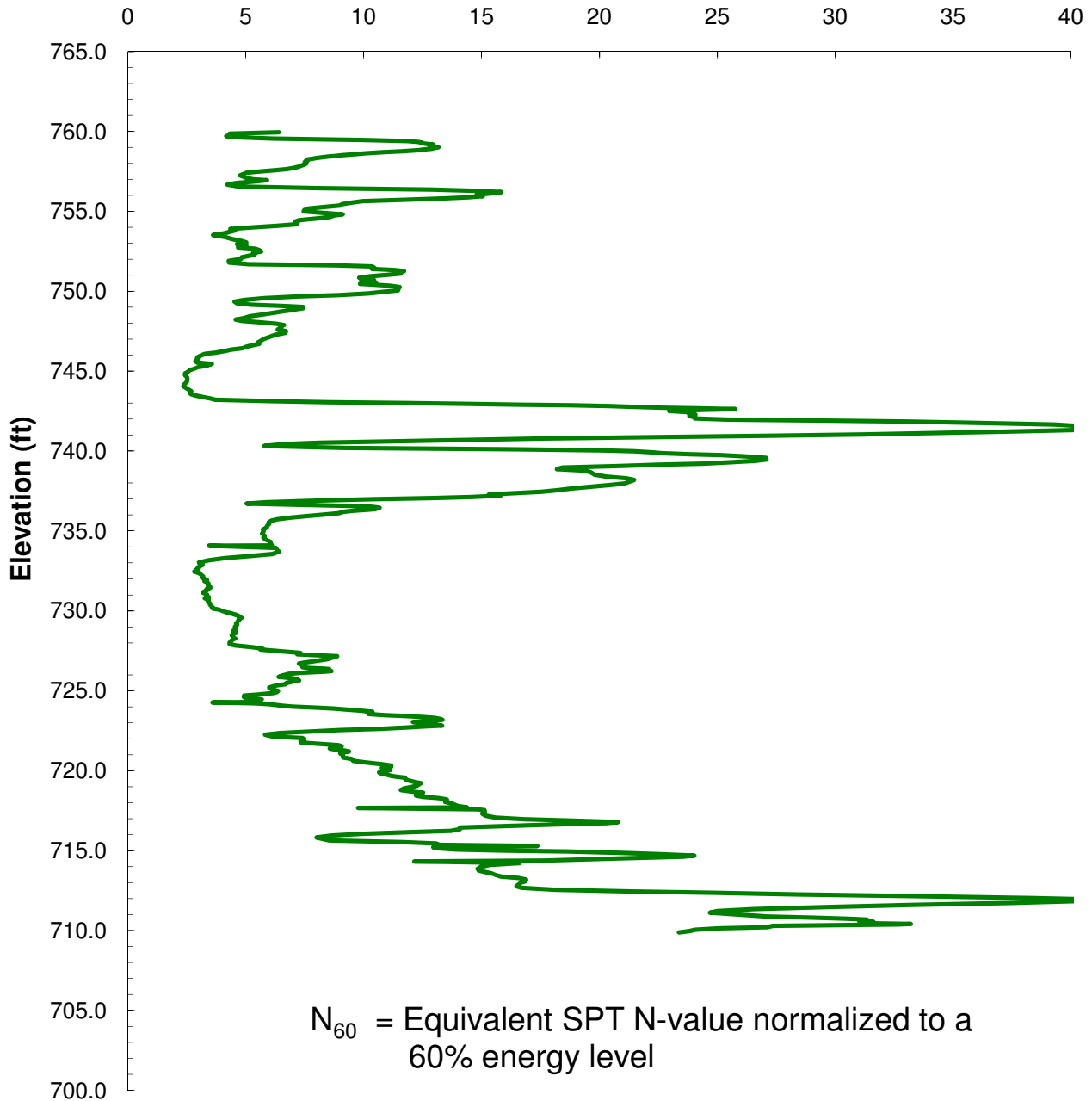


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

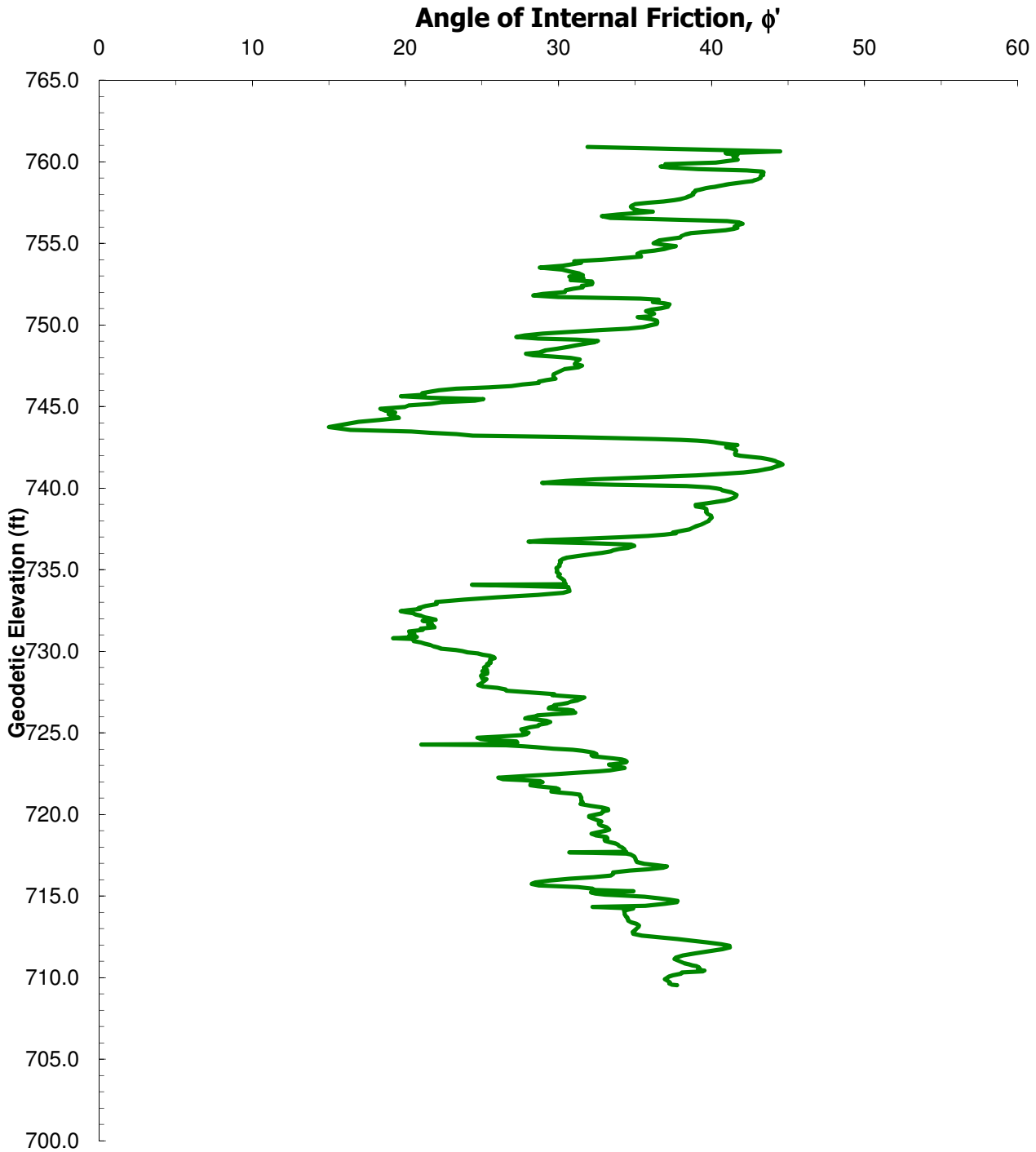
Project No. 175569042
STN-15E



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



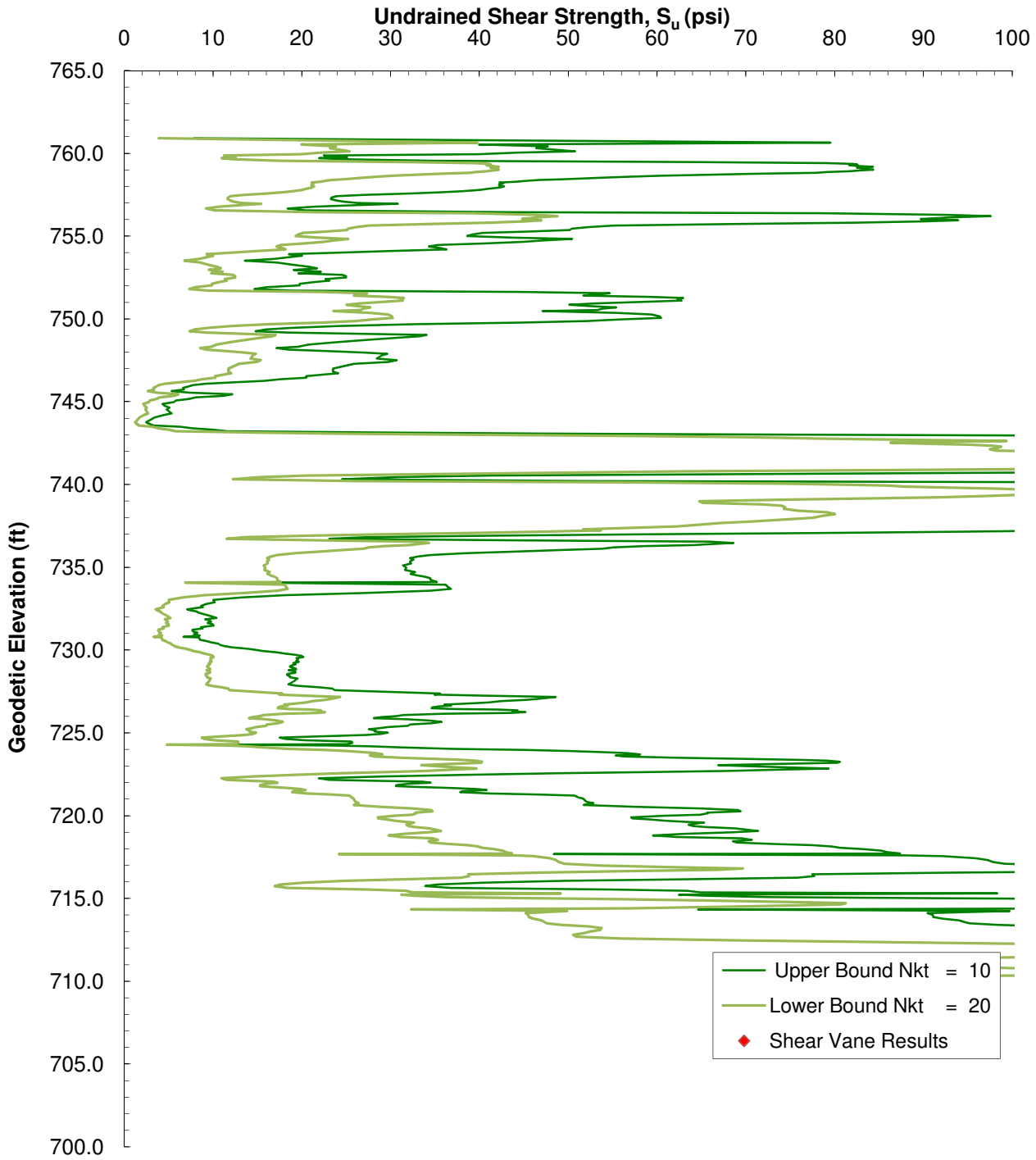
Project No. 175569042
STN-15E



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-15E

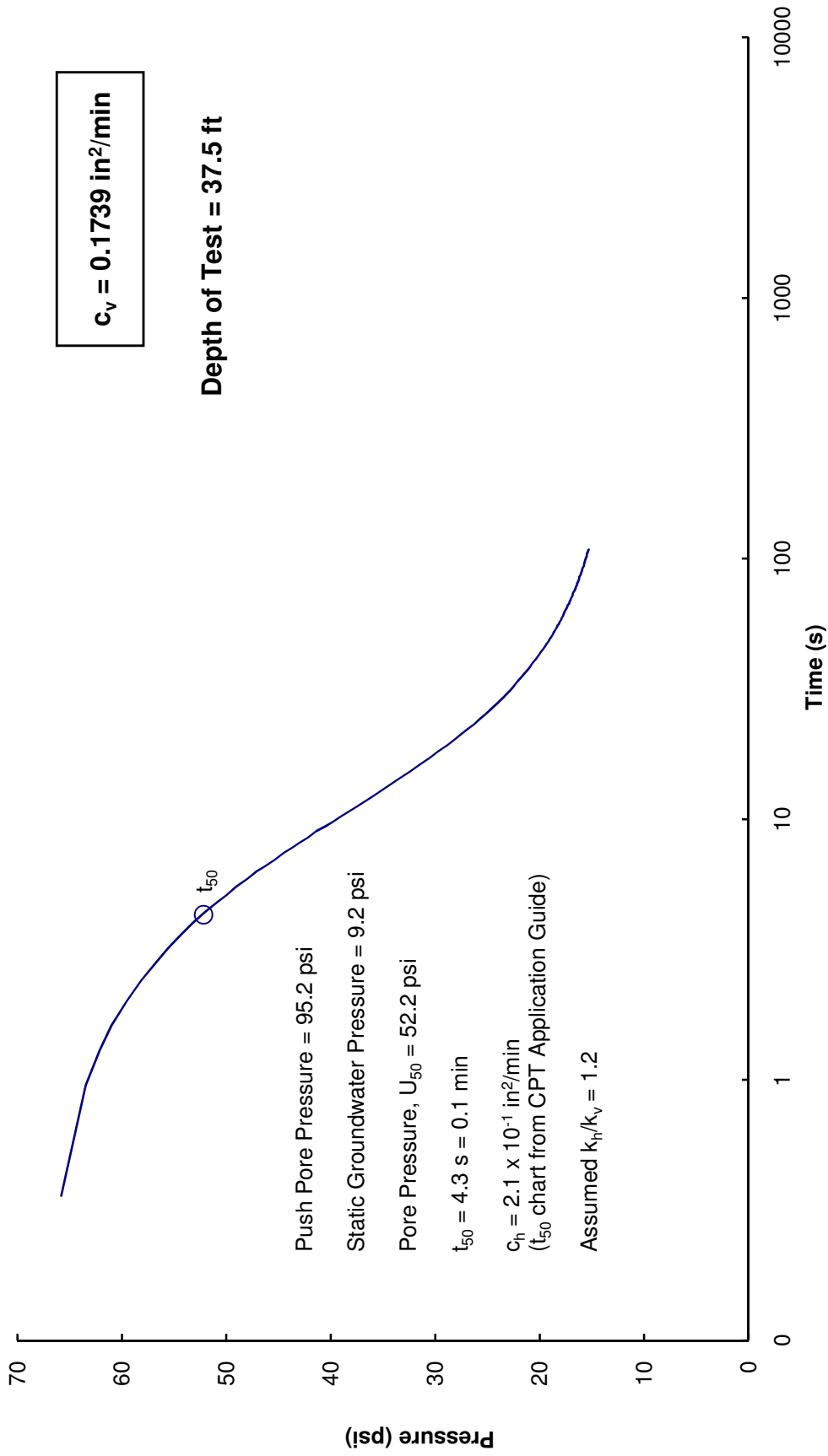


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**Stantec Consulting
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SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-15E



**Stantec Consulting
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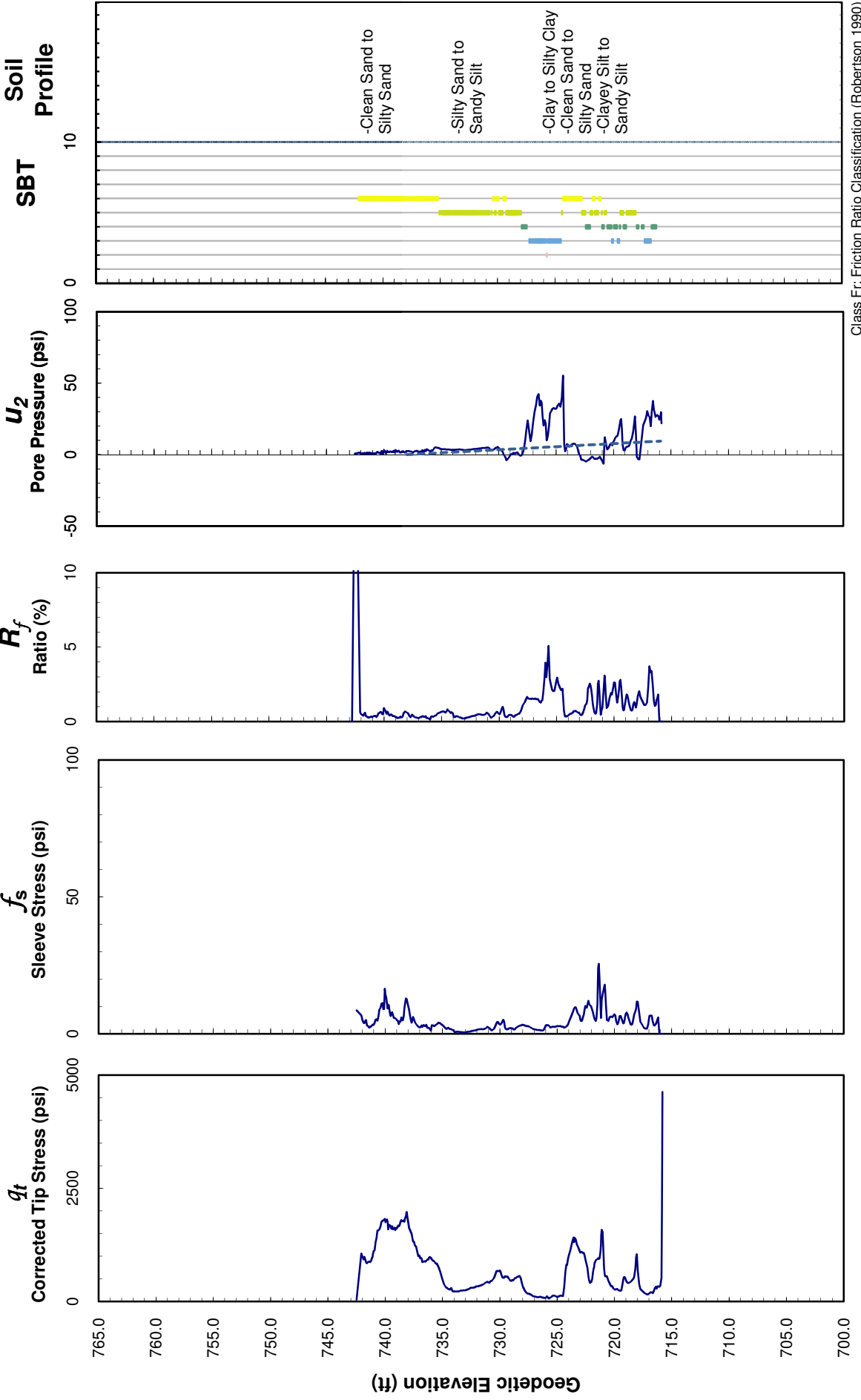
Stantec

Elevation: 751.80 ft
SCPTu Start Elevation: 742.80 ft
Groundwater Elevation: 738.00 ft

Client: TVA
Project: Kingston Ash Pond

Test Date: May 21, 2009
Project No. 175569042

STN-18A



Class Fr: Friction Ratio Classification (Robertson 1990)

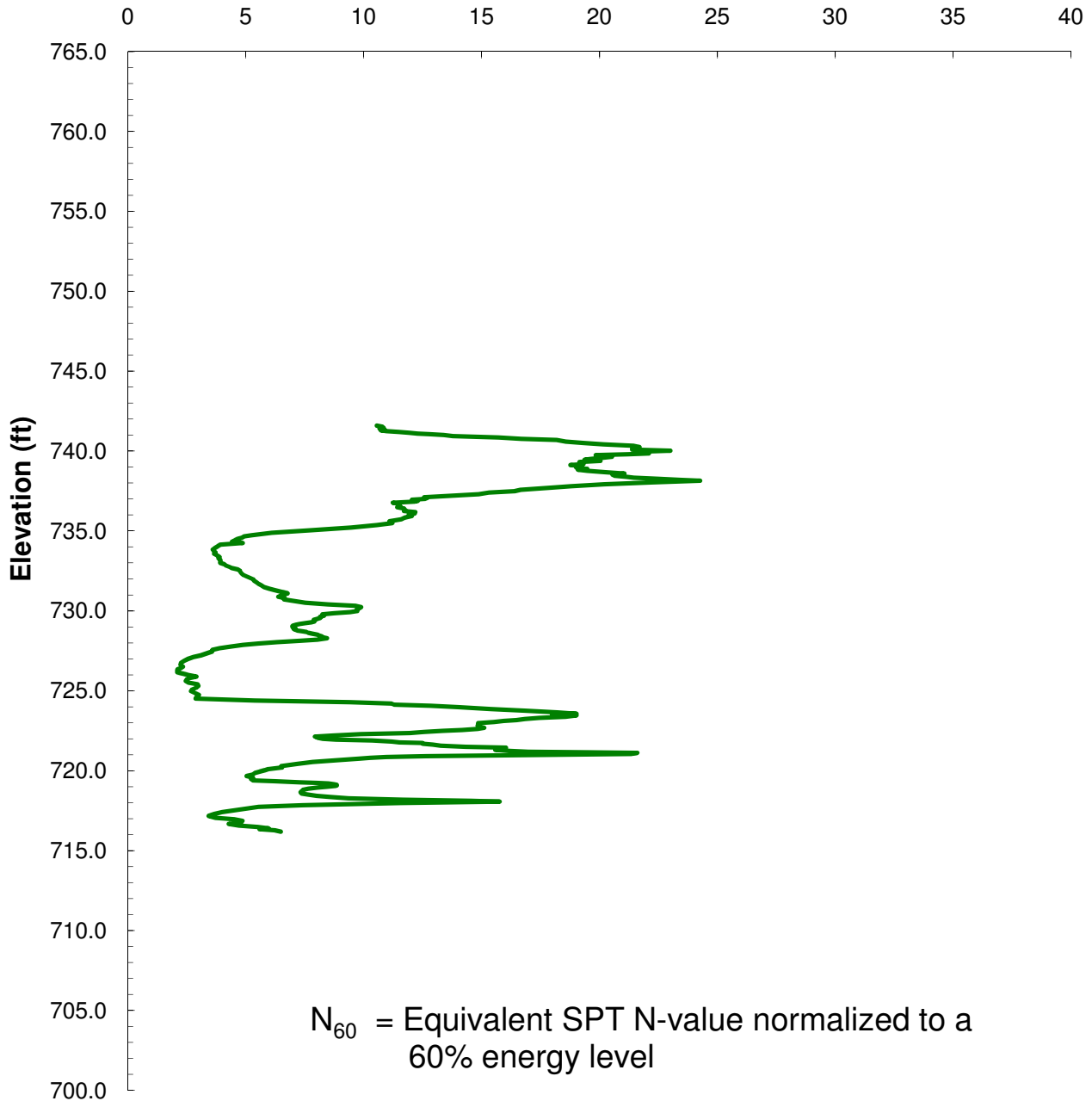


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

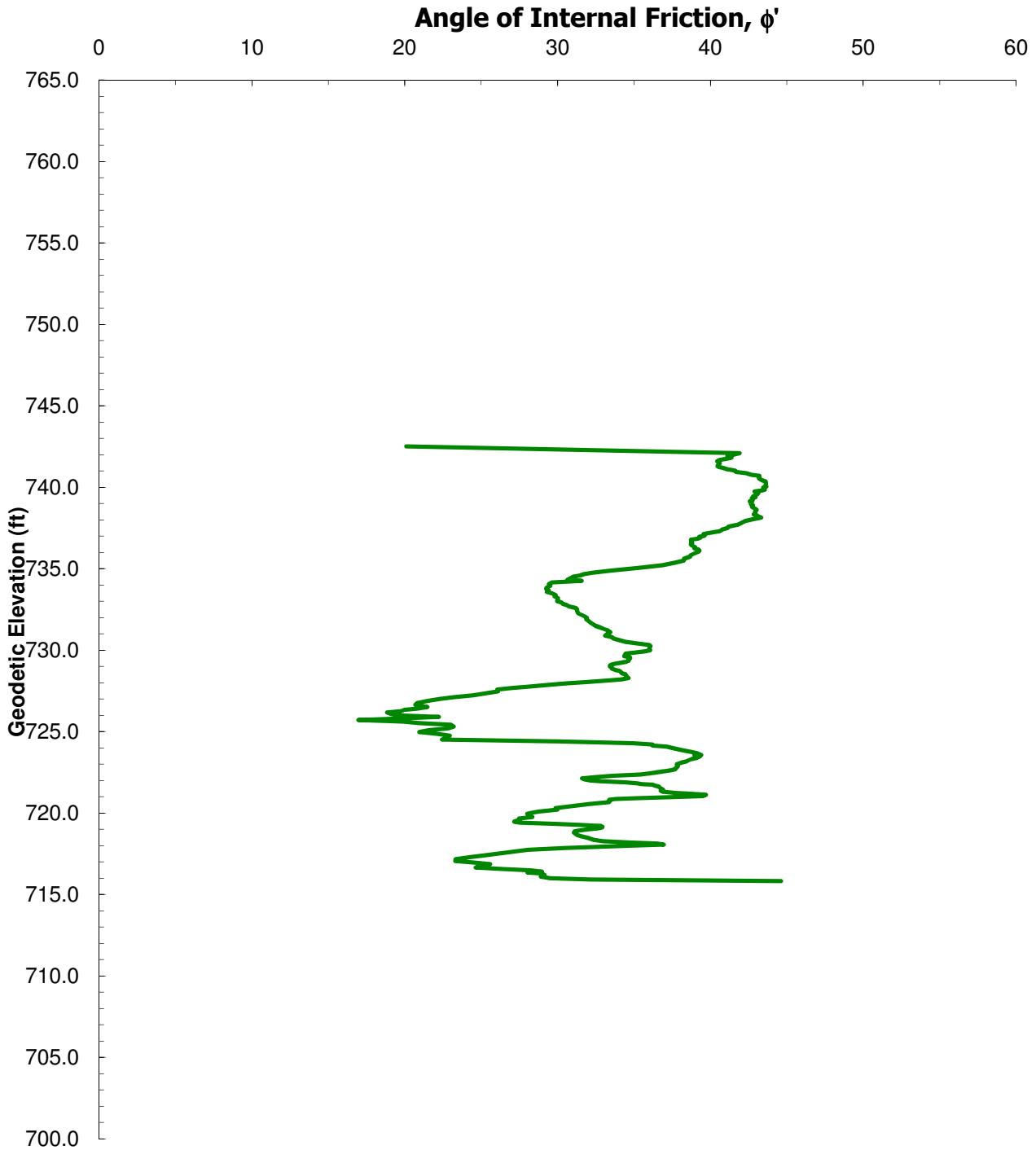
Project No. 175569042
STN-18A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



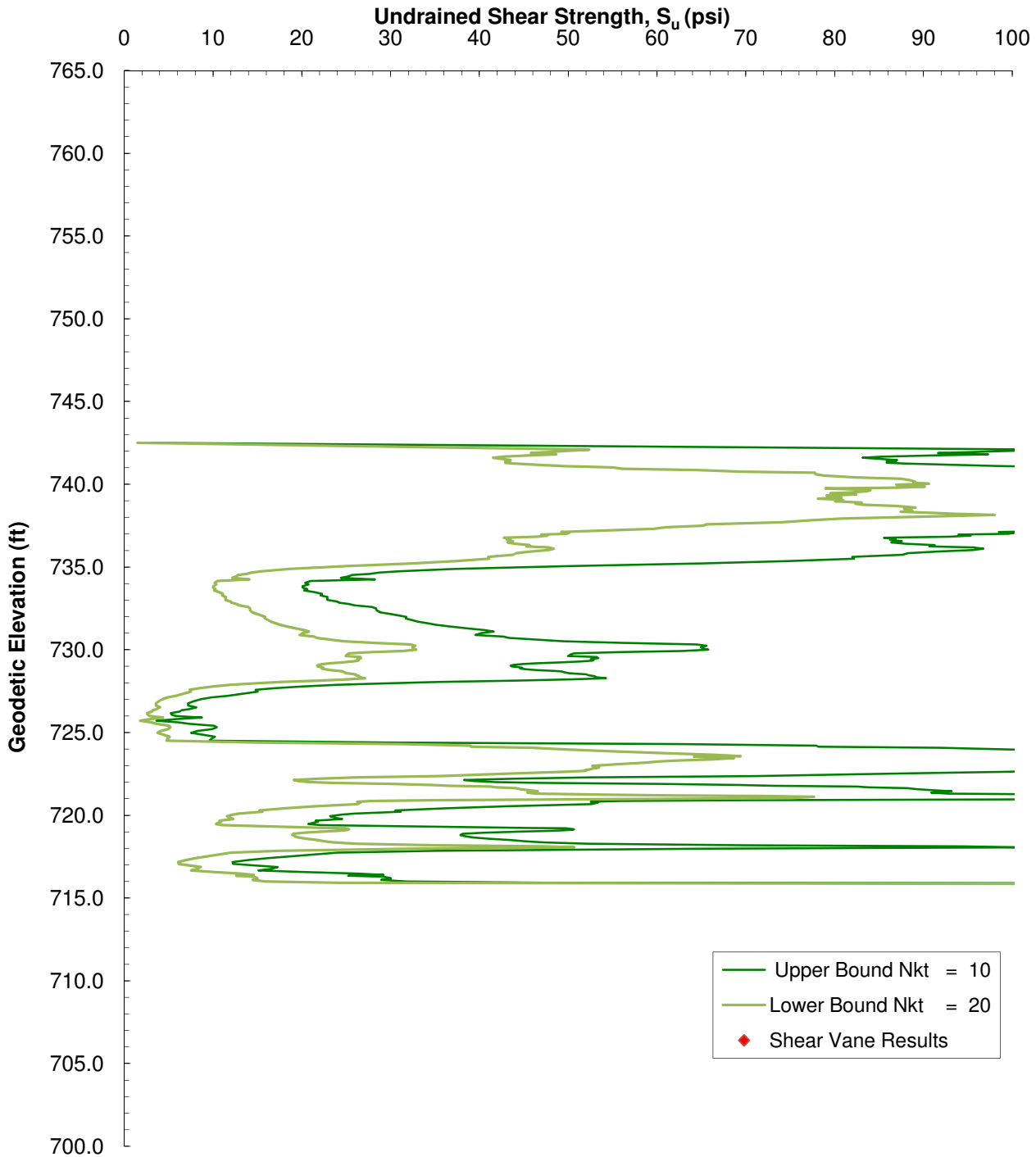
Project No. 175569042
STN-18A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-18A



**Stantec Consulting
Inc.**

Stantec

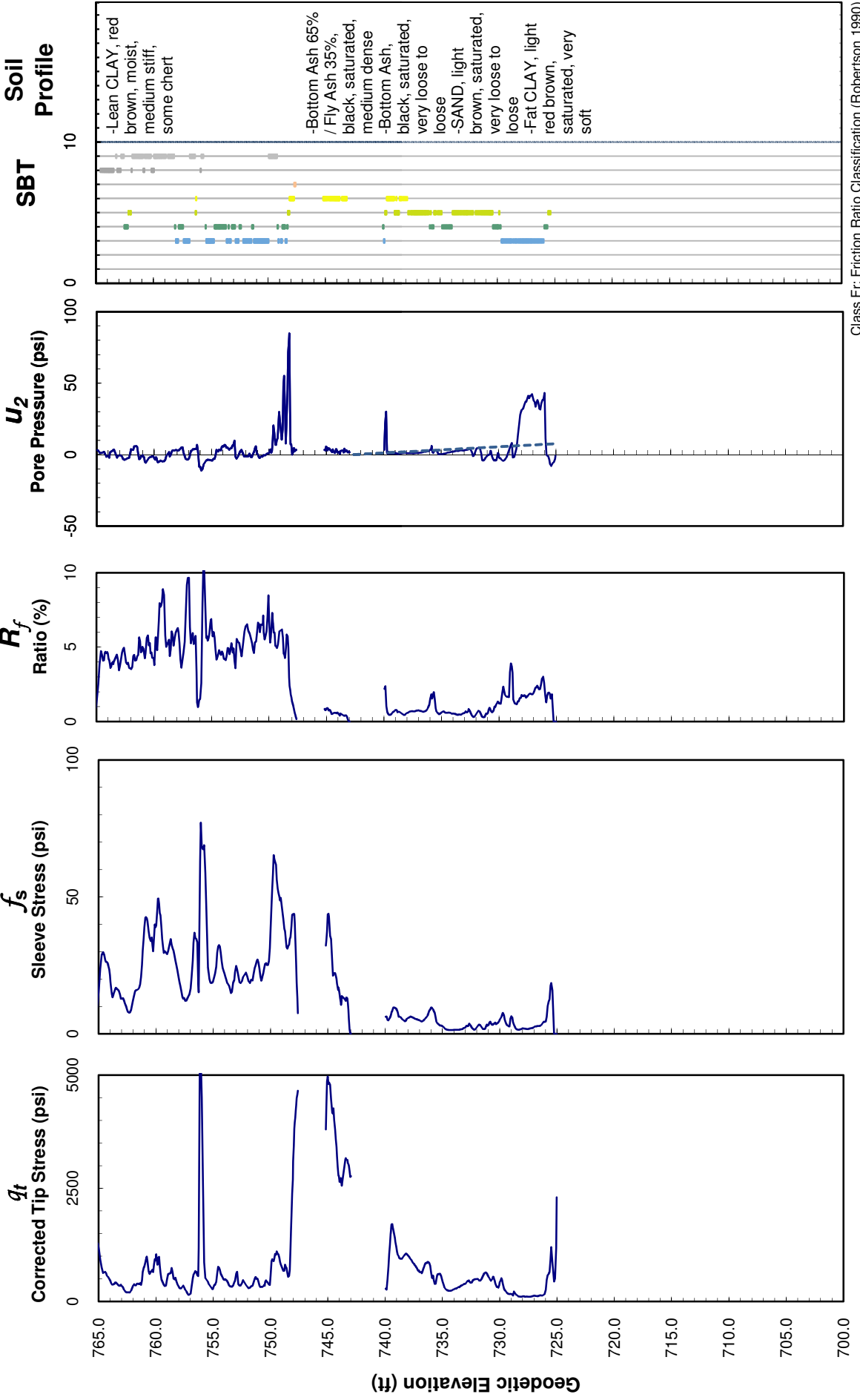
Elevation: 765.60 ft
SCPTu Start Elevation: 765.60 ft
Groundwater Elevation: 742.60 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 7, 2009
Project No. 175569042

STN-19A



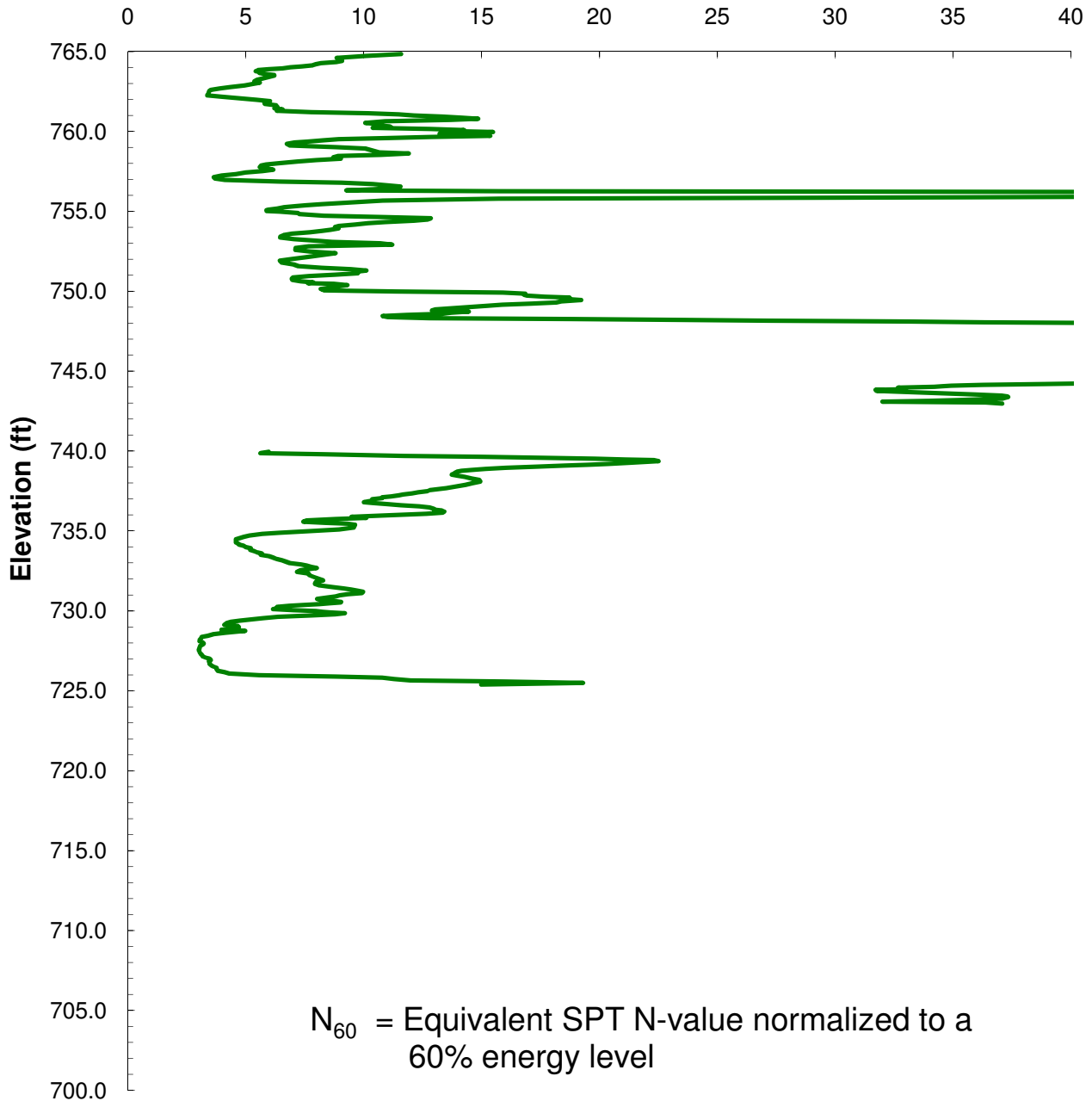


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

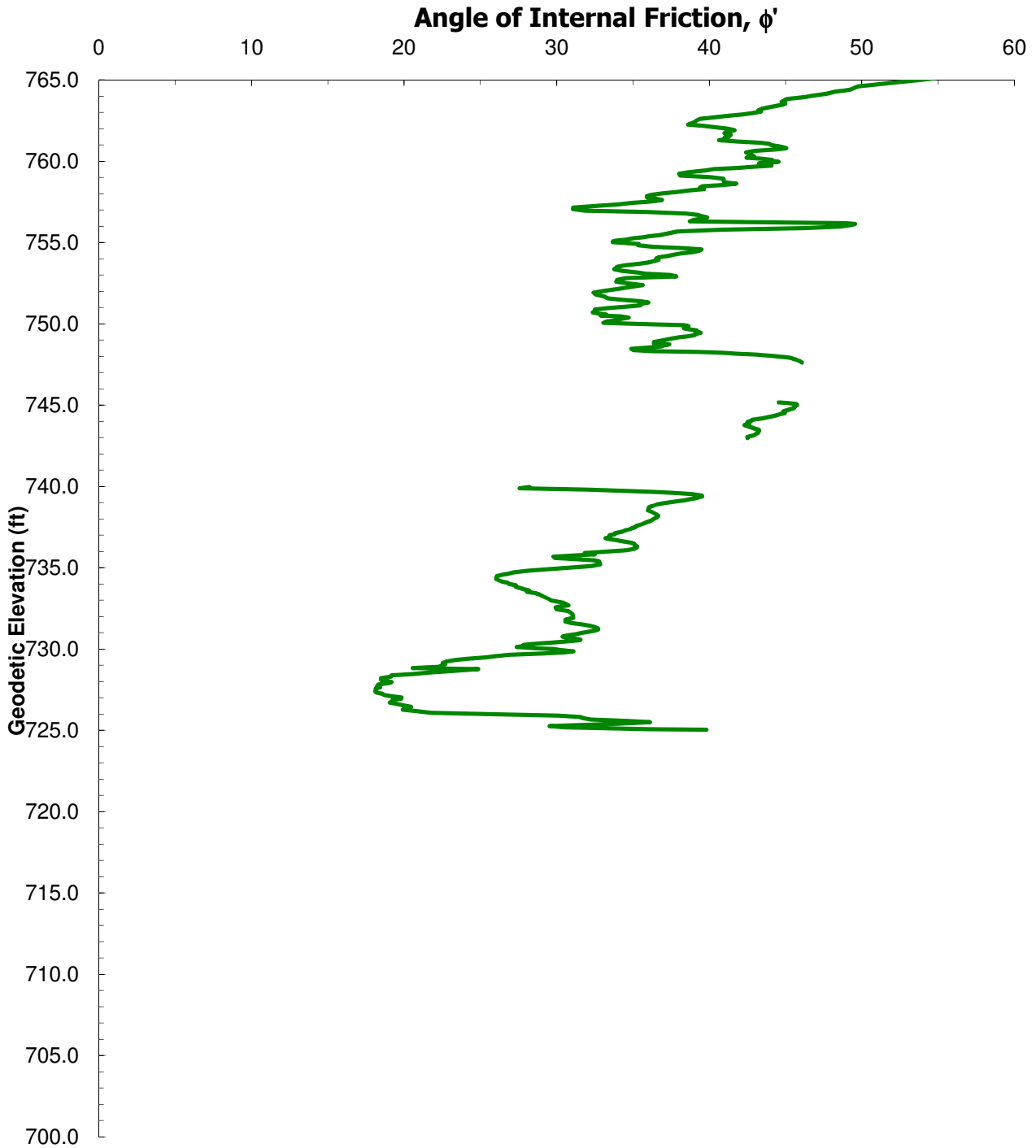
Project No. 175569042
STN-19A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



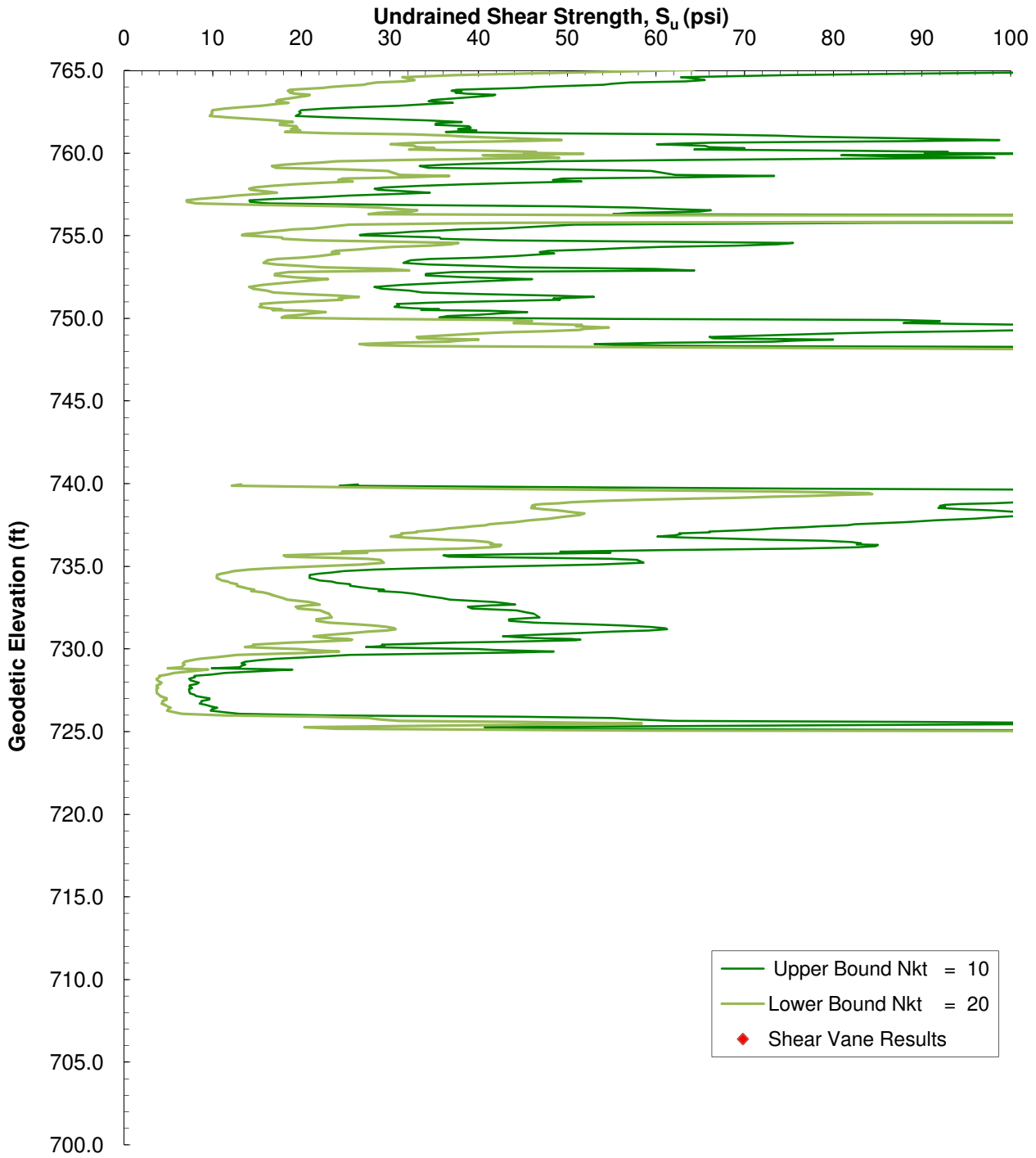
Project No. 175569042
STN-19A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-19A



**Stantec Consulting
Inc.**

Stantec

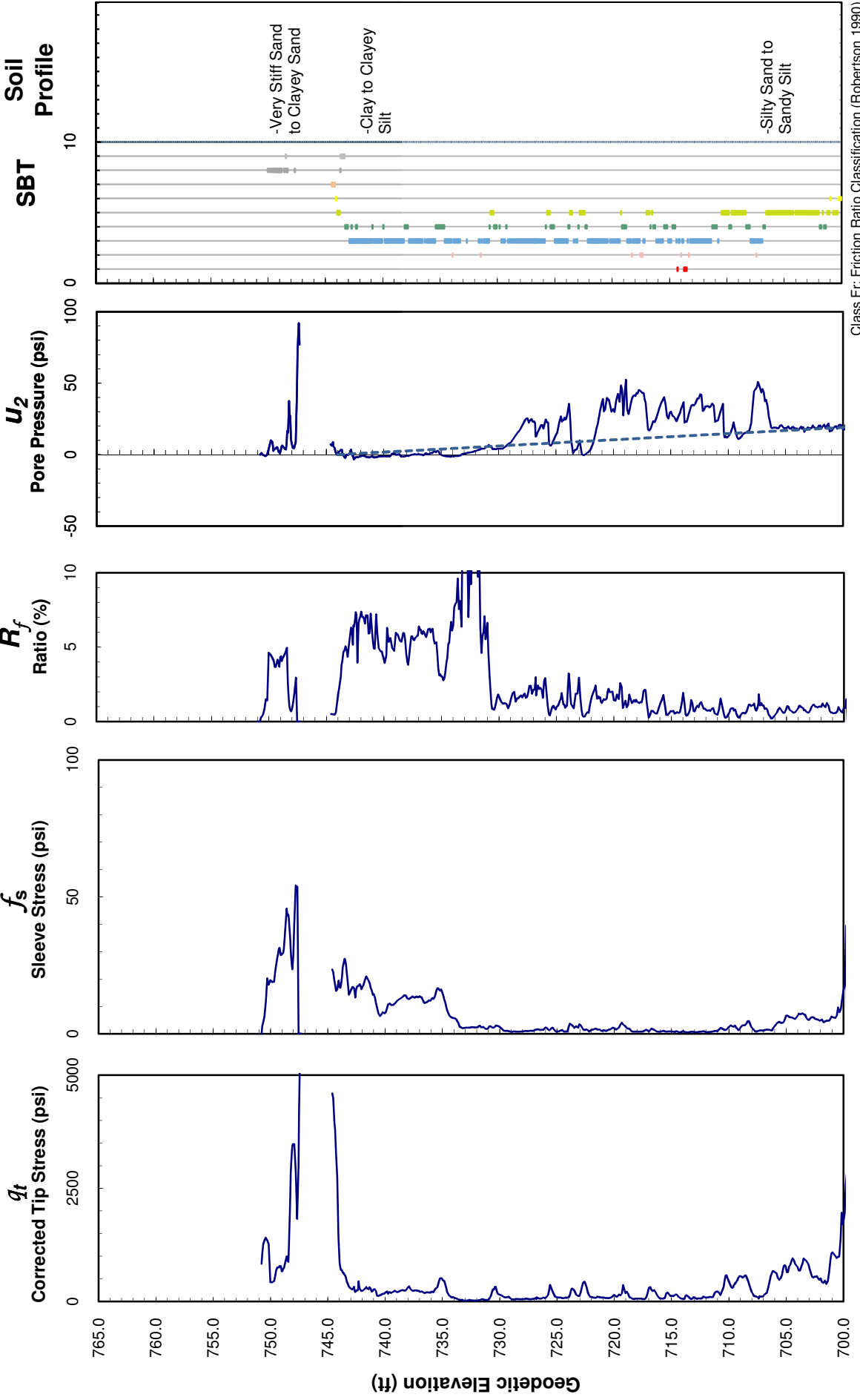
Elevation: 751.00 ft
SCPTu Start Elevation: 751.00 ft
Groundwater Elevation: 744.00 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 21, 2009
Project No. 175569042

STN-26B



Class Fr: Friction Ratio Classification (Robertson 1990)

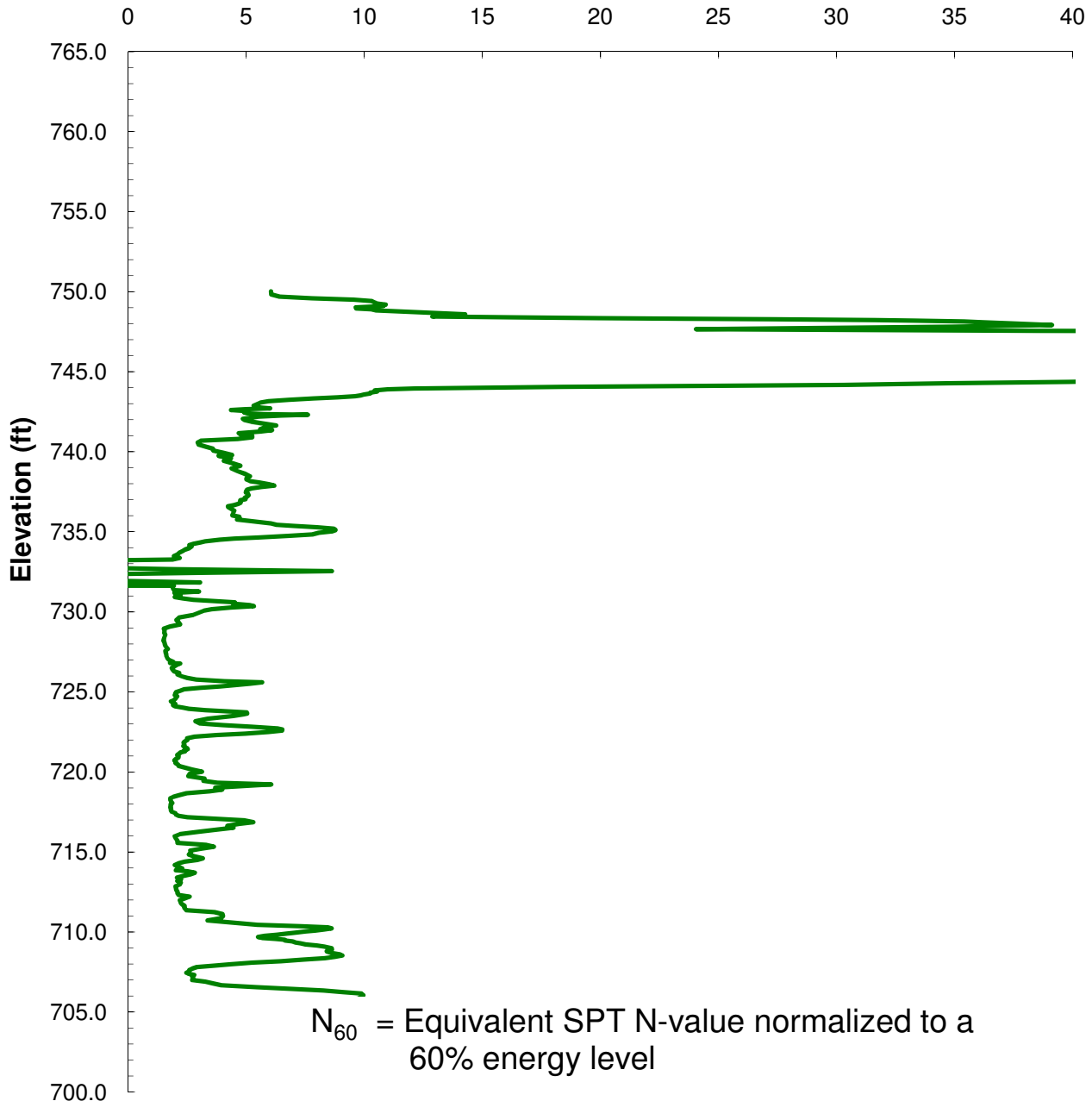


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

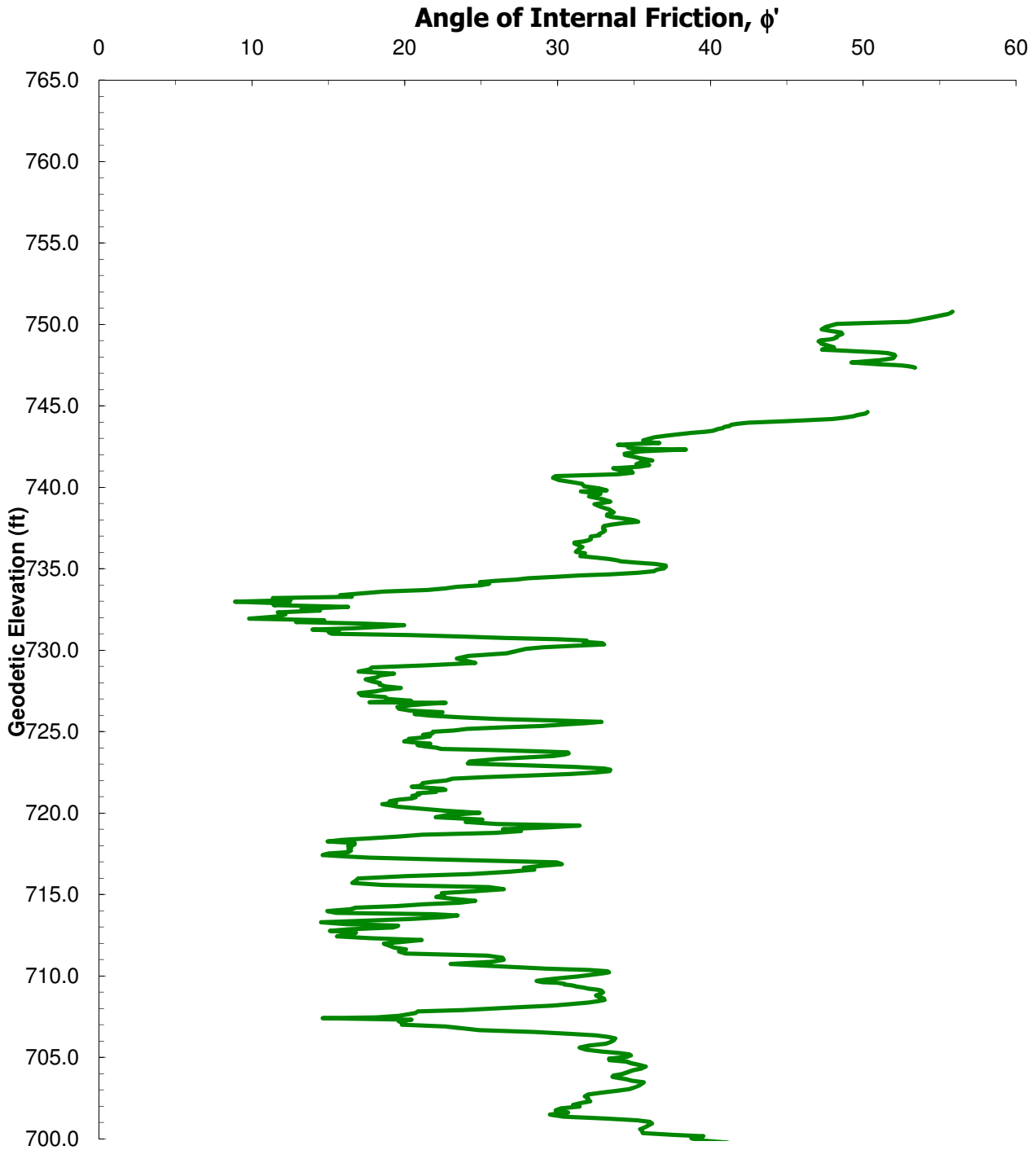
Project No. 175569042
STN-26B



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



Project No. 175569042

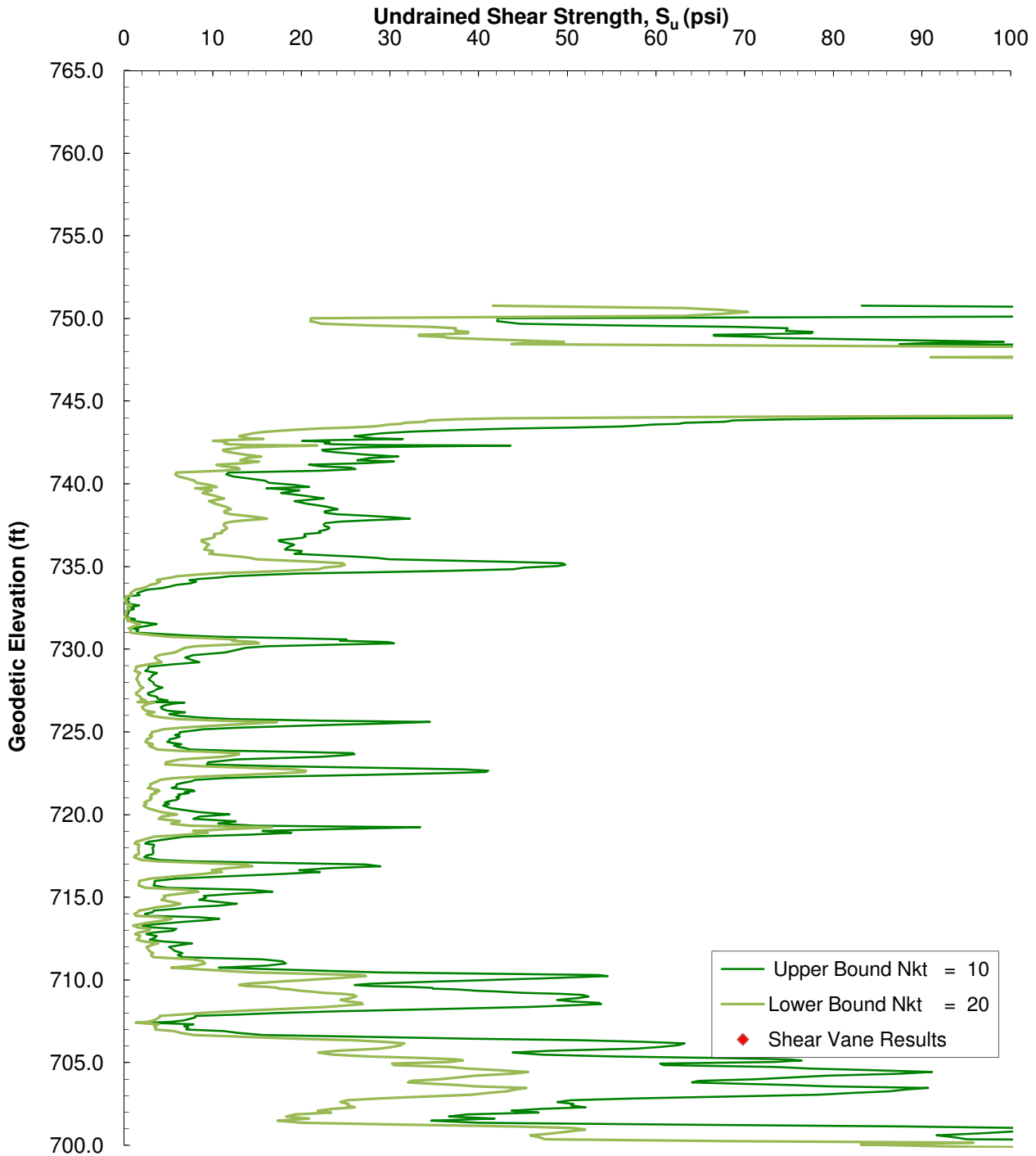
STN-26B



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-26B



**Stantec Consulting
Inc.**



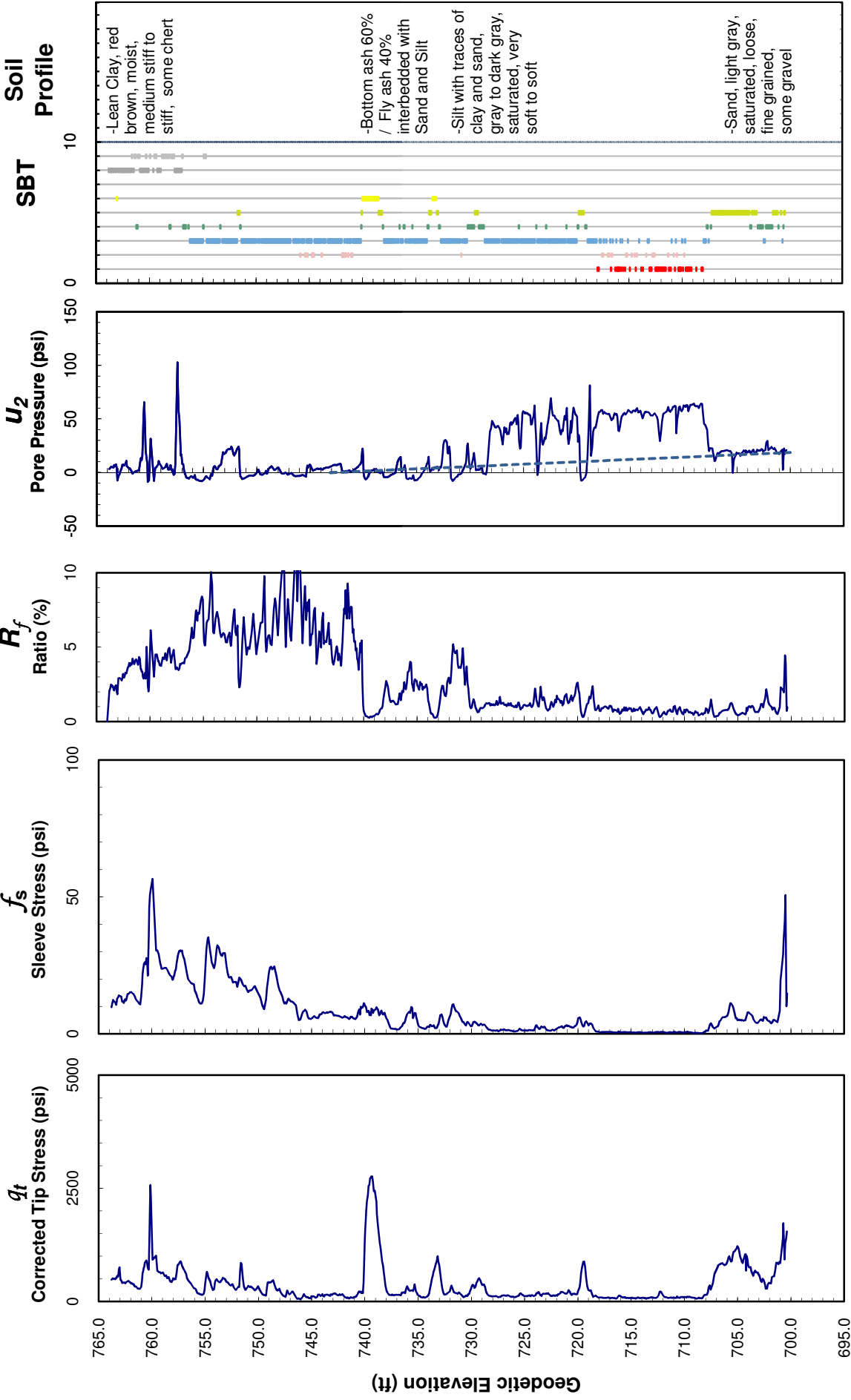
Elevation: 765.00 ft
 SCPTu Start Elevation: 764.00 ft
 Groundwater Elevation: 743.10 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 4, 2009
 Project No. 175569042

STN-27C



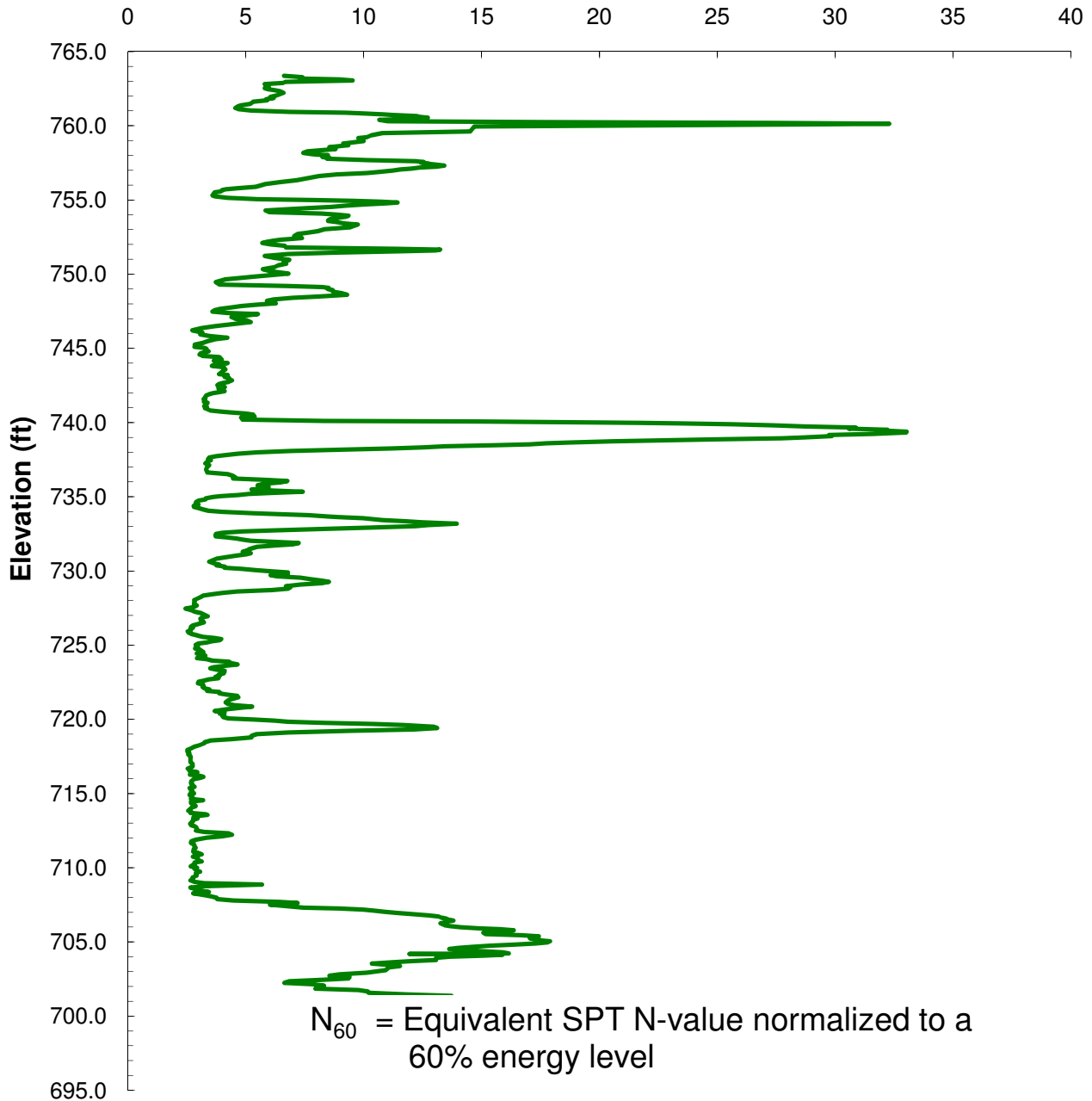


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

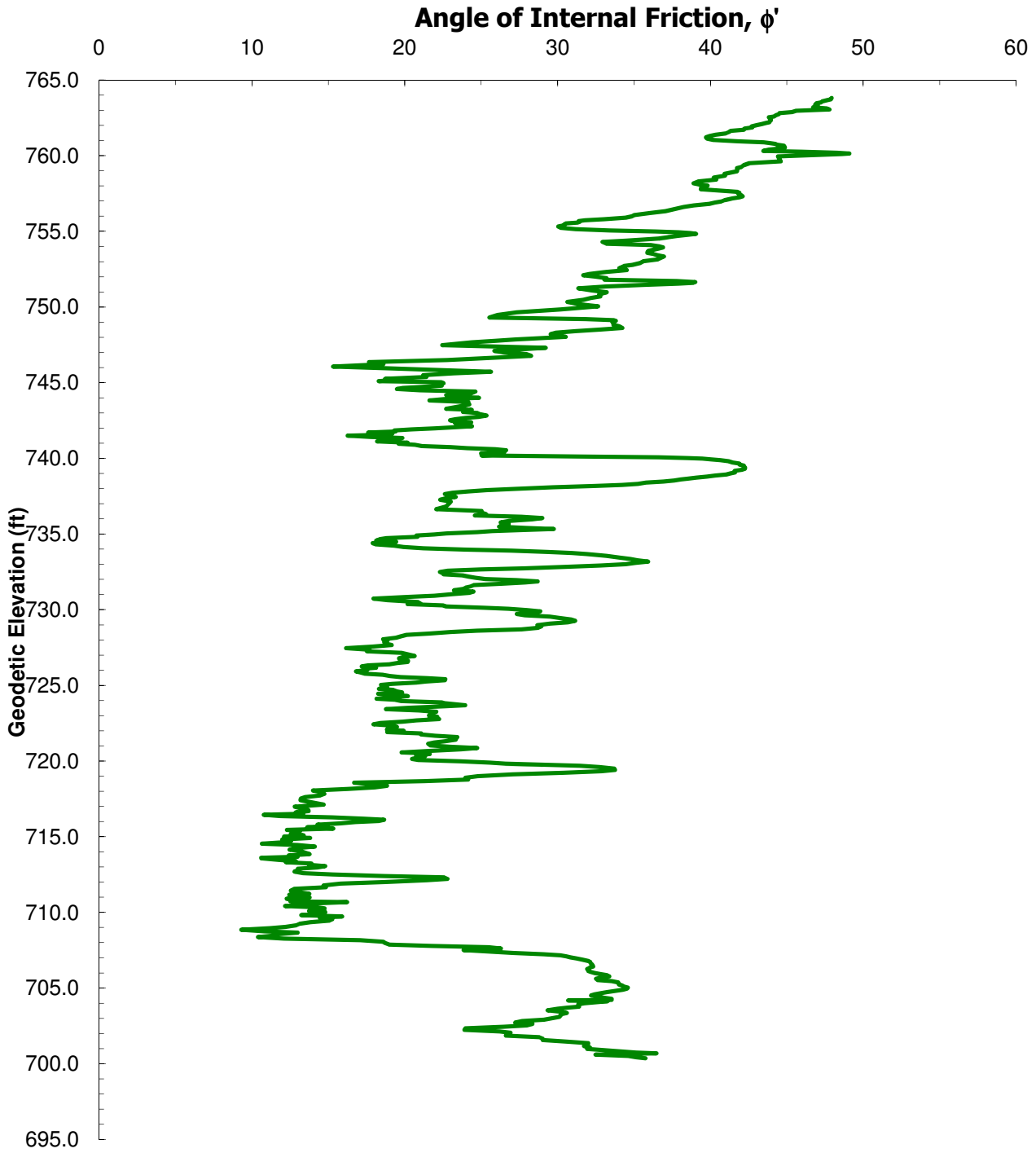
Project No. 175569042
STN-27C



Stantec

SCPTu RESULTS

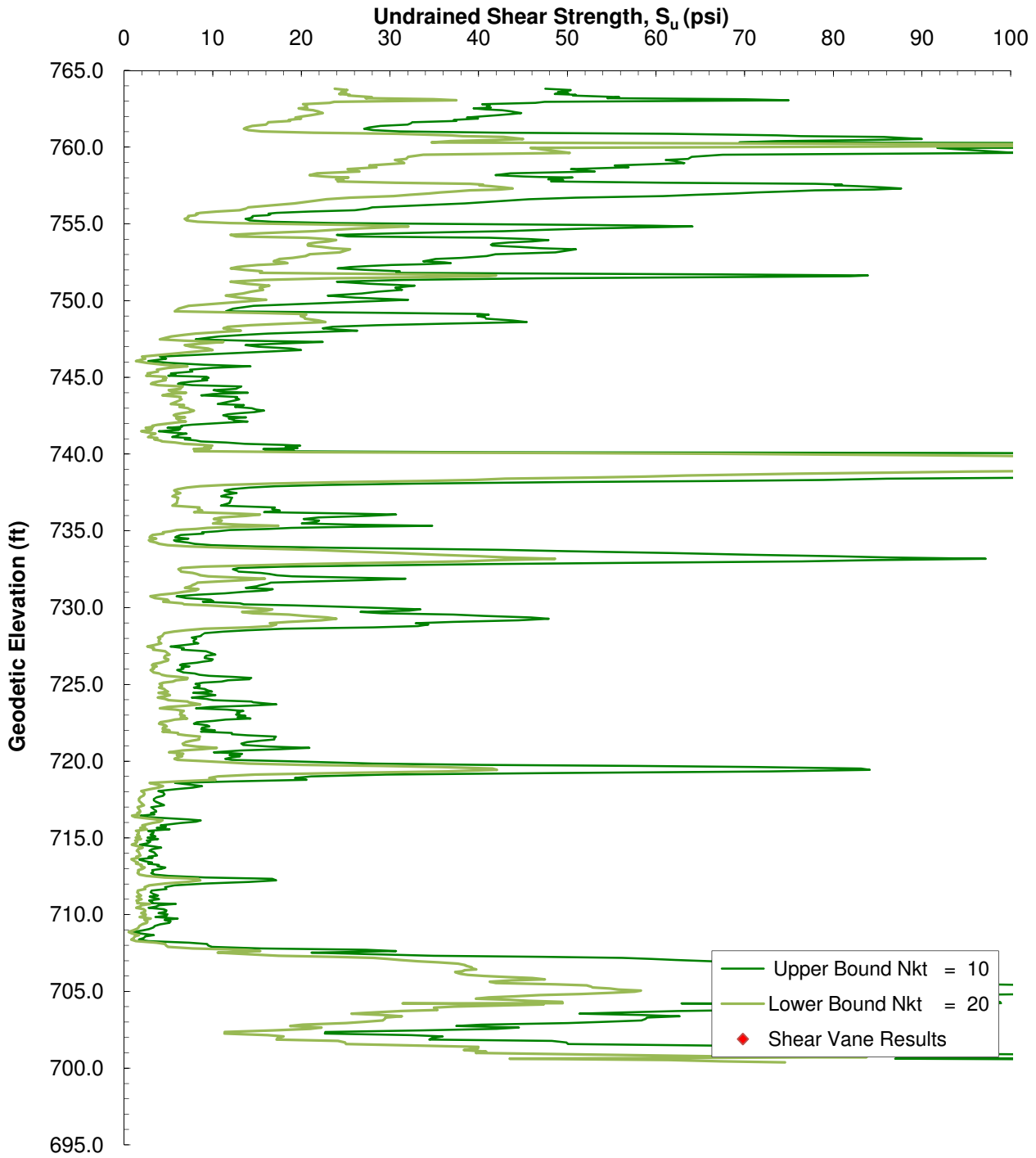
Effective Angle of Internal Friction



Project No. 175569042
STN-27C



Stantec



Project No. 175569042
STN-27C

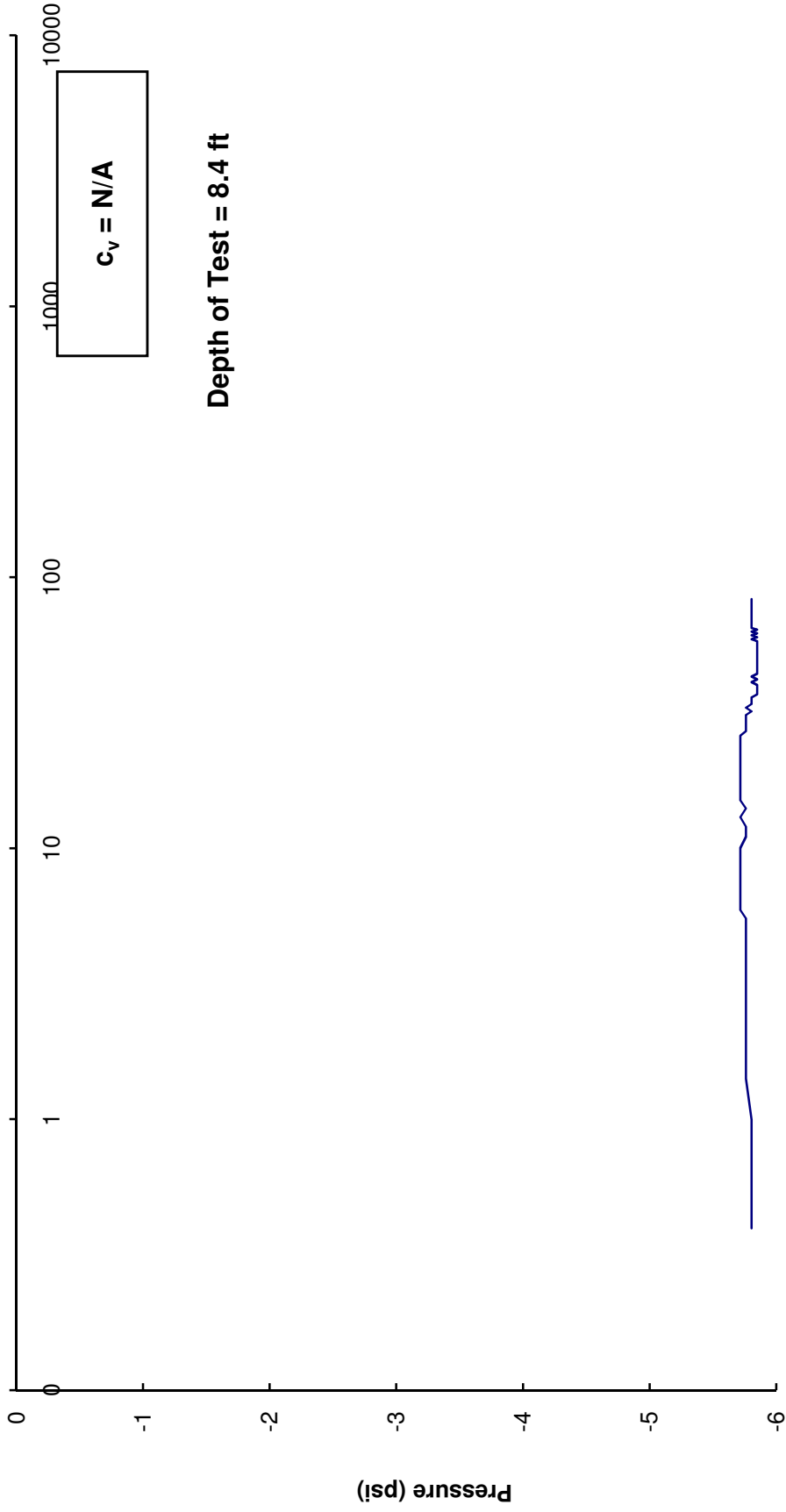


Stantec

**Stantec Consulting
Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-27C

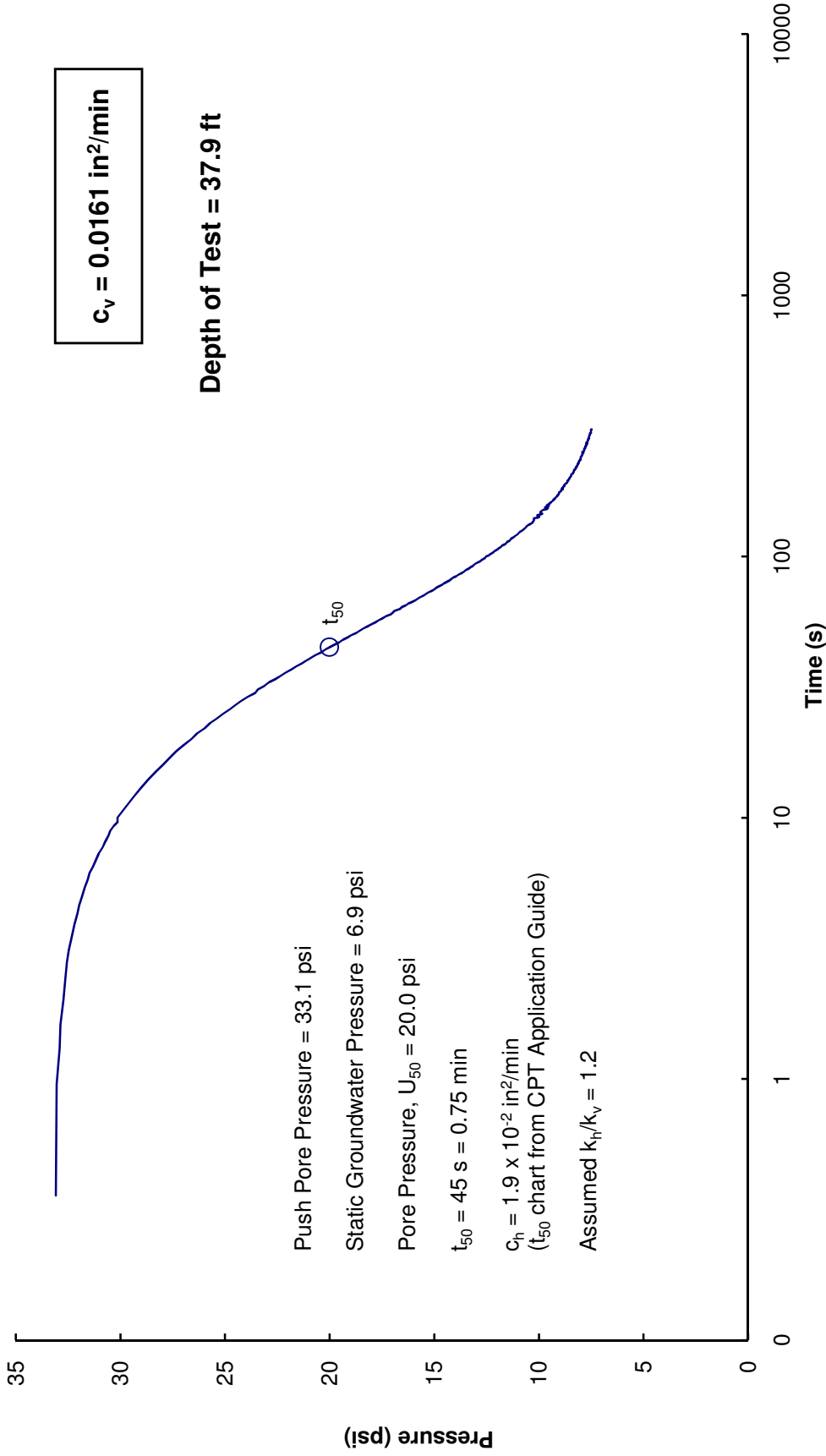


Stantec

**Stantec Consulting
Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-27C

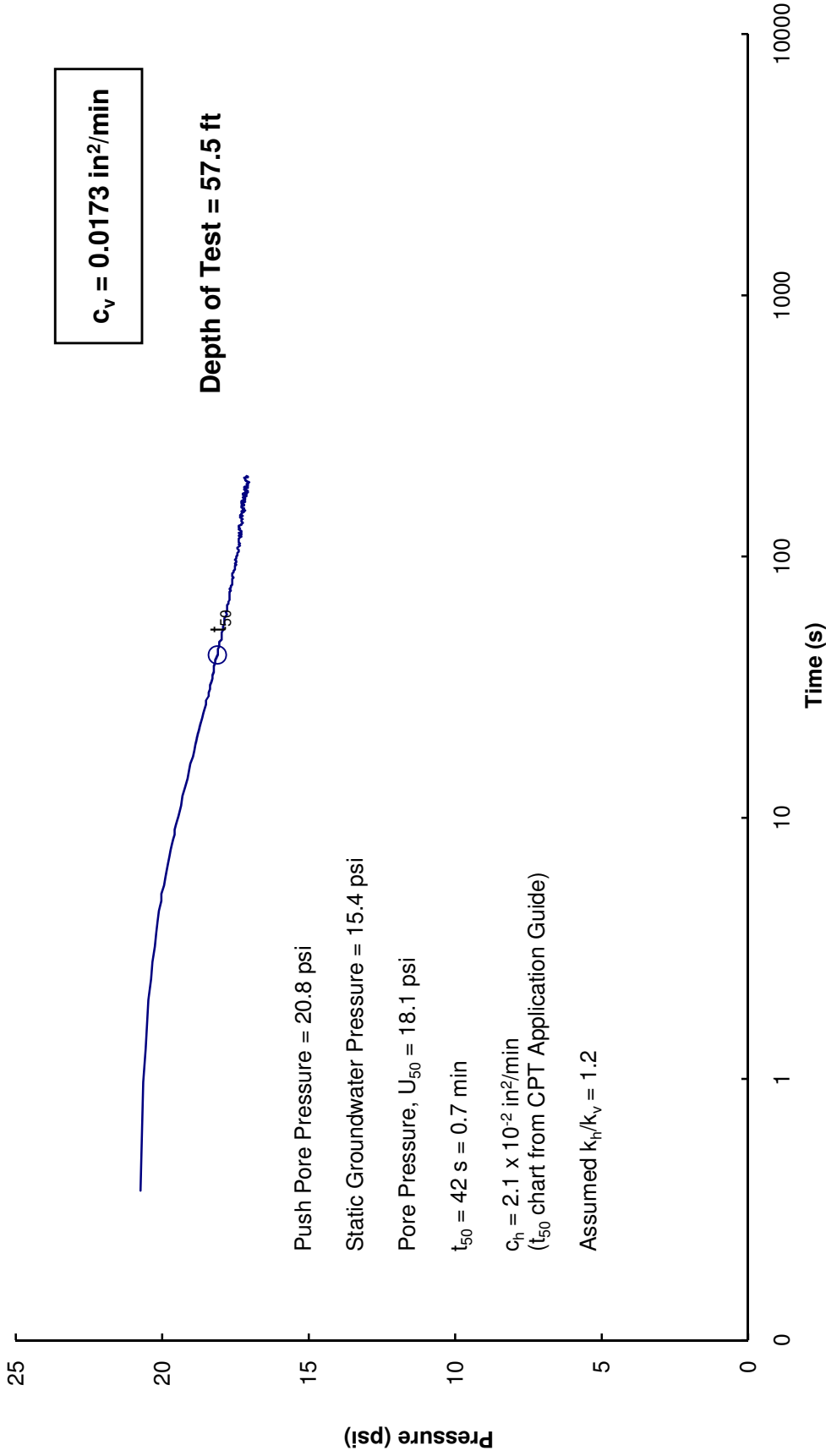


Stantec

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Inc.**

SCPTu DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-27C



**Stantec Consulting
Inc.**

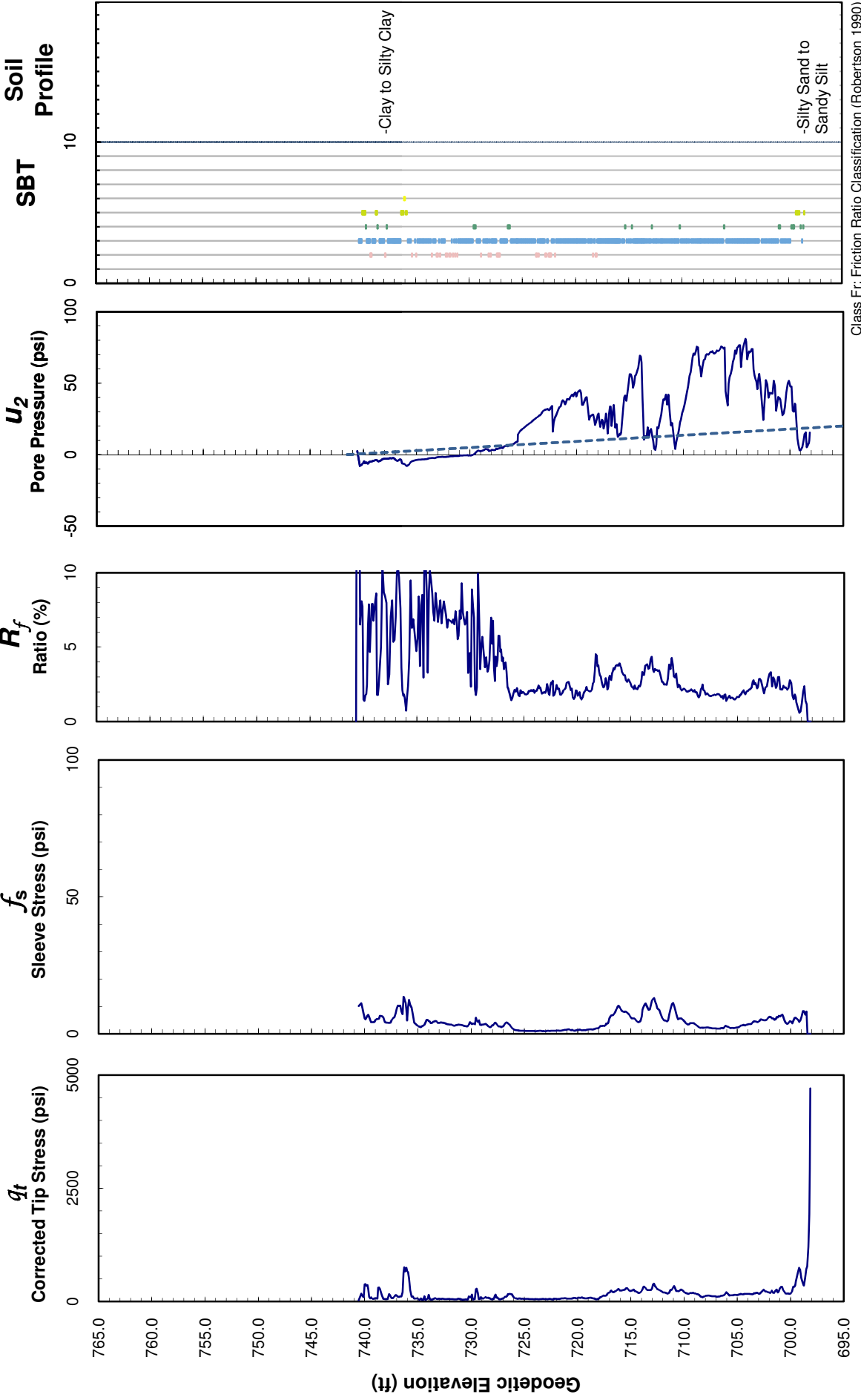
Stantec

Elevation: 749.70 ft
SCPTu Start Elevation: 740.70 ft
Groundwater Elevation: 741.50 ft

Client: TVA
Project: Kingston Ash Pond

Test Date: May 21, 2009
Project No. 175569042

STN-31A



Class Fr: Friction Ratio Classification (Robertson 1990)

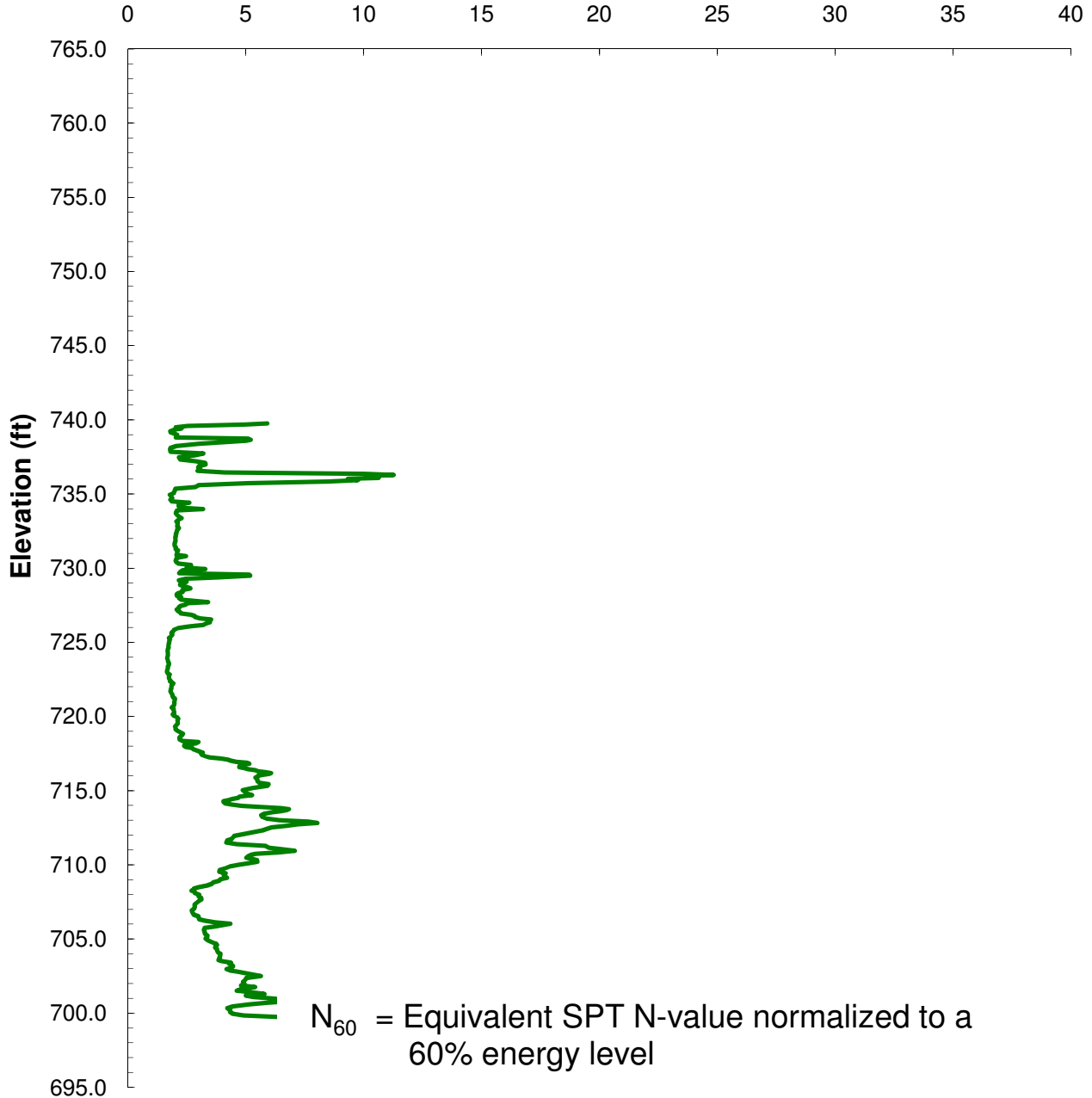


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

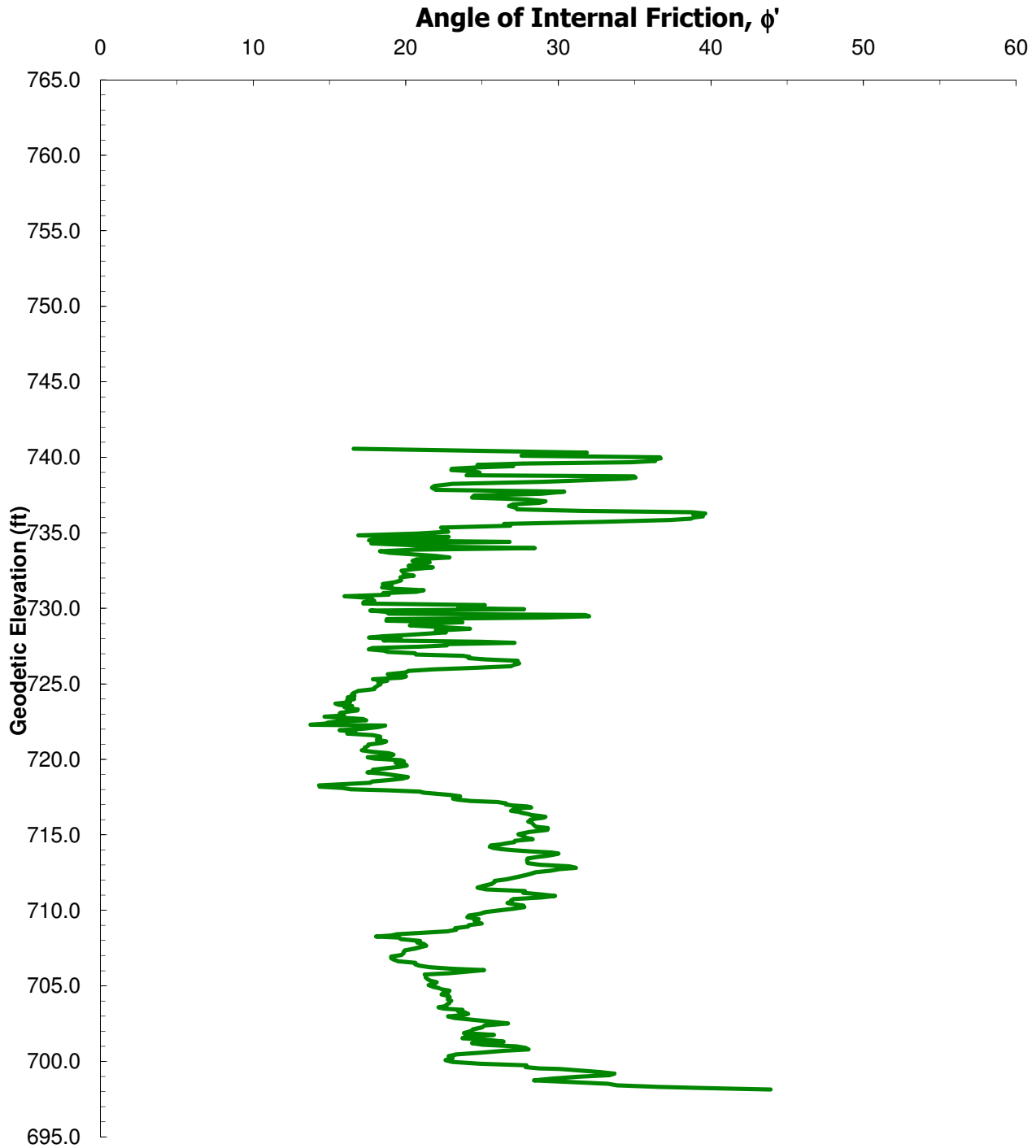
Project No. 175569042
STN-31A



Stantec

SCPT_u RESULTS

Effective Angle of Internal Friction



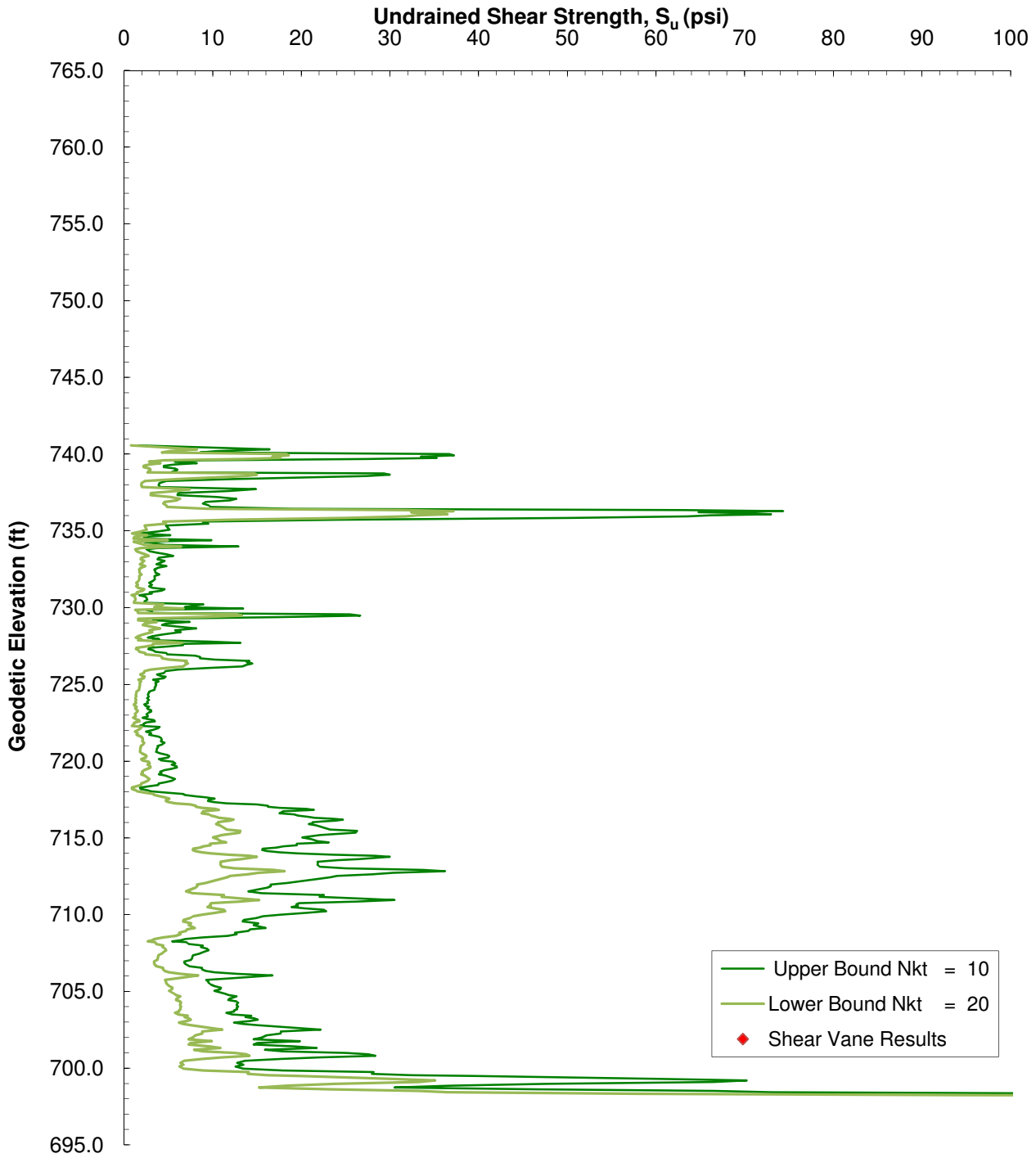
Project No. 175569042
STN-31A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-31A



**Stantec Consulting
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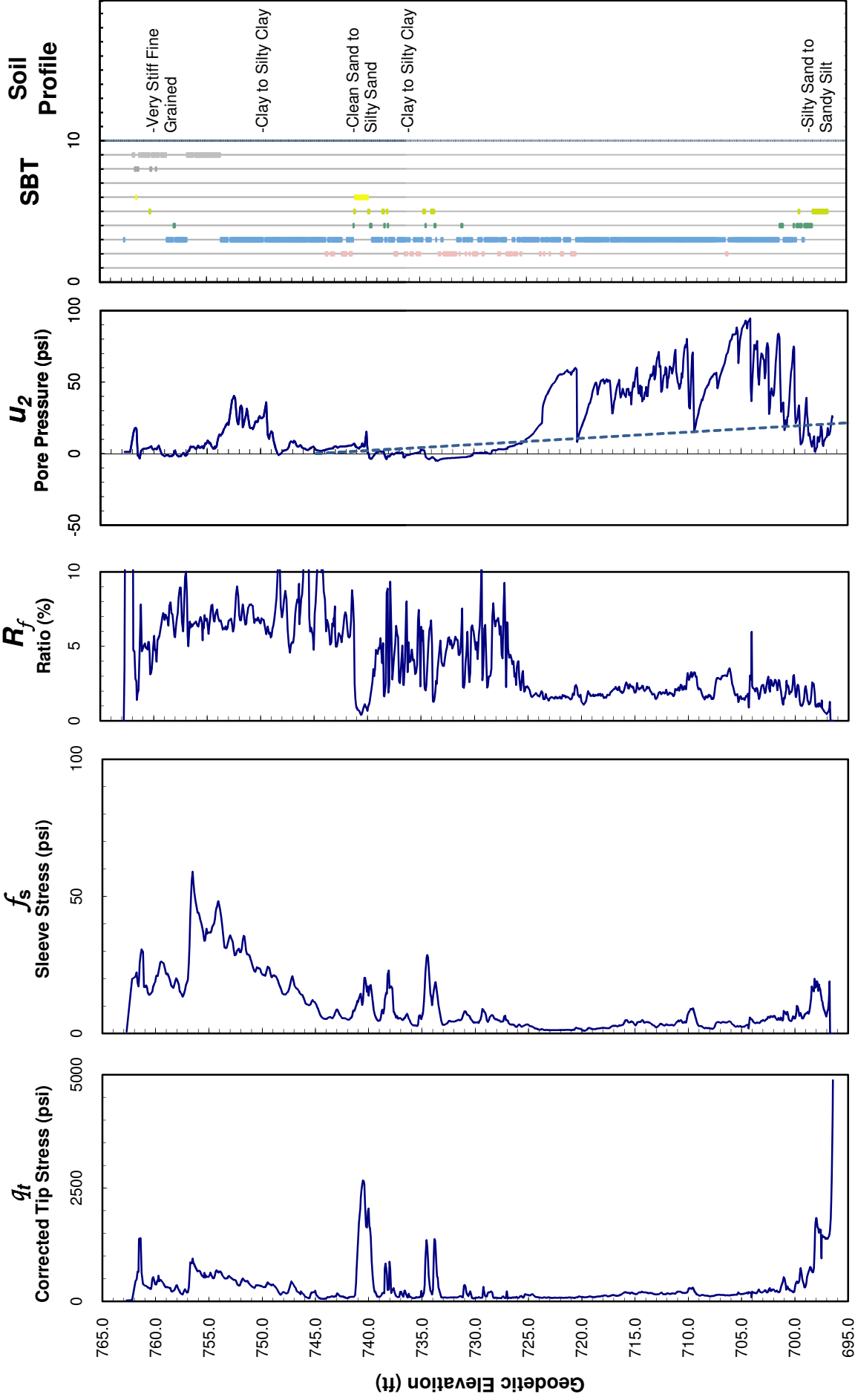
Stantec

Elevation: 764.80 ft
SCPTu Start Elevation: 762.80 ft
Groundwater Elevation: 744.80 ft

Client: TVA
Project: Kingston Ash Pond

Test Date: May 21, 2009
Project No. 175569042

STN-32A



Class Fr: Friction Ratio Classification (Robertson 1990)

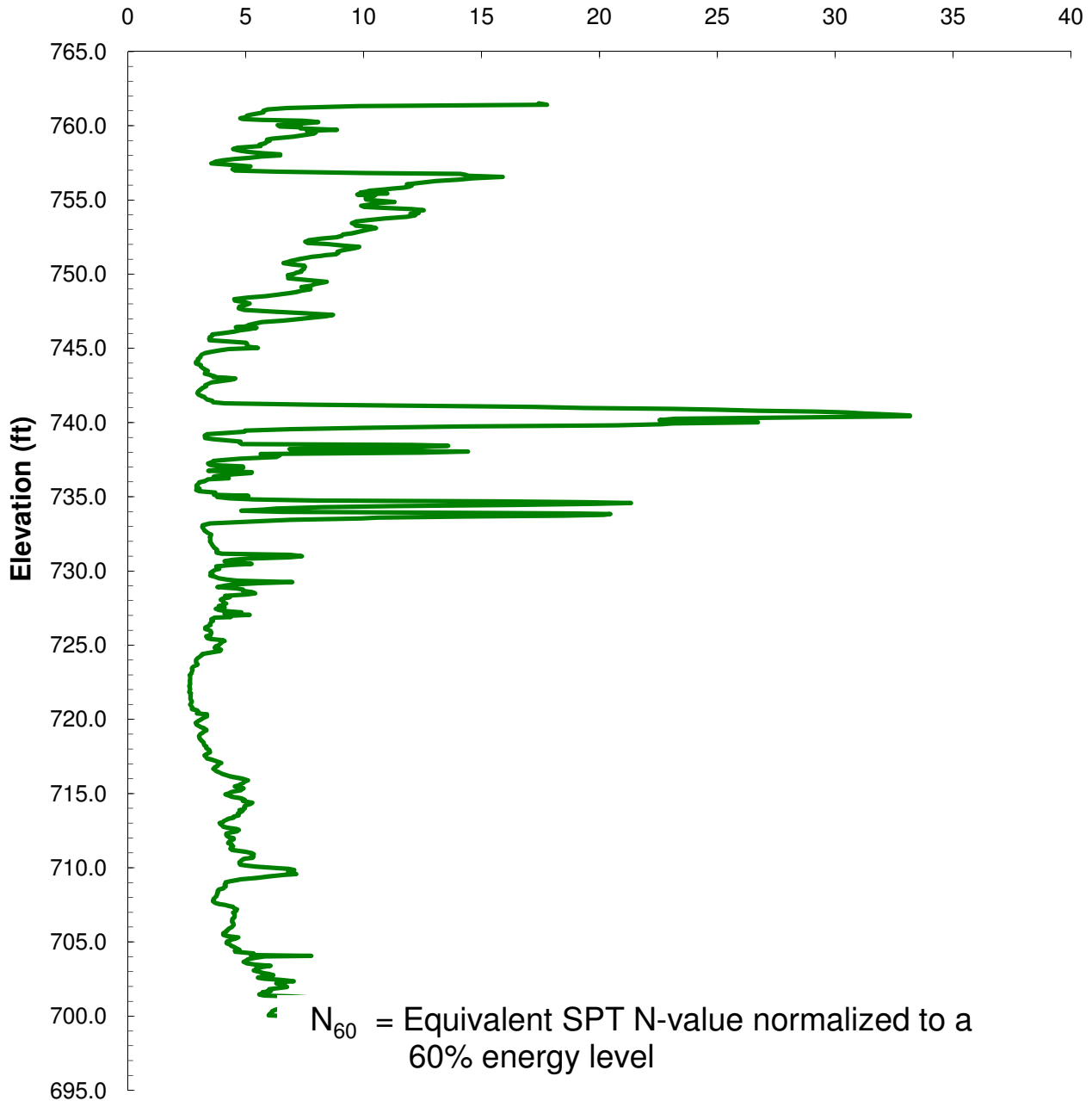


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

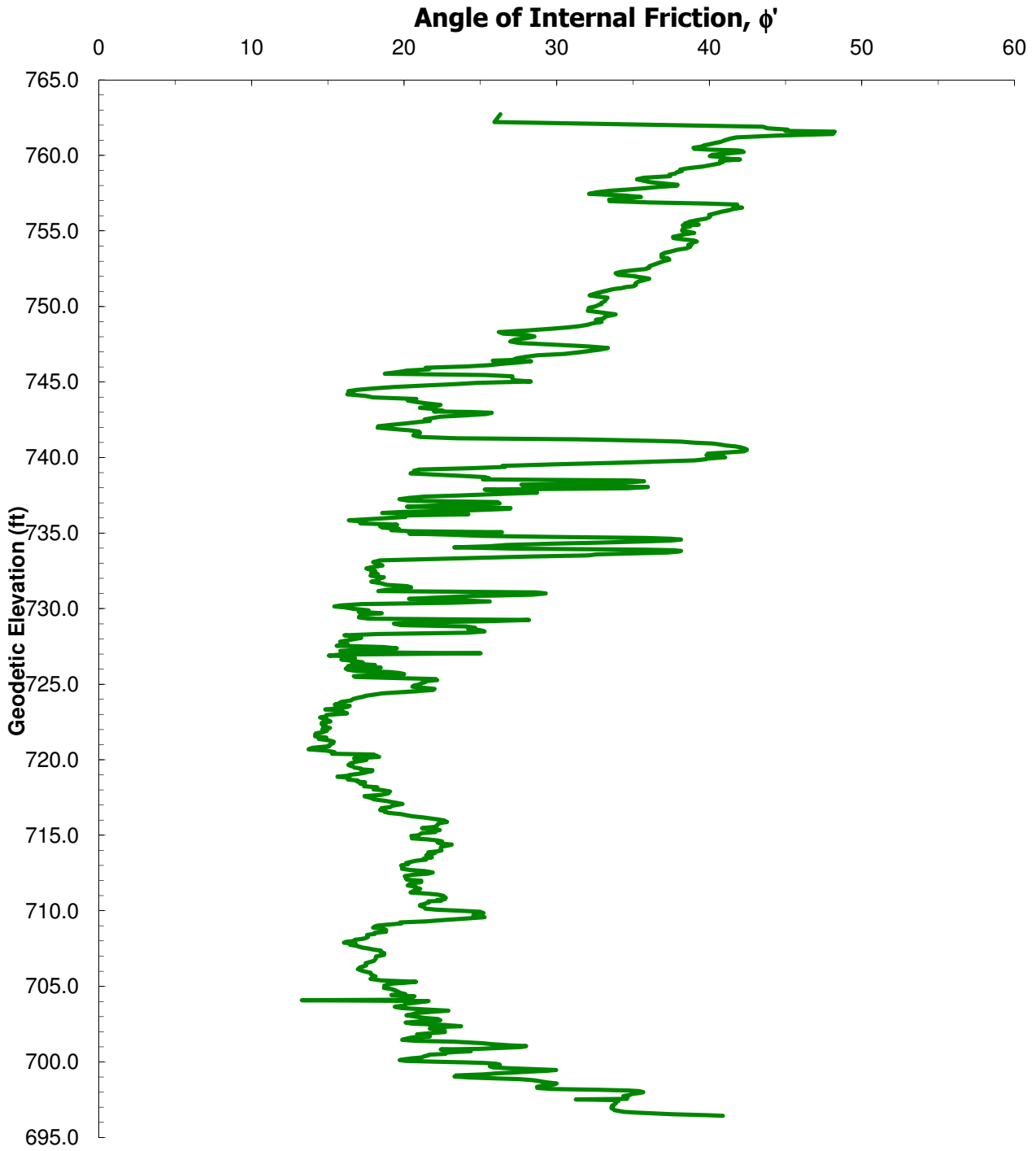
Project No. 175569042
STN-32A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



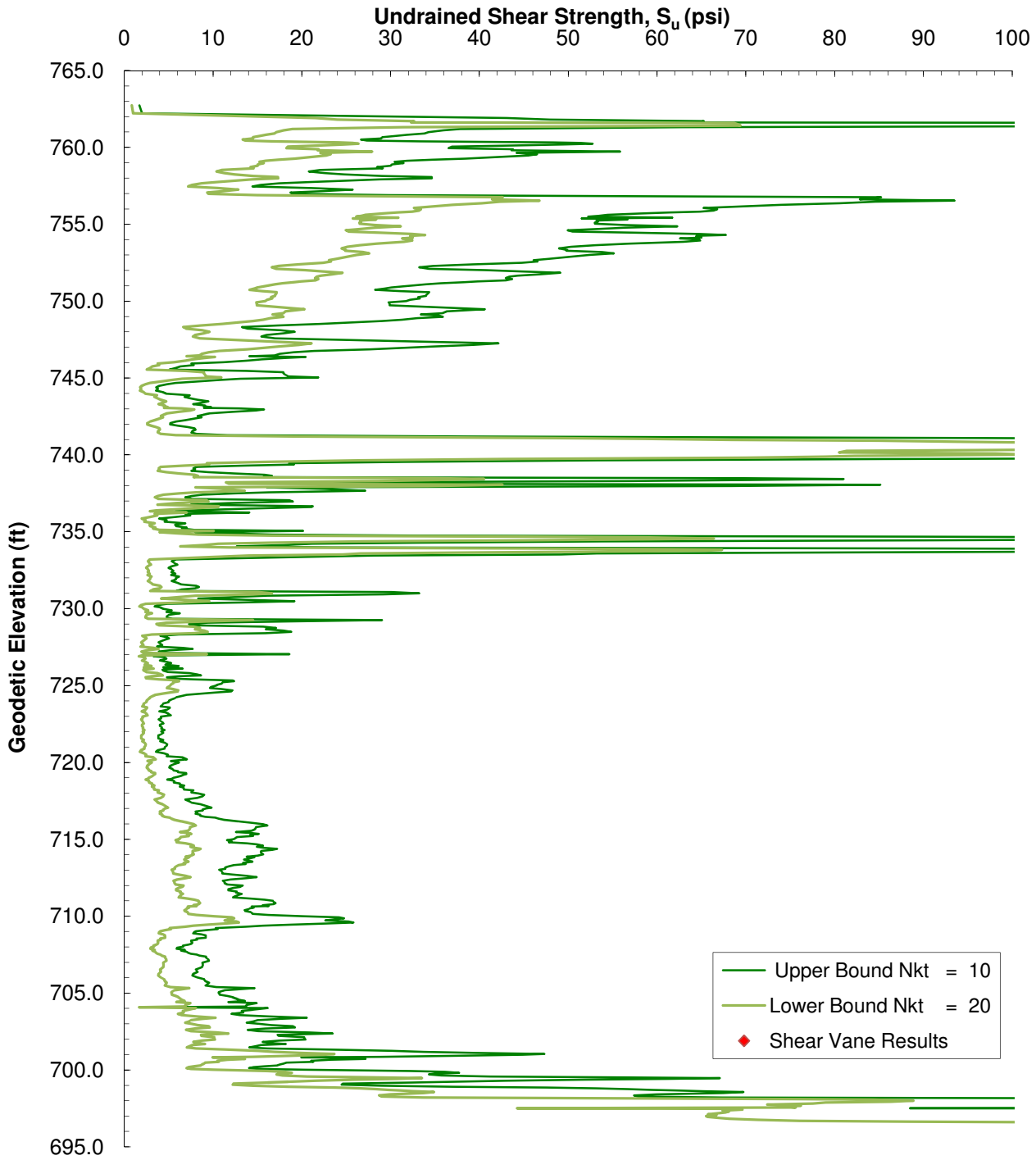
Project No. 175569042
STN-32A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-32A

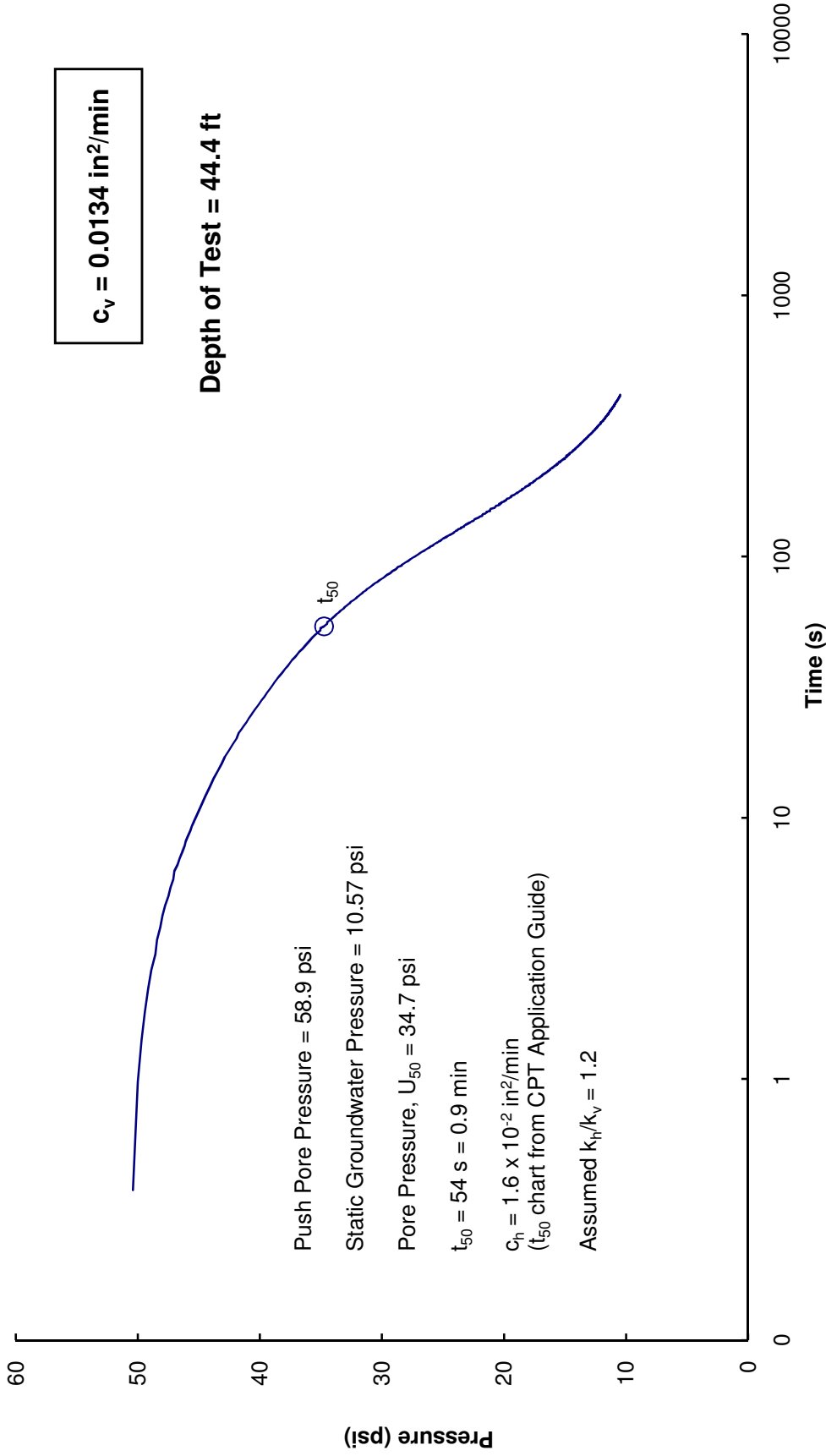


Stantec

**Stantec Consulting
Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-32A

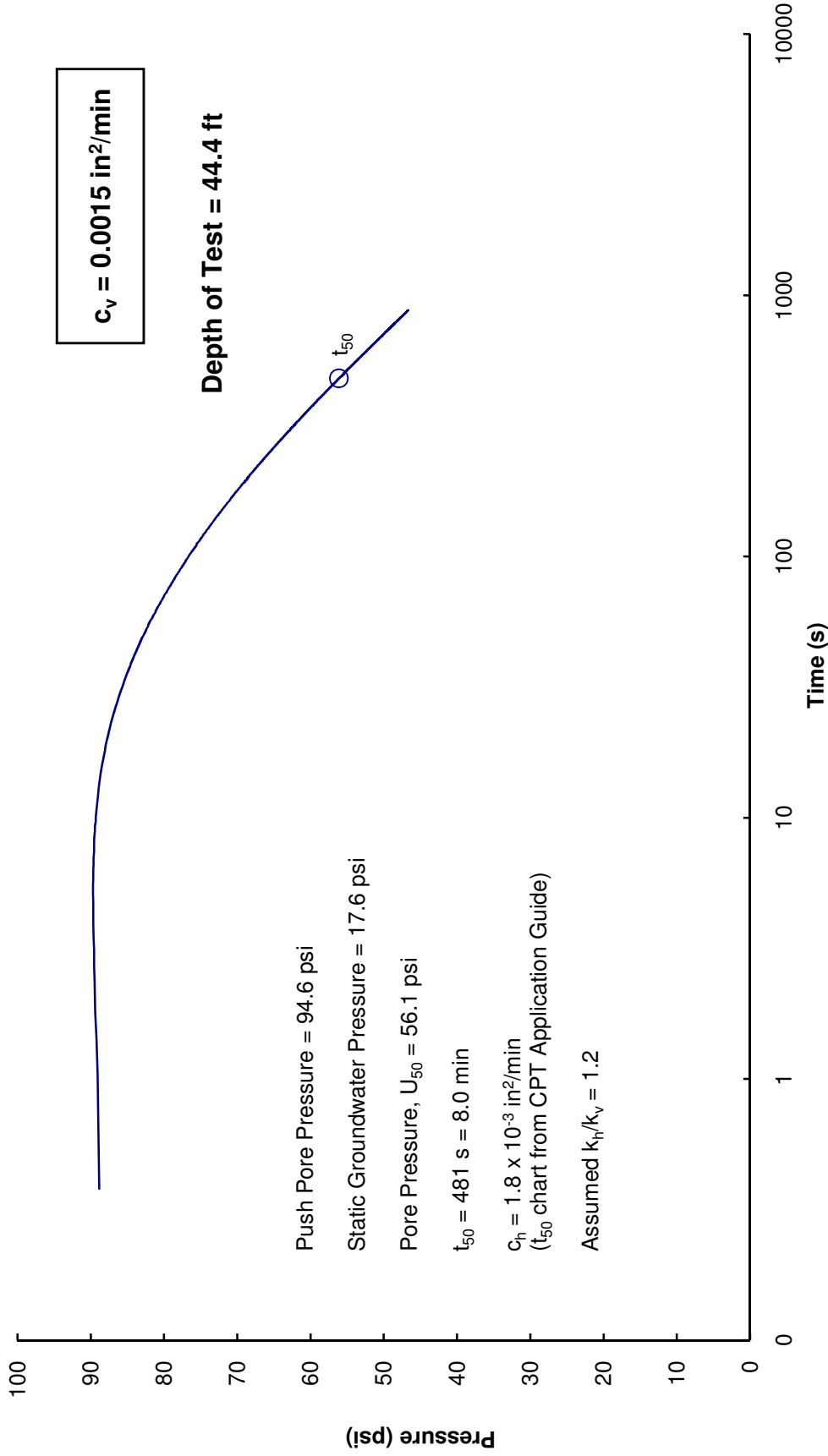


Stantec

**Stantec Consulting
Inc.**

SCPTu DISSIPATION RESULTS

Coefficient of Consolidation



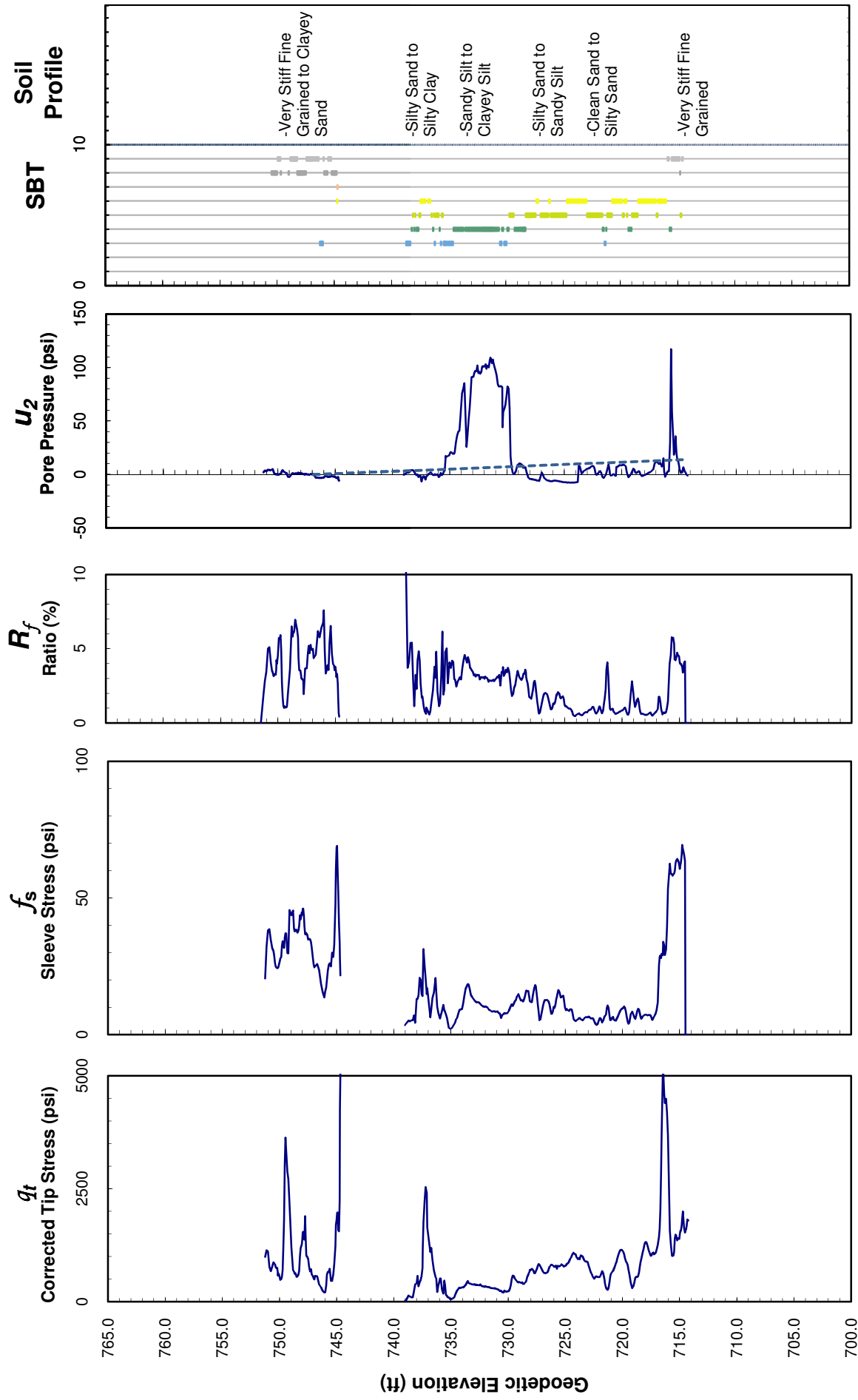
Project No. 175569042
STN-32A



**Stantec Consulting
Inc.**

Stantec

Elevation: 751.50 ft SCPTu Start Elevation: 751.50 ft Groundwater Elevation: 746.90 ft Client: TVA Project: Kingston Ash Pond	Test Date: May 20, 2009 Project No. 175569042	STN-36B
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Class Fr: Friction Ratio Classification (Robertson 1990)

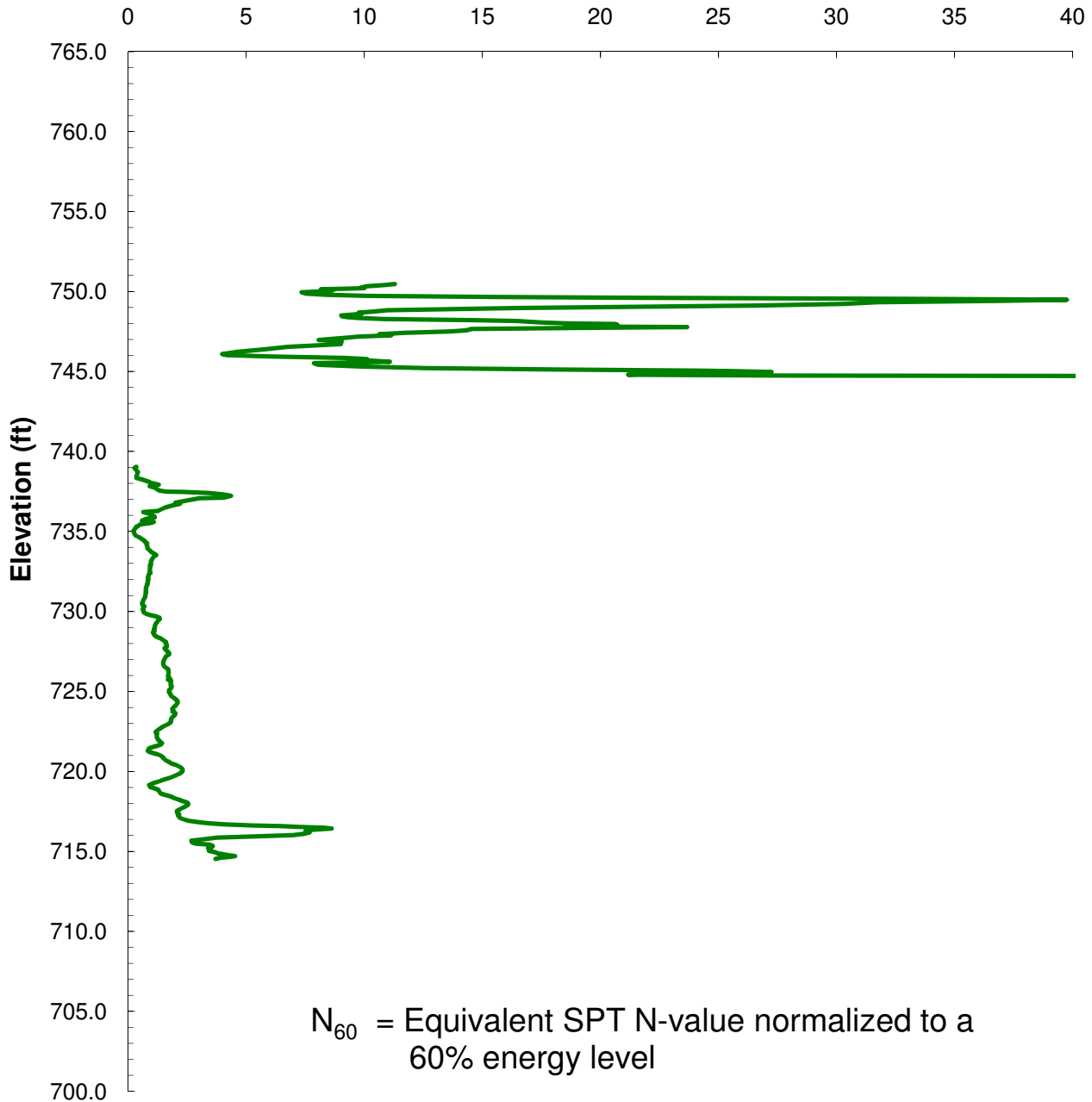


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

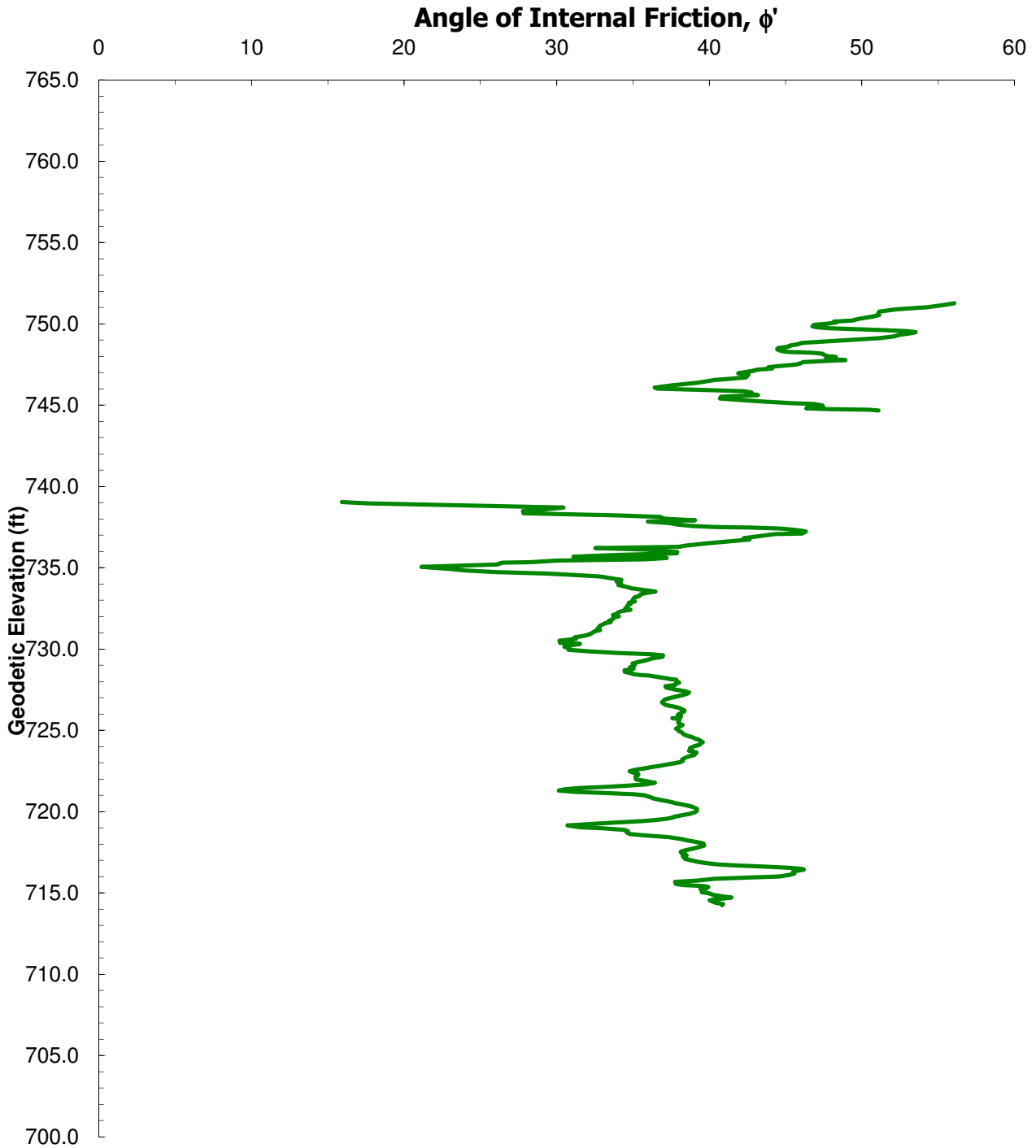
Project No. 175569042
STN-36B



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



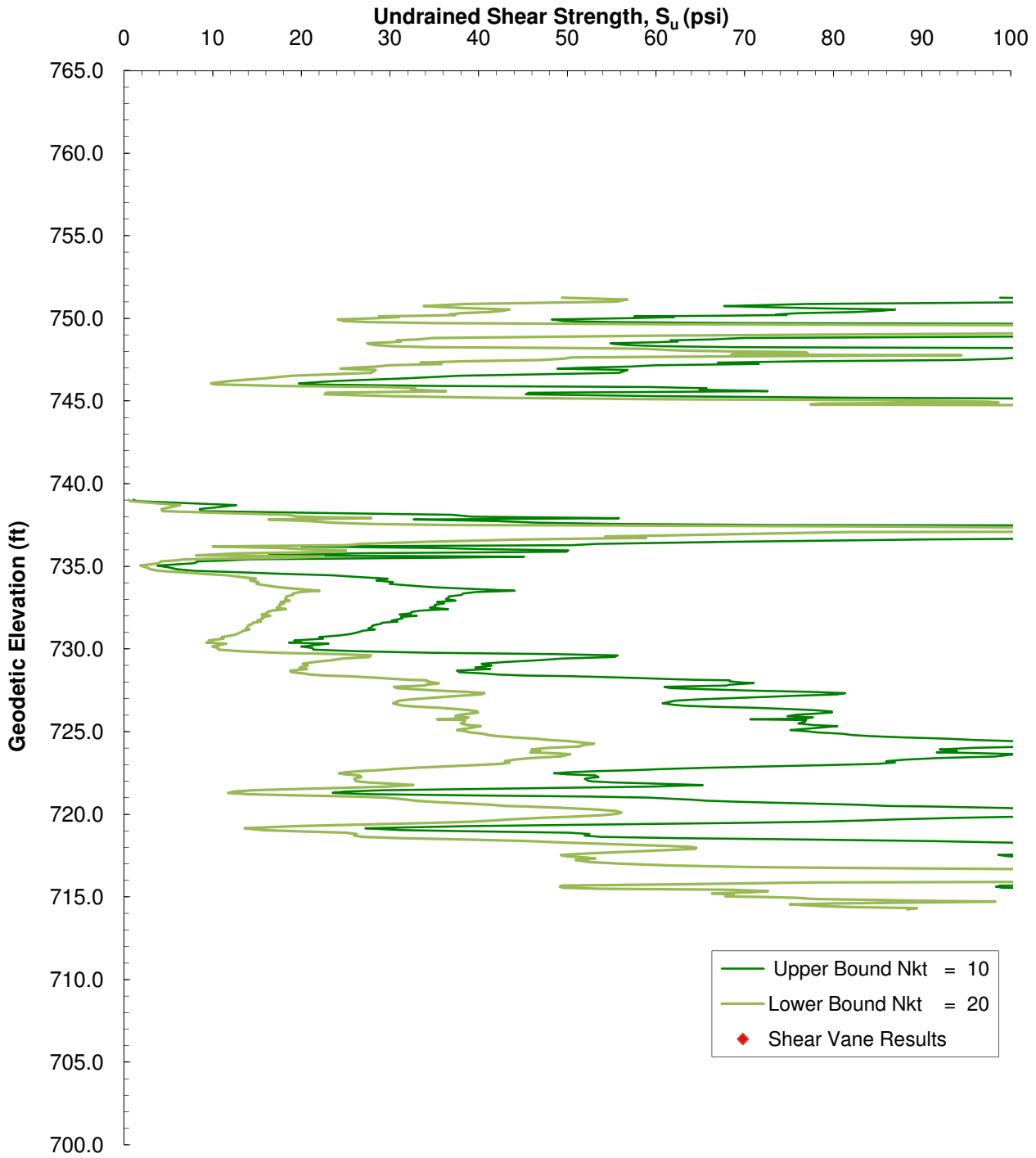
Project No. 175569042
STN-36B



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-36B

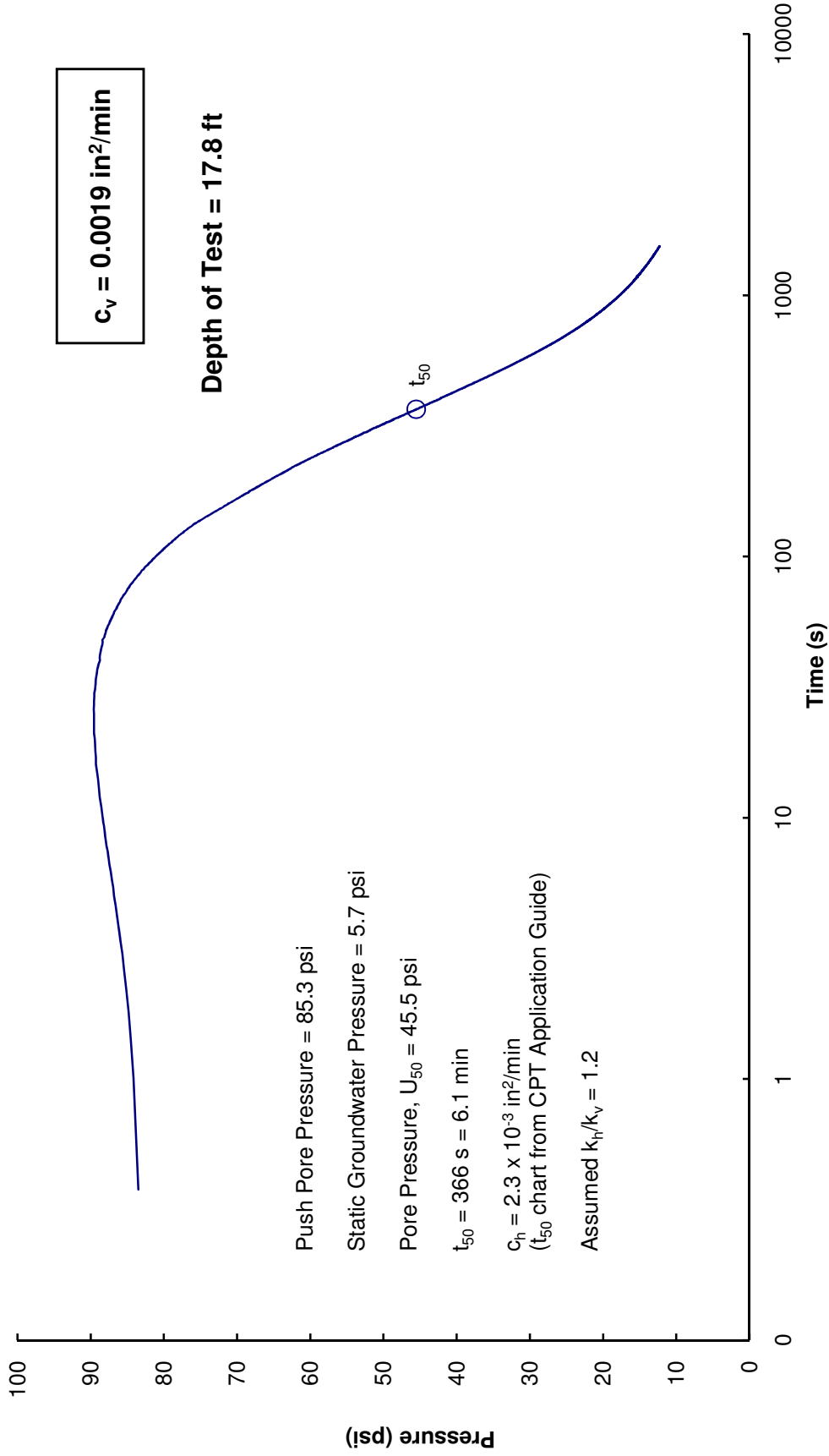


Stantec

**Stantec Consulting
Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



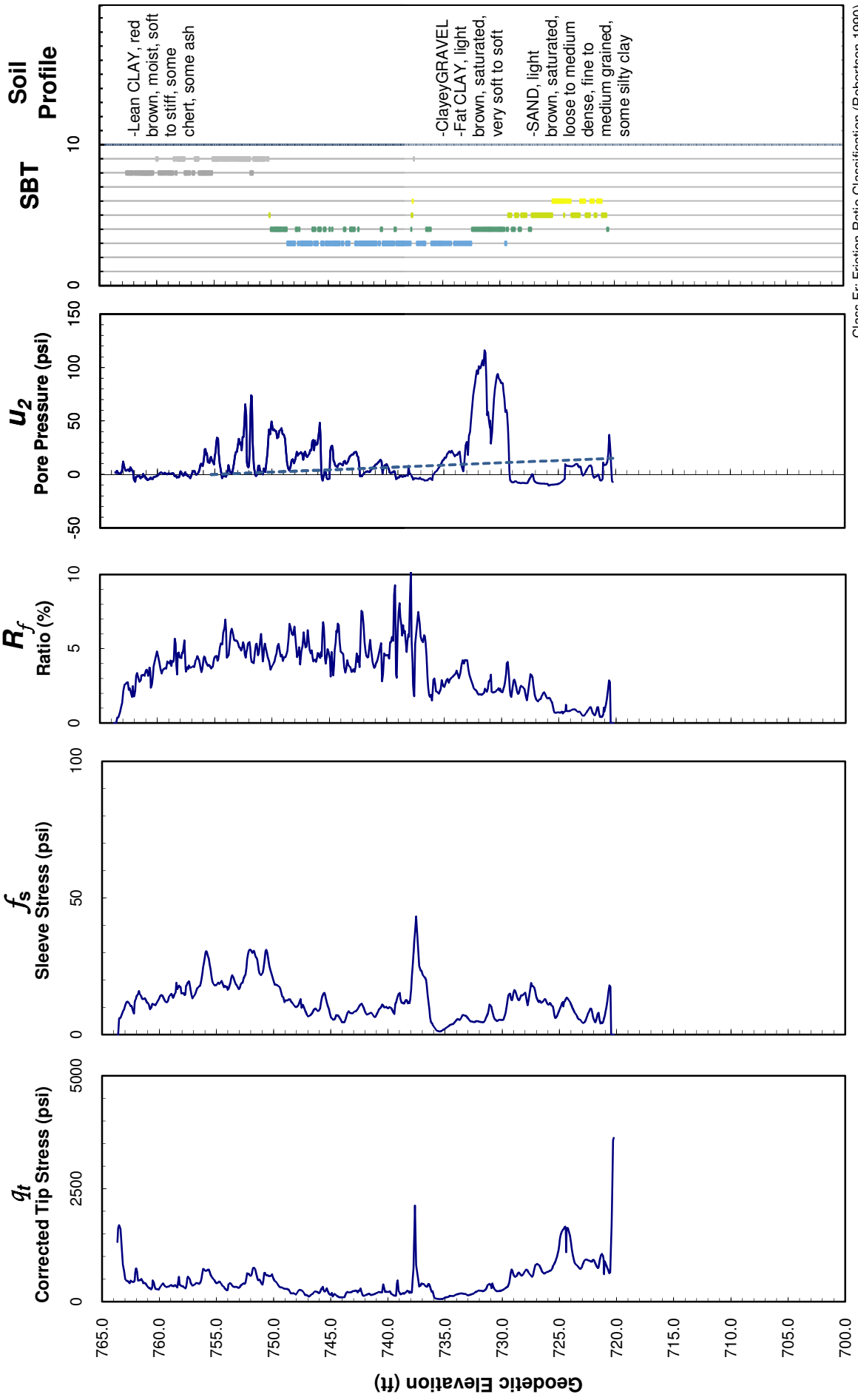
Project No. 175569042
STN-36B



**Stantec Consulting
Inc.**

Stantec

<p>Client: TVA Project: Kingston Ash Pond</p>	<p>Elevation: 763.80 ft</p>	<p>Test Date: May 7, 2009</p>	<p>STN-37E</p>
	<p>SCPTu Start Elevation: 763.80 ft</p> <p>Groundwater Elevation: 755.30 ft</p>	<p>Project No. 175569042</p>	



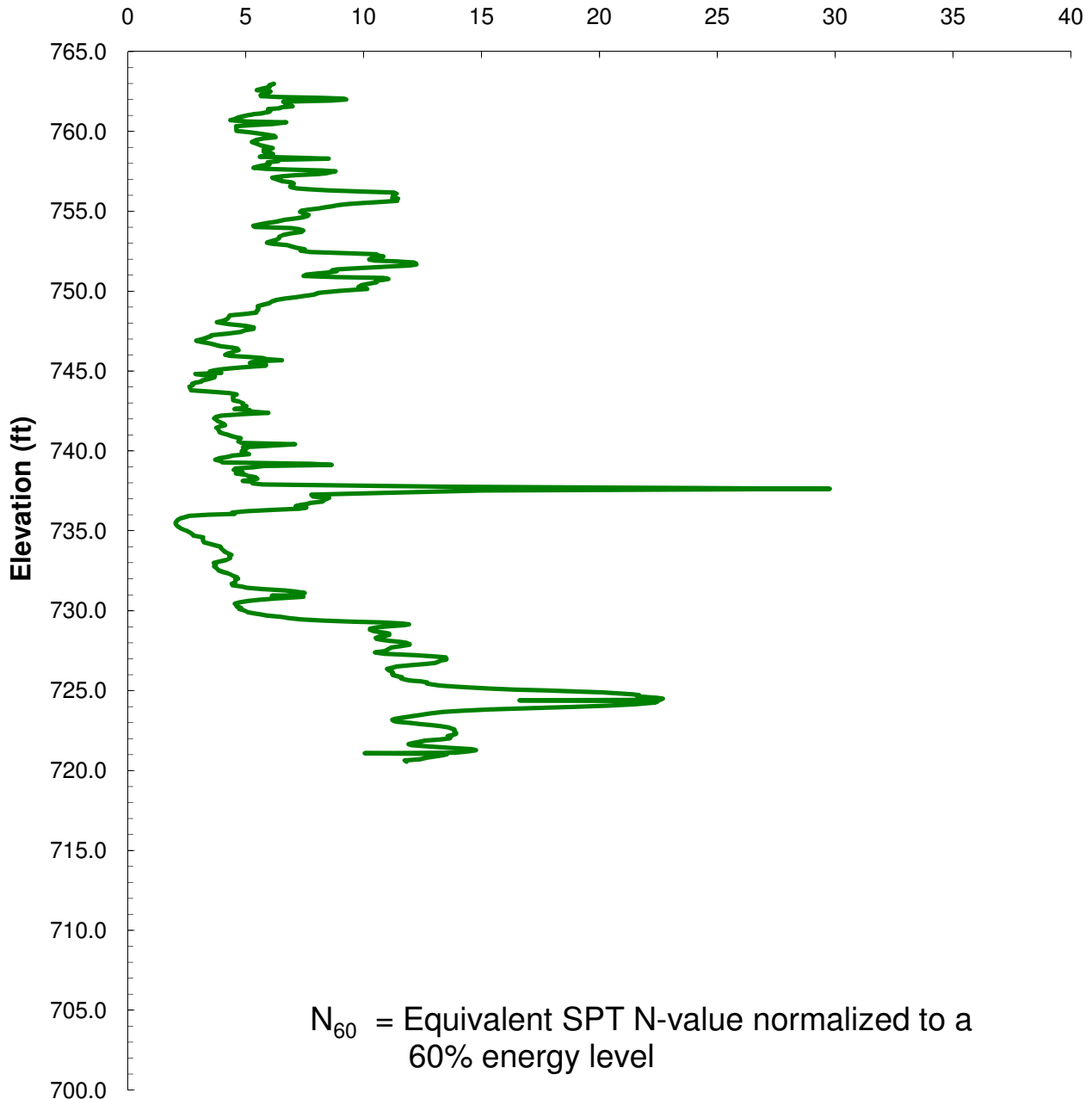


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

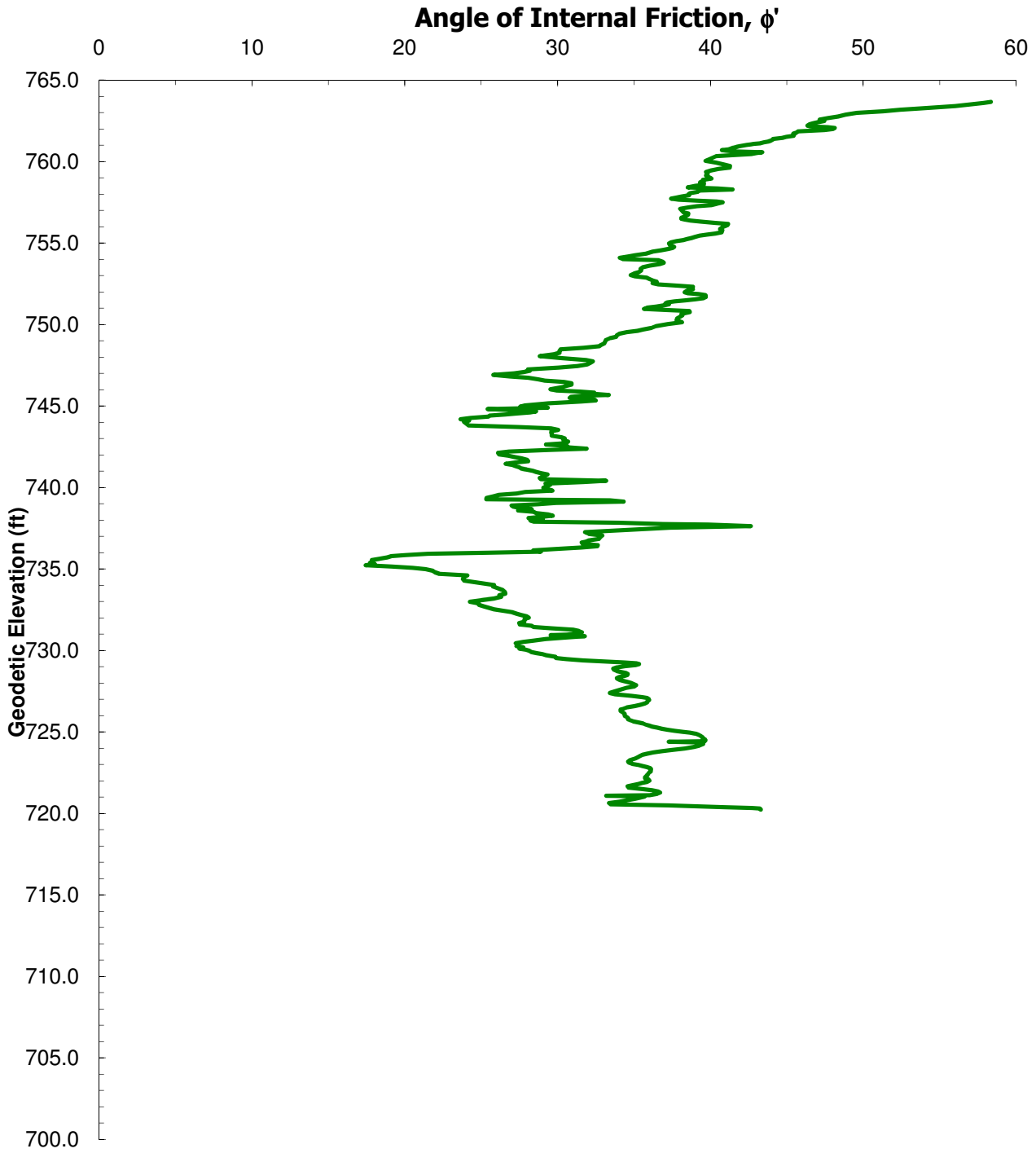
Project No. 175569042
STN-37E



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



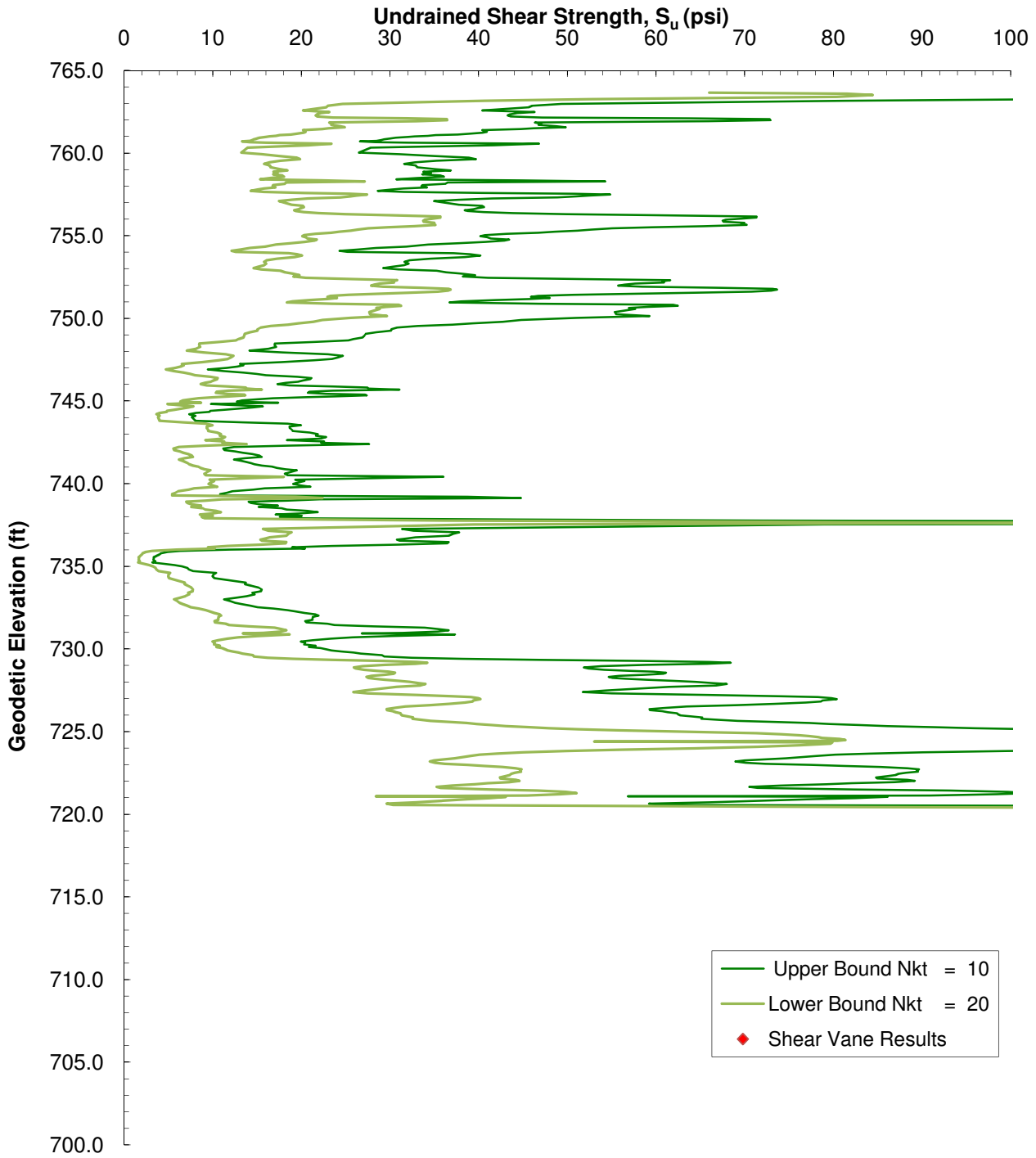
Project No. 175569042
STN-37E



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-37E



**Stantec Consulting
Inc.**

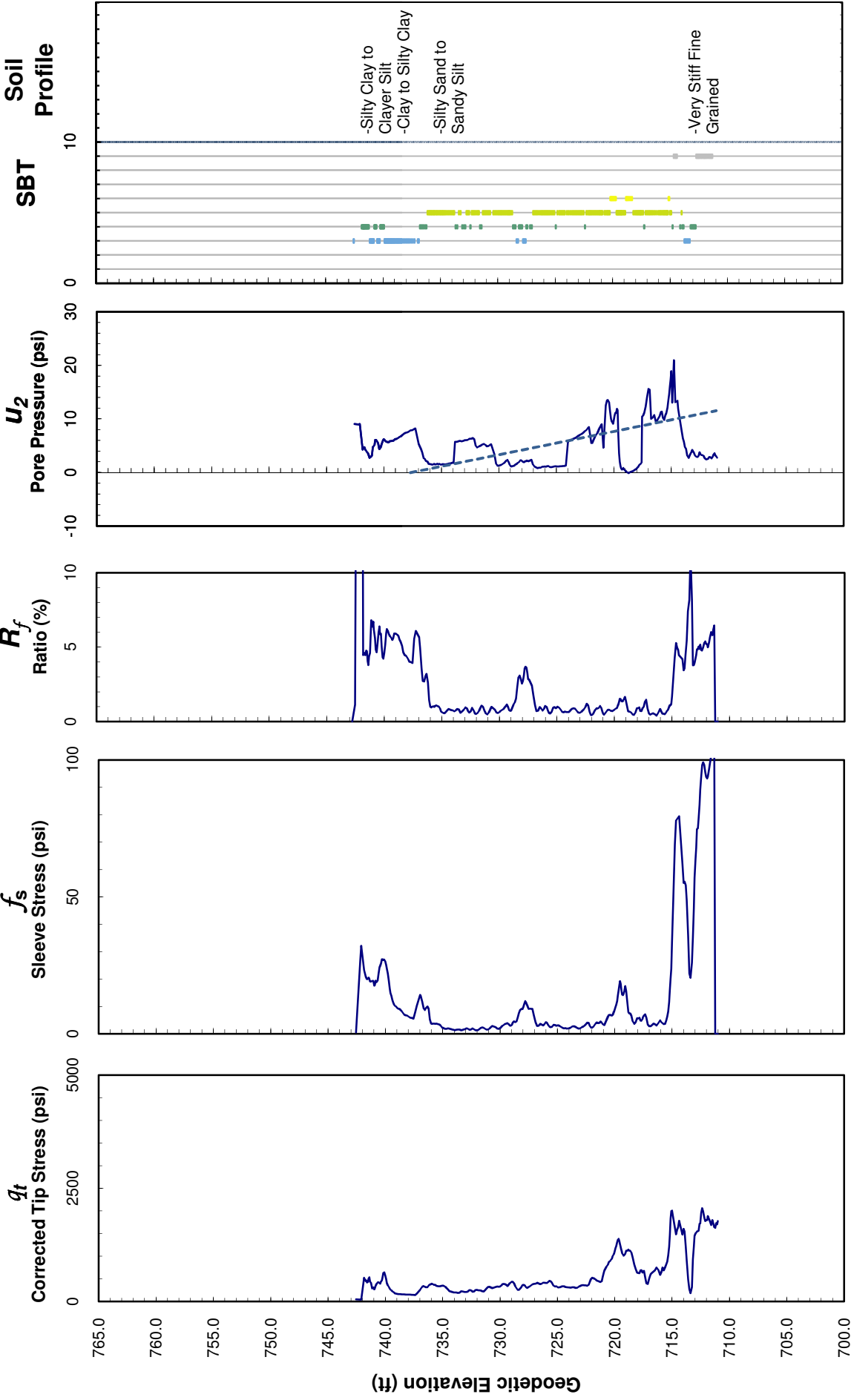
Stantec

Elevation: 751.80 ft
SCPTu Start Elevation: 742.80 ft
Groundwater Elevation: 737.70 ft

Client: TVA
Project: Kingston Ash Pond

Test Date: May 20, 2009
Project No. 175569042

STN-41A



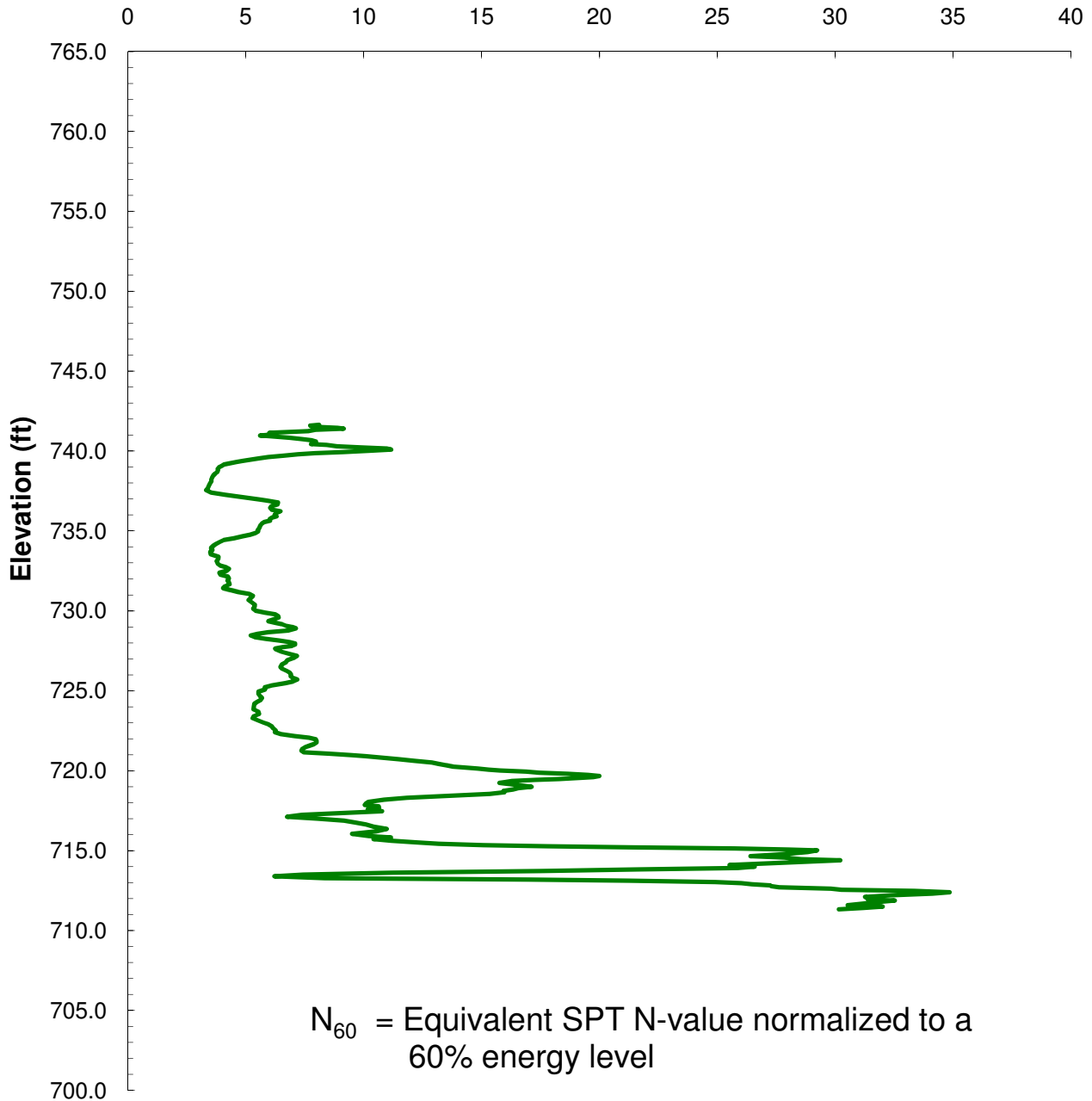


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

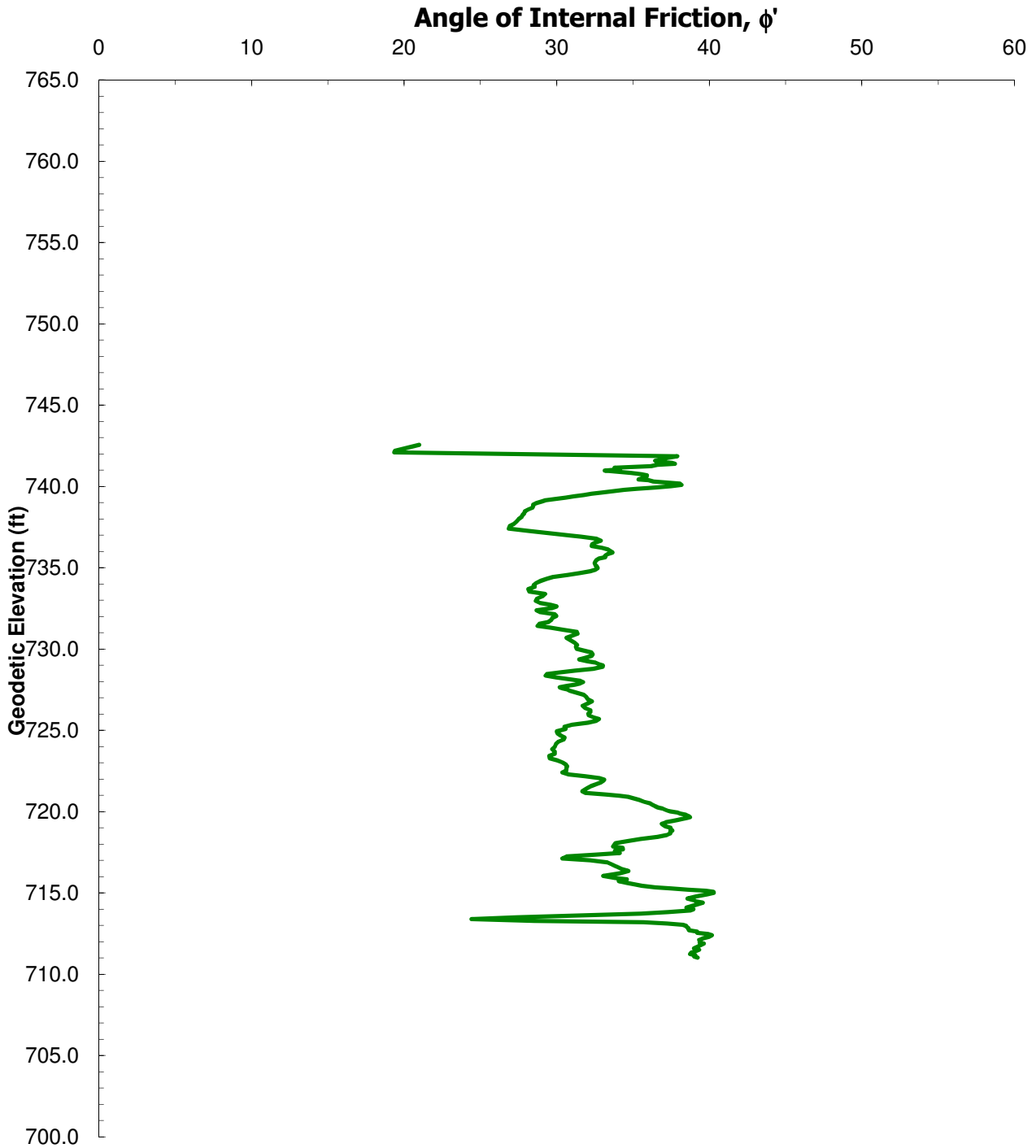
Project No. 175569042
STN-41A



Stantec

SCPT_u RESULTS

Effective Angle of Internal Friction



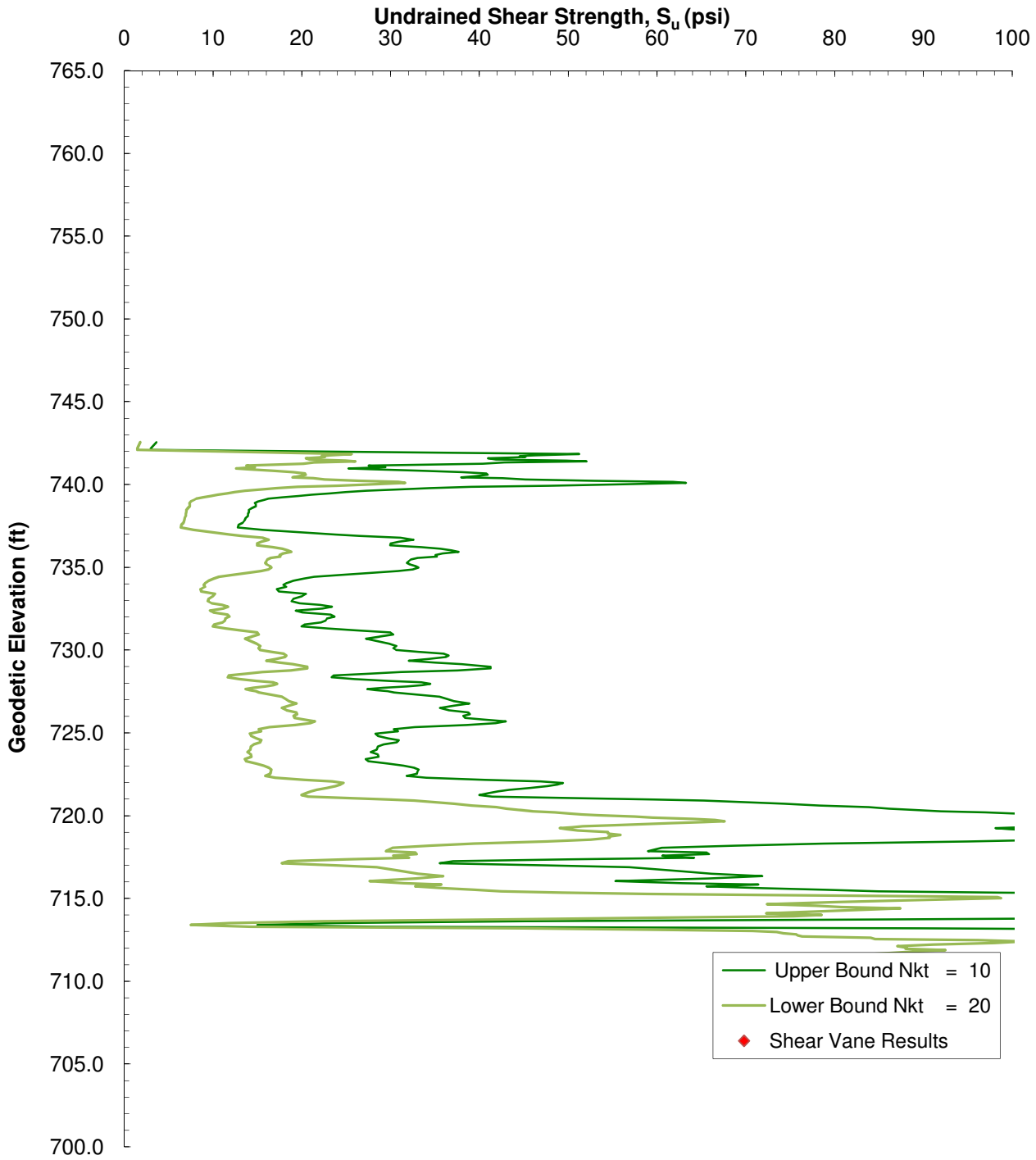
Project No. 175569042
STN-41A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-41A



**Stantec Consulting
Inc.**

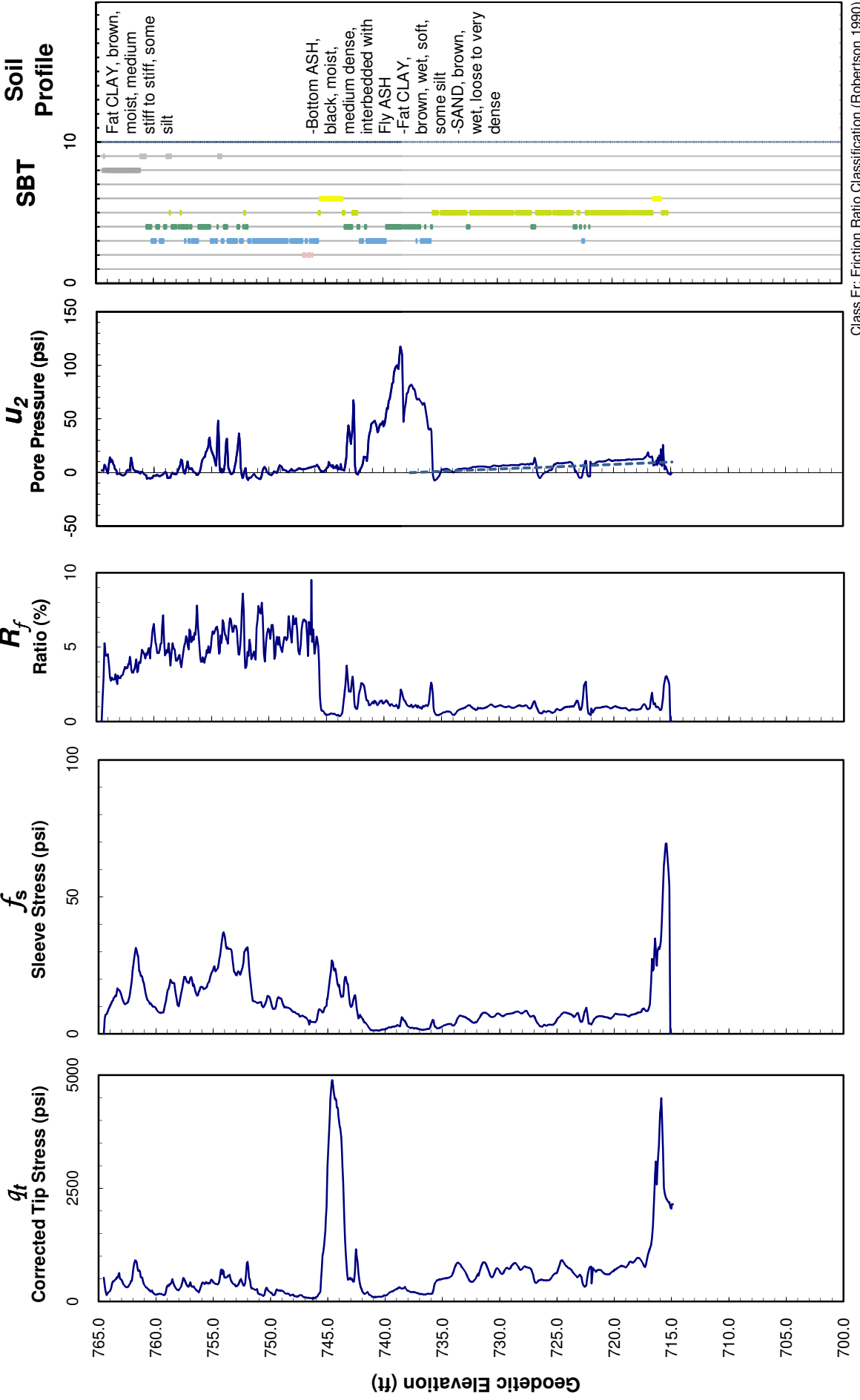
Stantec

Client: TVA
Project: Kingston Ash Pond

Elevation: 764.70 ft
SCPTu Start Elevation: 764.70 ft
Groundwater Elevation: 737.70 ft

Test Date: May 7, 2009
Project No. 175569042

STN-42A



Class Fr: Friction Ratio Classification (Robertson 1990)

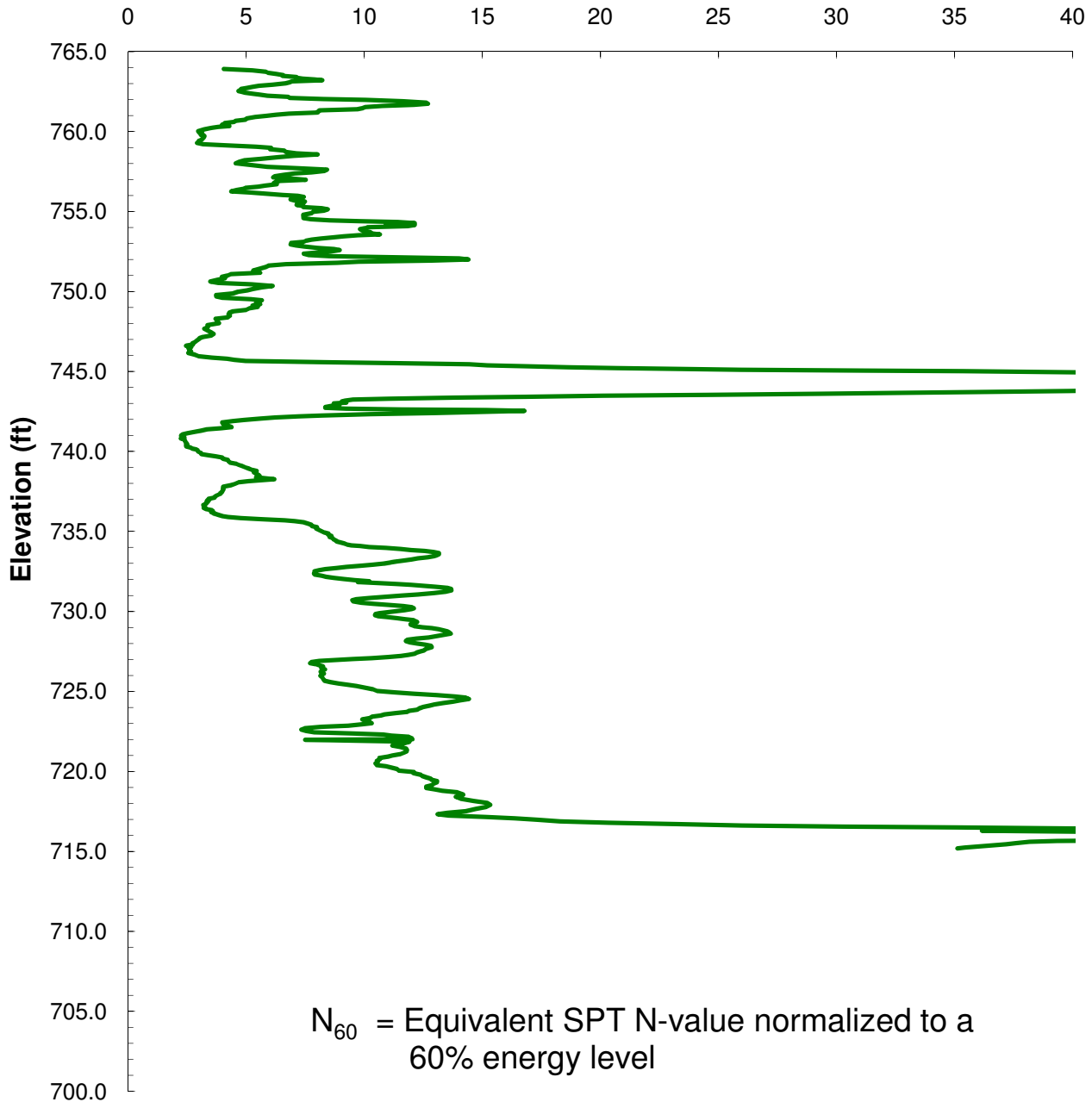


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

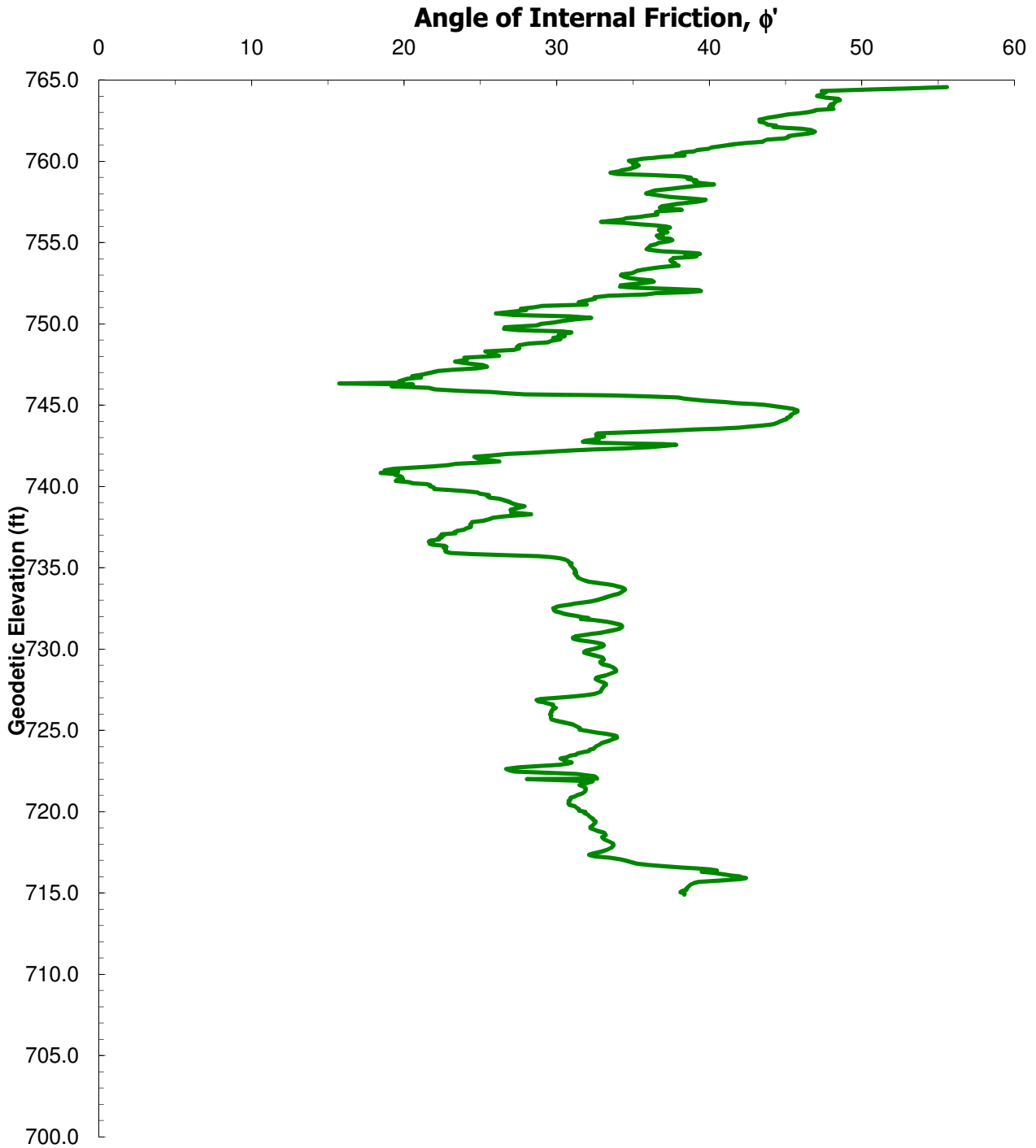
Project No. 175569042
STN-42A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



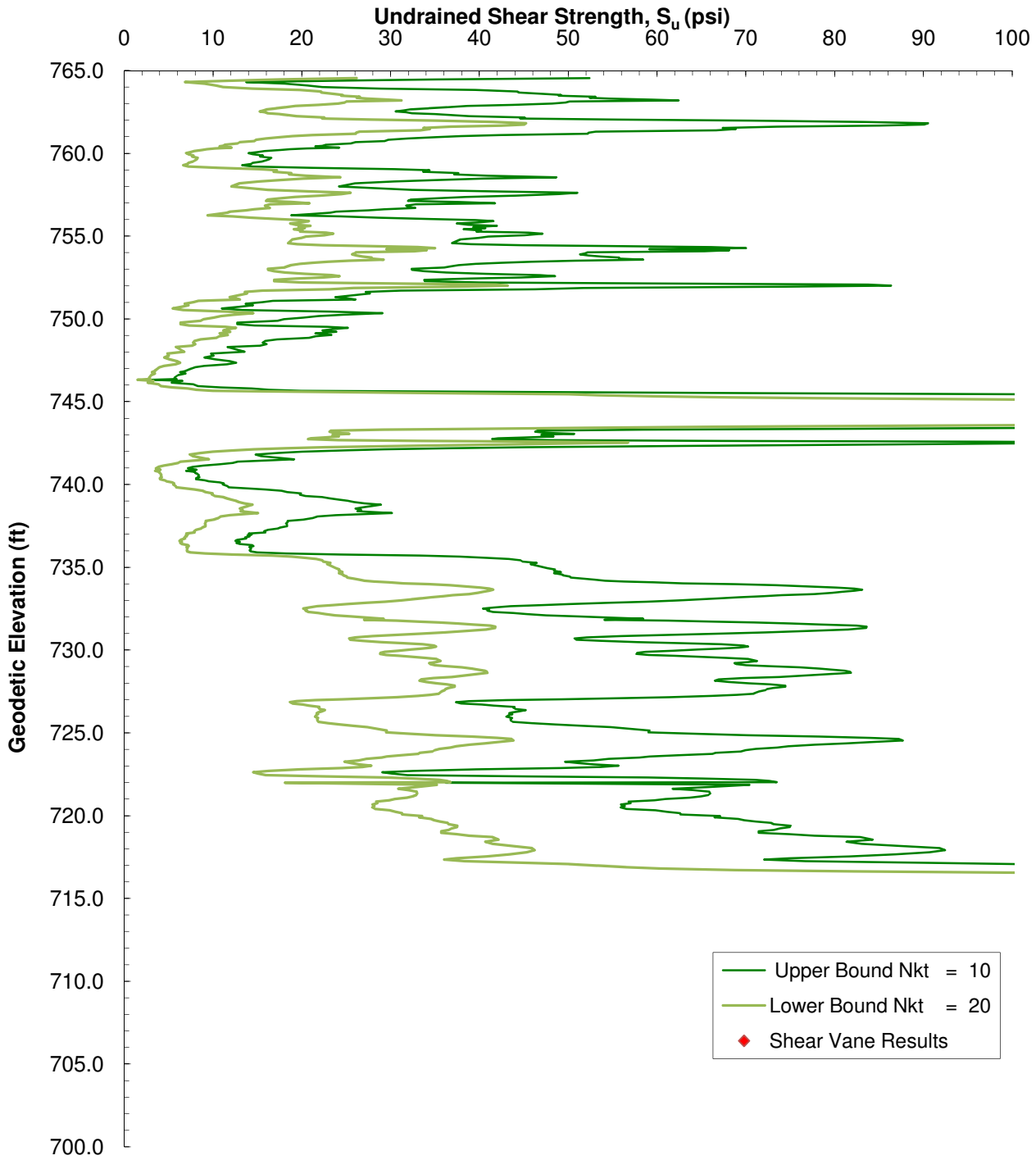
Project No. 175569042
STN-42A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-42A

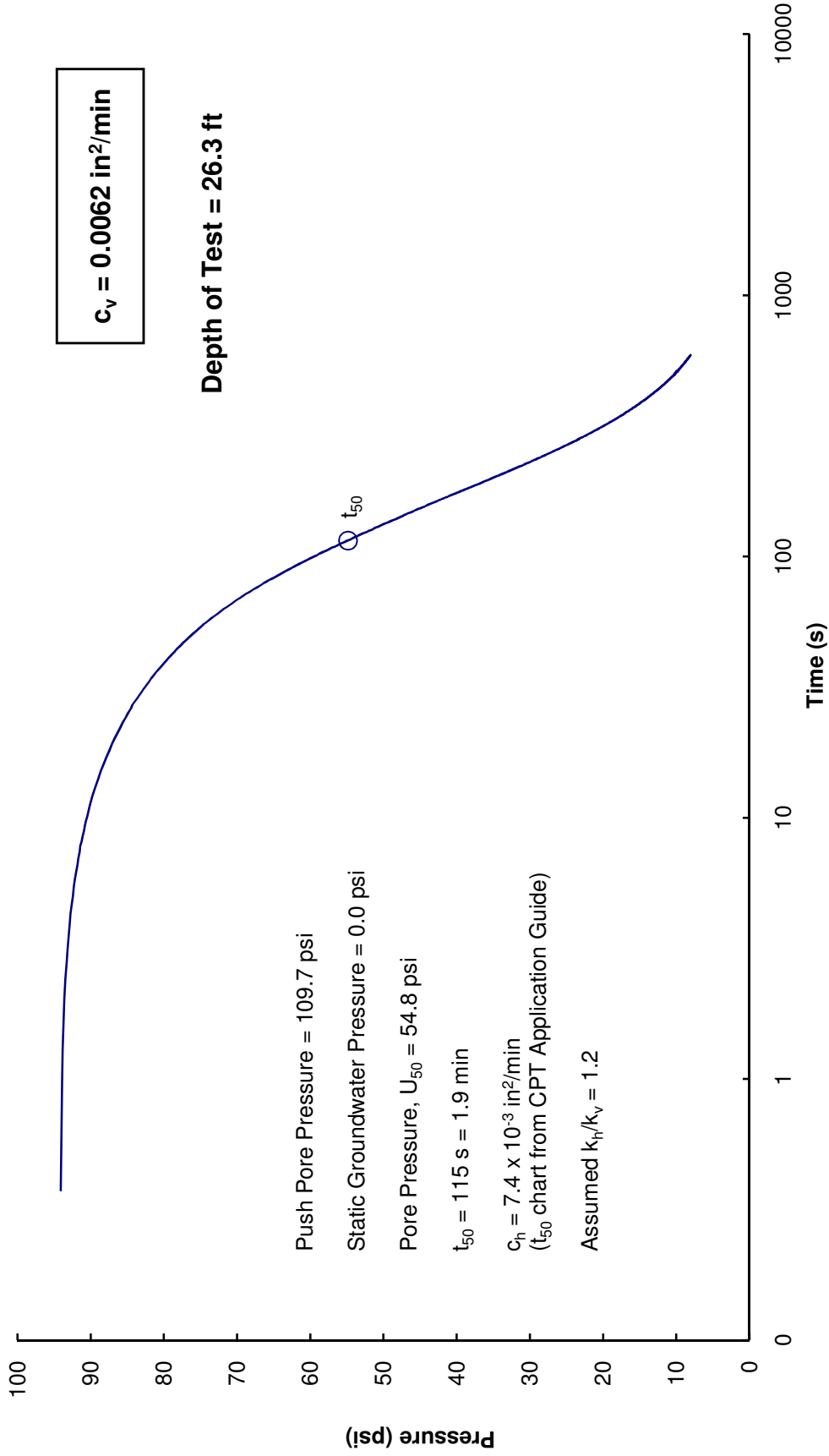


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SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-42A



**Stantec Consulting
Inc.**

Stantec

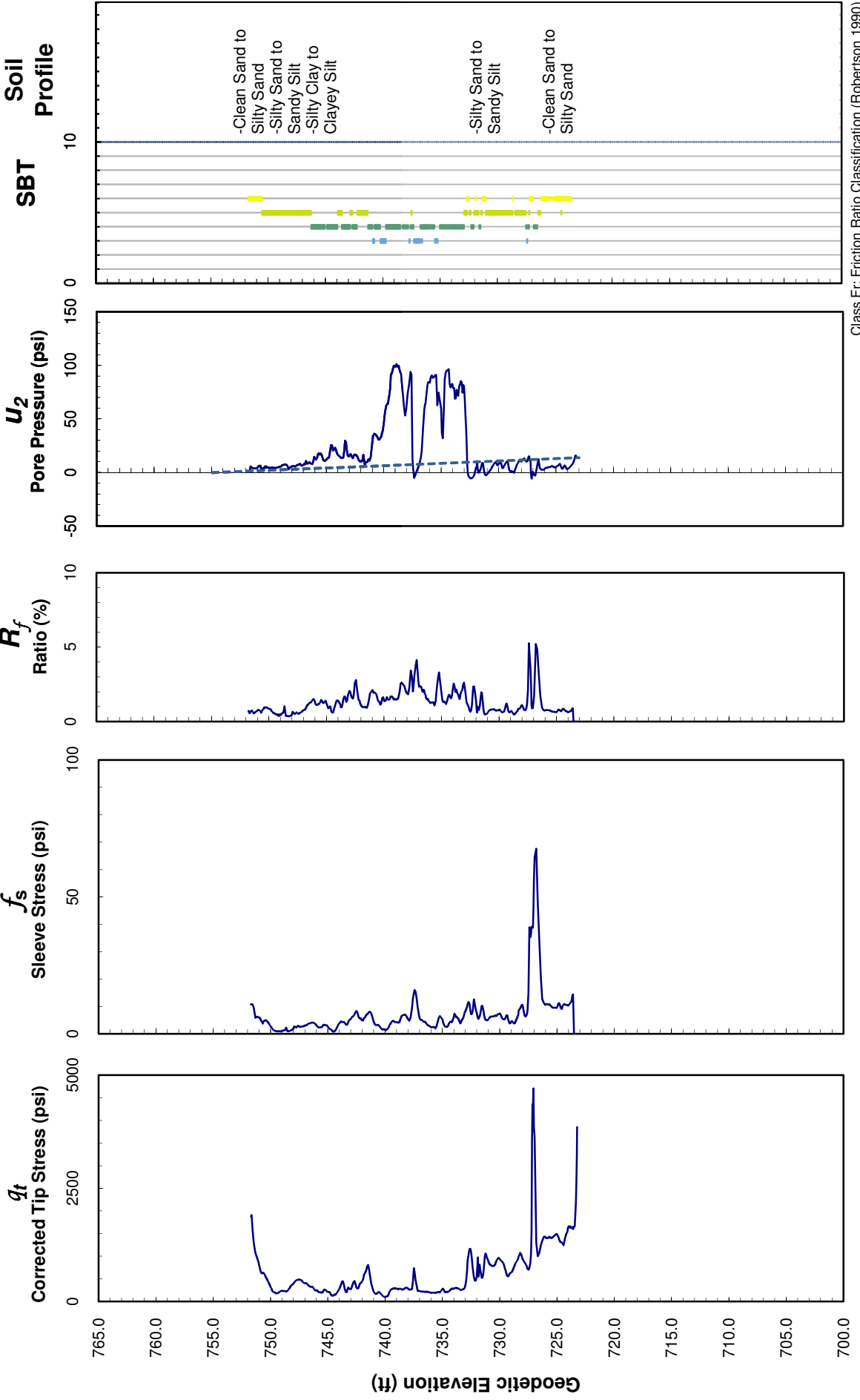
Elevation: 765.90 ft
SCPTu Start Elevation: 751.90 ft
Groundwater Elevation: 754.90 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 20, 2009
Project No. 175569042

STN-43A



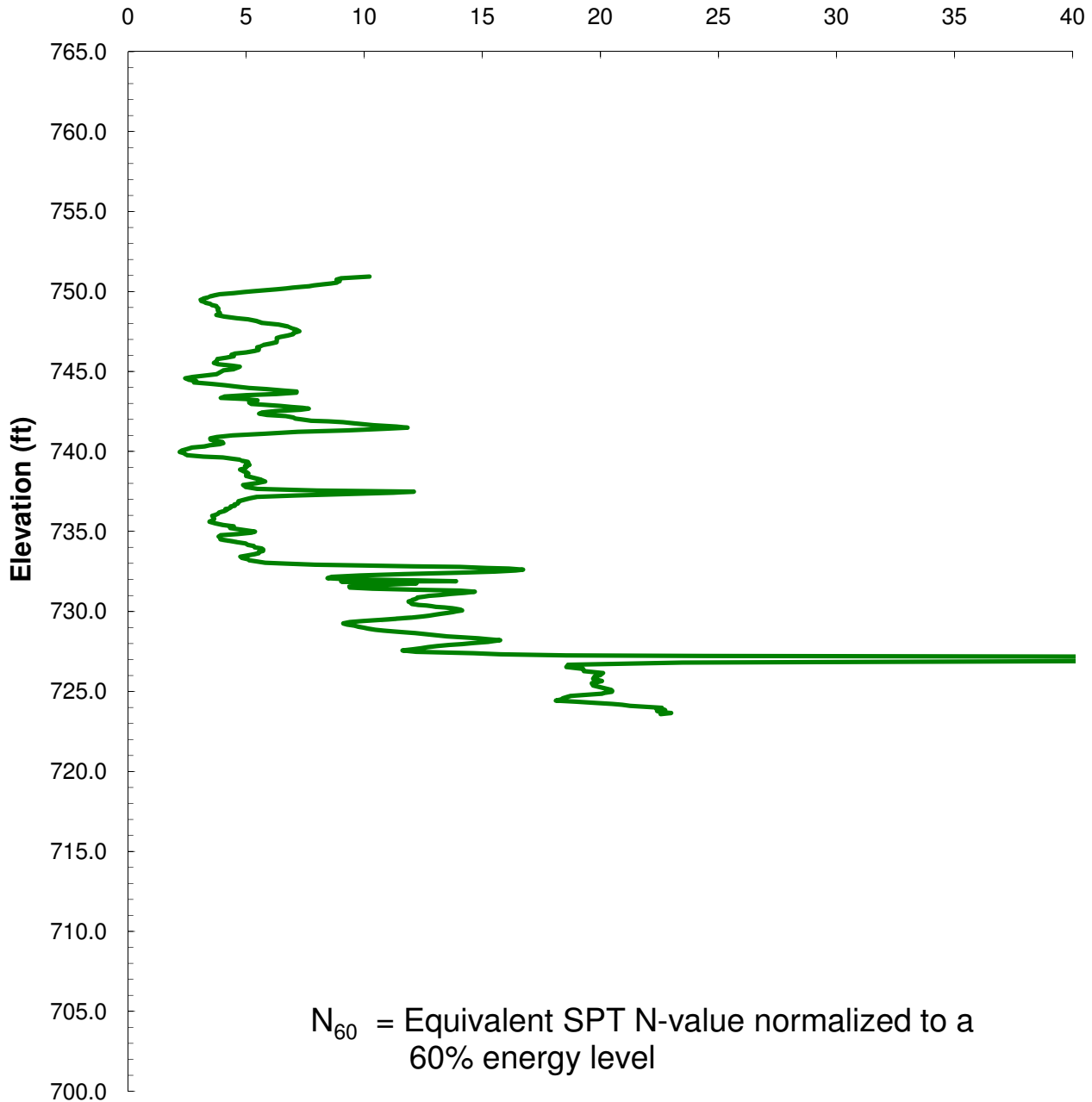


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

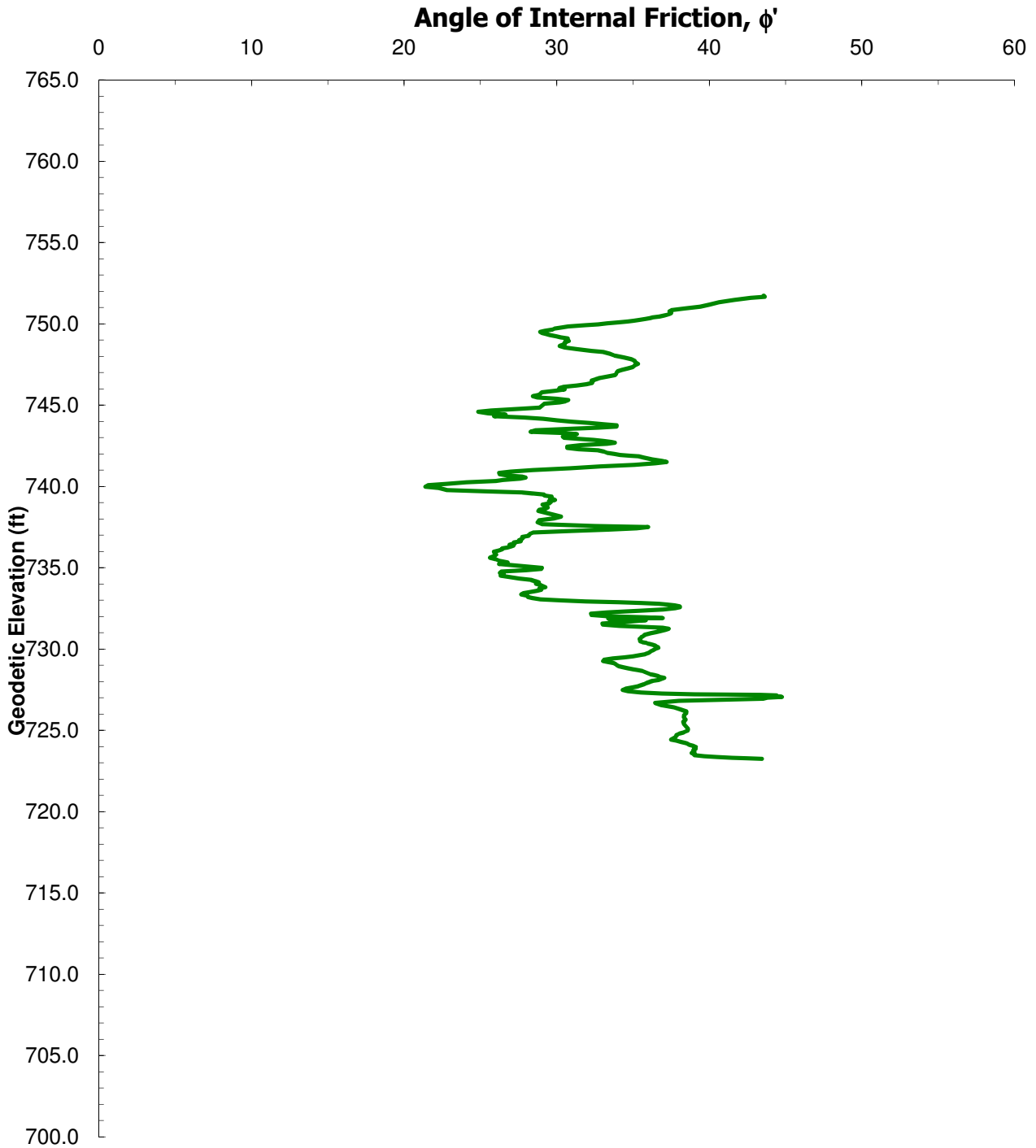
Project No. 175569042
STN-43A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



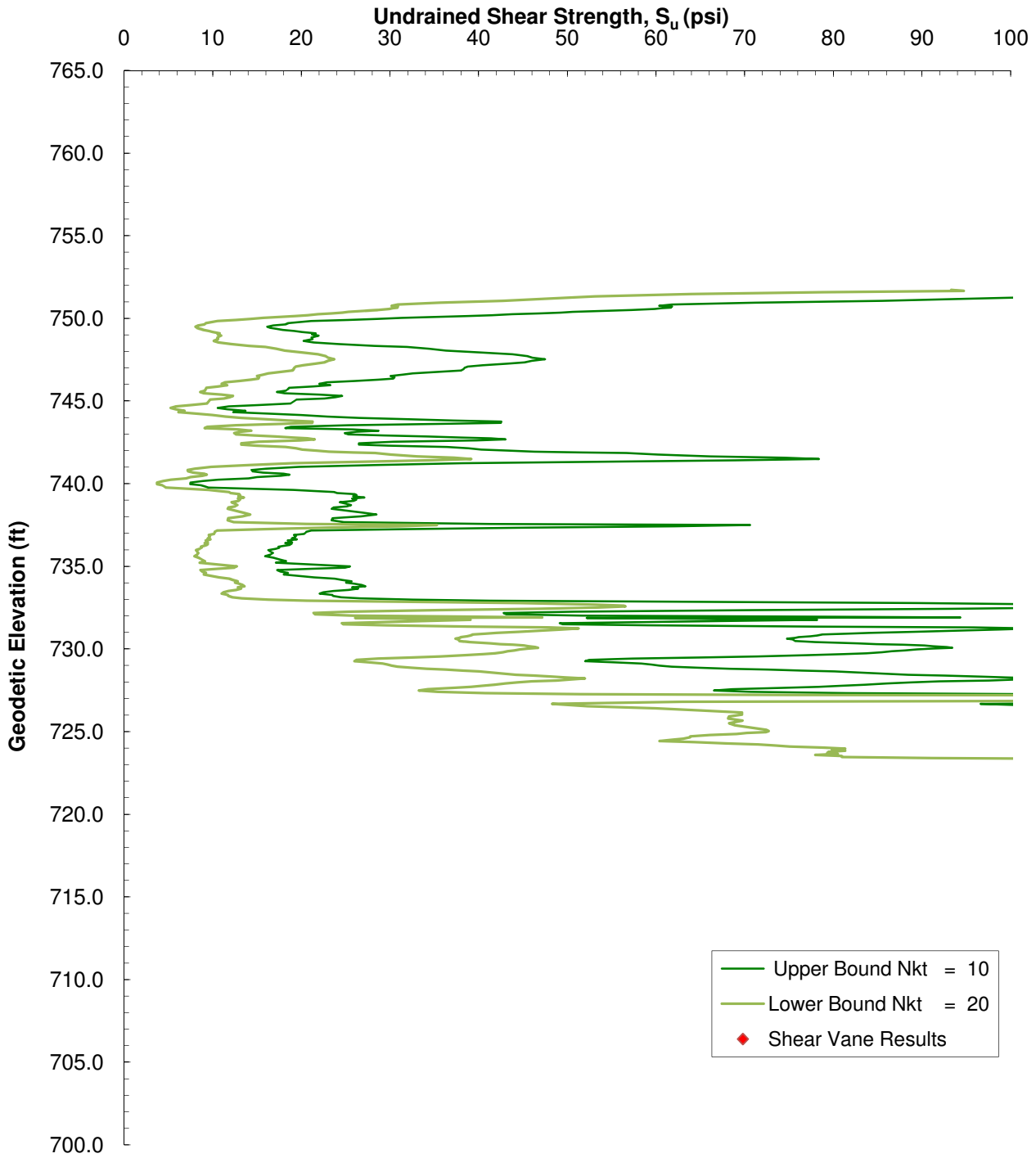
Project No. 175569042
STN-43A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-43A

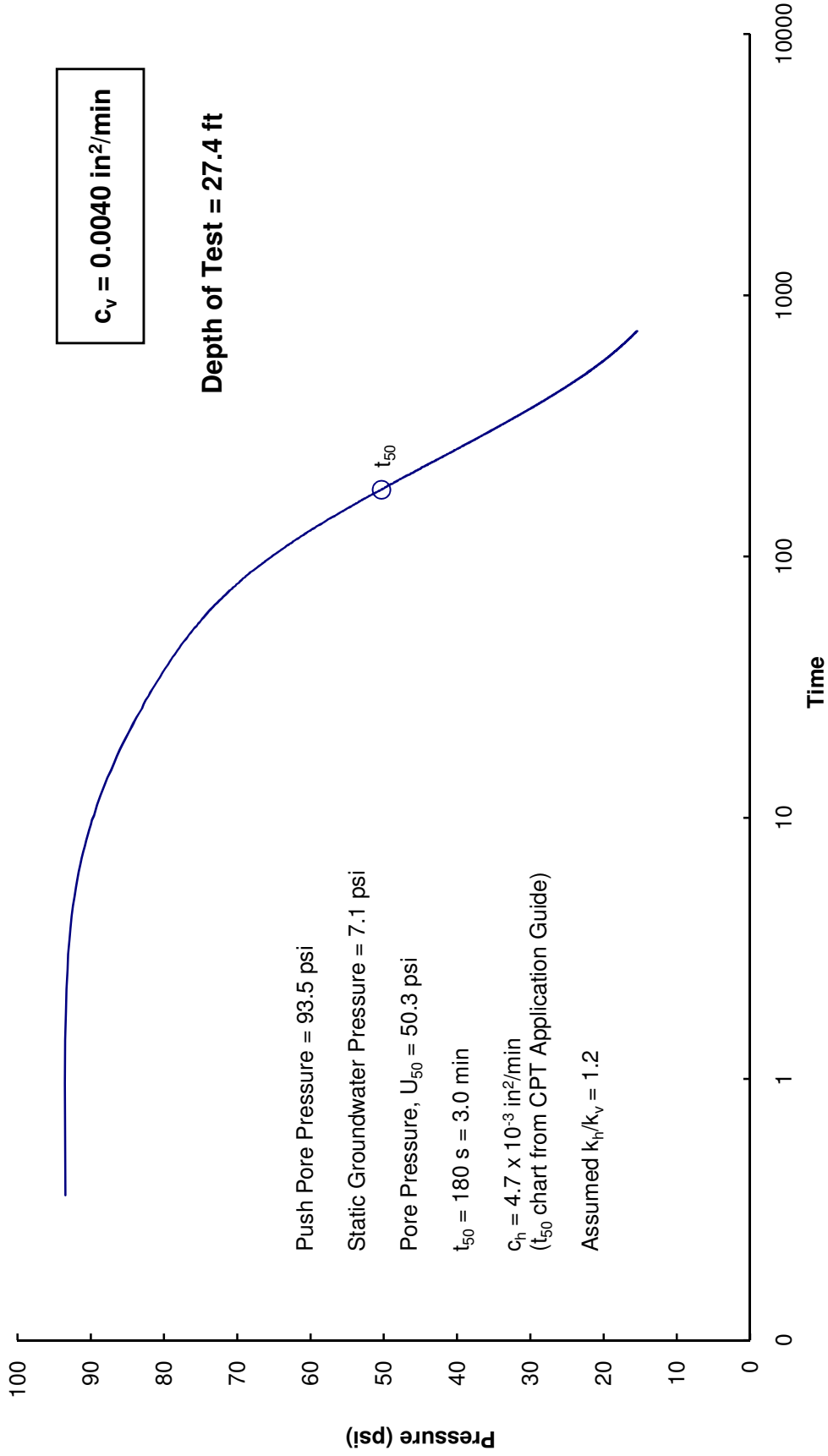


Stantec

**Stantec Consulting
Inc.**

SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



Project No. 175569042
STN-43A



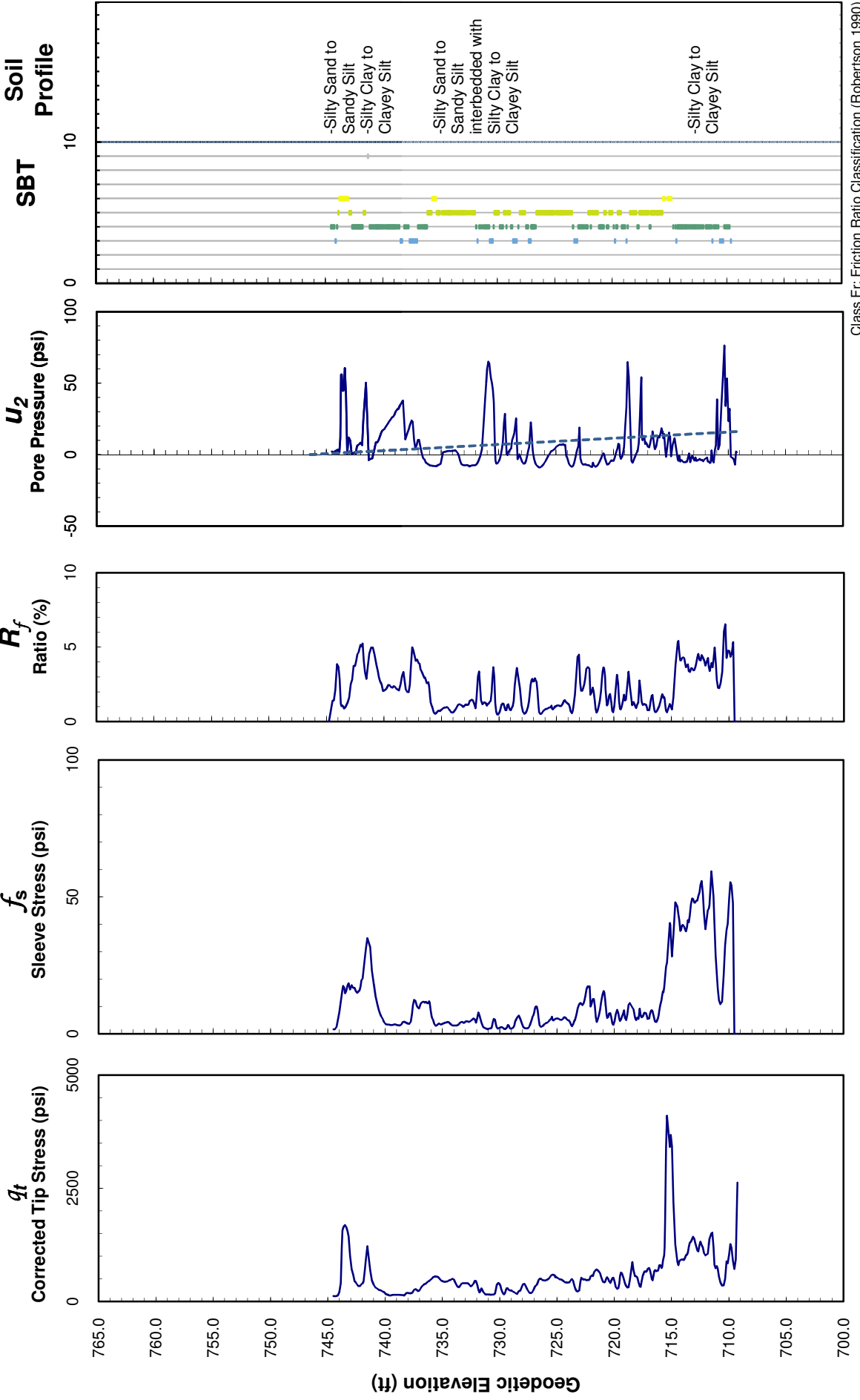
**Stantec Consulting
Inc.**

Stantec

Elevation: 753.80 ft
 SCPTu Start Elevation: 744.80 ft
 Groundwater Elevation: 746.40 ft
 Client: TVA
 Project: Kingston Ash Pond

Test Date: May 20, 2009
 Project No. 175669015

STN-47B



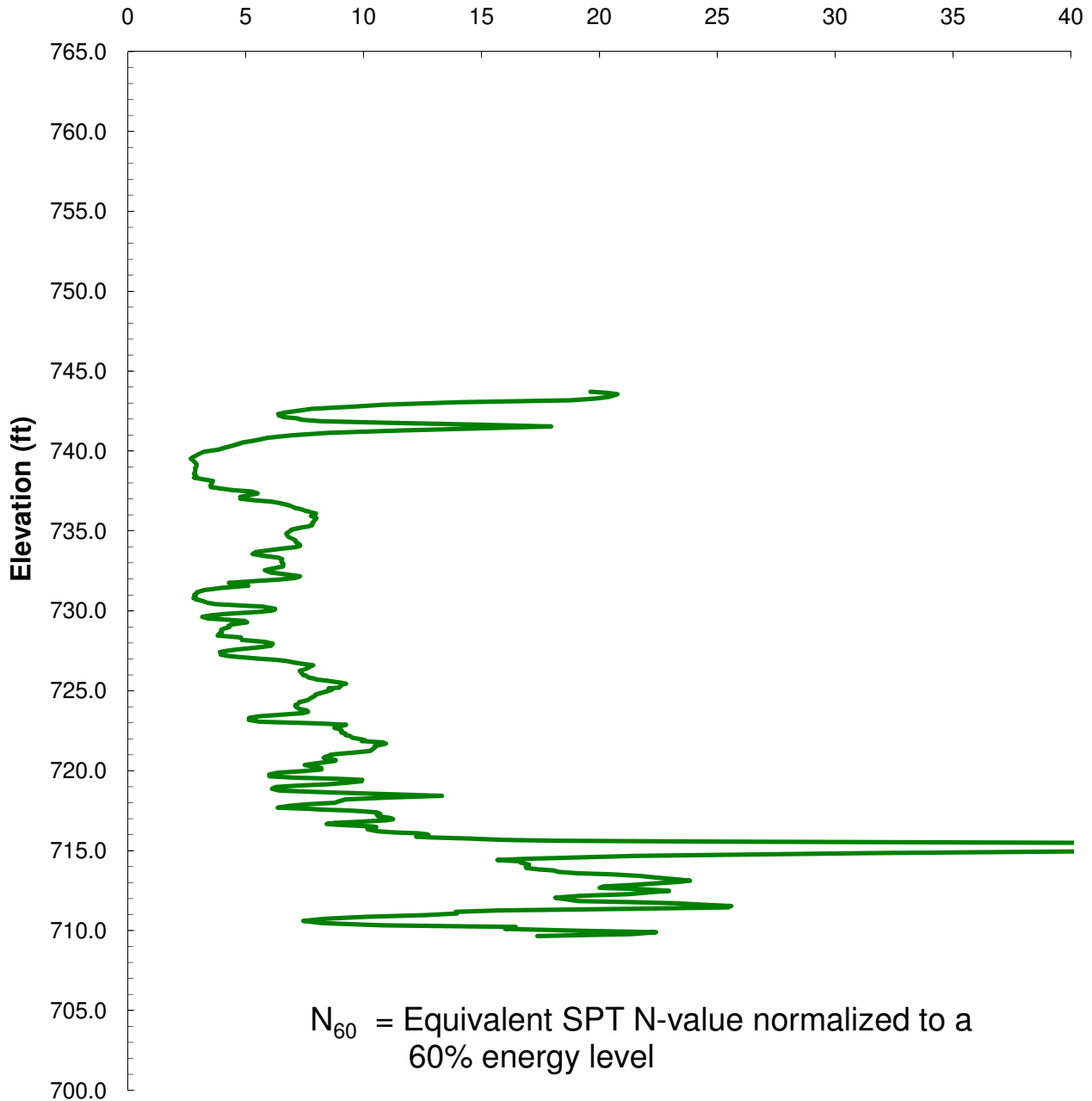


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



N_{60} = Equivalent SPT N-value normalized to a 60% energy level

The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

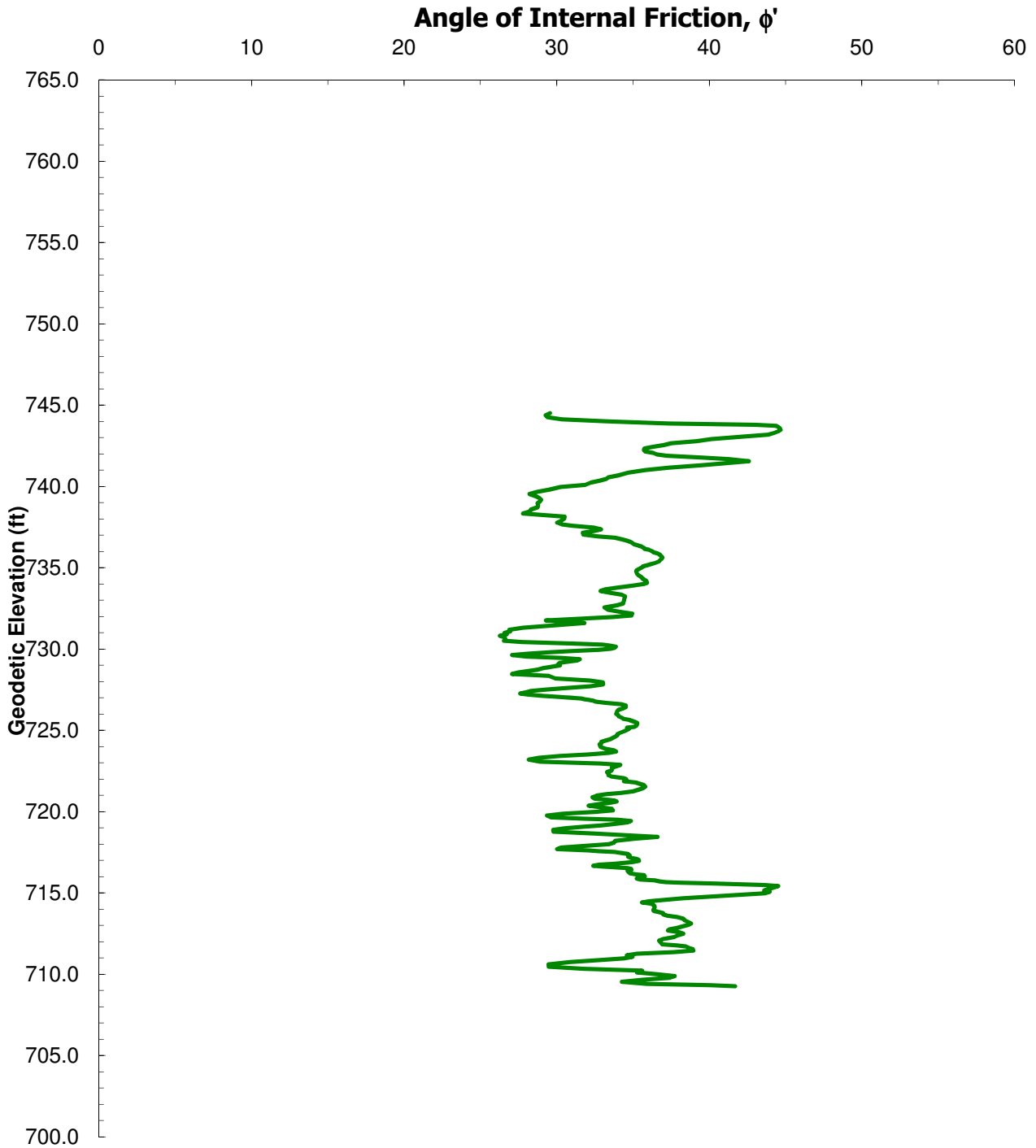
Project No. 175669015
STN-47B



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



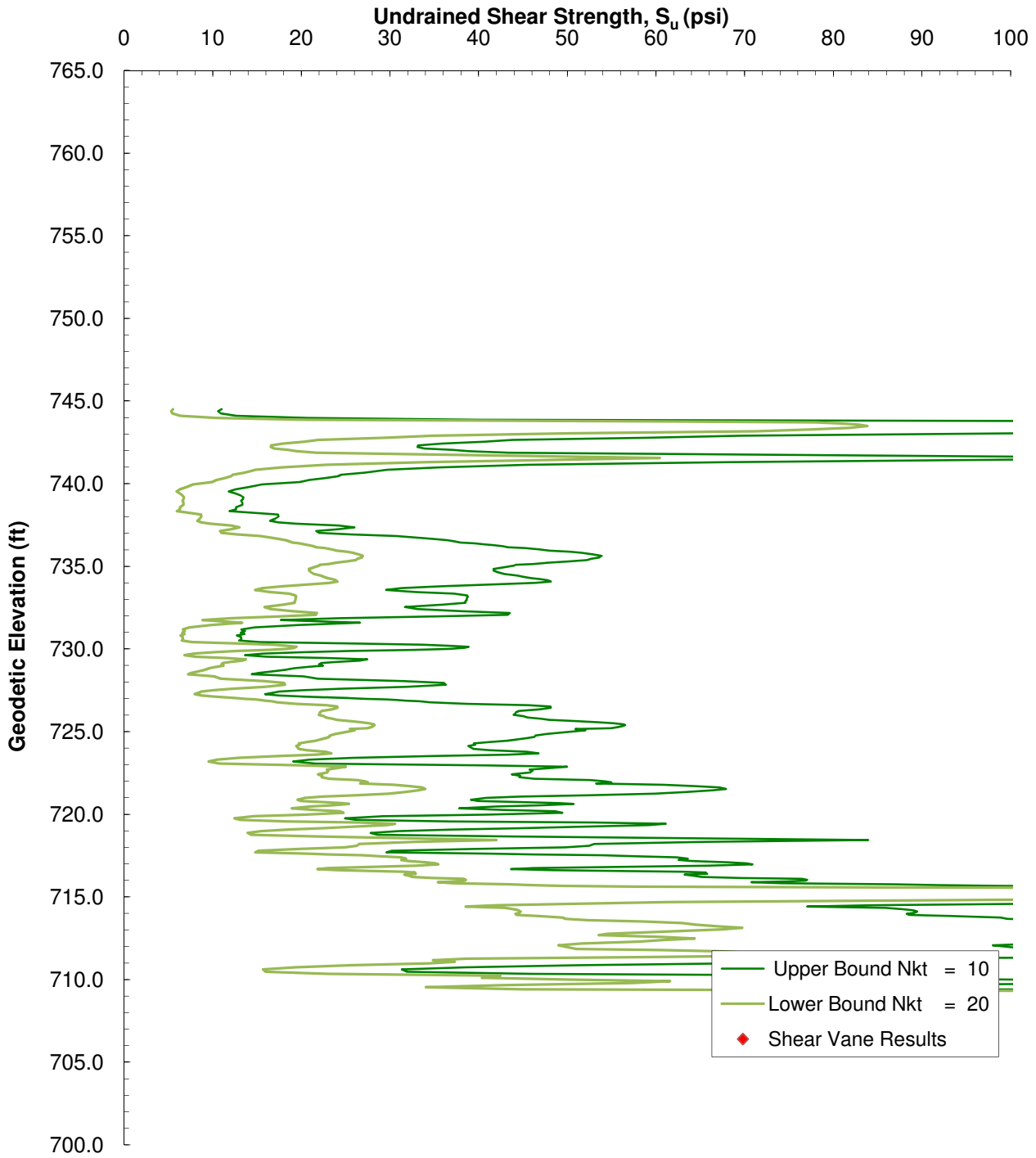
Project No. 175669015
STN-47B



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175669015
STN-47B



**Stantec Consulting
Inc.**

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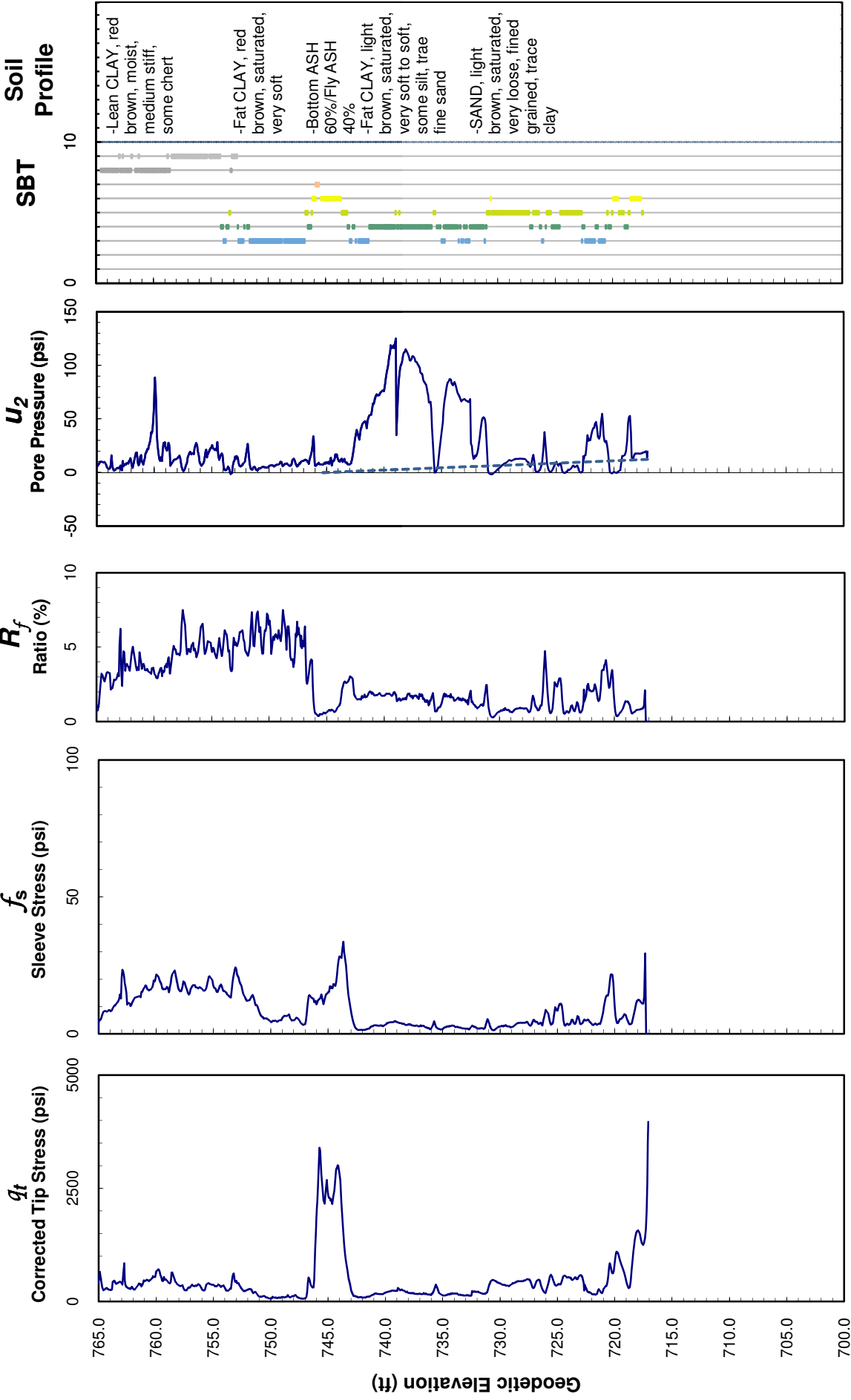
Elevation: 765.30 ft
 SCPTu Start Elevation: 765.30 ft
 Groundwater Elevation: 745.30 ft

Client: TVA

Project: Kingston Ash Pond

Test Date: May 7, 2009
 Project No. 175569042

STN-48C



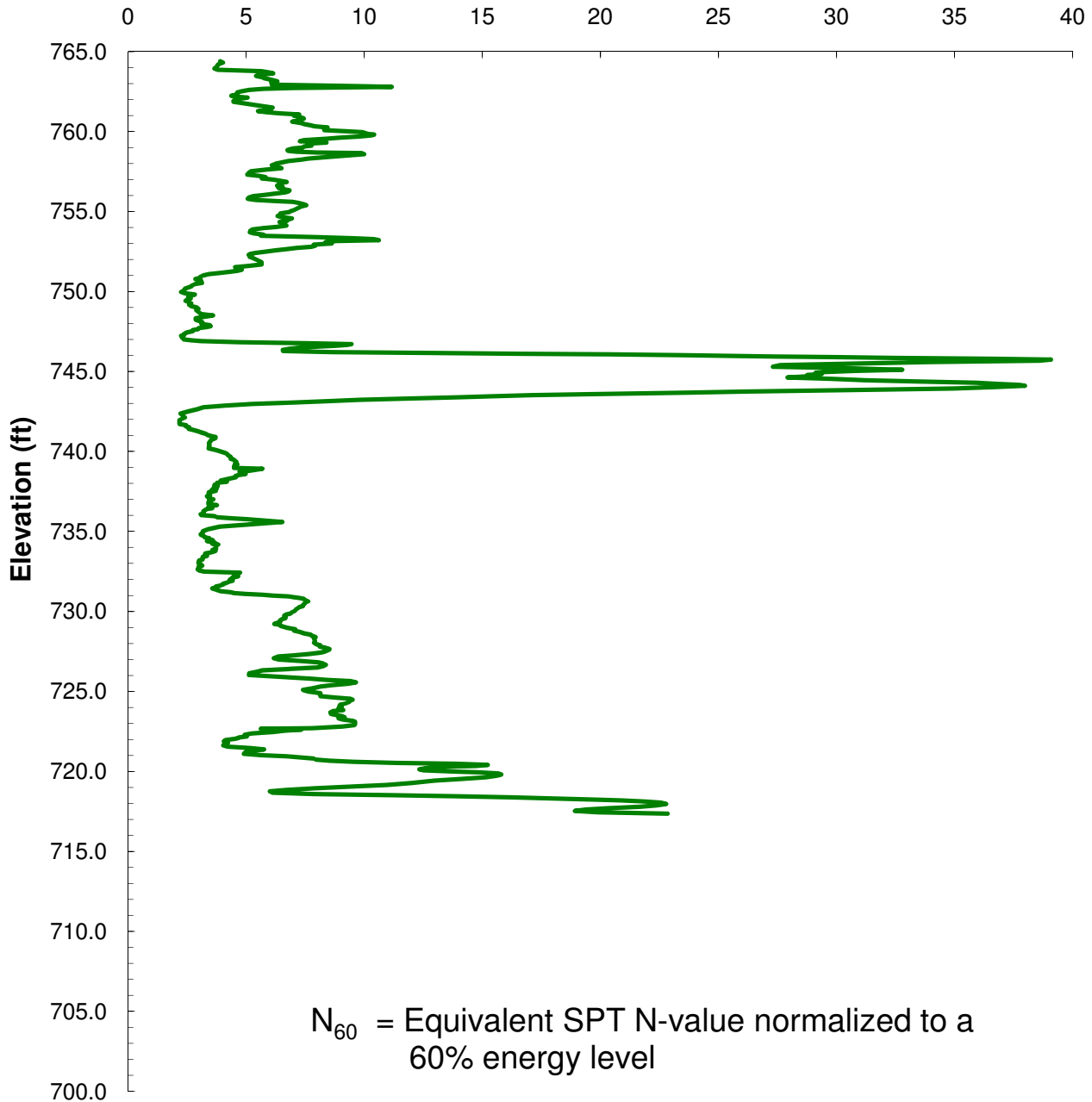


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

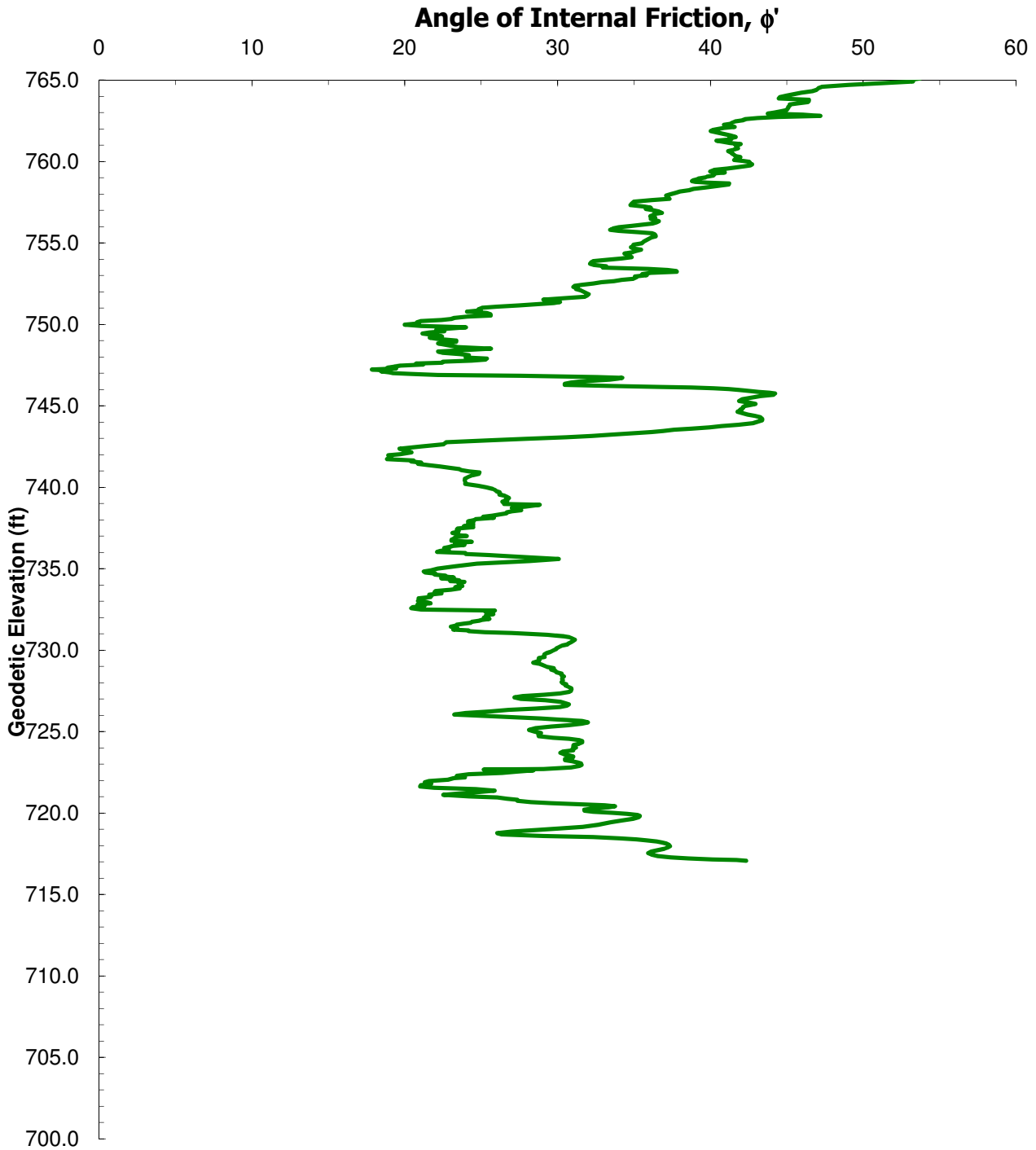
Project No. 175569042
STN-48C



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SCPTu RESULTS

Effective Angle of Internal Friction



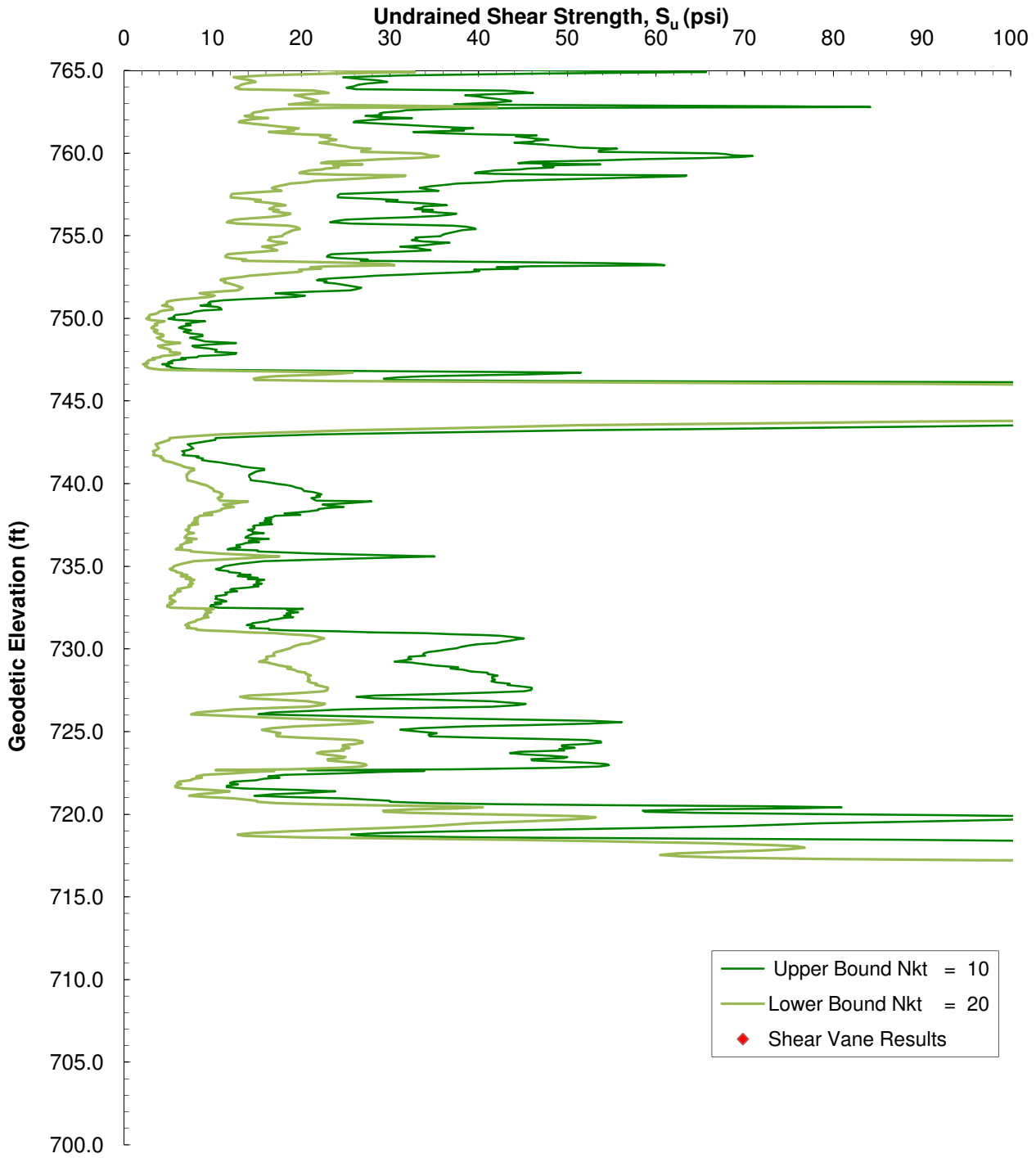
Project No. 175569042
STN-48C



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SCPT_u RESULTS

Undrained Shear Strength, S_u



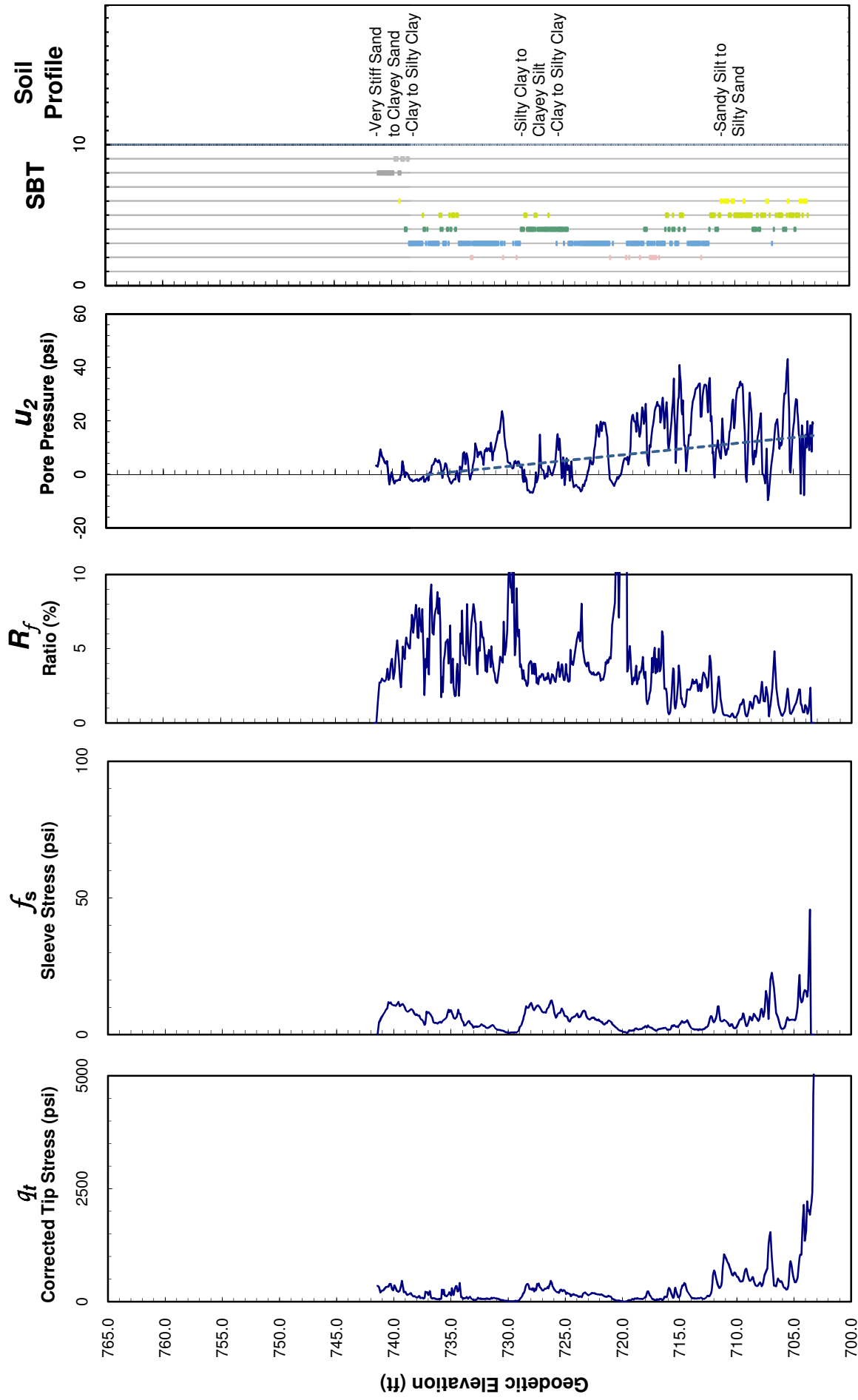
Project No. 175569042
STN-48C



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Inc.**

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Elevation: 741.60 ft SCPTu Start Elevation: 741.60 ft Groundwater Elevation: 737.00 ft Client: TVA Project: Kingston Ash Pond	Test Date: May 19, 2009 Project No. 175569042	STN-50A
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Class Fr: Friction Ratio Classification (Robertson 1990)

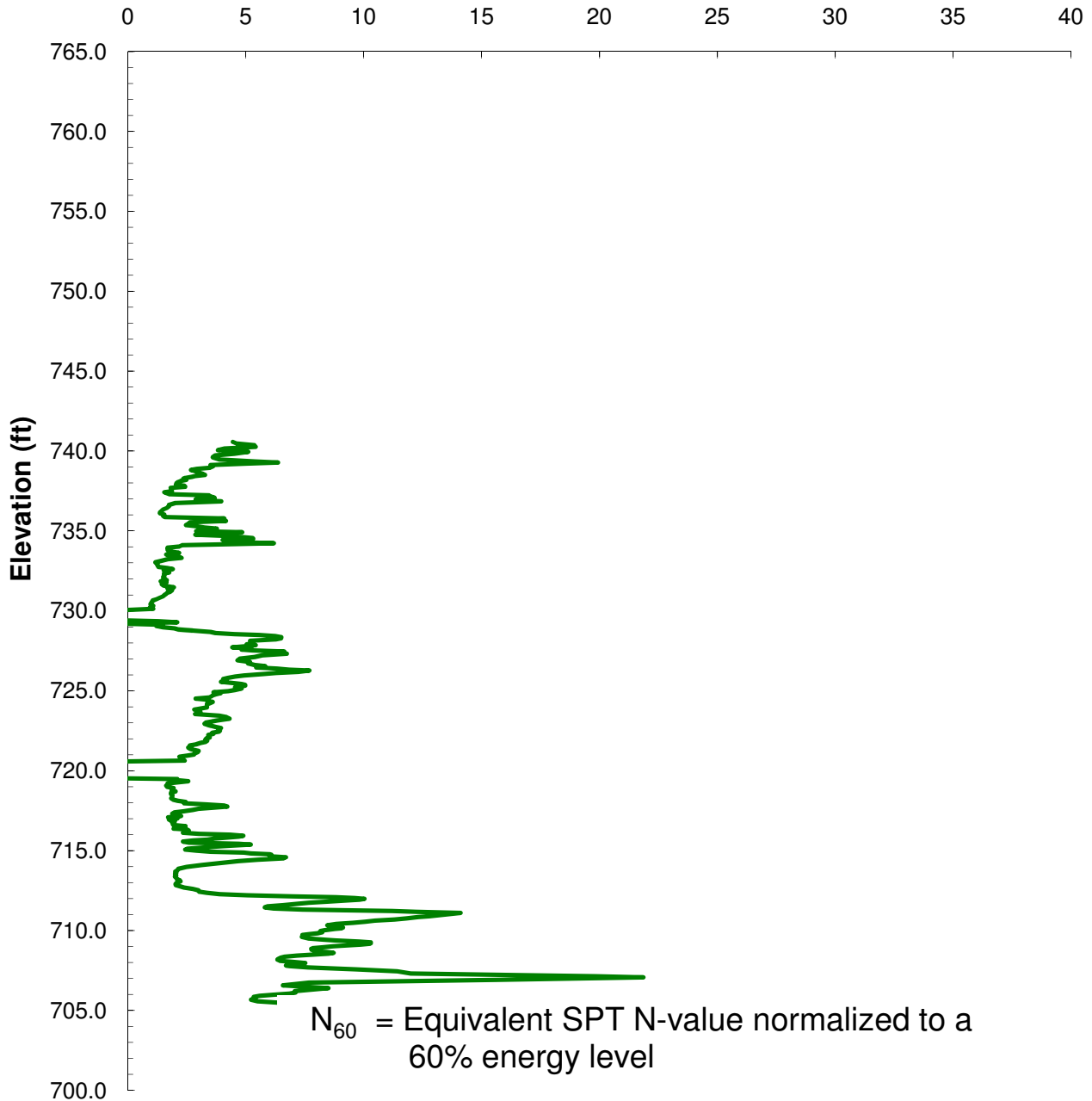


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

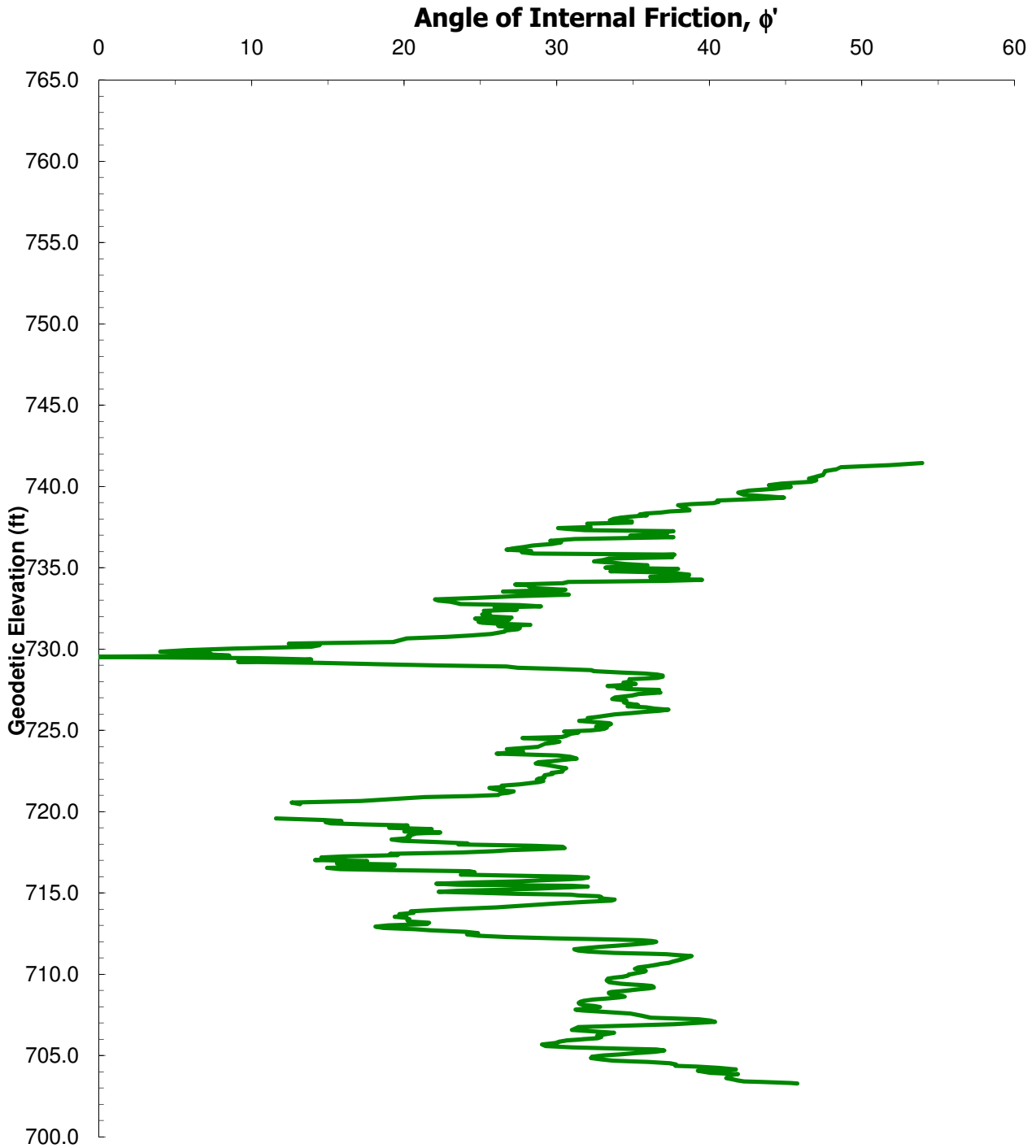
Project No. 175569042
STN-50A



Stantec

SCPTu RESULTS

Effective Angle of Internal Friction



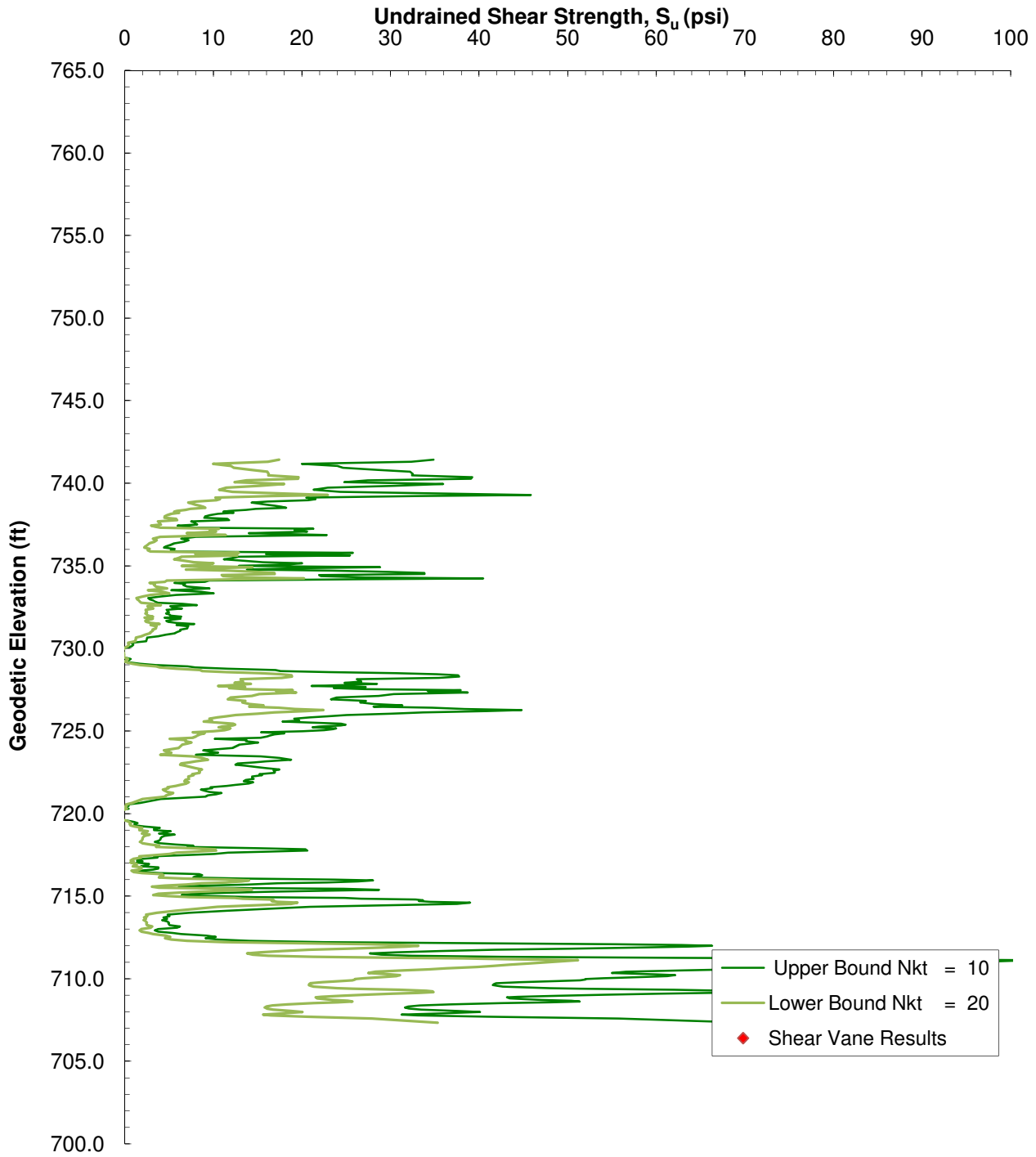
Project No. 175569042
STN-50A



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SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-50A

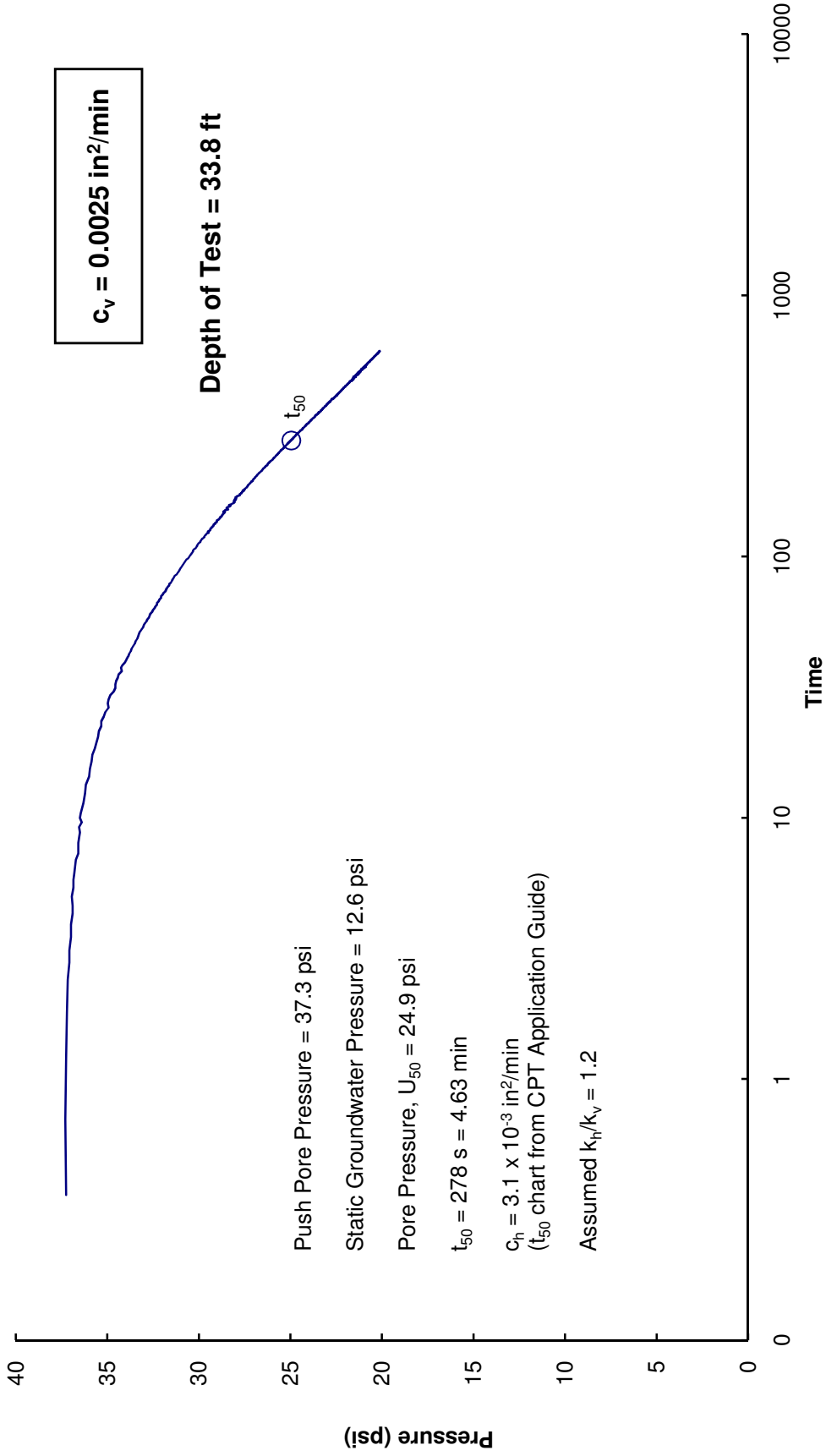


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SCPT_u DISSIPATION RESULTS

Coefficient of Consolidation



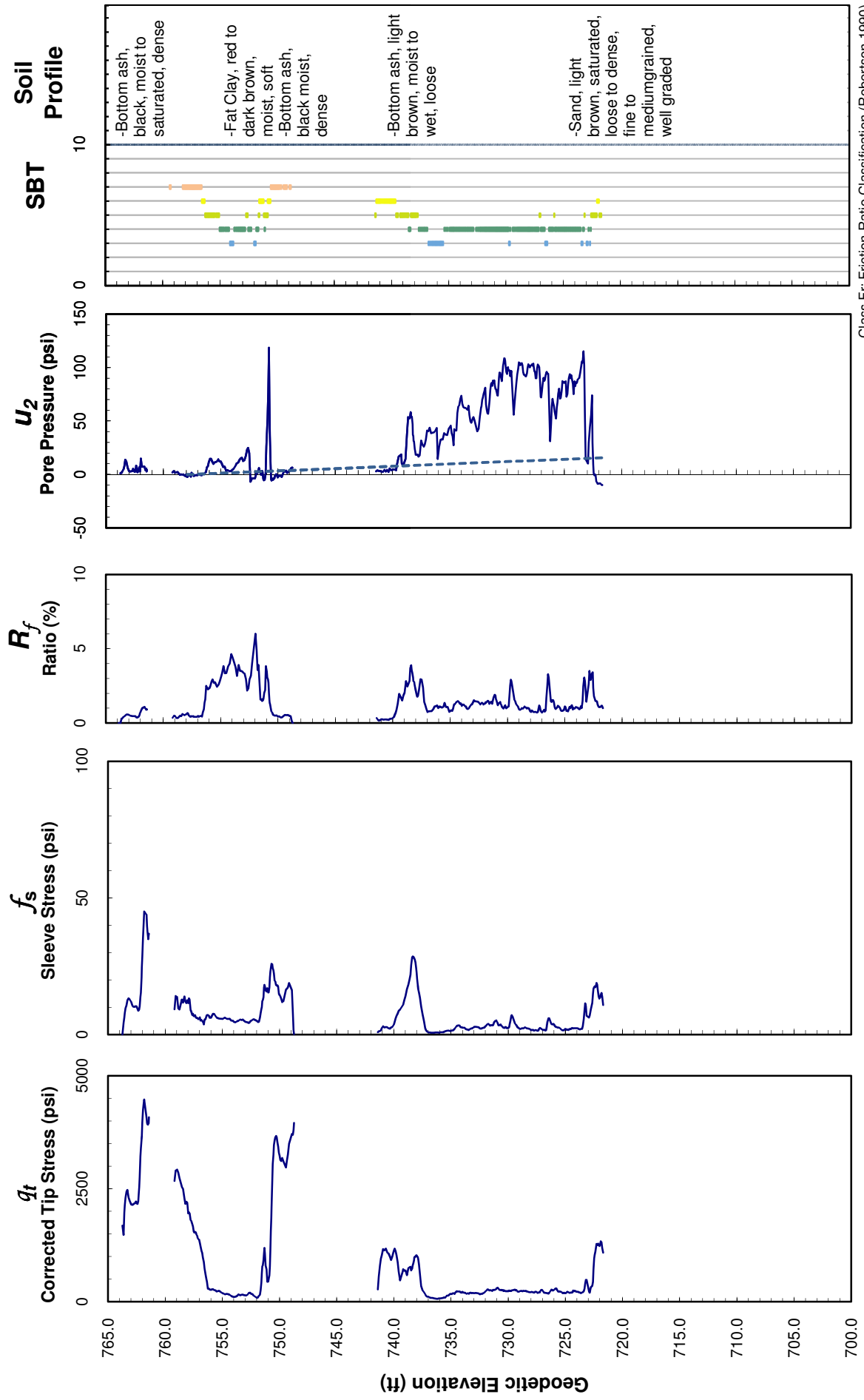
Project No. 175569042
STN-50A



**Stantec Consulting
Inc.**

Stantec

<p>Client: TVA Project: Kingston Ash Pond</p>	<p>Elevation: 763.90 ft</p>	<p>Test Date: May 6, 2009</p>	<p>STN-53A</p>
	<p>SCPTu Start Elevation: 763.90 ft</p>	<p>Project No. 175569042</p>	
	<p>Groundwater Elevation: 757.90 ft</p>		



Class Fr: Friction Ratio Classification (Robertson 1990)

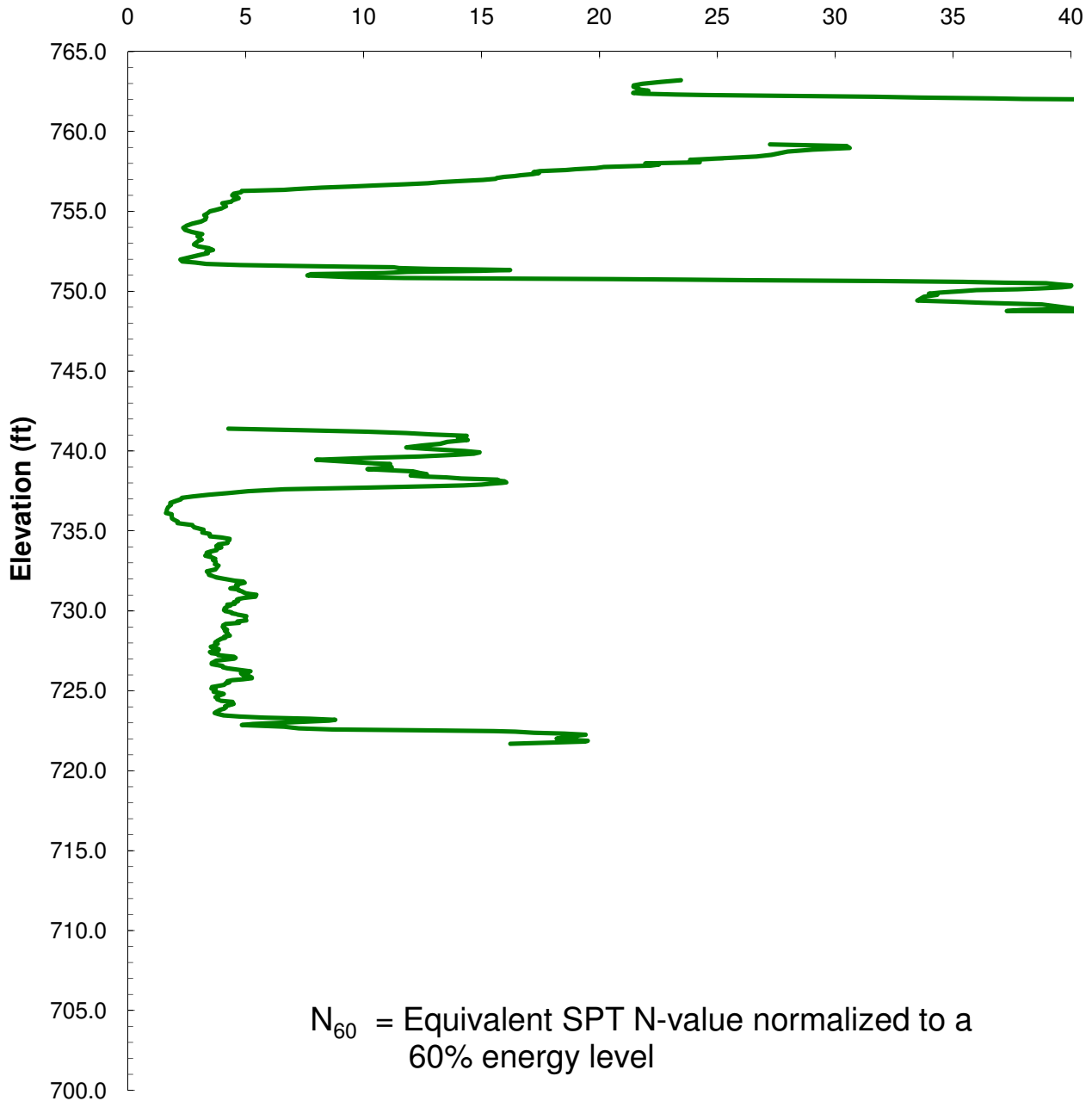


Stantec

SCPTu Results

SCPTu N_{60} Values

Equivalent SPT N_{60} Profile



The correlation from SCPTu data to equivalent SPT N_{60} values is based on the Jefferies and Davies (1993) approach.

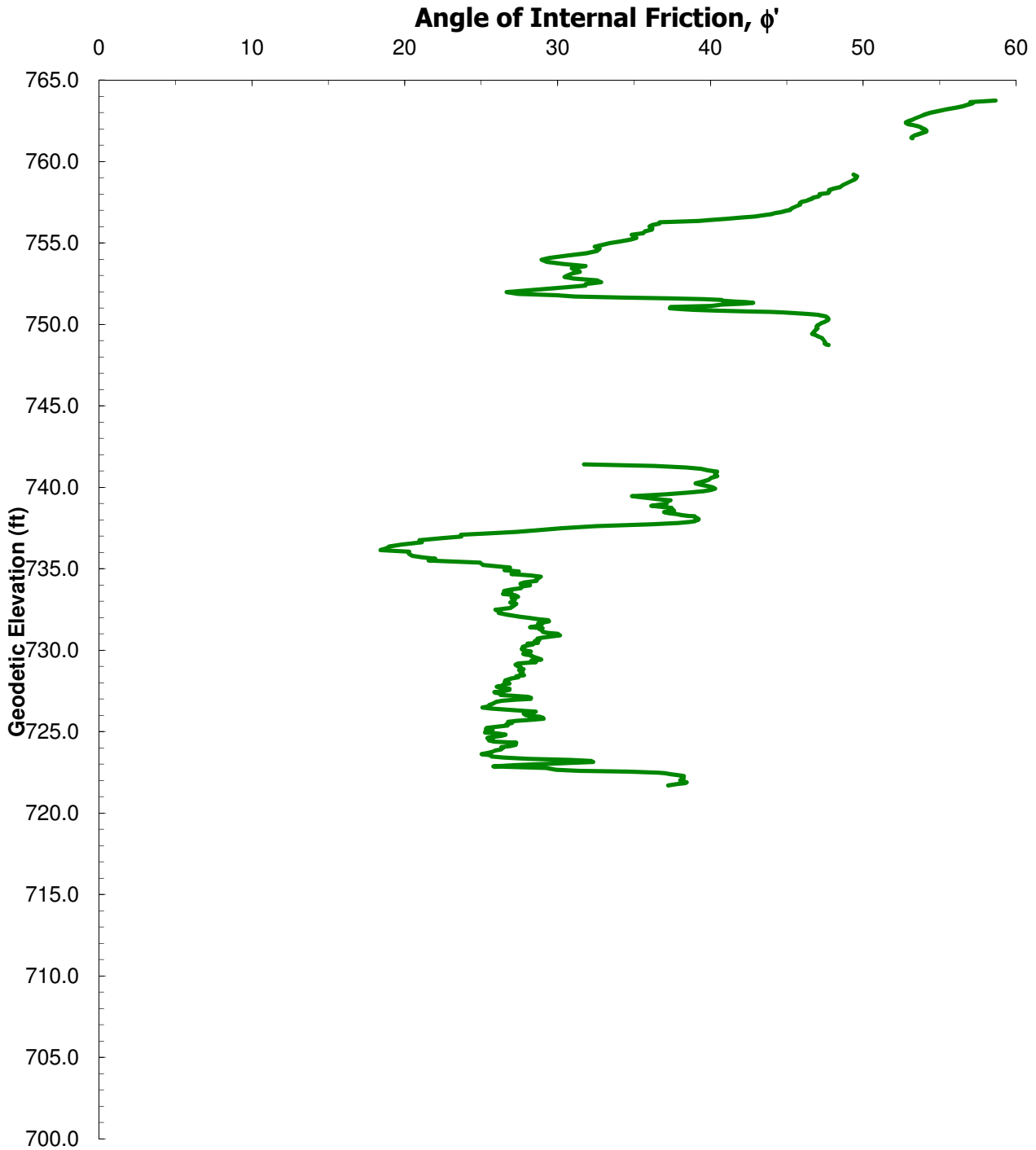
Project No. 175569042
STN-53A



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SCPTu RESULTS

Effective Angle of Internal Friction



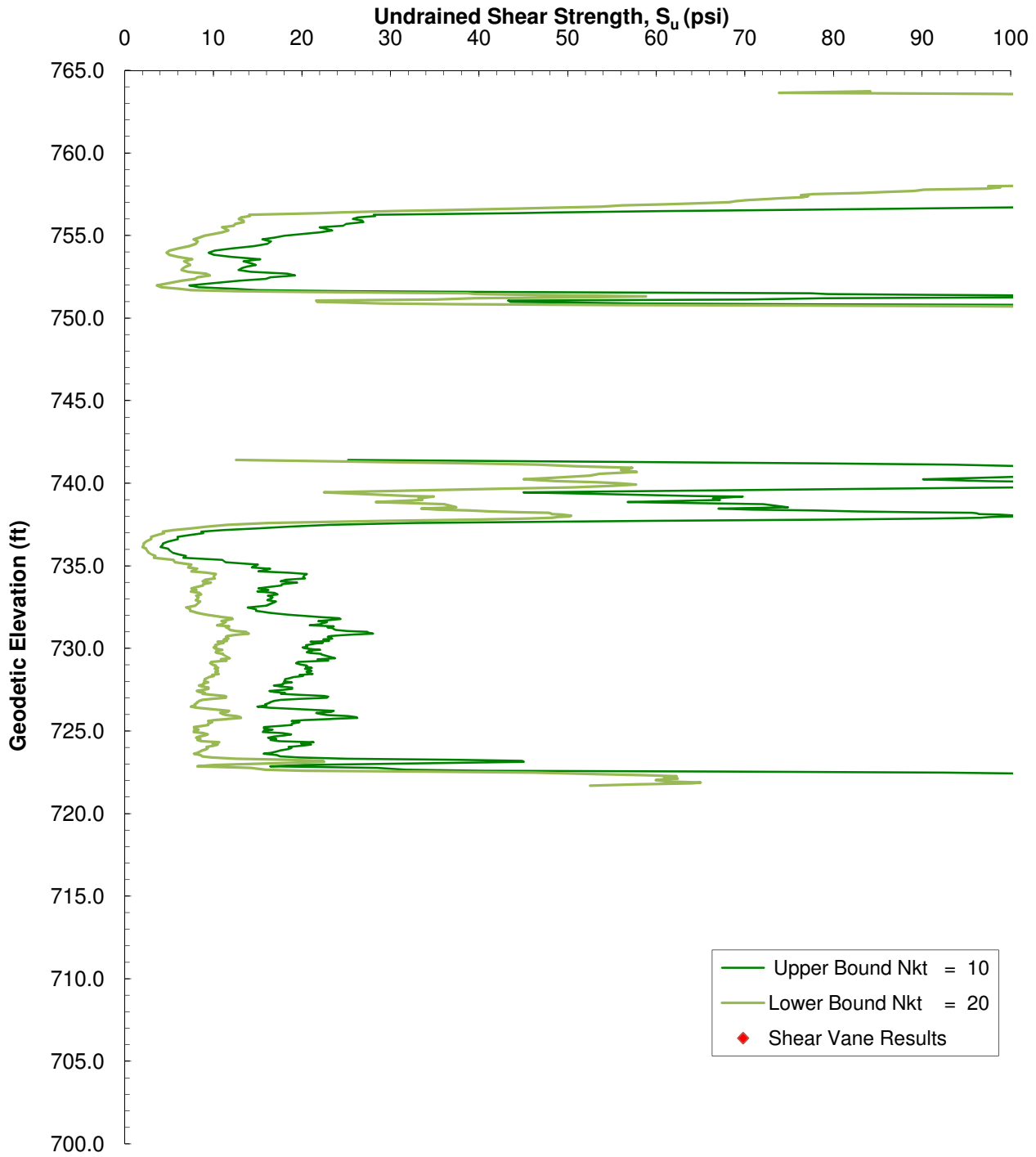
Project No. 175569042
STN-53A



Stantec

SCPT_u RESULTS

Undrained Shear Strength, S_u



Project No. 175569042
STN-53A

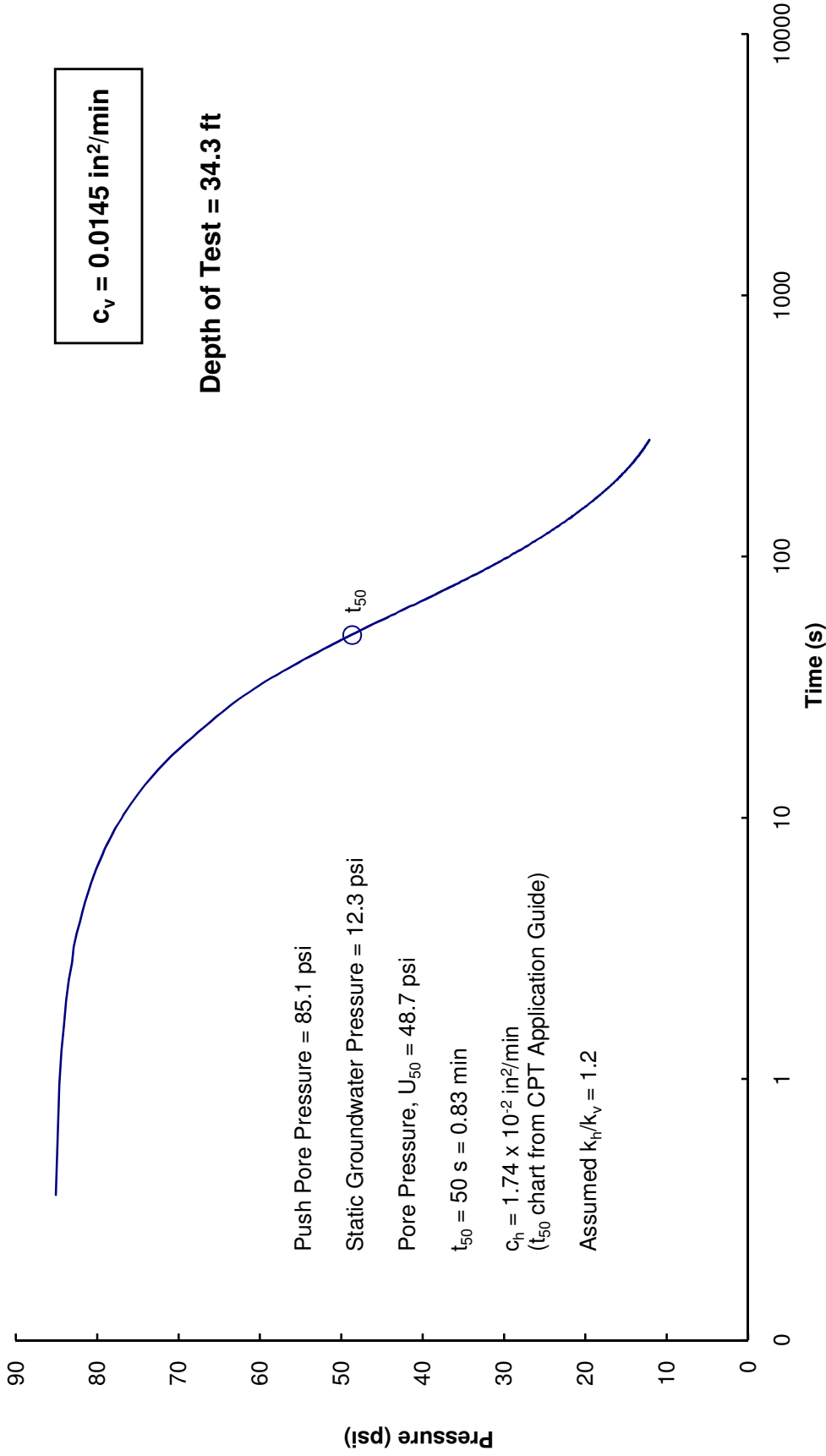


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**Stantec Consulting
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SCPT_u DISSIPATION RESULTS

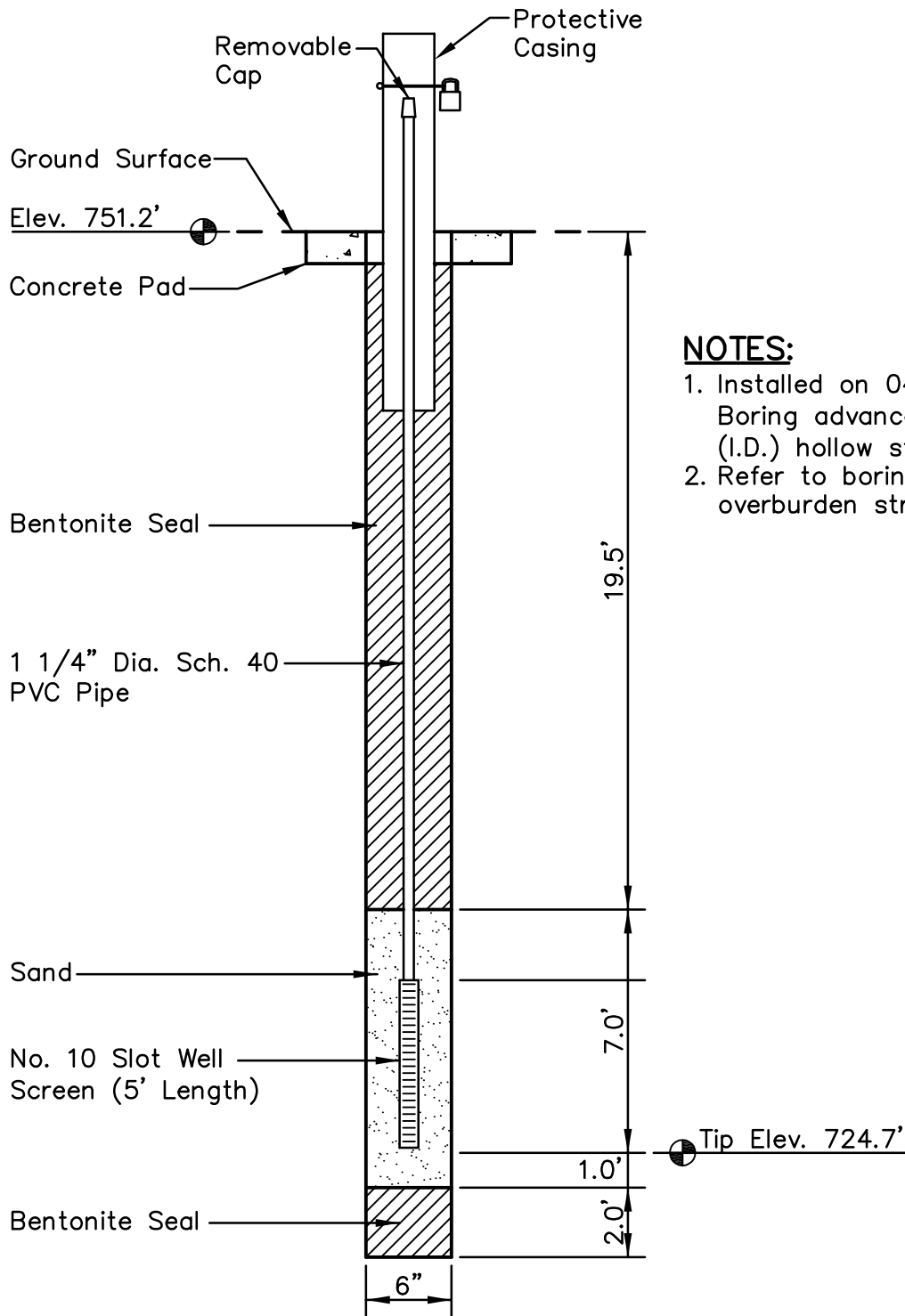
Coefficient of Consolidation



Project No. 175569042
STN-53A

Appendix C

Instrumentation Installation Details



NOTES:

1. Installed on 04/16/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 556,806.57
 Easting: 2,442,329.32
 Ground Elevation: 751.2 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-2A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



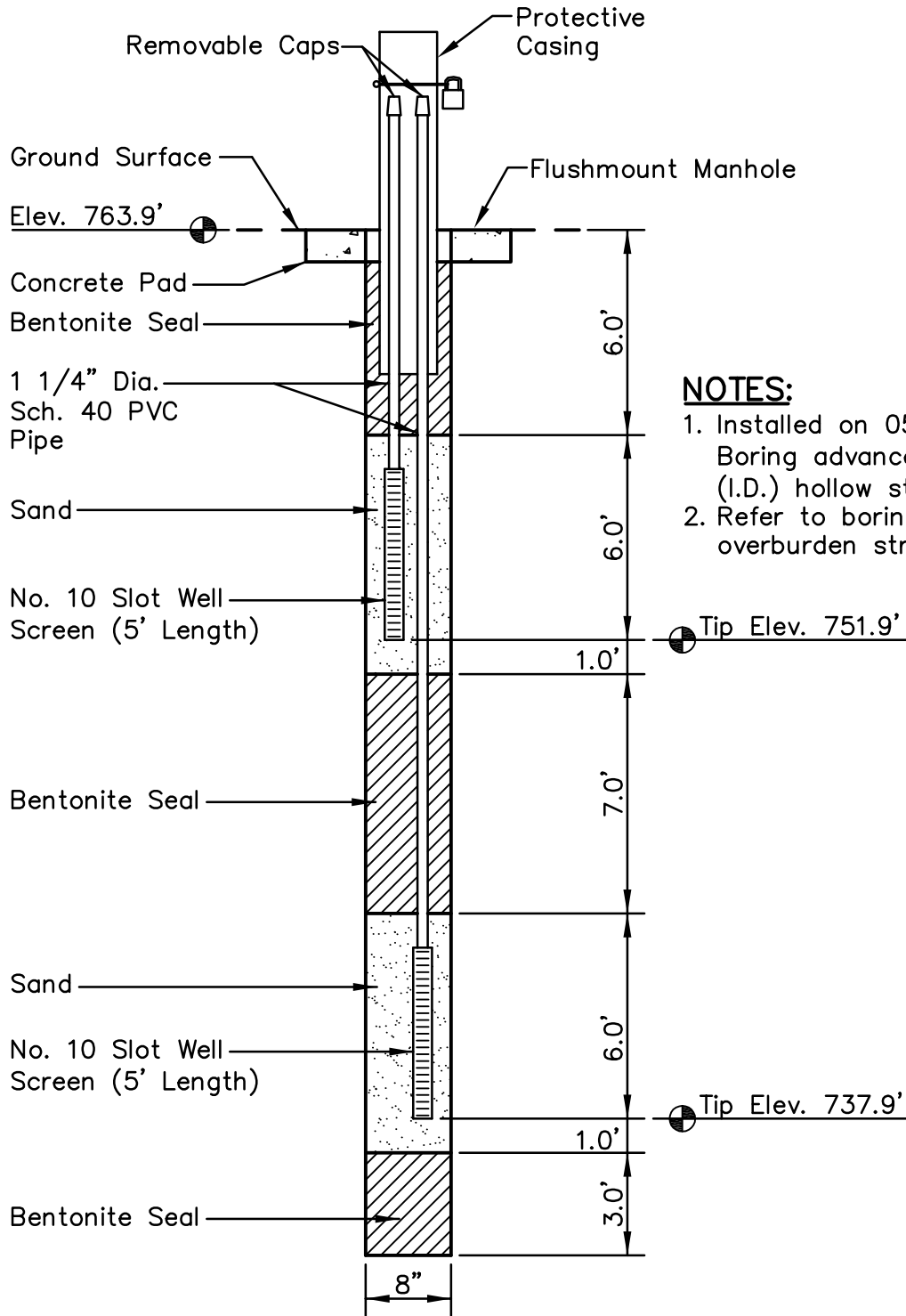
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.	1 OF 1
CHECKED BY	AAC	SCALE	NTS	2.	4.	

PLOT DATE: 07/15/2009 USER: FLYNN, RENEE
 V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZZA.DWG



NOTES:

1. Installed on 05/01/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 556,761.99
 Easting: 2,442,259.75
 Ground Elevation: 763.9 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-3A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



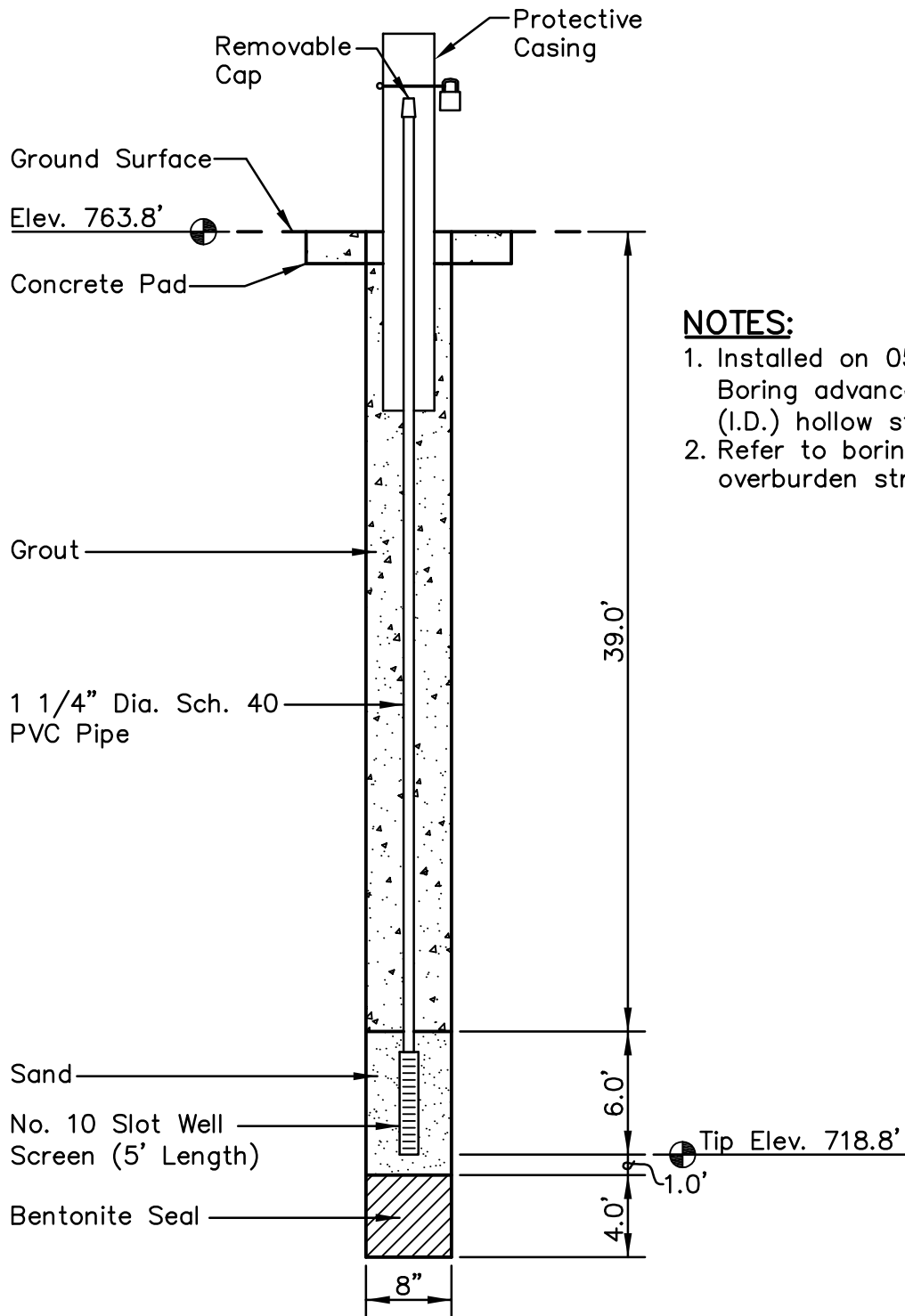
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SHEET
1 OF 1



NOTES:

1. Installed on 05/01/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 556,765.05
 Easting: 2,442,256.36
 Ground Elevation: 763.8 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-3B
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



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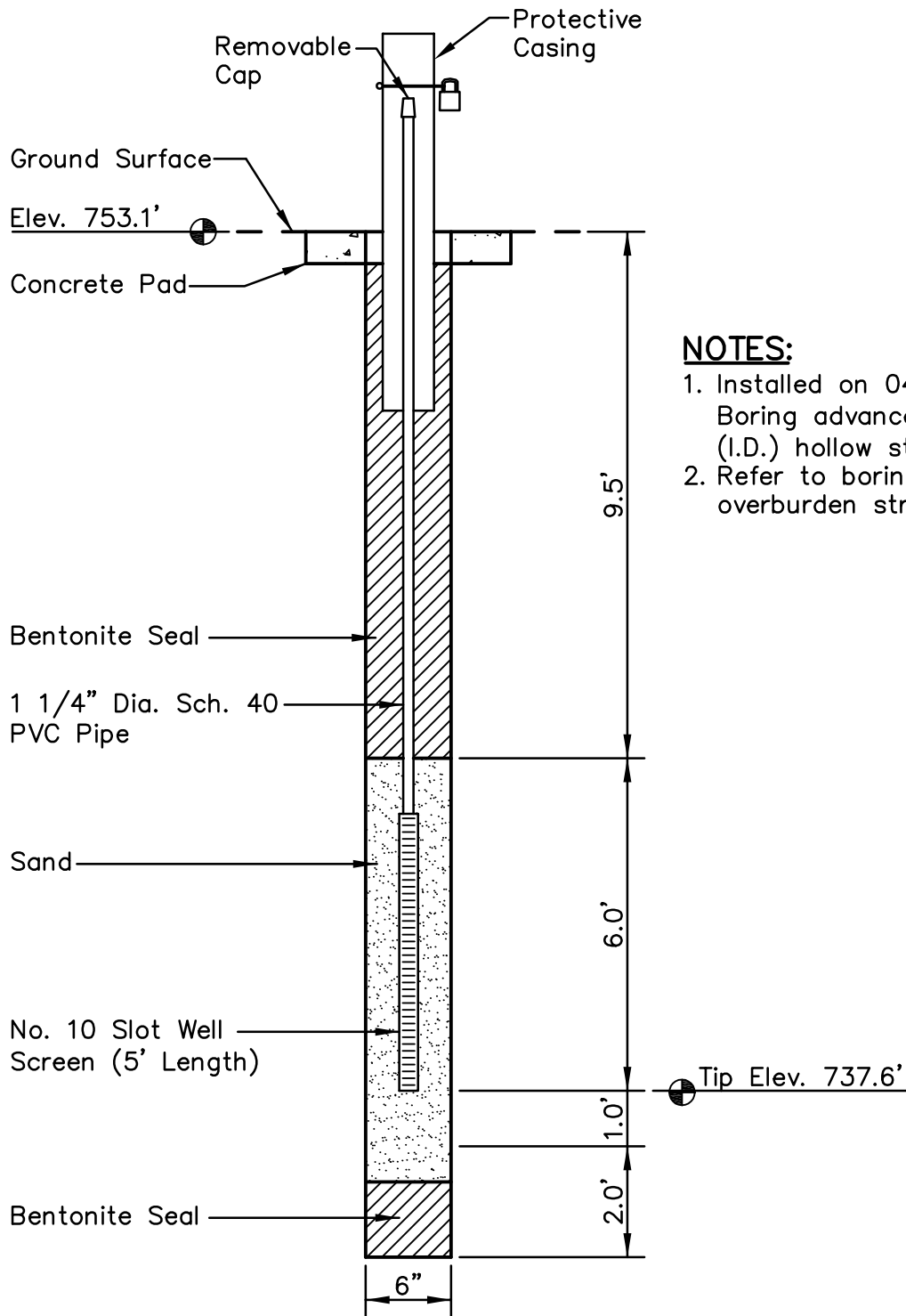
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ3B.DWG



NOTES:

1. Installed on 04/16/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ14A.DWG

LOCATION:

Northing: 555,687.58
 Easting: 2,442,734.21
 Ground Elevation: 753.1 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-14A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



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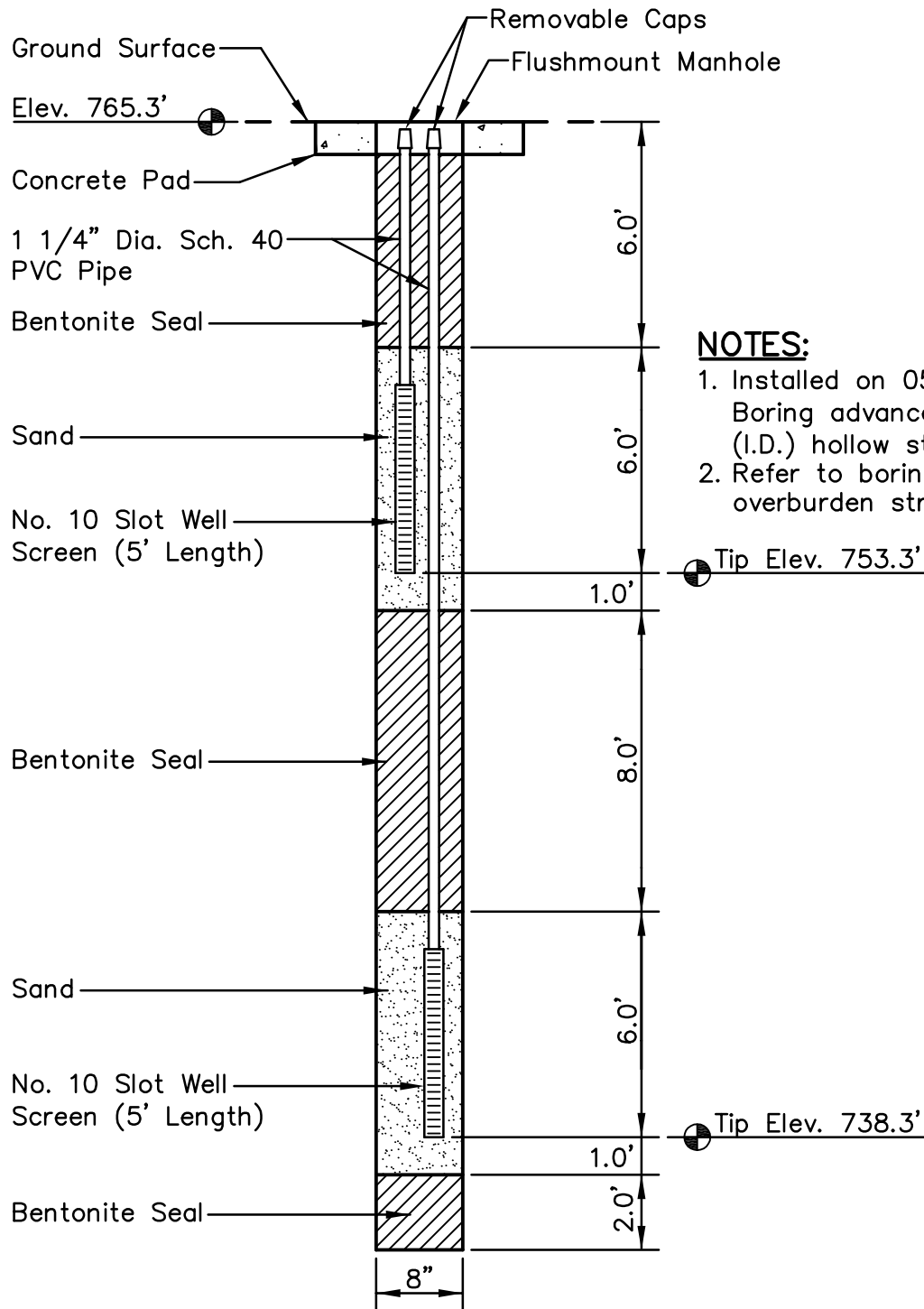
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CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1



NOTES:

1. Installed on 05/01/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 555,669.72
 Easting: 2,442,691.43
 Ground Elevation: 765.3 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-15A
 ASH POND STABILITY
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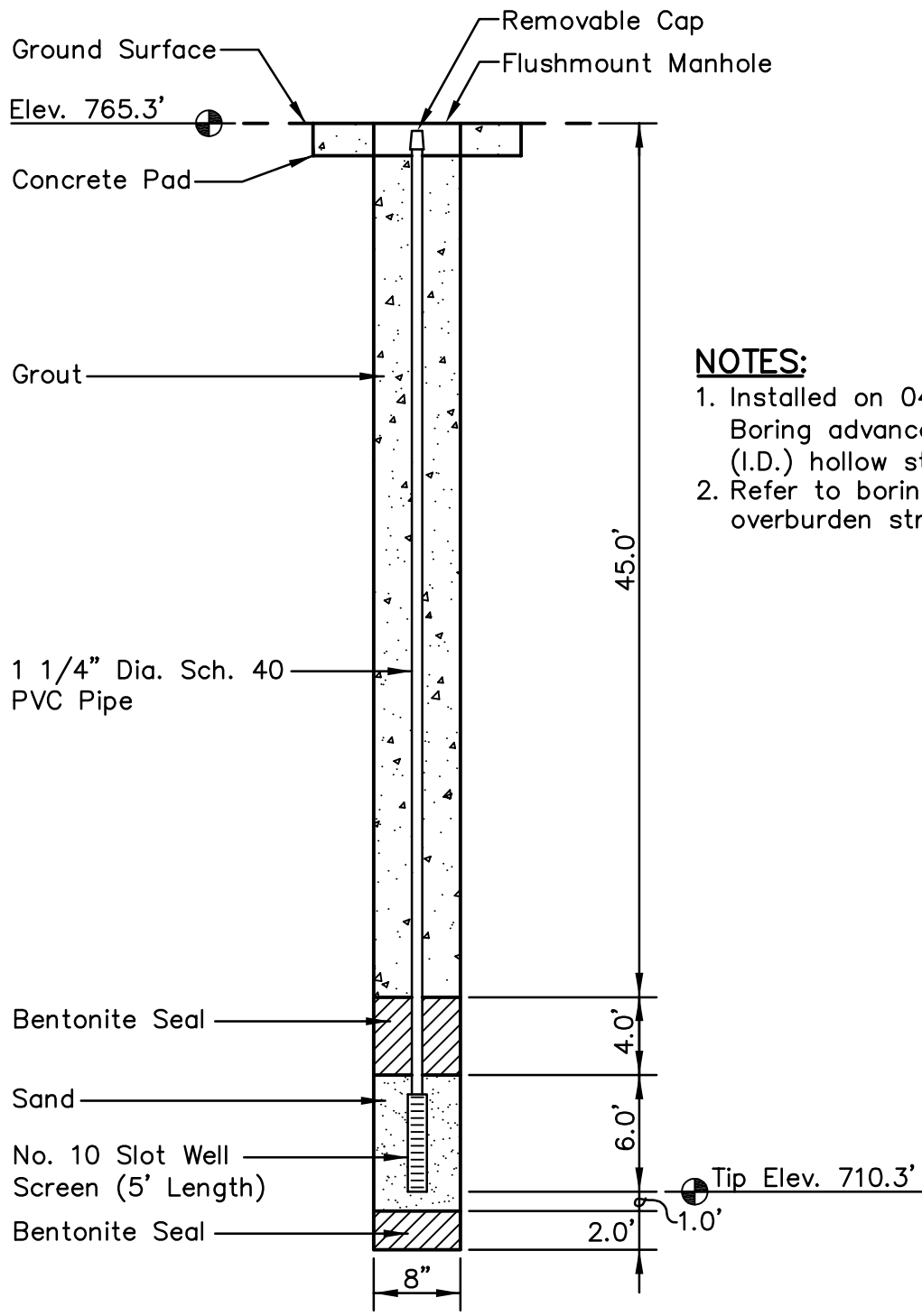
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ15A.DWG



NOTES:

1. Installed on 04/29/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

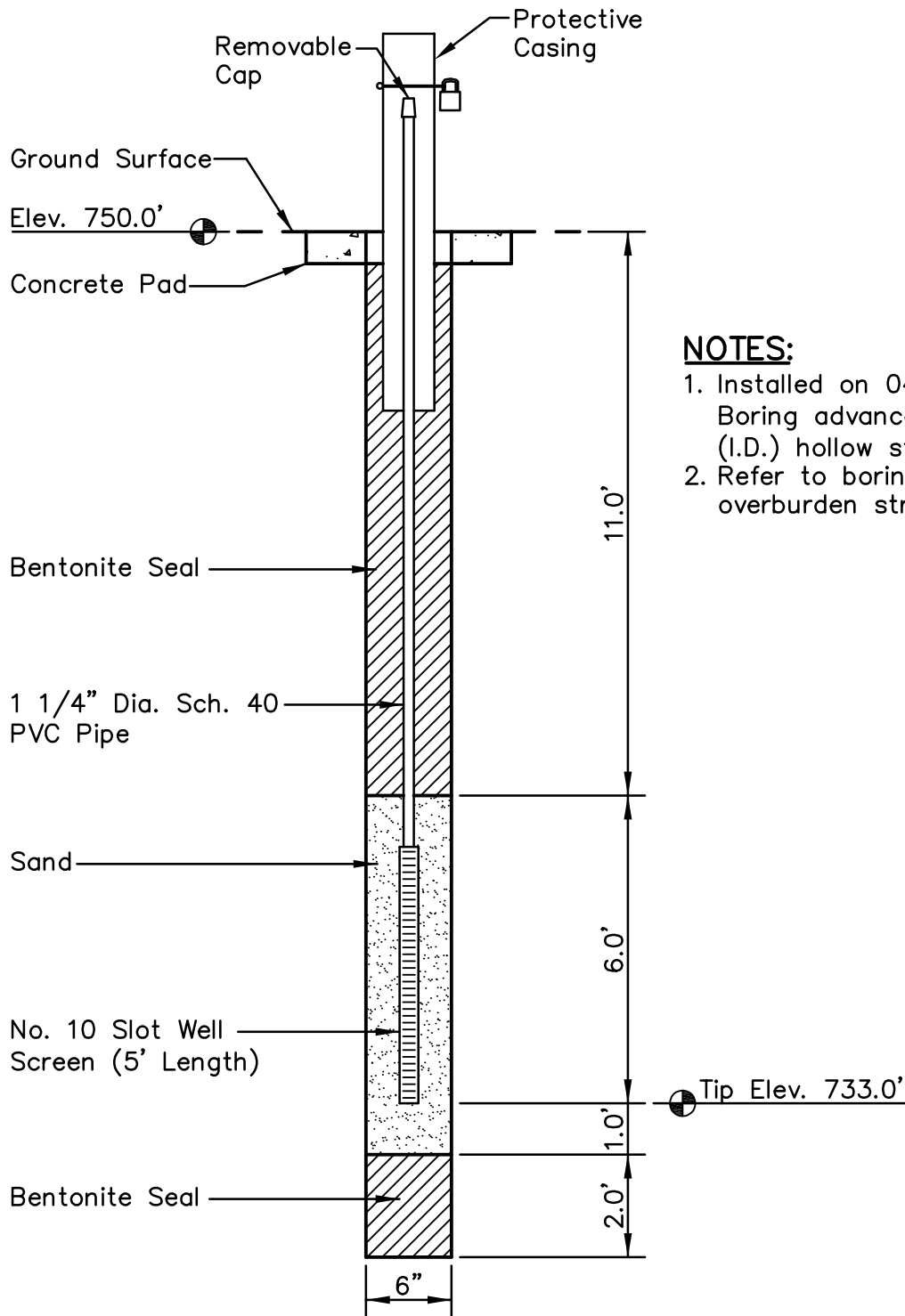
LOCATION:

Northing: 555,672.20
 Easting: 2,442,690.32
 Ground Elevation: 765.3 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
 Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

PIEZOMETER STN-15B ASH POND STABILITY KINGSTON FOSSIL PLANT			
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CHECKED BY	AAC	SCALE	NTS
		REVISED	SHEET
		1.	3.
		2.	4.
			1 OF 1

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ15B.DWG



NOTES:

1. Installed on 04/16/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENE V:\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ26A.DWG

LOCATION:

Northing: 554,604.66
 Easting: 2,442,904.17
 Ground Elevation: 757.0 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-26A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



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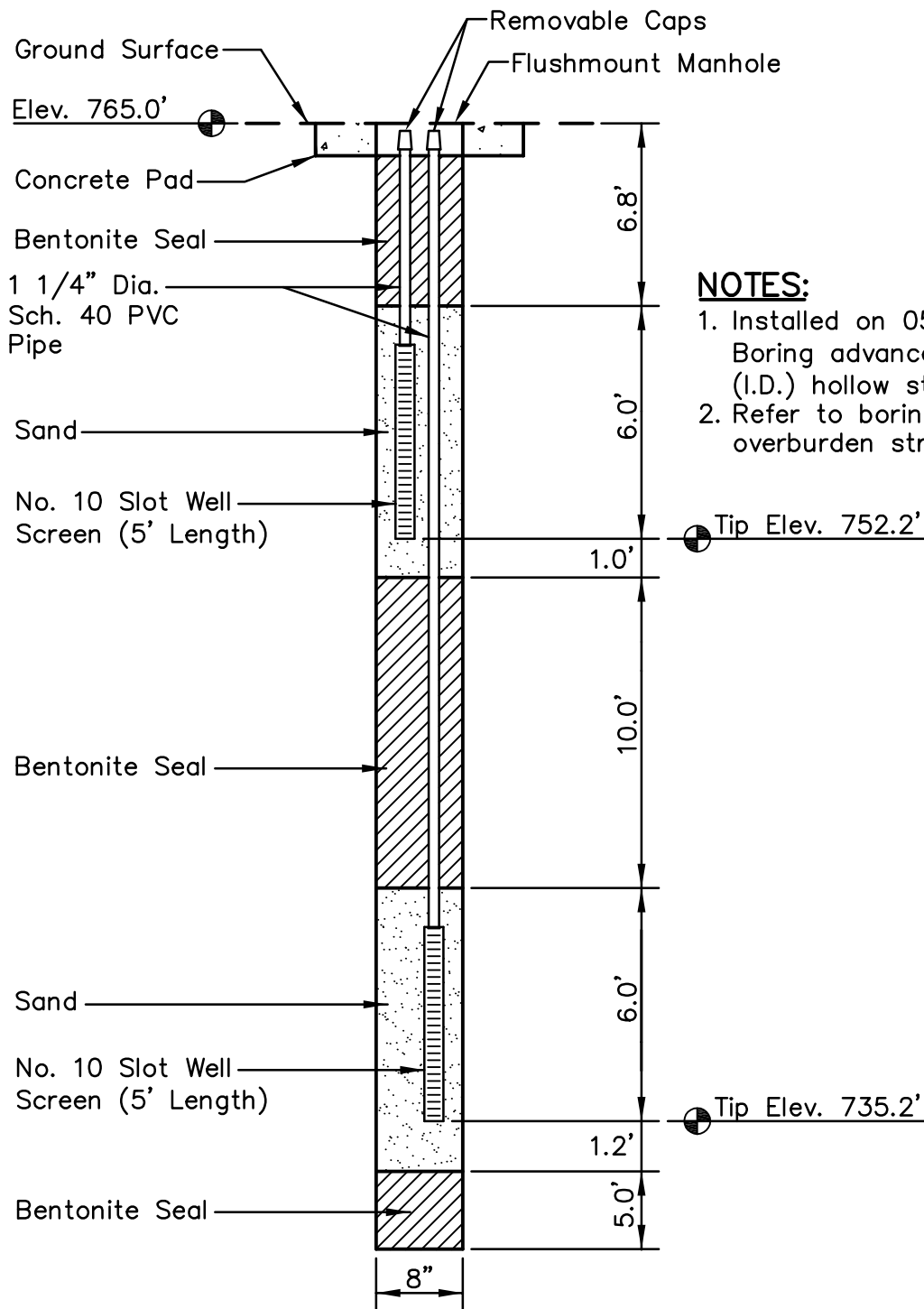
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CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1



NOTES:

1. Installed on 05/06/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 554,606.18
 Easting: 2,442,840.52
 Ground Elevation: 765.0 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-27A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



Stantec

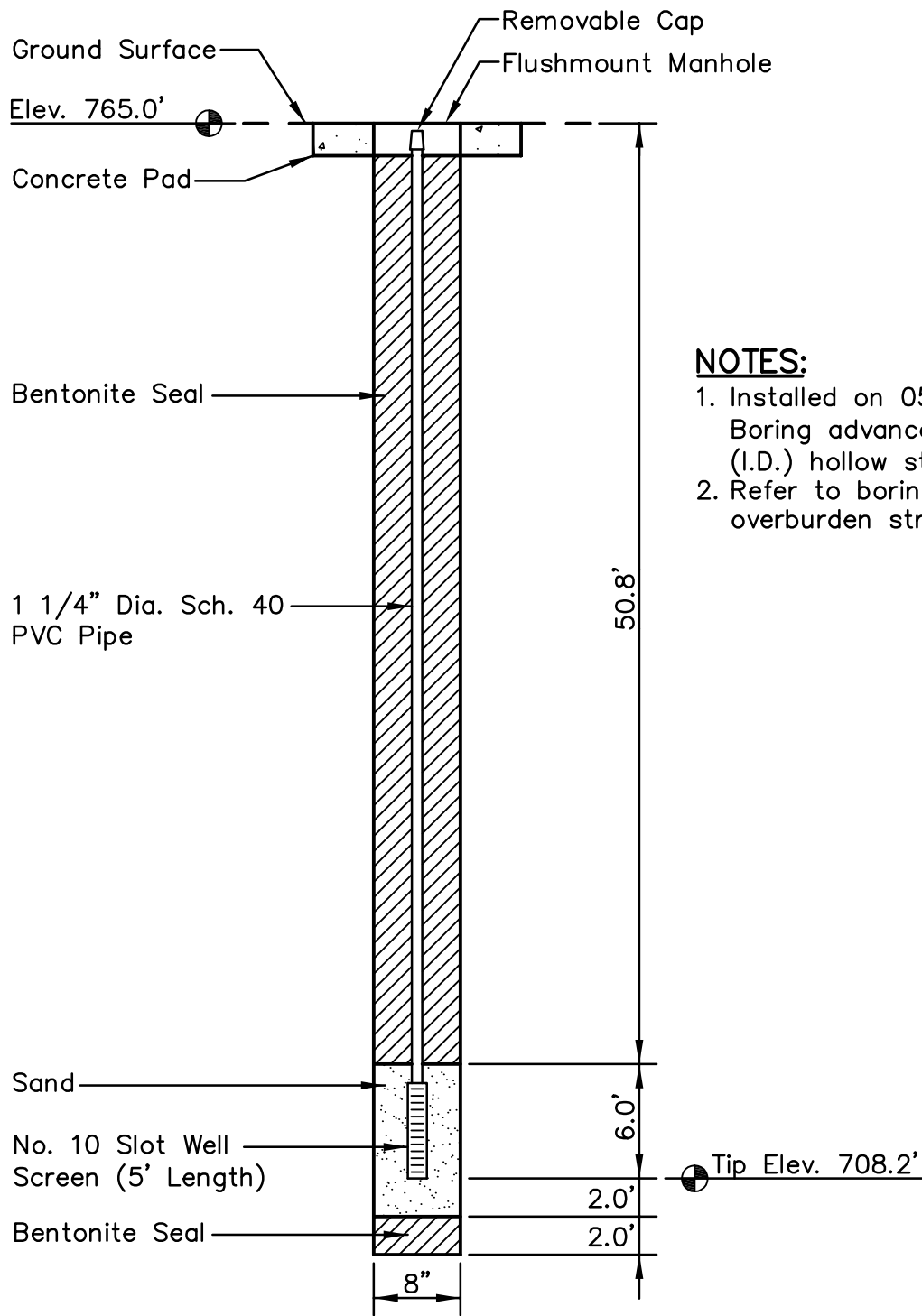
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SHEET

1 OF 1



NOTES:

1. Installed on 05/06/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

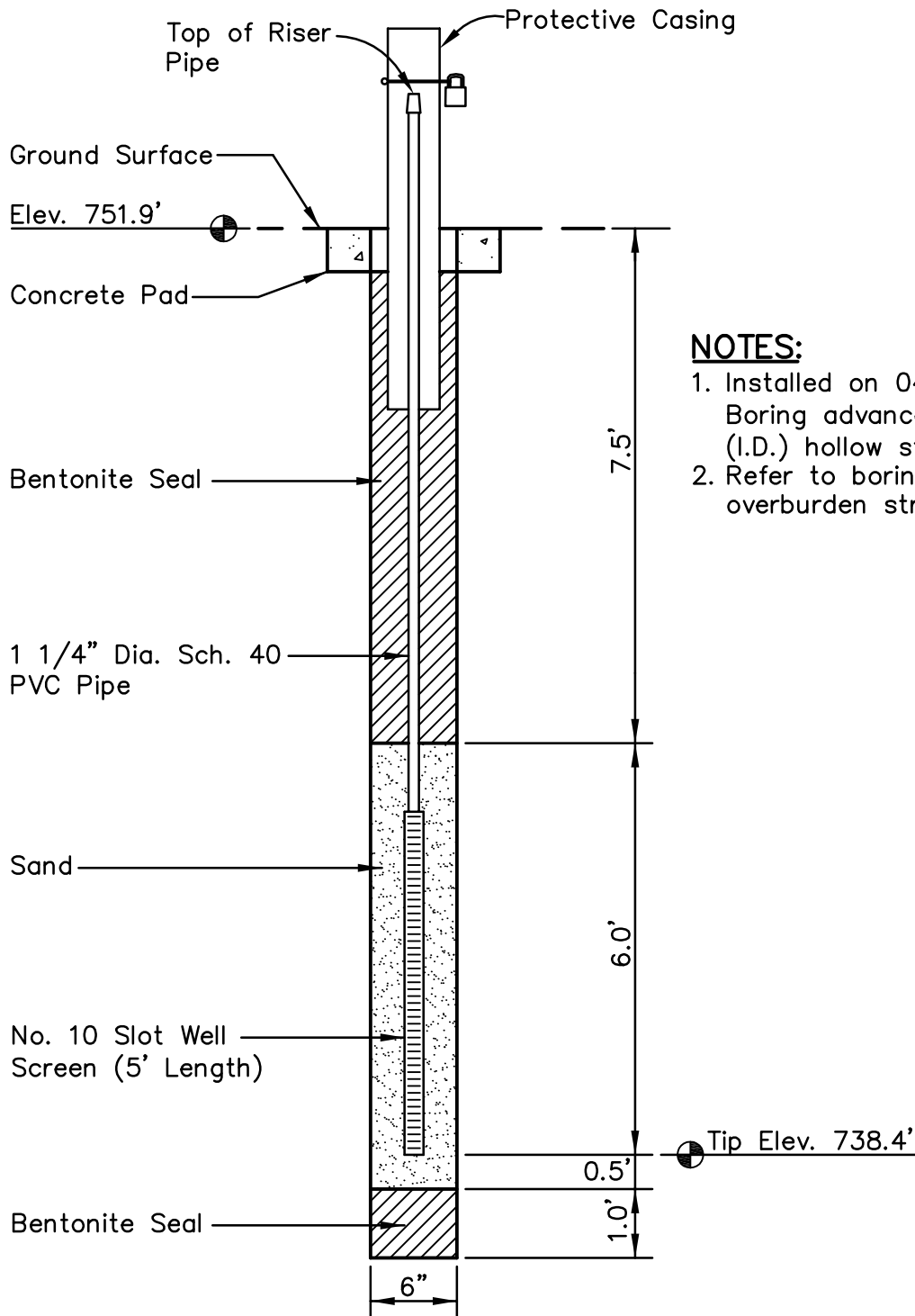
LOCATION:

Northing: 554,600.64
 Easting: 2,442,840.21
 Ground Elevation: 765.0 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.
 Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

PIEZOMETER STN-27B ASH POND STABILITY KINGSTON FOSSIL PLANT			
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CHECKED BY	ZCM	PROJ. NO.	175569042
CHECKED BY	AAC	SCALE	NTS
		REVISED	SHEET
		1.	3.
		2.	4.
			1 OF 1

PLOT DATE: 07/10/2009 USER: FLYNN, RENEE
 V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ27B.DWG



NOTES:

1. Installed on 04/30/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ36A.DWG

LOCATION:

Northing: 553,766.08
 Easting: 2,442,199.97
 Ground Elevation: 751.9 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

PIEZOMETER STN-36A
ASH POND STABILITY
KINGSTON FOSSIL PLANT

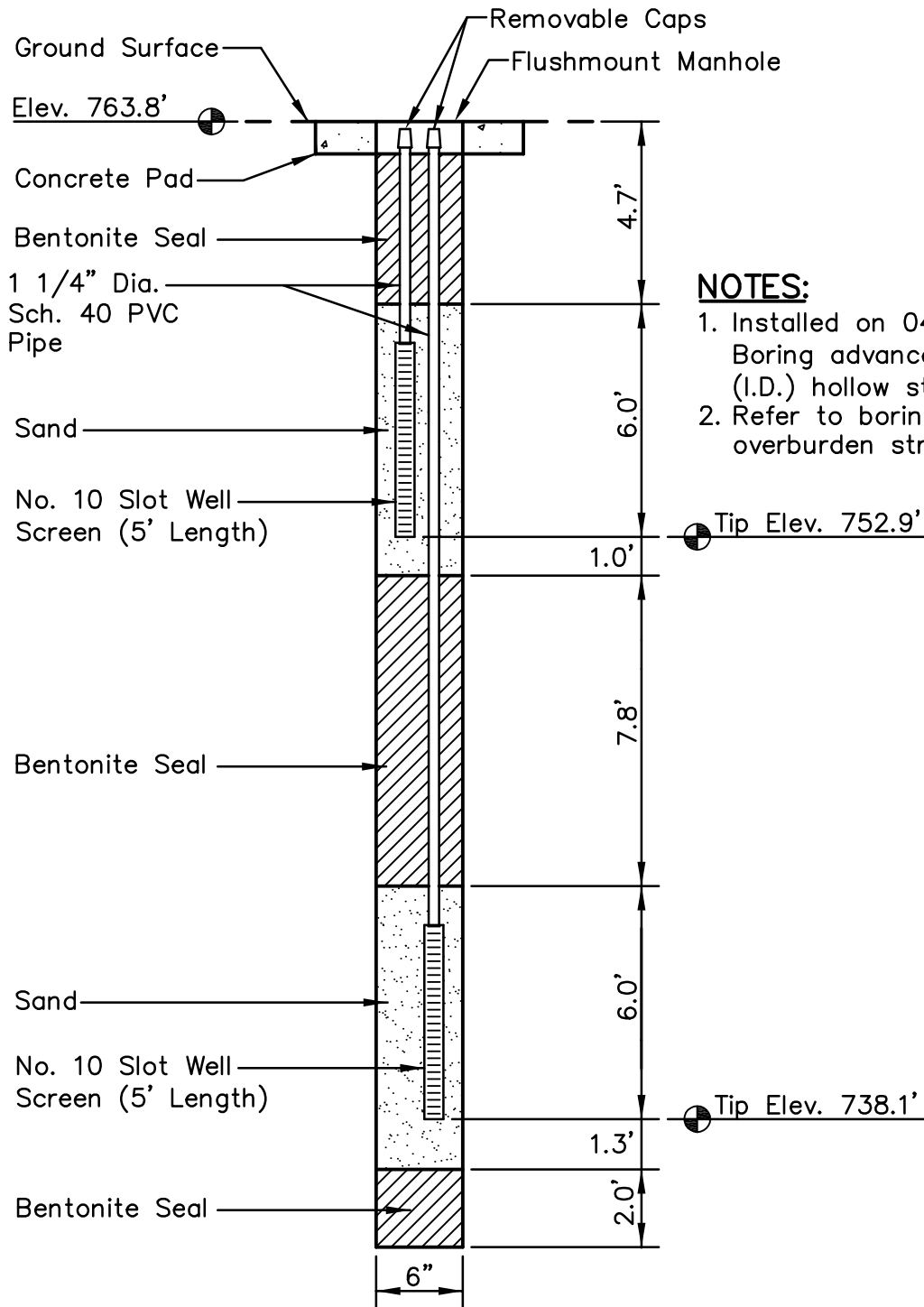


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CHECKED BY	AAC	SCALE	NTS	2.		4.	



NOTES:

1. Installed on 04/22/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 553,799.38
 Easting: 2,442,182.40
 Ground Elevation: 763.8 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-37A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



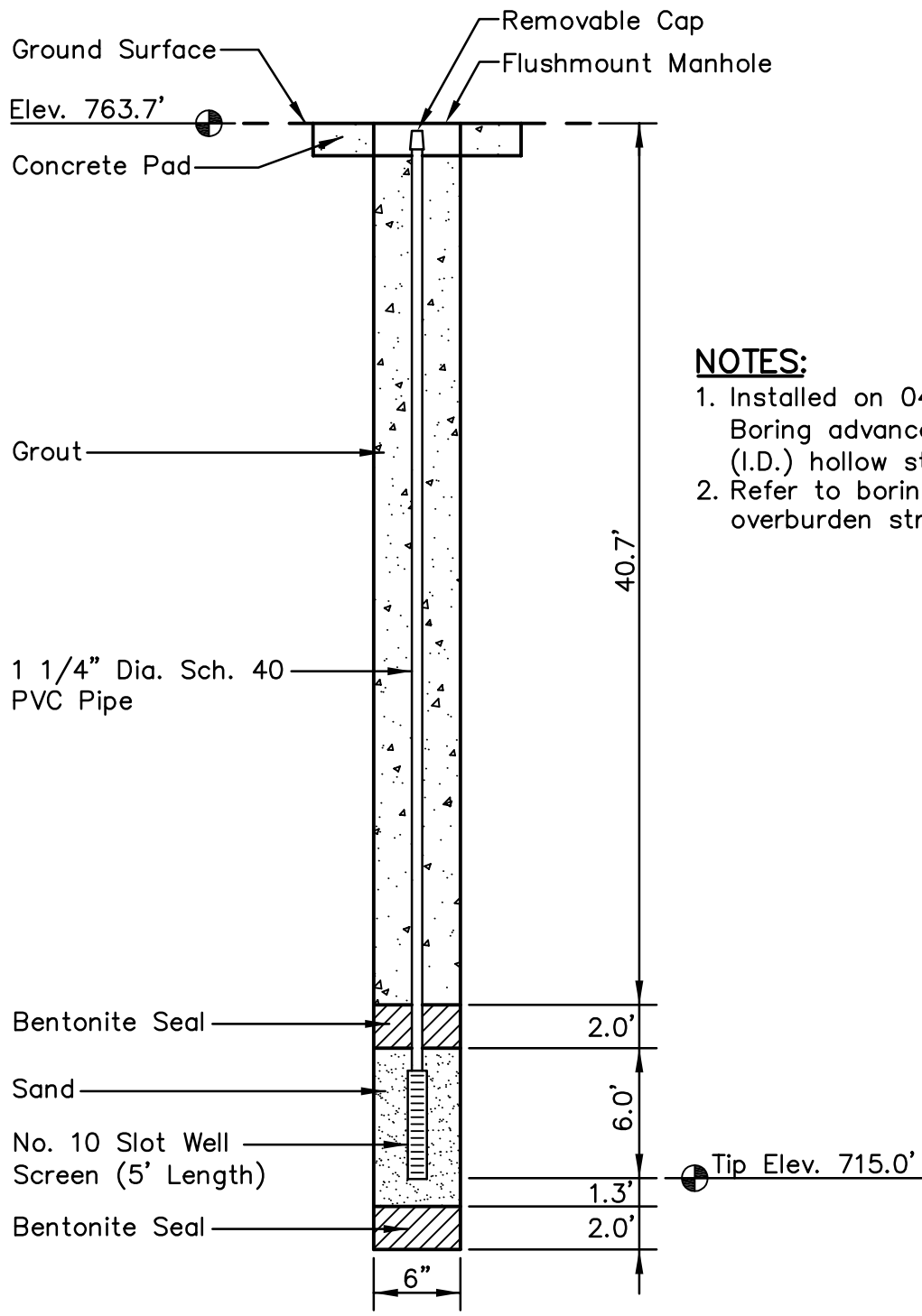
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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED		SHEET
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.	1 OF 1
CHECKED BY	AAC	SCALE	NTS	2.	4.	

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ37A.DWG



NOTES:

1. Installed on 04/22/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

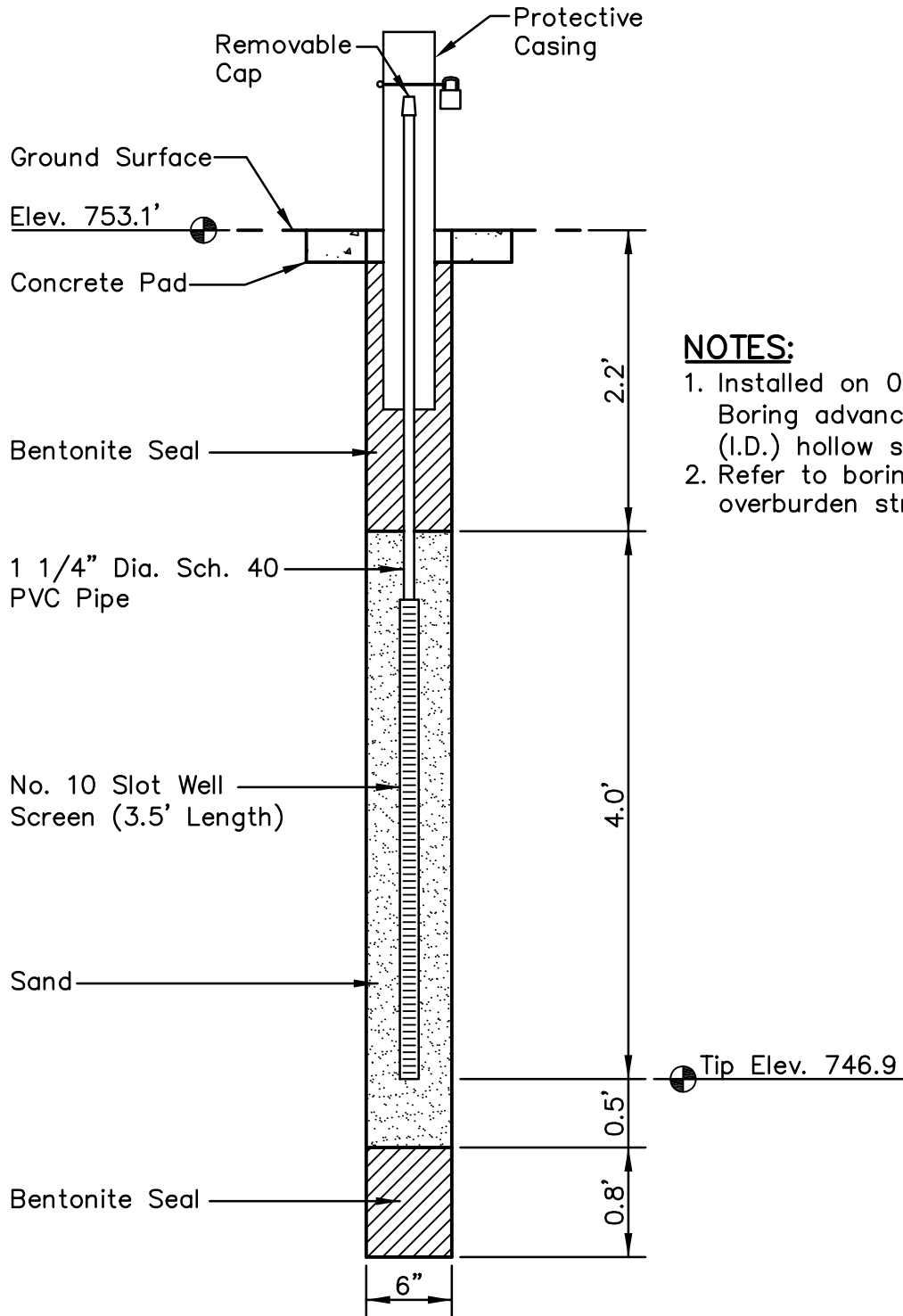
PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-P237B.DWG

LOCATION:

Northing: 553,800.49
 Easting: 2,442,186.20
 Ground Elevation: 763.7 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
 Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

PIEZOMETER STN-37B ASH POND STABILITY KINGSTON FOSSIL PLANT			
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CHECKED BY	ZCM	PROJ. NO.	175569042
CHECKED BY	AAC	SCALE	NTS
		REVISED	SHEET
		1.	3.
		2.	4.
			1 OF 1



NOTES:

1. Installed on 04/30/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-PZ47A.DWG

LOCATION:

Northing: 553,733.63
 Easting: 2,441,141.18
 Ground Elevation: 753.1 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

PIEZOMETER STN-47A
ASH POND STABILITY
KINGSTON FOSSIL PLANT



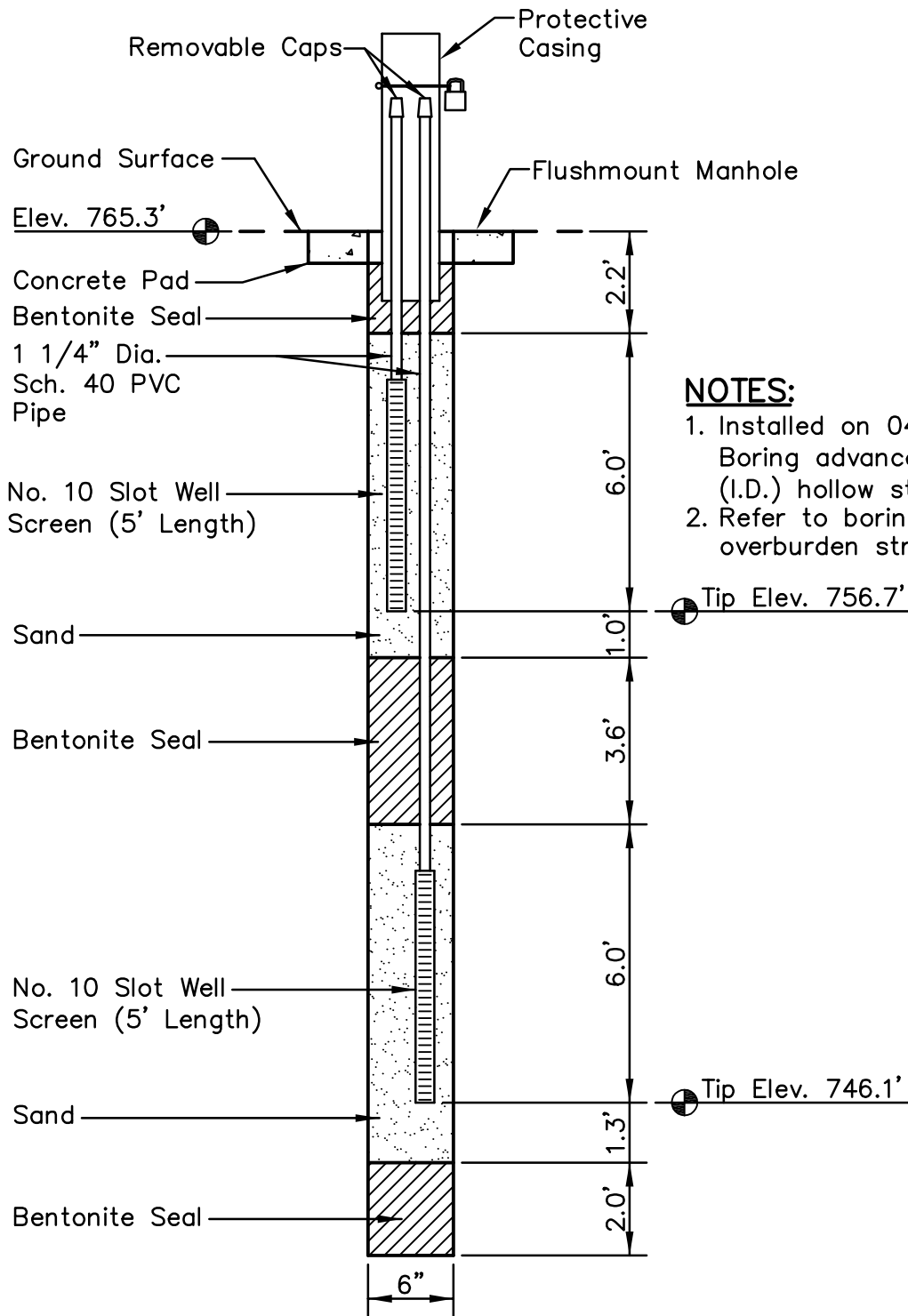
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CHECKED BY	AAC	SCALE	NTS	2.	4.	

1 OF 1



NOTES:

1. Installed on 04/21/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 553,771.75
 Easting: 2,441,159.01
 Ground Elevation: 765.3 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-48A
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



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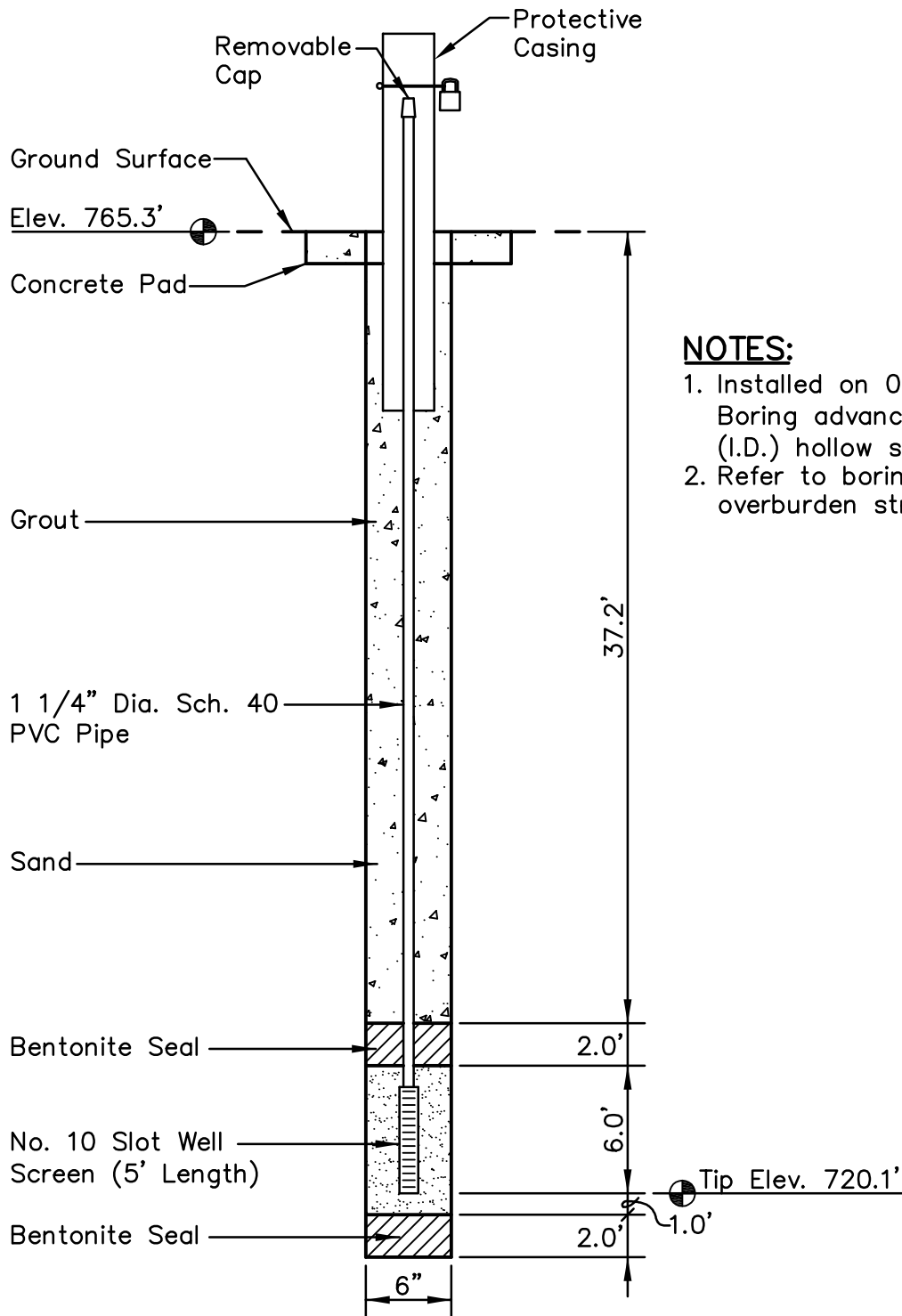
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1



NOTES:

1. Installed on 04/21/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 553,769.40
 Easting: 2,441,163.30
 Ground Elevation: 765.3 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**PIEZOMETER STN-48B
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



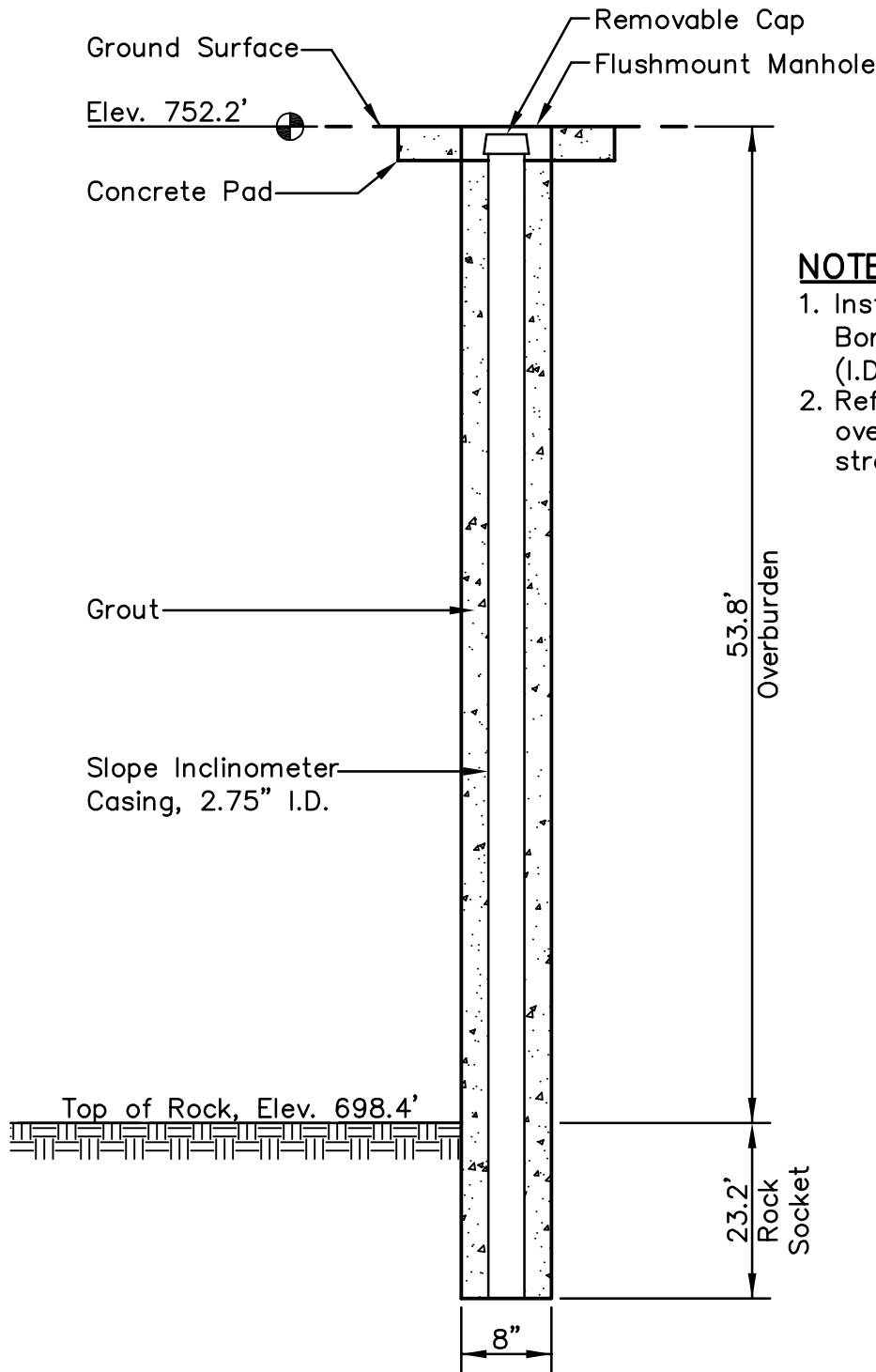
Stantec

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 40511-2050
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET
1 OF 1



NOTES:

1. Installed on 04/13/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-STN8.DWG

LOCATION:

Northing: 556,298.52
 Easting: 2,442,540.30
 Ground Elevation: 752.2 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

SLOPE INCLINOMETER STN-8
ASH POND STABILITY
KINGSTON FOSSIL PLANT



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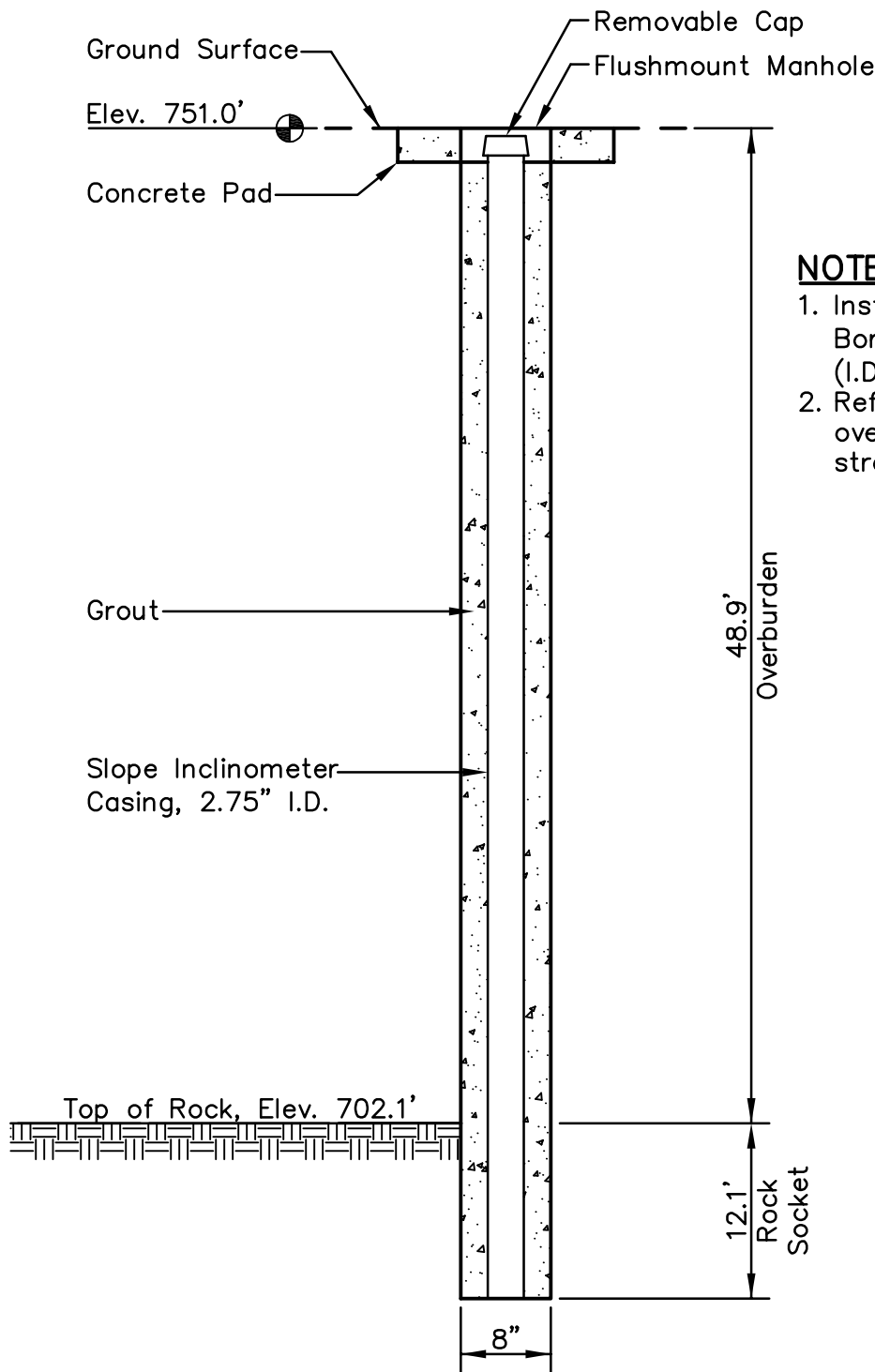
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CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1



NOTES:

1. Installed on 04/14/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE V: \\1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-STN18.DWG

LOCATION:

Northing: 555,204.87
 Easting: 2,442,894.11
 Ground Elevation: 751.0 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

SLOPE INCLINOMETER STN-18
ASH POND STABILITY
KINGSTON FOSSIL PLANT



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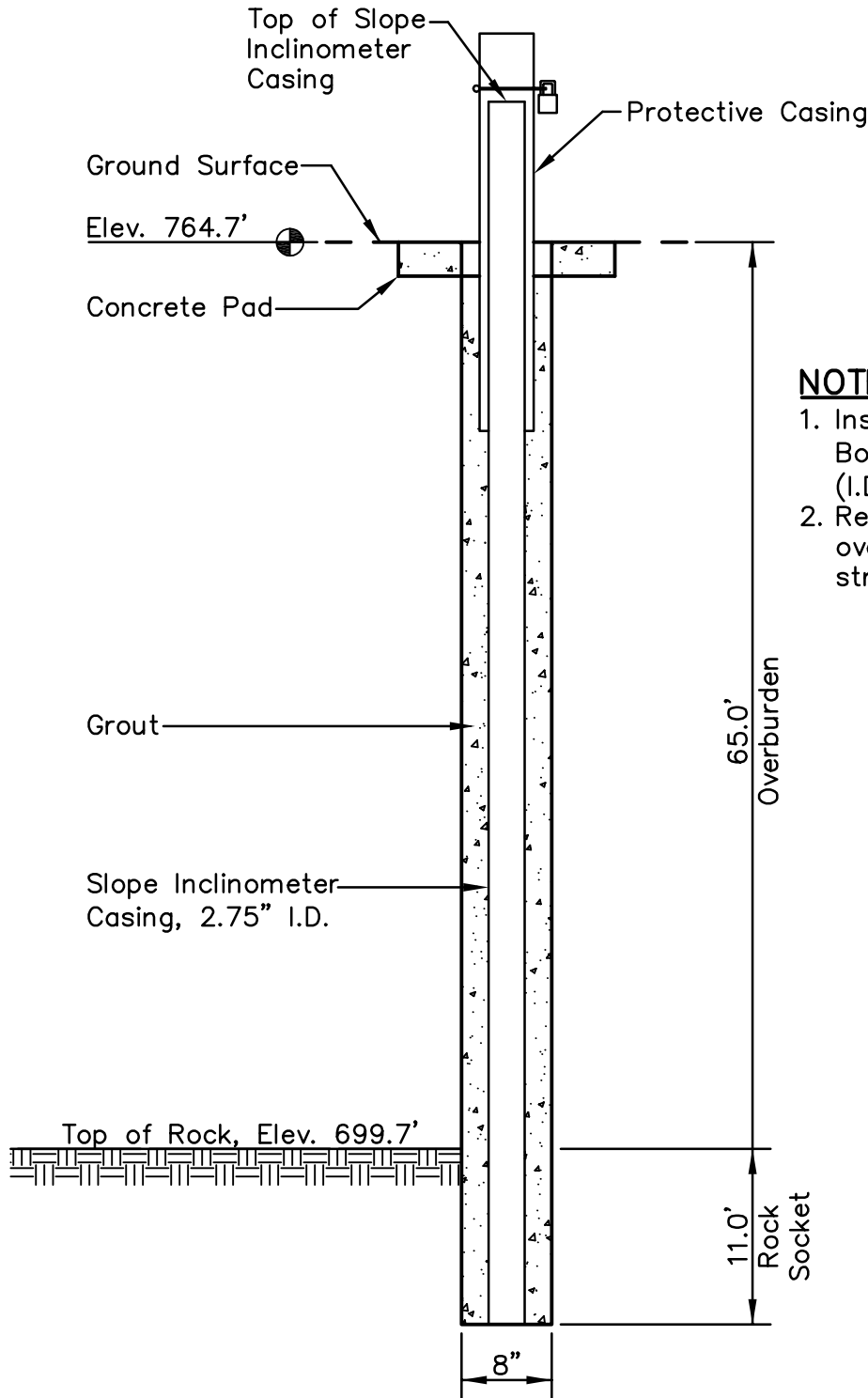
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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED	
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET

1 OF 1



NOTES:

1. Installed on 05/31/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

LOCATION:

Northing: 553,853.66
 Easting: 2,442,184.35
 Ground Elevation: 764.7 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**SLOPE INCINOMETER STN-34
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**



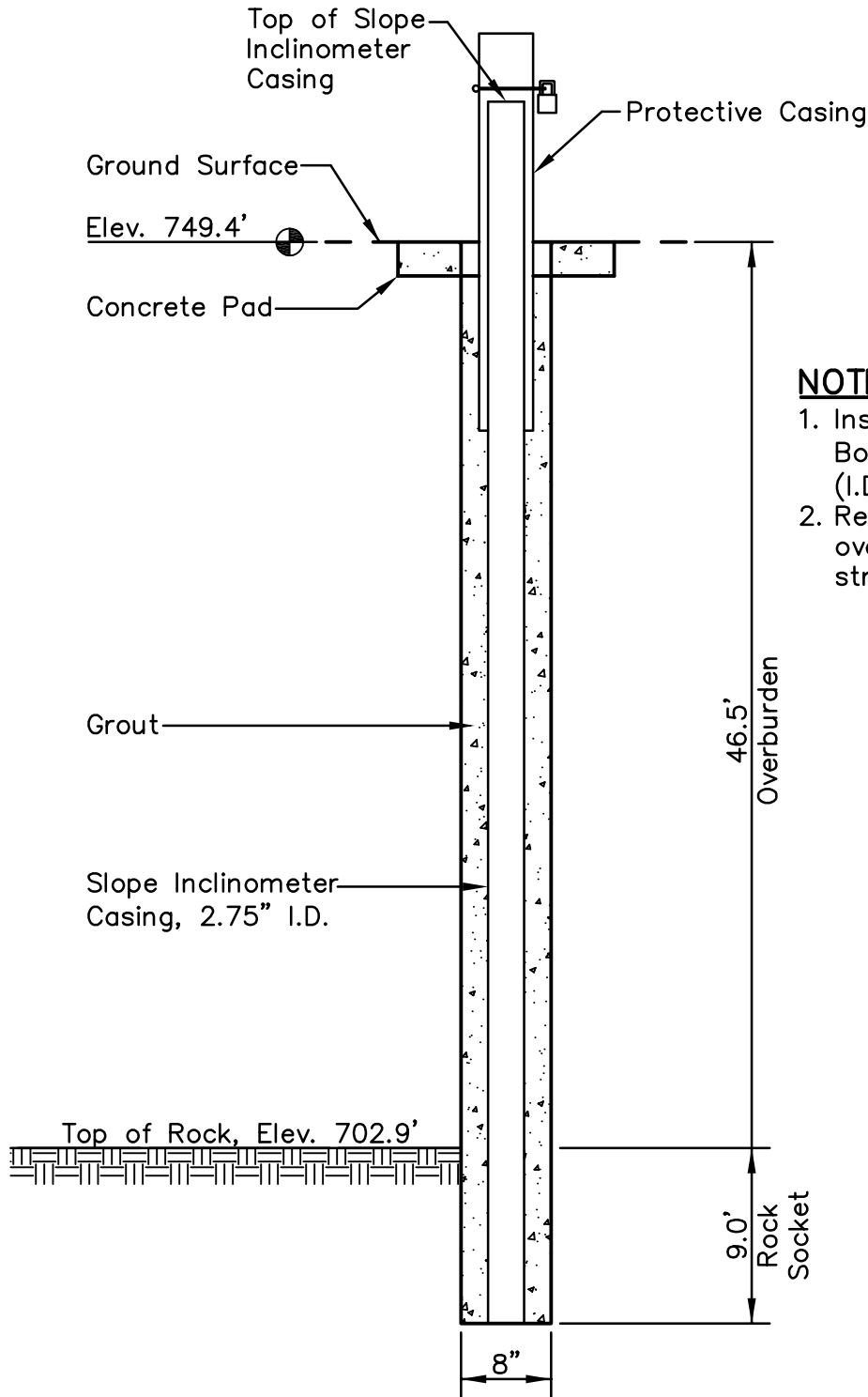
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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED	
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET
1 OF 1



NOTES:

1. Installed on 04/06/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

LOCATION:

Northing: 554,411.29
 Easting: 2,442,911.08
 Ground Elevation: 749.4 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

SLOPE INCLINOMETER STN-64
ASH POND STABILITY
KINGSTON FOSSIL PLANT



Stantec

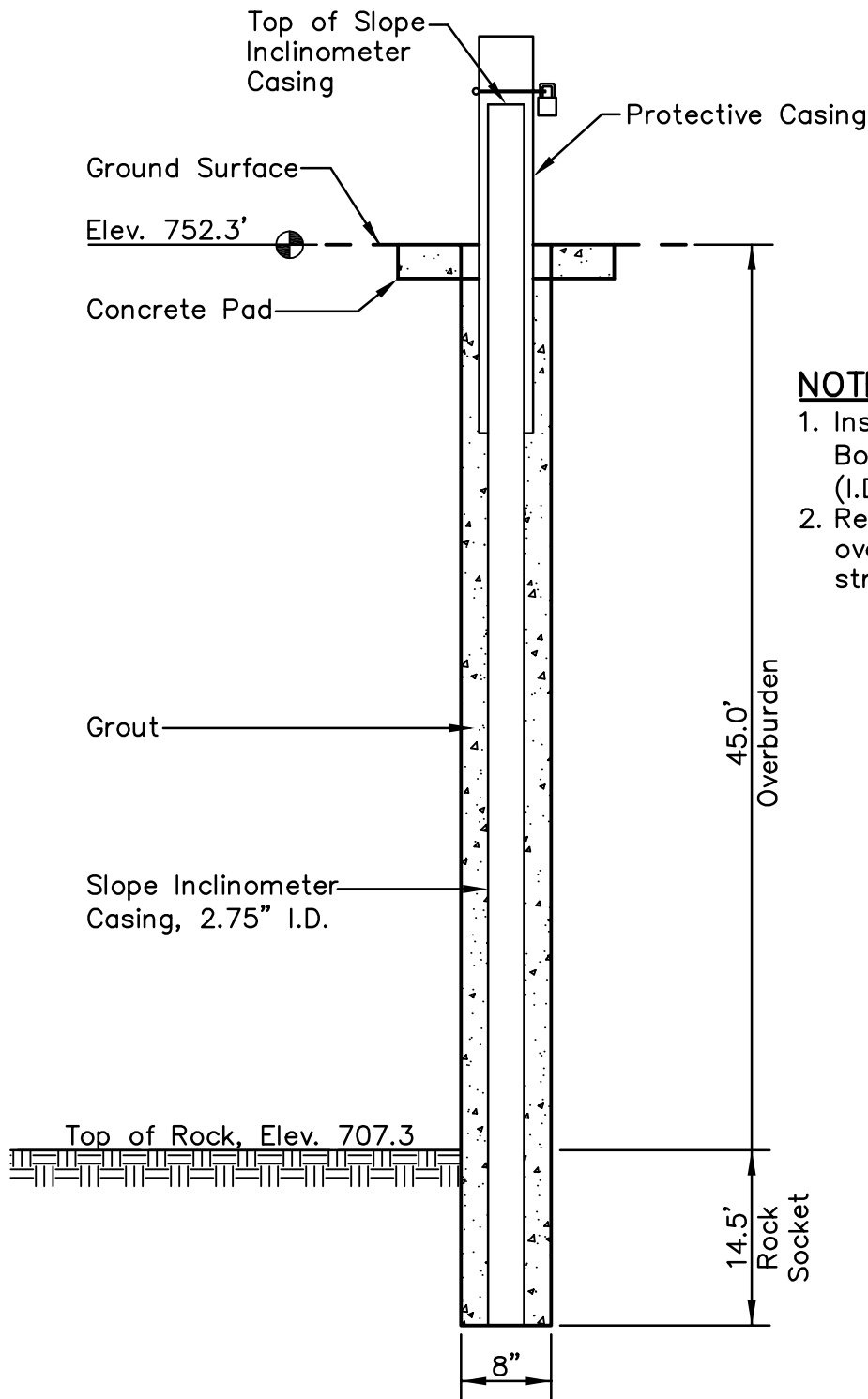
Stantec Consulting
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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED	
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET
1 OF 1

PLOT DATE: 07/14/2009 USER: FLYNN, RENEE
 V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-STN64.DWG



NOTES:

1. Installed on 05/20/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

LOCATION:

Northing: 553,607.58
 Easting: 2,441,718.01
 Ground Elevation: 752.3 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

**SLOPE INCLINOMETER STN-69
 ASH POND STABILITY
 KINGSTON FOSSIL PLANT**

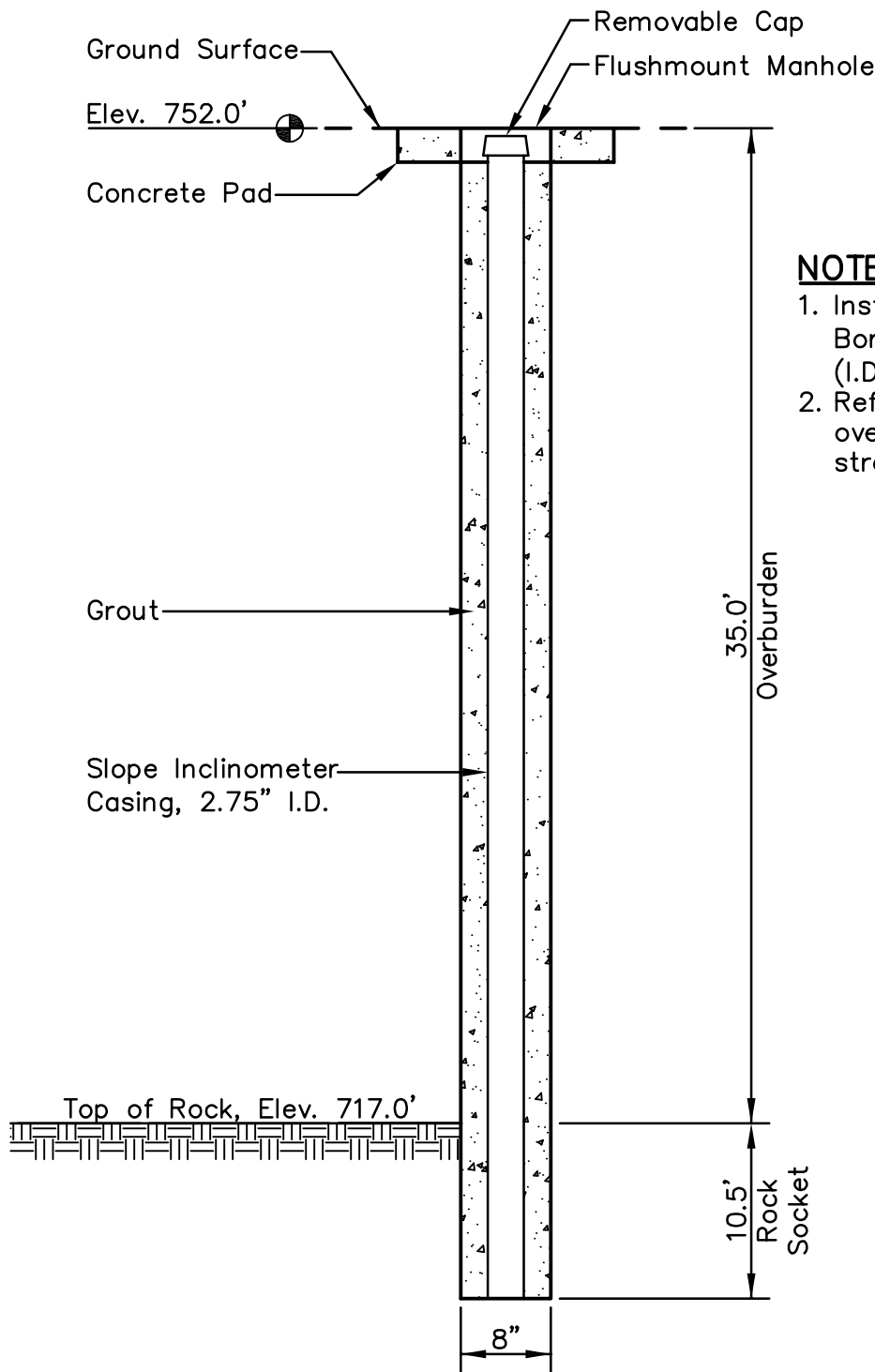


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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED		SHEET 1 OF 1
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.	
CHECKED BY	AAC	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 05/14/2009. Boring advanced with 4.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden and rock stratigraphy.

LOCATION:

Northing: 553,840.20
 Easting: 2,440,981.04
 Ground Elevation: 752.0 feet

Locations to be provided by
 TVA, Power Systems
 Operations, Surveying and
 Project Services.

Horizontal Datum: NAD 27
 Vertical Datum: NGVD29

SLOPE INCLINOMETER STN-71
ASH POND STABILITY
KINGSTON FOSSIL PLANT



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DRAWN BY	TJ	DATE	JUNE, 2009	REVISED	
CHECKED BY	ZCM	PROJ. NO.	175569042	1.	3.
CHECKED BY	AAC	SCALE	NTS	2.	4.

SHEET
1 OF 1

PLOT DATE: 06/30/2009 USER: FLYNN, RENEE
 V: \1755\ACTIVE\175569042\GEO\TECHNICAL\DRAWING\INSTRUMENTS\69042C-KIF-301-STN71.DWG

Appendix D

Instrumentation Results

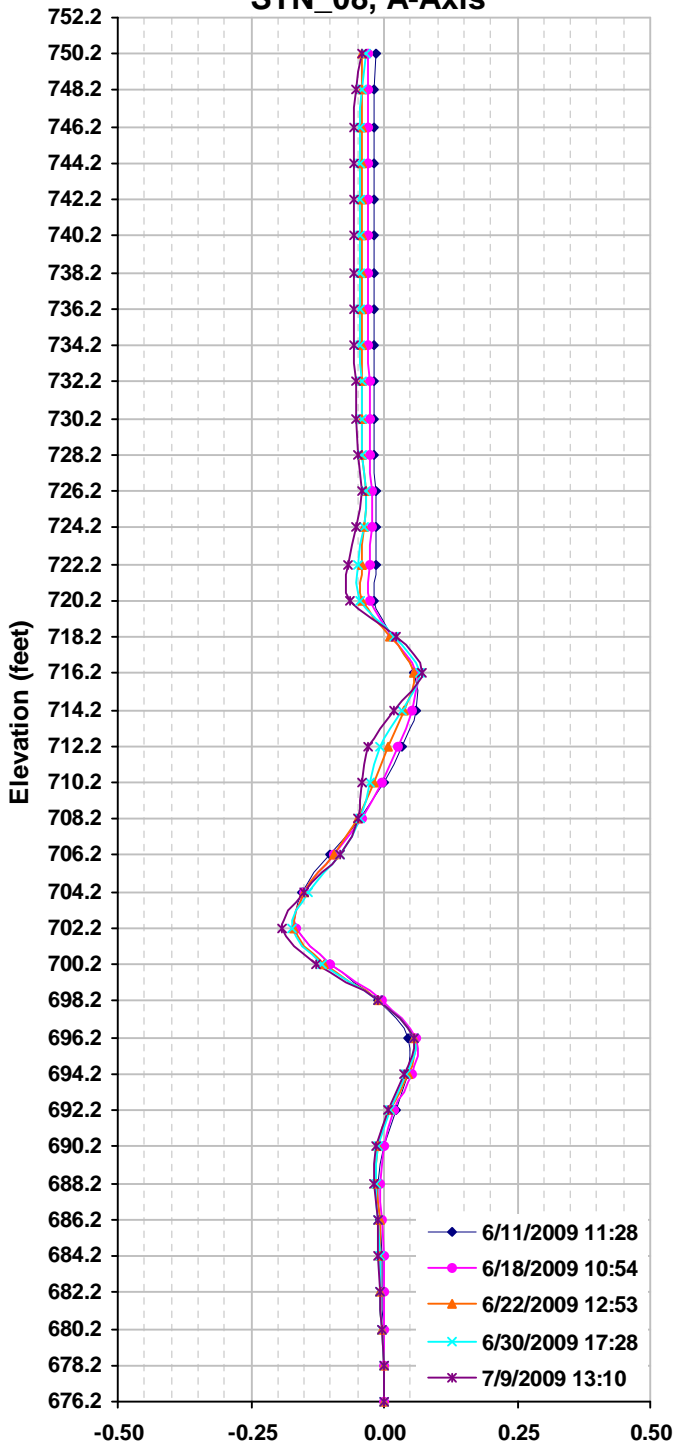


PIEZOMETER

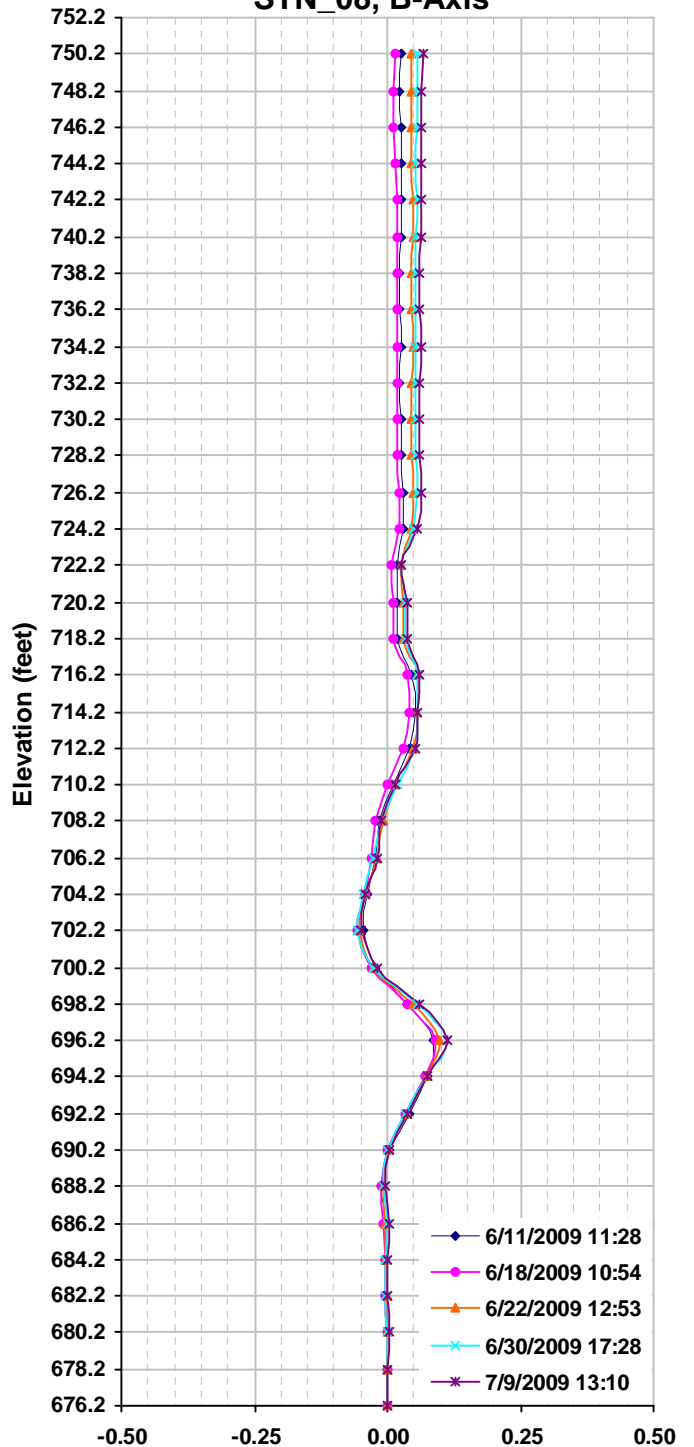
Kingston
Kingston, TN
175569042

Piezometer	Location	Surface Elevation (ft)	Stickup (ft)	5/28/2009			6/11/2009			6/22/2009			7/9/2009		
				Depth Measurement (ft)	Water Elevation (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	
STN-2A	PZ-1	751.20	2.90	8.30	745.80	745.60	8.50	745.60	8.50	745.60	8.70	745.40			
STN-3A	PZ-2 (U)	763.90	3.30	10.50	756.70	756.40	10.80	756.40	10.80	756.40	11.10	756.10			
STN-3A	PZ-3 (L)	763.90	3.30	7.90	759.30	759.20	8.00	759.20	8.00	759.20	8.10	759.10			
STN-3B	PZ-4	763.80	3.40	16.80	750.40	749.90	17.30	749.90	17.20	750.00	17.76	749.44			
STN-14A	PZ-5	753.10	3.10	13.30	742.90	743.00	13.20	743.00	13.40	742.80	13.47	742.73			
STN-15A	PZ-6 (U)	765.30	0.00	8.10	757.20	755.50	9.80	755.50	10.20	755.10	9.74	755.56			
STN-15A	PZ-7 (L)	765.30	0.00	15.10	750.20	747.80	17.50	747.80	17.50	747.80	17.54	747.76			
STN-15B	PZ-8	765.30	0.00	21.30	744.00	744.10	21.20	744.10	21.20	744.10	21.53	743.77			
STN-26A	PZ-9	750.00	2.80	20.60	732.20	741.50	11.30	741.50	11.50	741.30	11.70	741.10			
STN-27A	PZ-10 (U)	765.00	0.00	9.00	756.00	755.30	9.70	755.30	9.80	755.20	9.94	755.06			
STN-27A	PZ-11 (L)	765.00	0.00	14.10	750.90	751.10	13.90	751.10	13.80	751.20	13.84	751.16			
STN-27B	PZ-12	765.00	0.00	19.40	745.60	745.80	19.20	745.80	19.40	745.60	19.32	745.68			
STN-36A	PZ-13	751.90	3.40	14.40	740.90	741.20	14.10	741.20	14.30	741.00	14.31	740.99			
STN-37A	PZ-14 (U)	763.80	0.00	11.00	752.80	752.80	11.00	752.80	11.00	752.80	10.95	752.85			
STN-37A	PZ-15 (L)	763.80	0.00	22.70	741.10	741.40	22.40	741.40	22.50	741.30	22.45	741.35			
STN-37B	PZ-16	763.70	0.00	16.60	747.10	747.30	16.40	747.30	16.40	747.30	16.27	747.43			
STN-47A	PZ-17	753.10	4.50	8.70	748.90	748.30	9.30	748.30	8.70	748.90	9.31	748.29			
STN-48A	PZ-18 (U)	765.30	3.60	21.20	747.70	747.70	21.20	747.70	12.20	756.70	12.23	756.67			
STN-48A	PZ-19 (L)	765.30	3.60	17.20	751.70	751.80	17.10	751.80	16.90	752.00	16.97	751.93			
STN-48B	PZ-20	765.30	3.50	21.90	746.90	747.30	21.50	747.30	21.50	747.30	21.52	747.28			

STN_08, A-Axis

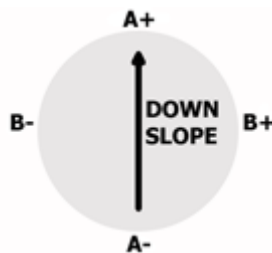


STN_08, B-Axis



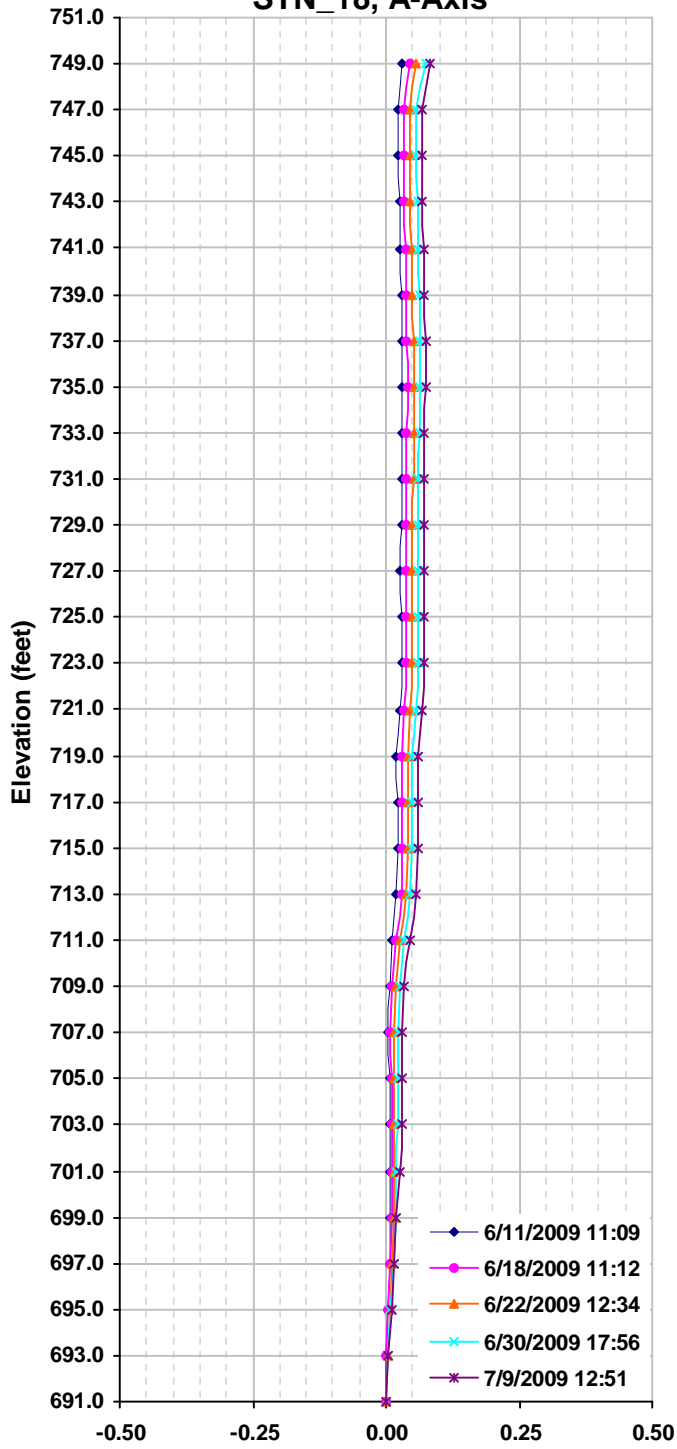
Cumulative Displacement (in) from 5/28/2009

Cumulative Displacement (in) from 5/28/2009

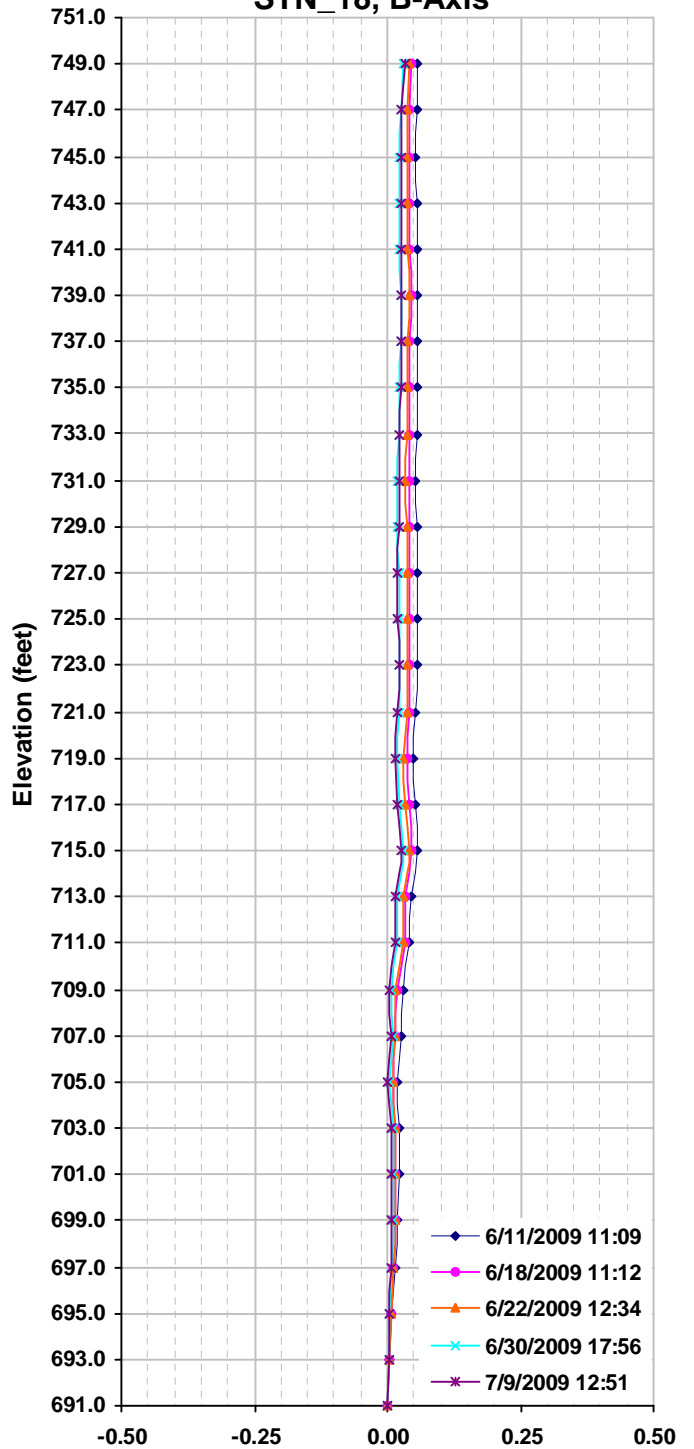


Kingston Fossil Plant
 Ash Pond Stability
 Kingston, TN
 175569042
 7/10/2009

STN_18, A-Axis

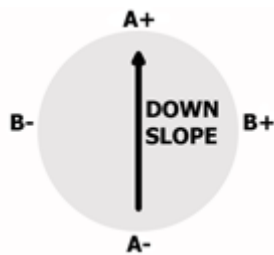


STN_18, B-Axis



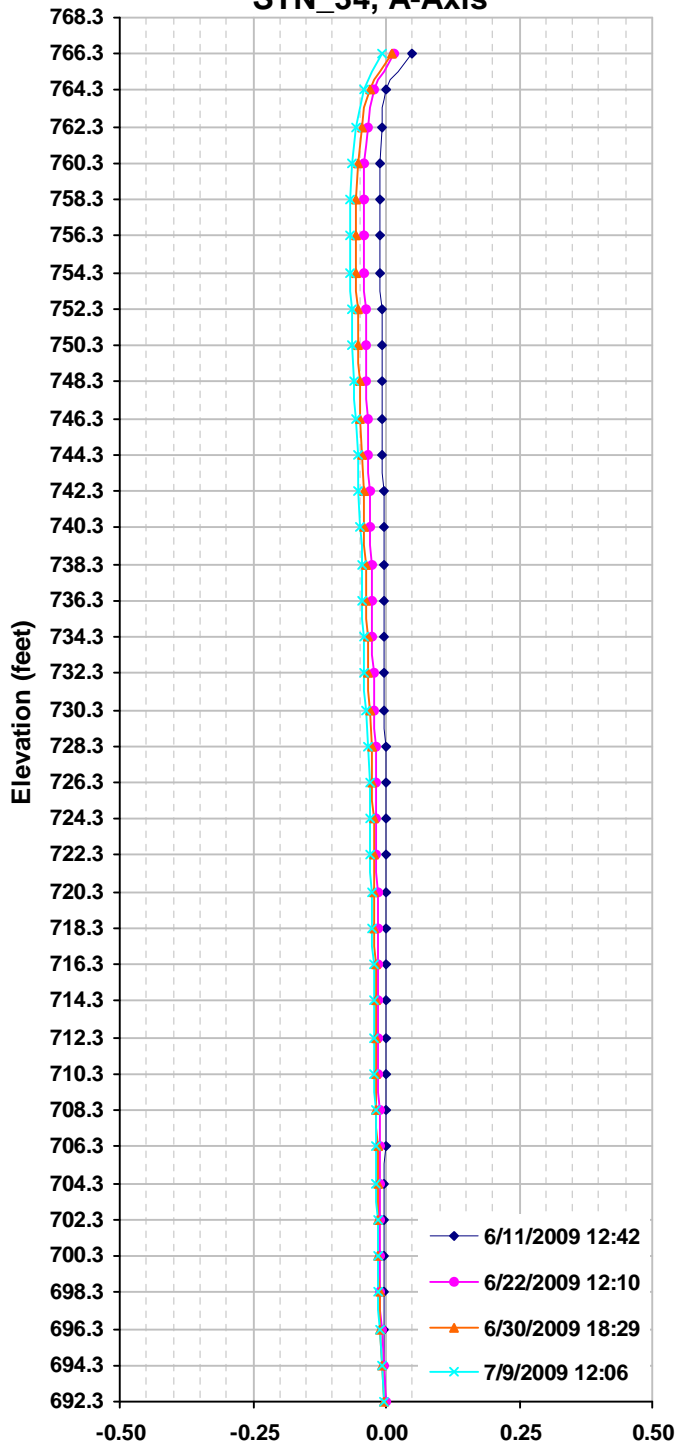
Cumulative Displacement (in) from 4/17/2009

Cumulative Displacement (in) from 4/17/2009

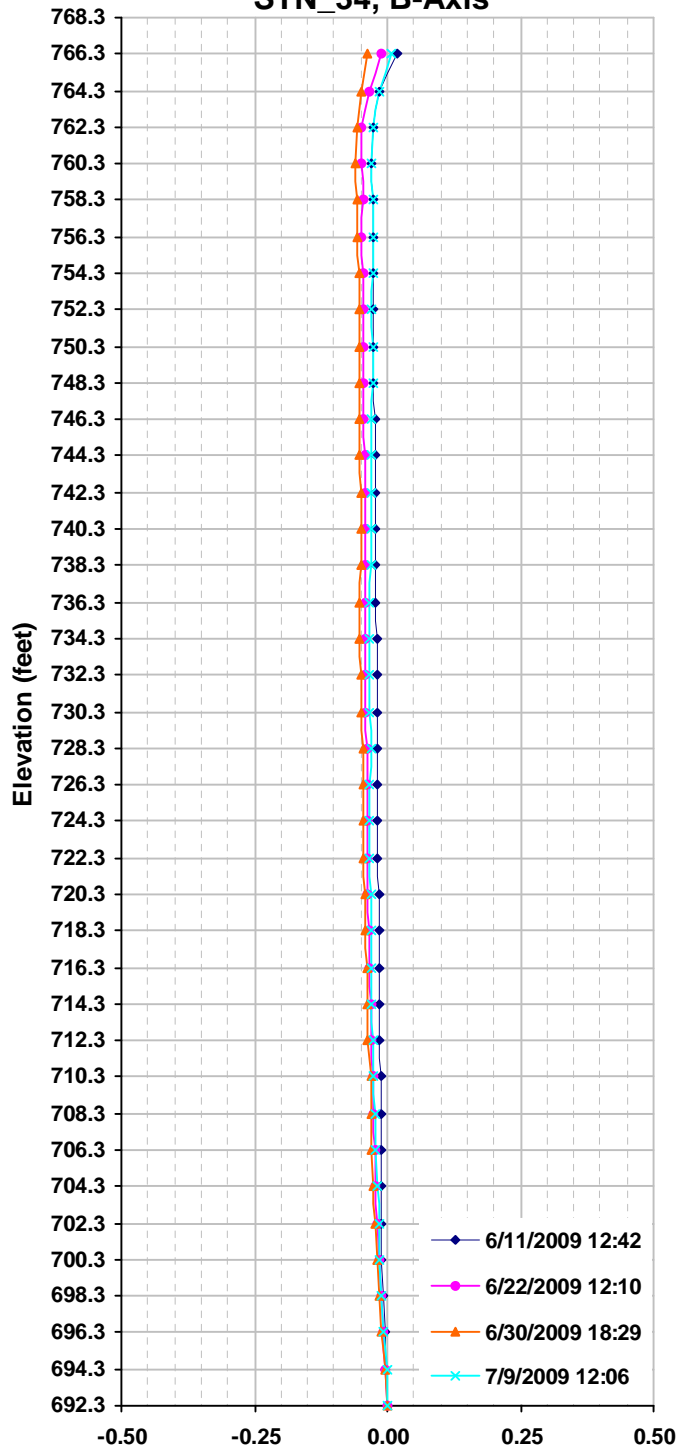


**Kingston Fossil Plant
Ash Pond Stability
Kingston, TN
175569042
7/10/2009**

STN_34, A-Axis

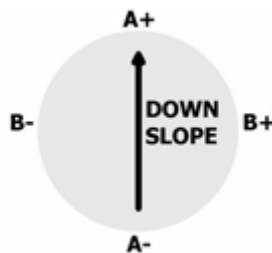


STN_34, B-Axis



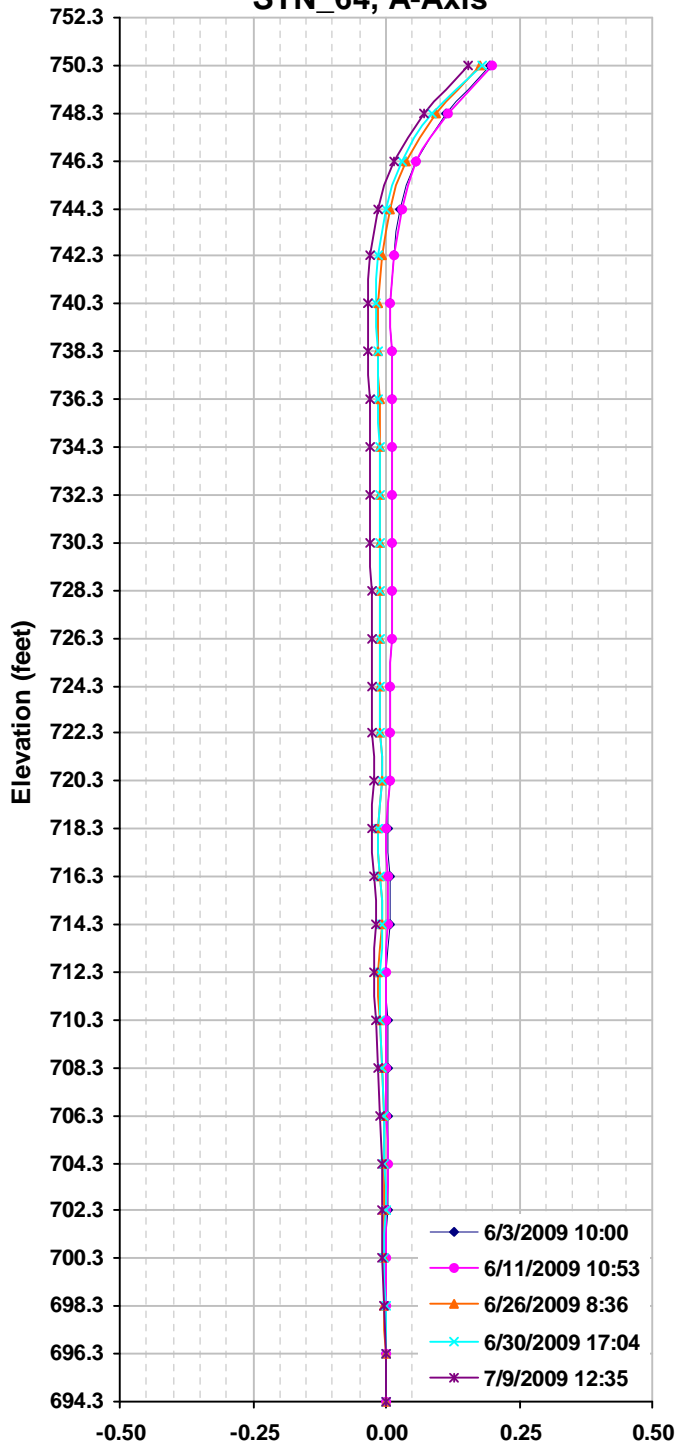
Cumulative Displacement (in) from 5/28/2009

Cumulative Displacement (in) from 5/28/2009

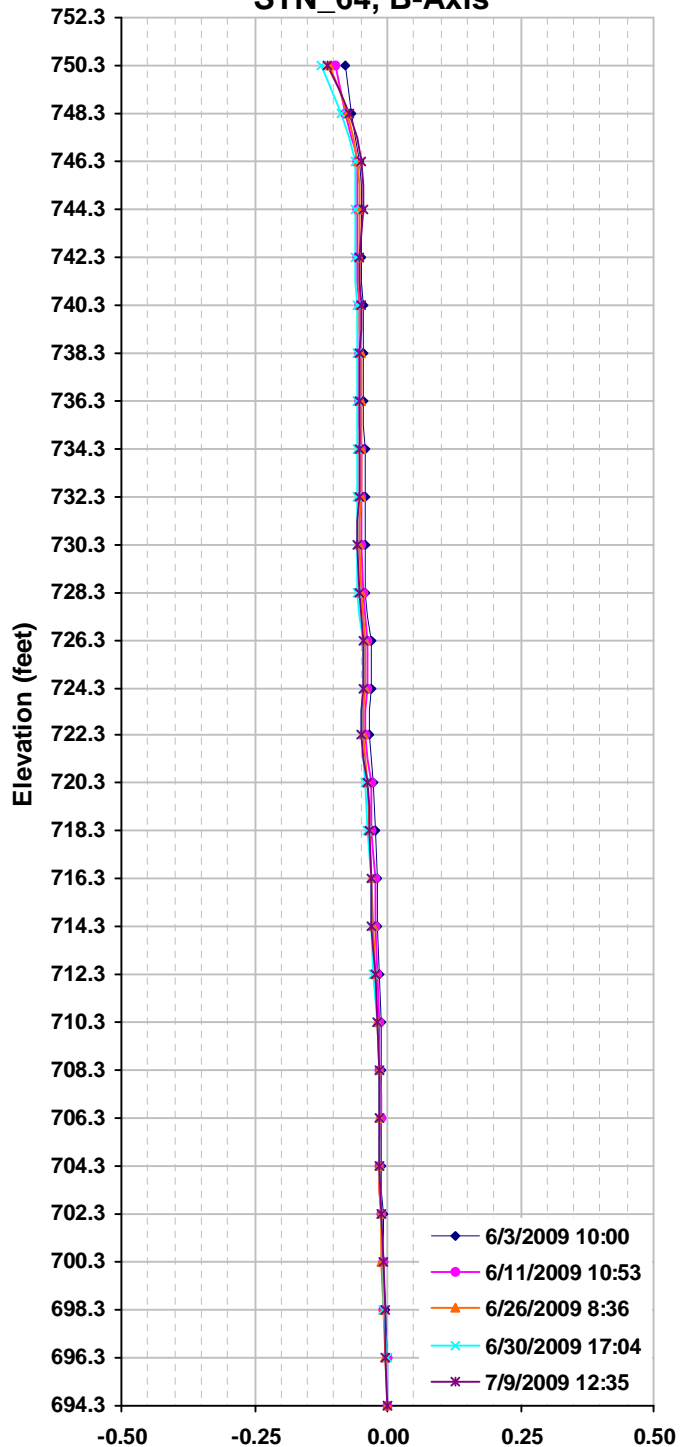


Kingston Fossil Plant
 Ash Pond Stability
 Kingston, TN
 175569042
 7/10/2009

STN_64, A-Axis

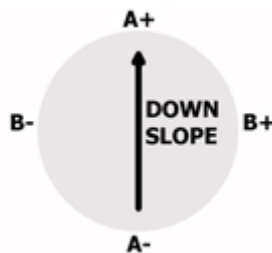


STN_64, B-Axis



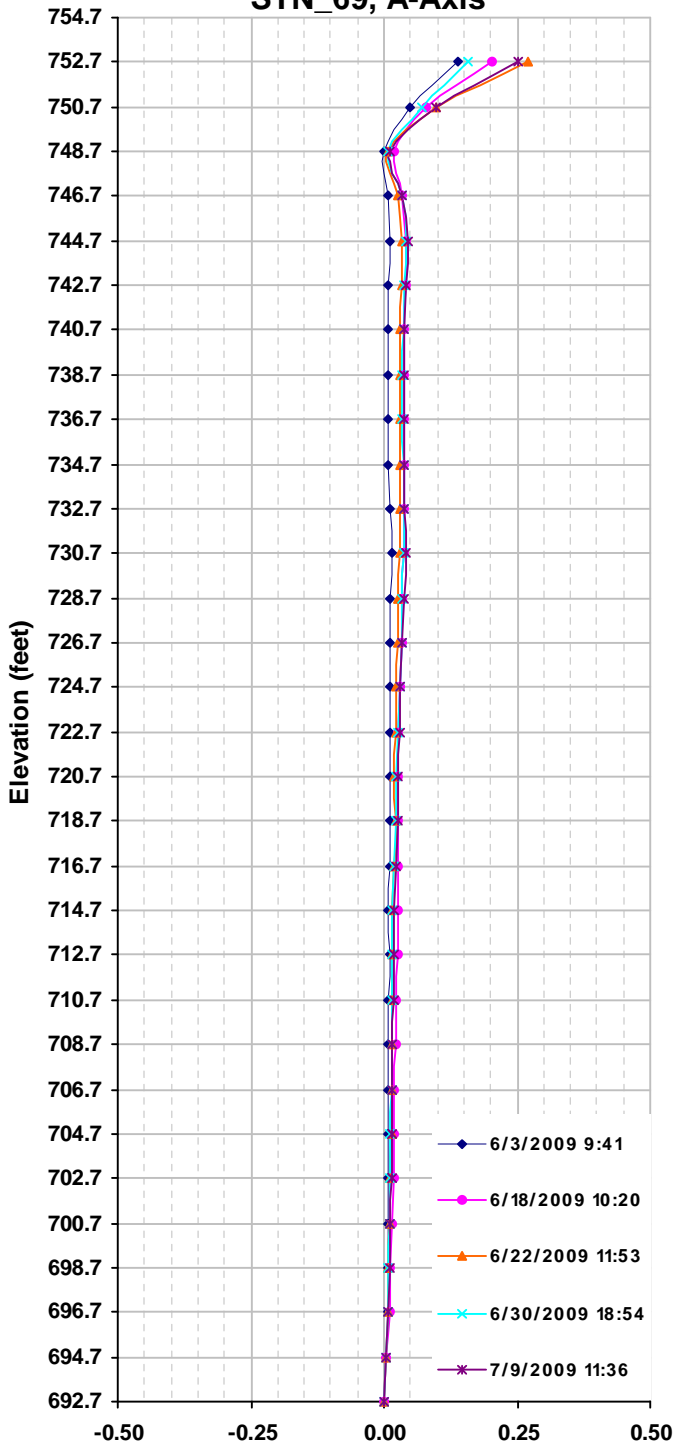
Cumulative Displacement (in) from 4/14/2009

Cumulative Displacement (in) from 4/14/2009

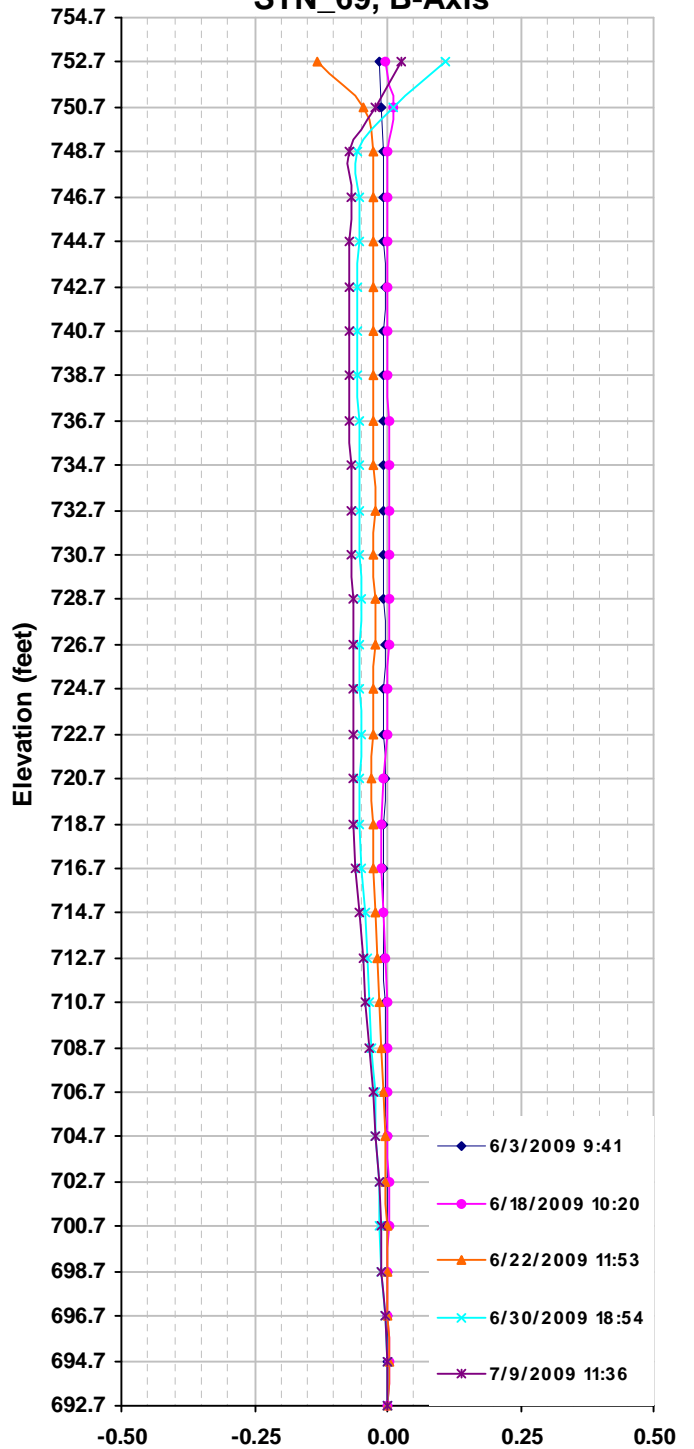


**Kingston Fossil Plant
Ash Pond Stability
Kingston, TN
175569042
7/10/2009**

STN_69, A-Axis

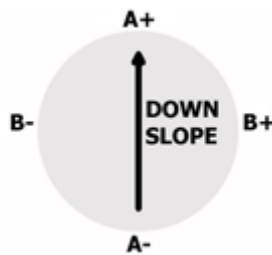


STN_69, B-Axis

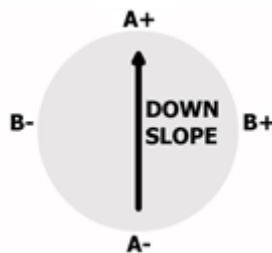
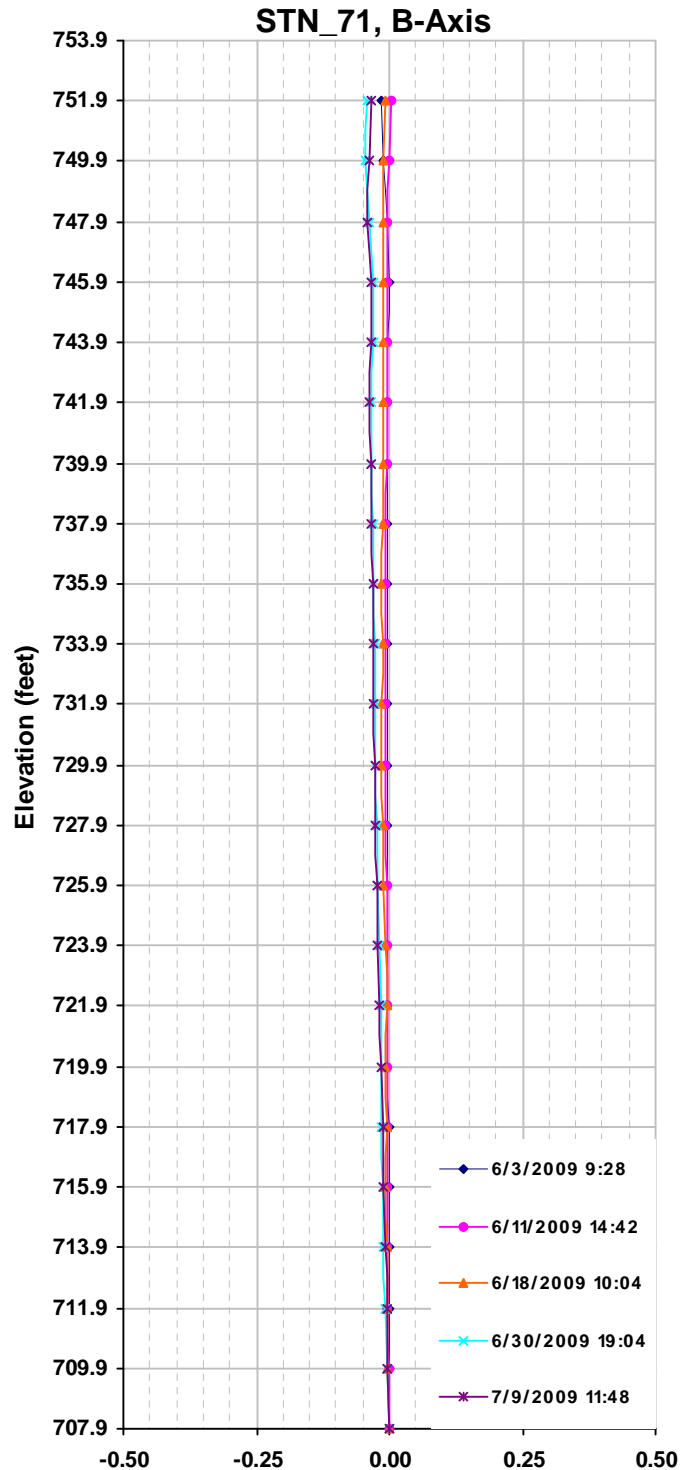
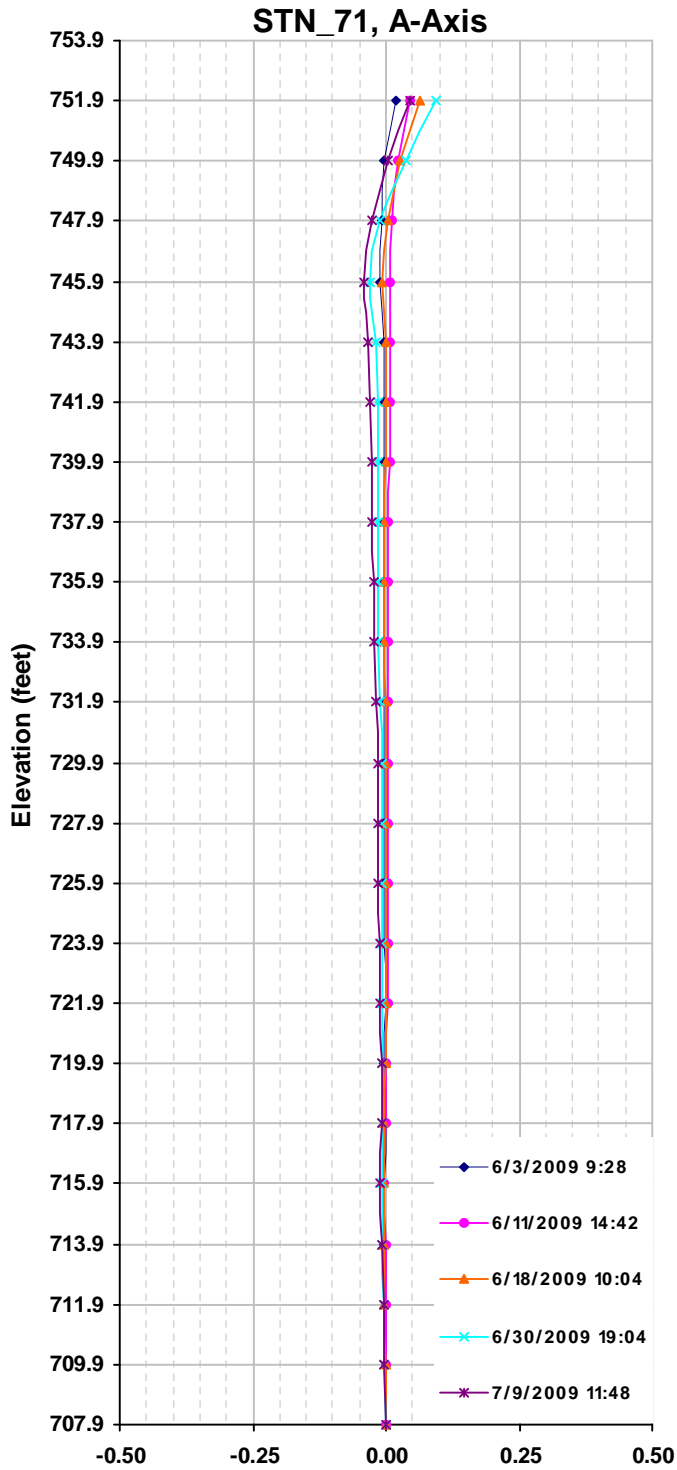


Cumulative Displacement (in) from 5/28/2009

Cumulative Displacement (in) from 5/28/2009



Kingston Fossil Plant
 Ash Pond Stability
 Kingston, TN
 175569042
 7/13/2009



Kingston Fossil Plant

Kingston, TN

7/13/2009

Appendix E

Laboratory Testing

Unconsolidated Undrained
Triaxial Test Results



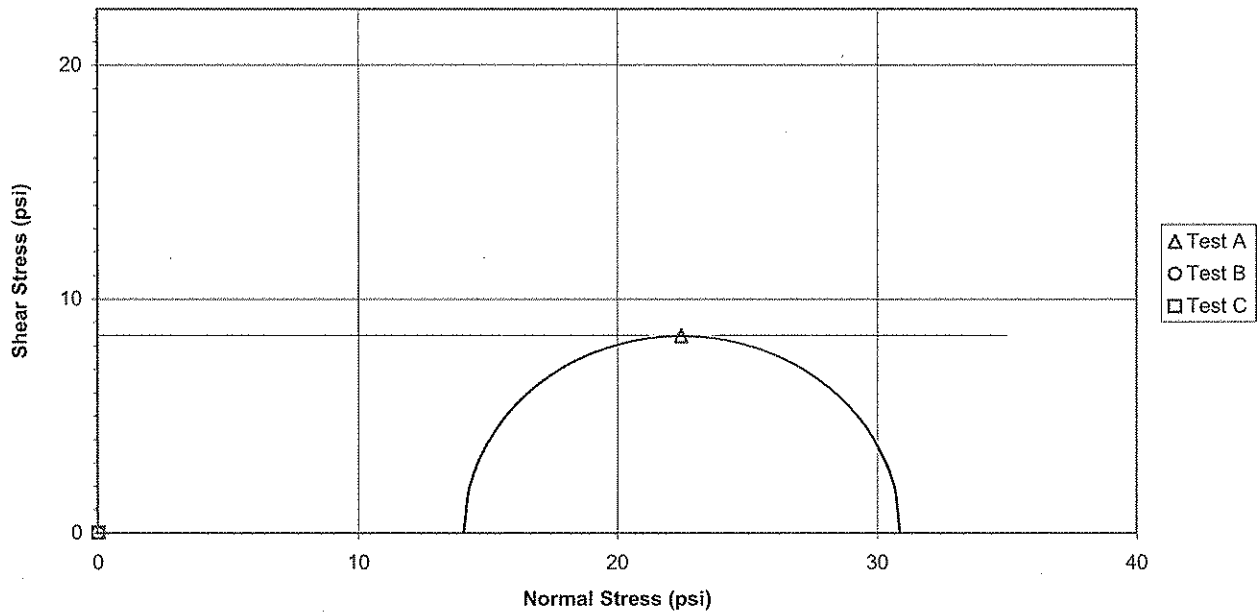
Unconsolidated Undrained Triaxial Test ASTM D 2850-03a

Project Kingston Ash Pond
Sample ID STN-2, 20.5' - 21.0'

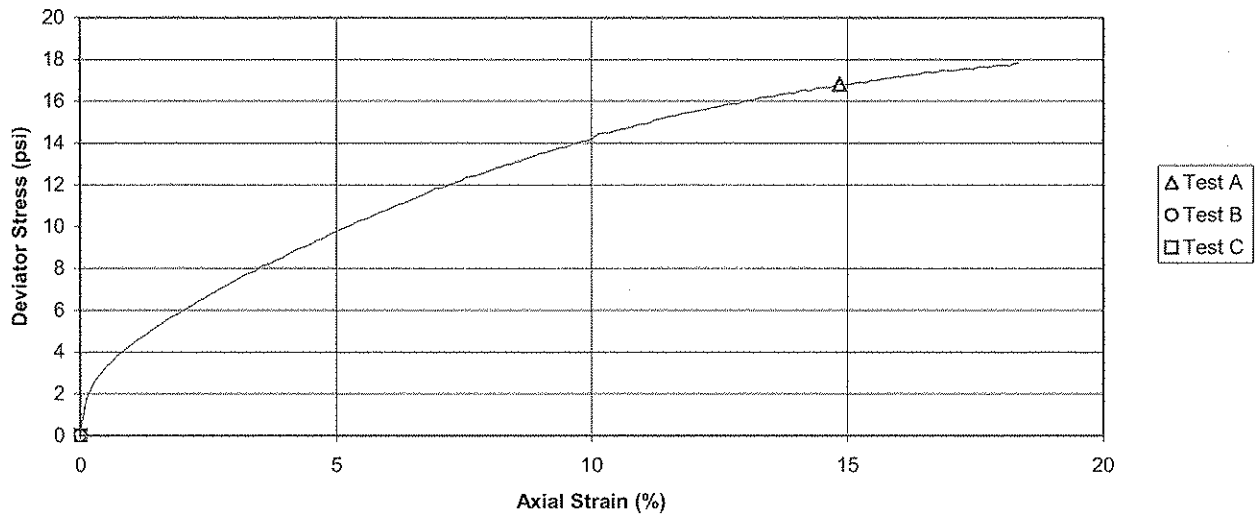
Project No. 175569042
Test Number 531

Failure Criterion: $\phi = 0.0$ deg. Maximum Deviator Stress
 $c = 8.5$ psi

Mohr Failure Envelope



Deviator Stress vs. Axial Strain

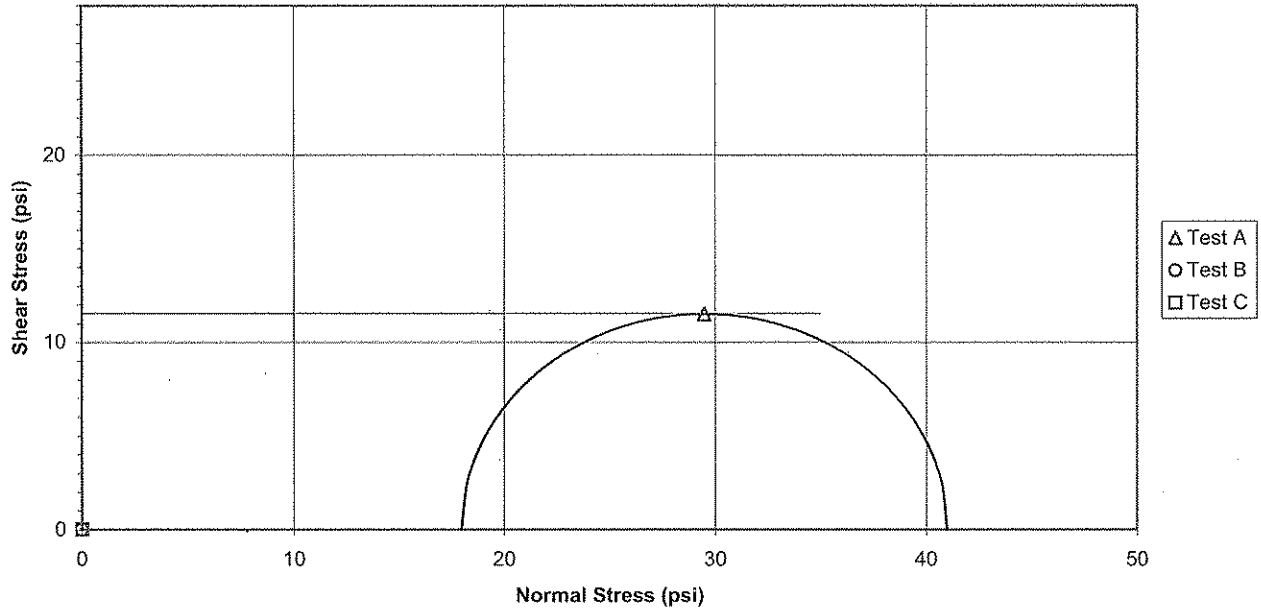


Project Kingston Ash Pond
 Sample ID STN-2, 30.6' - 31.1'

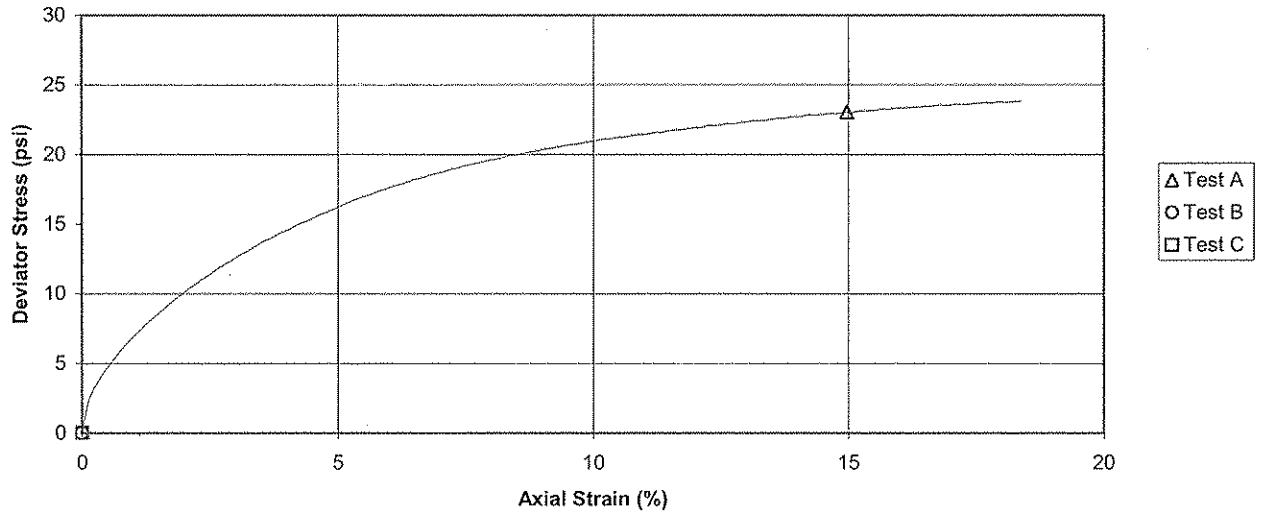
Project No. 175569042
 Test Number 535
 c = 11.6 psi

$\phi = 0.0$ deg.
 Failure Criterion: Maximum Deviator Stress

Mohr Failure Envelope



Deviator Stress vs. Axial Strain





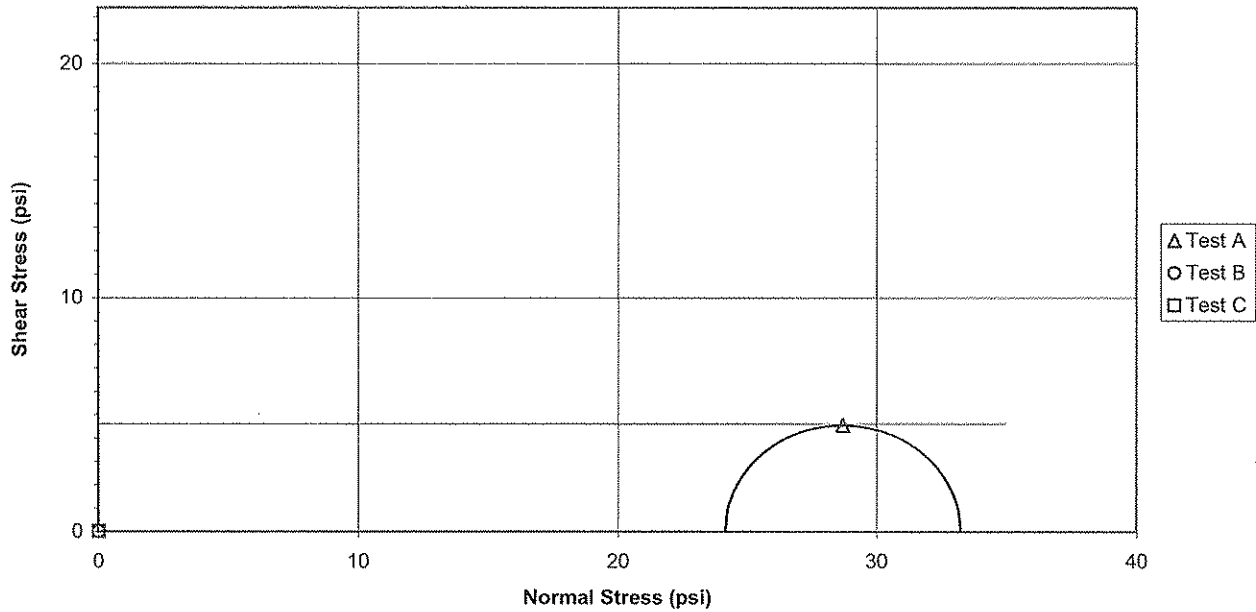
Unconsolidated Undrained Triaxial Test
ASTM D 2850-03a

Project Kingston Ash Pond
Sample ID STN-5, 38.5' - 39.0'

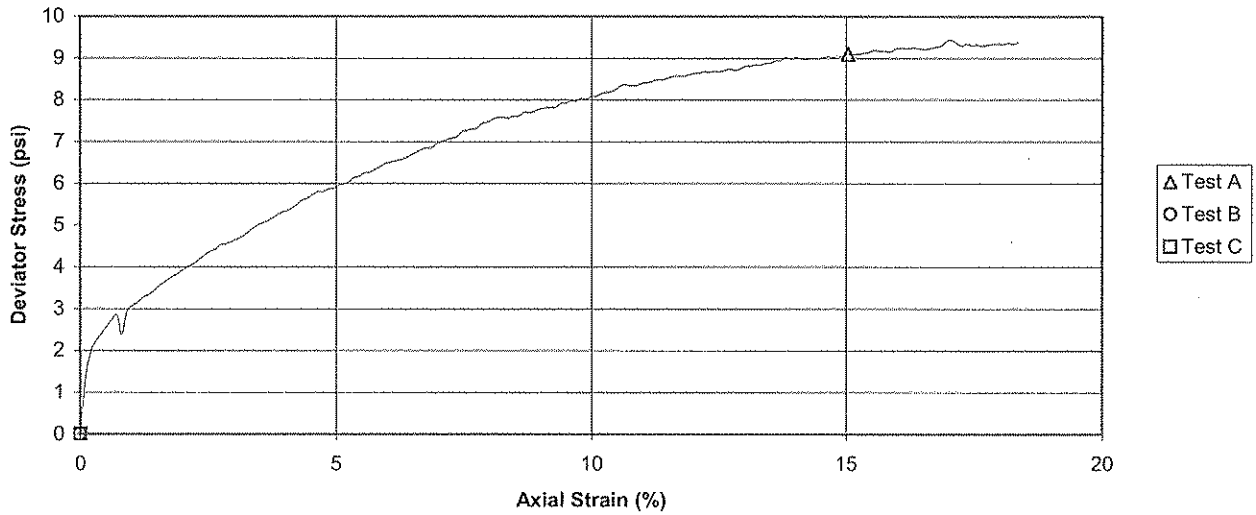
Project No. 175569042
Test Number 543
c = 4.6 psi

Failure Criterion: $\phi = 0.0$ deg. Maximum Deviator Stress

Mohr Failure Envelope



Deviator Stress vs. Axial Strain





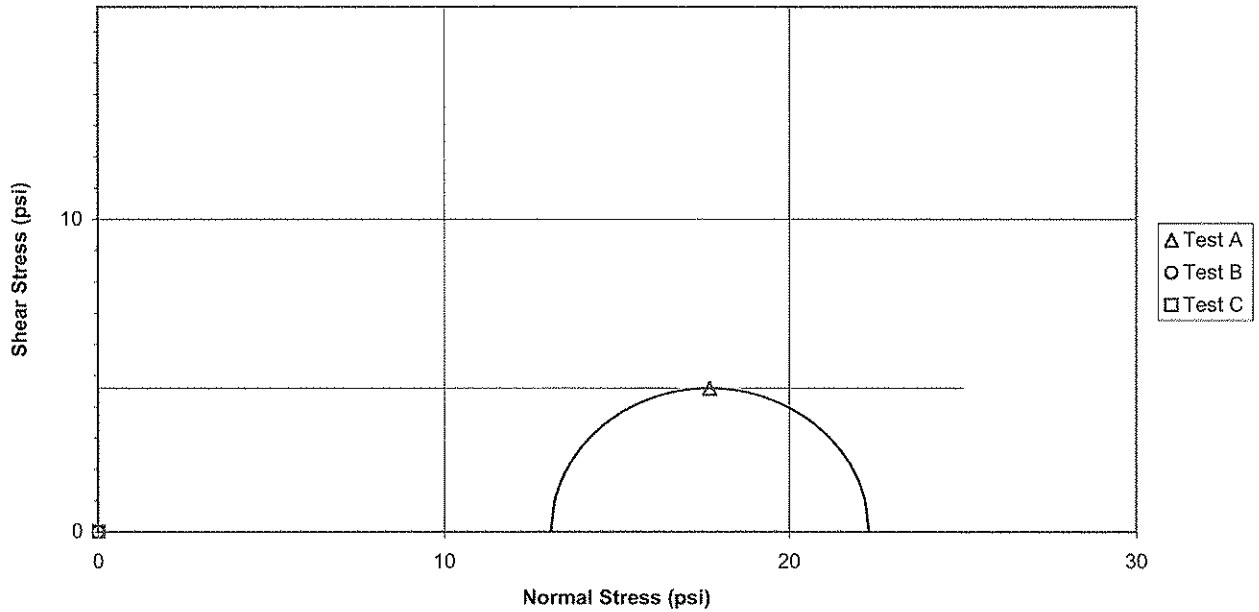
Unconsolidated Undrained Triaxial Test
ASTM D 2850-03a

Project Kingston Ash Pond
Sample ID STN-8, 15.5' - 16.0'

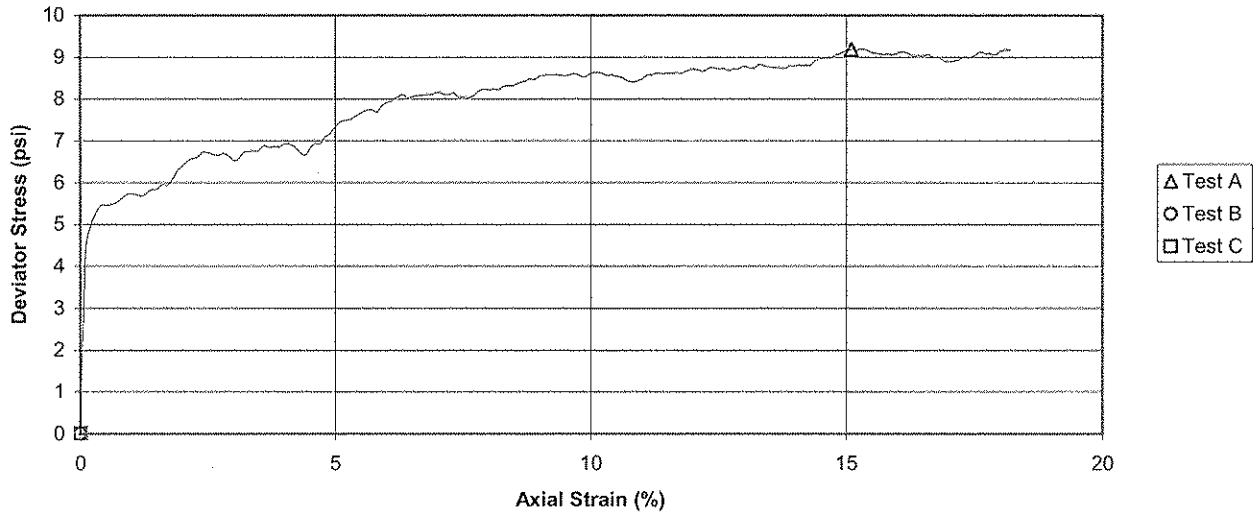
Project No. 175569042
Test Number 555
c = 4.6 psi

Failure Criterion: $\phi = 0.0$ deg. Maximum Deviator Stress

Mohr Failure Envelope



Deviator Stress vs. Axial Strain

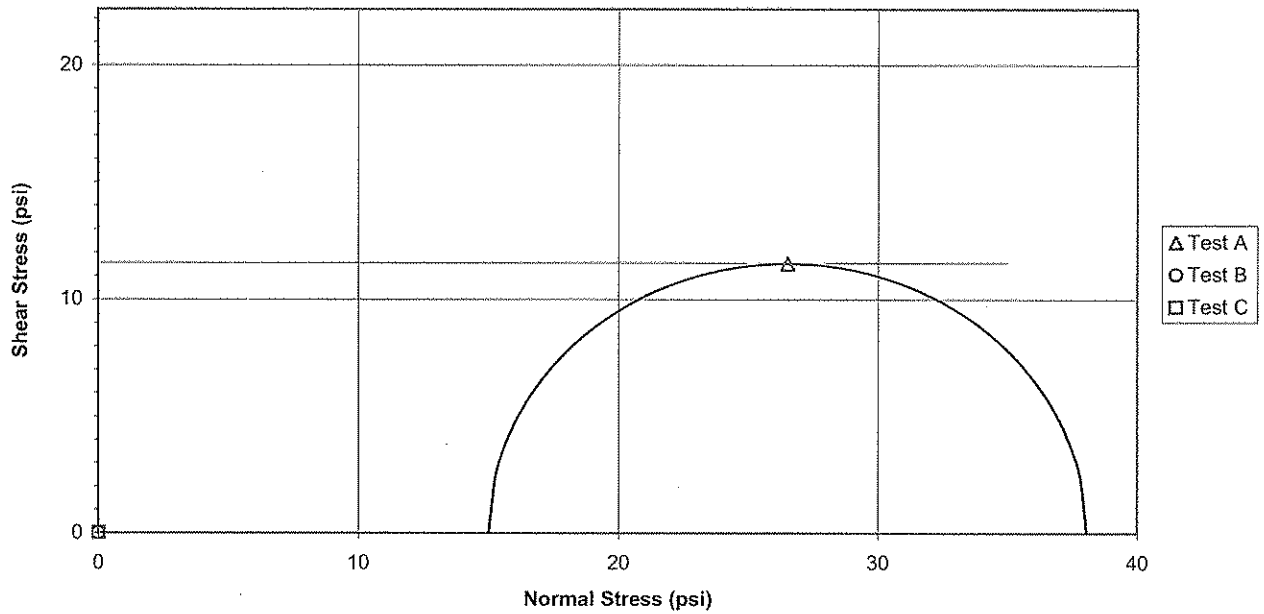


Project Kingston Ash Pond
 Sample ID STN-18, 25.5' - 26.0'

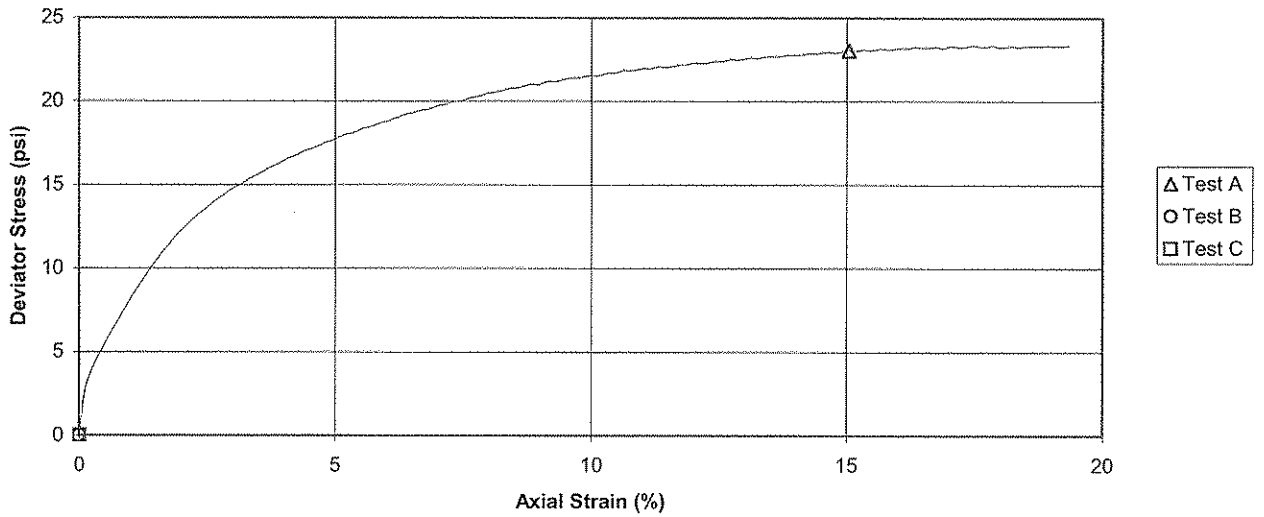
Project No. 175569042
 Test Number 521
 c = 11.6 psi

$\phi = 0.0$ deg.
 Failure Criterion: Maximum Deviator Stress

Mohr Failure Envelope



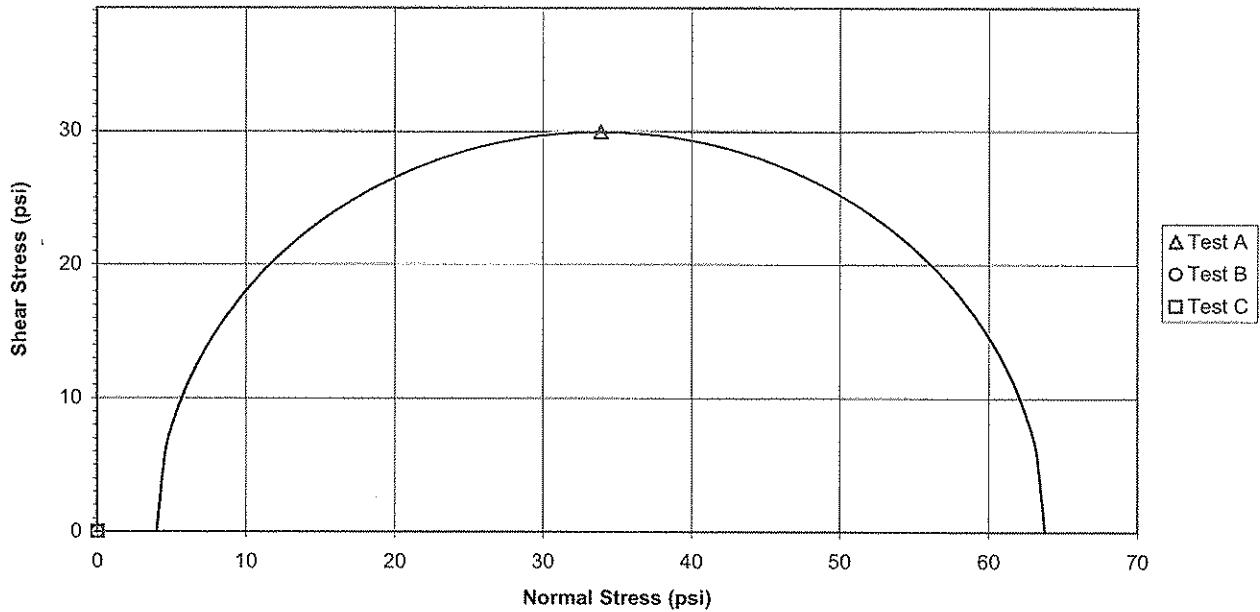
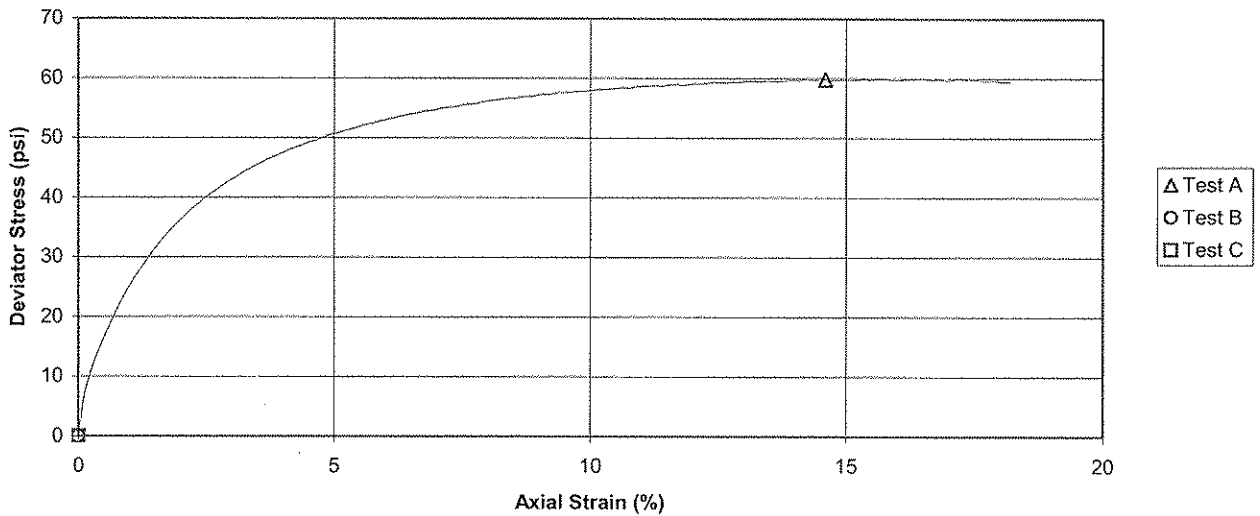
Deviator Stress vs. Axial Strain



Project Kingston Ash Pond
 Sample ID STN-19, 5.0' - 5.5'

Project No. 175569042
 Test Number 515
 $c = 29.9$ psi

Failure Criterion: $\phi = 0.0$ deg.
 Maximum Deviator Stress

Mohr Failure Envelope

Deviator Stress vs. Axial Strain




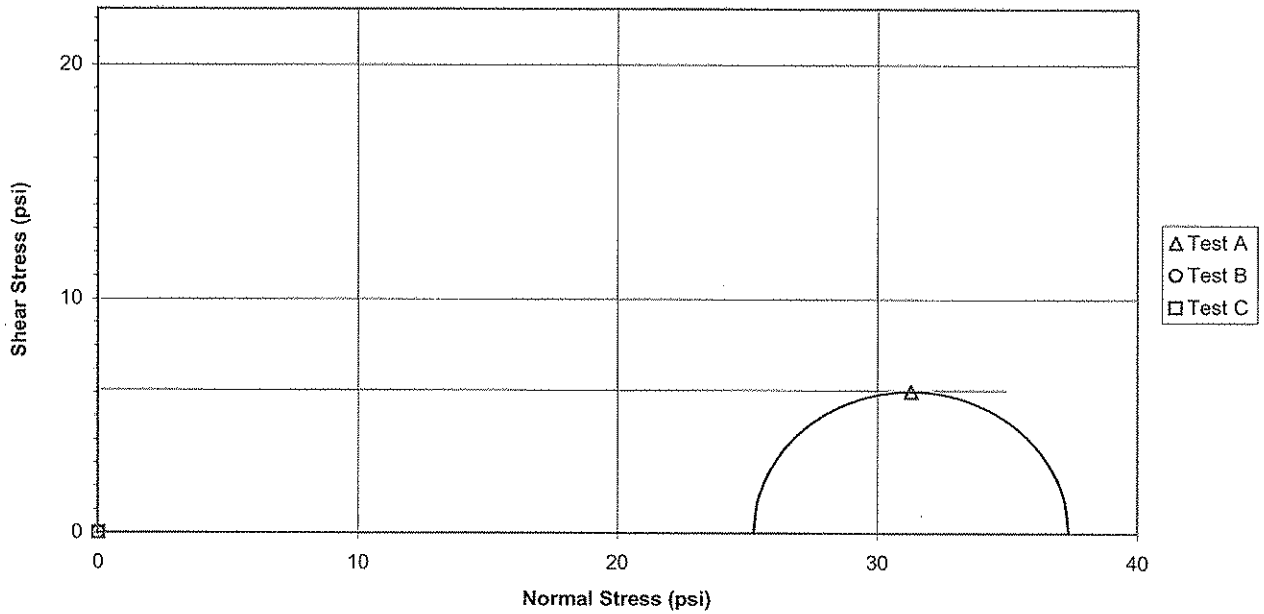
Unconsolidated Undrained Triaxial Test ASTM D 2850-03a

Project Kingston Ash Pond
Sample ID STN-19, 39.7' - 40.2'

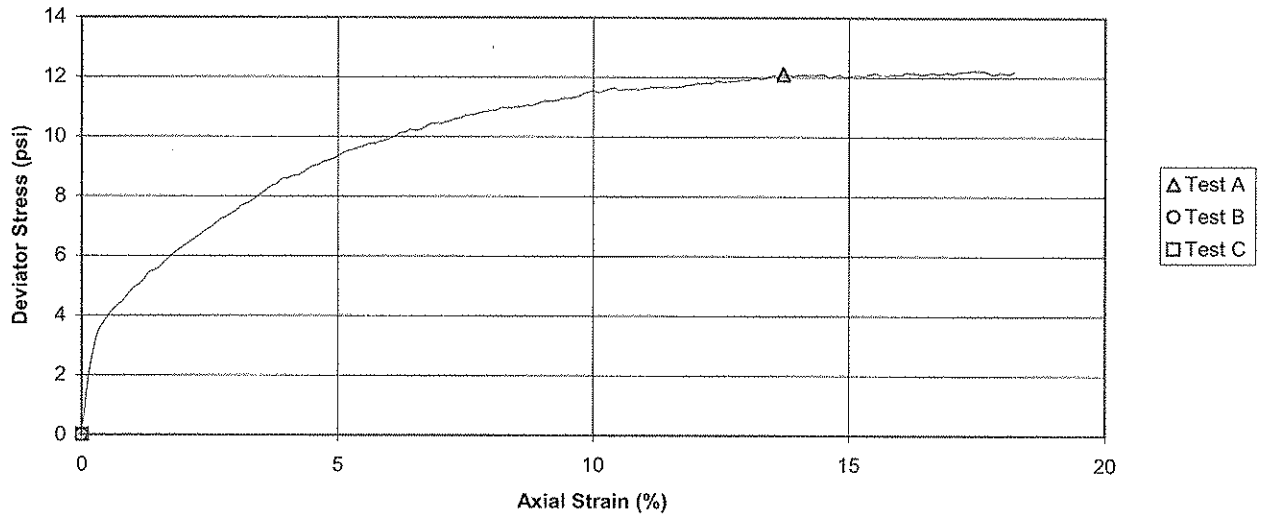
Project No. 175569042
Test Number 518
c = 6.1 psi

Failure Criterion: $\phi = 0.0$ deg. Maximum Deviator Stress

Mohr Failure Envelope



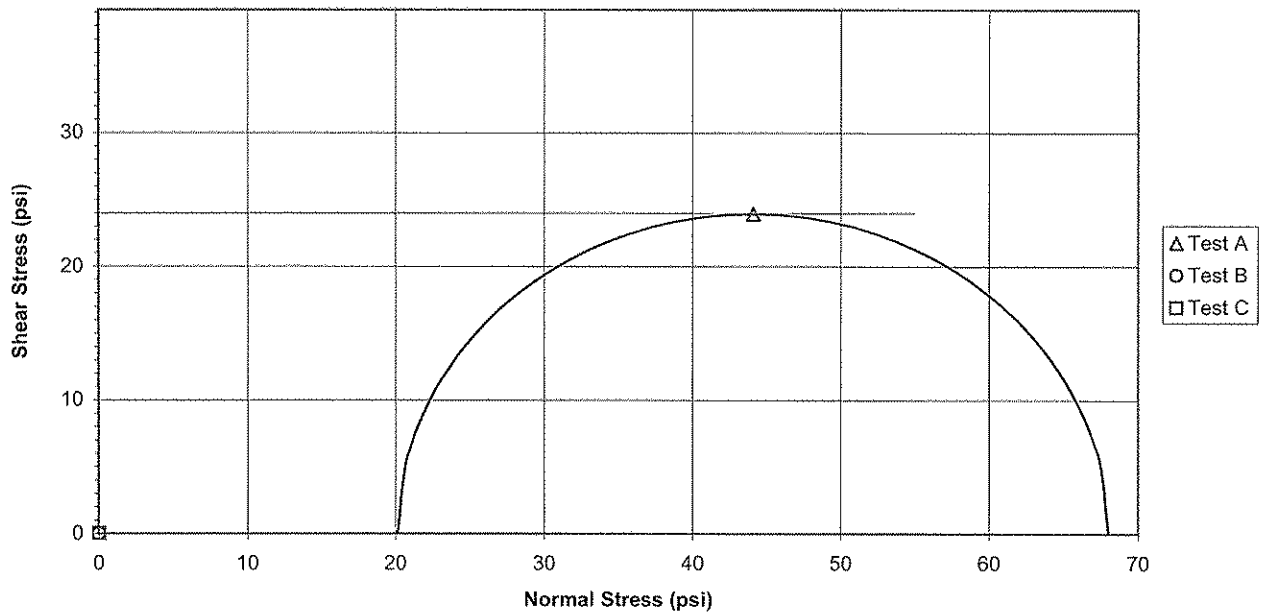
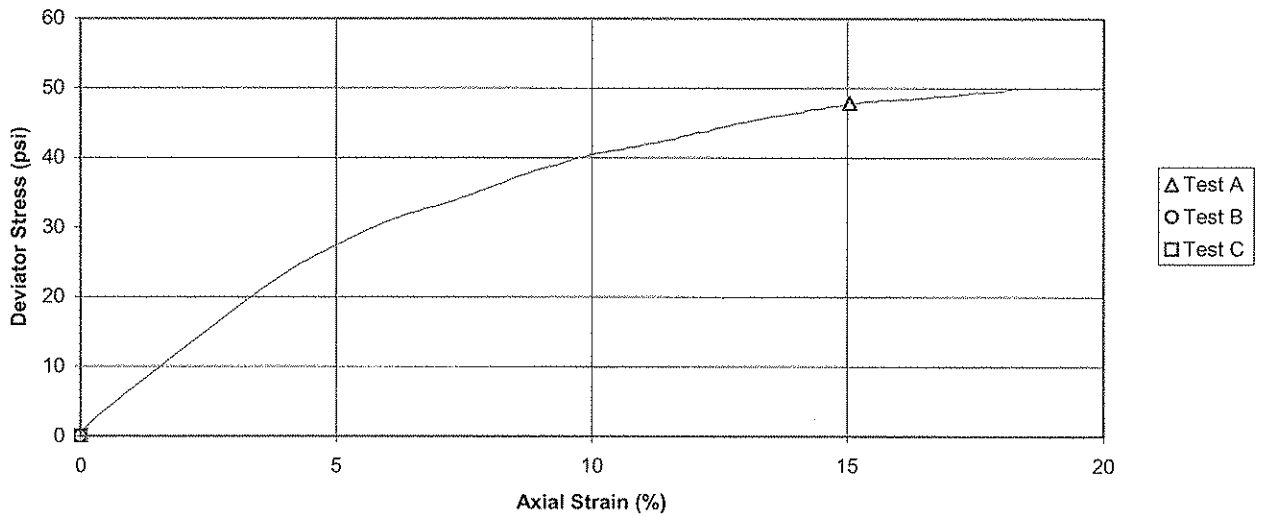
Deviator Stress vs. Axial Strain



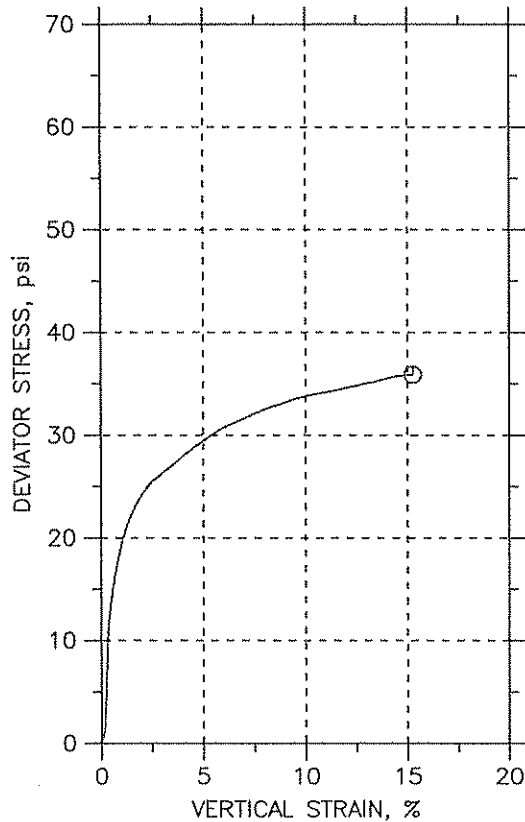
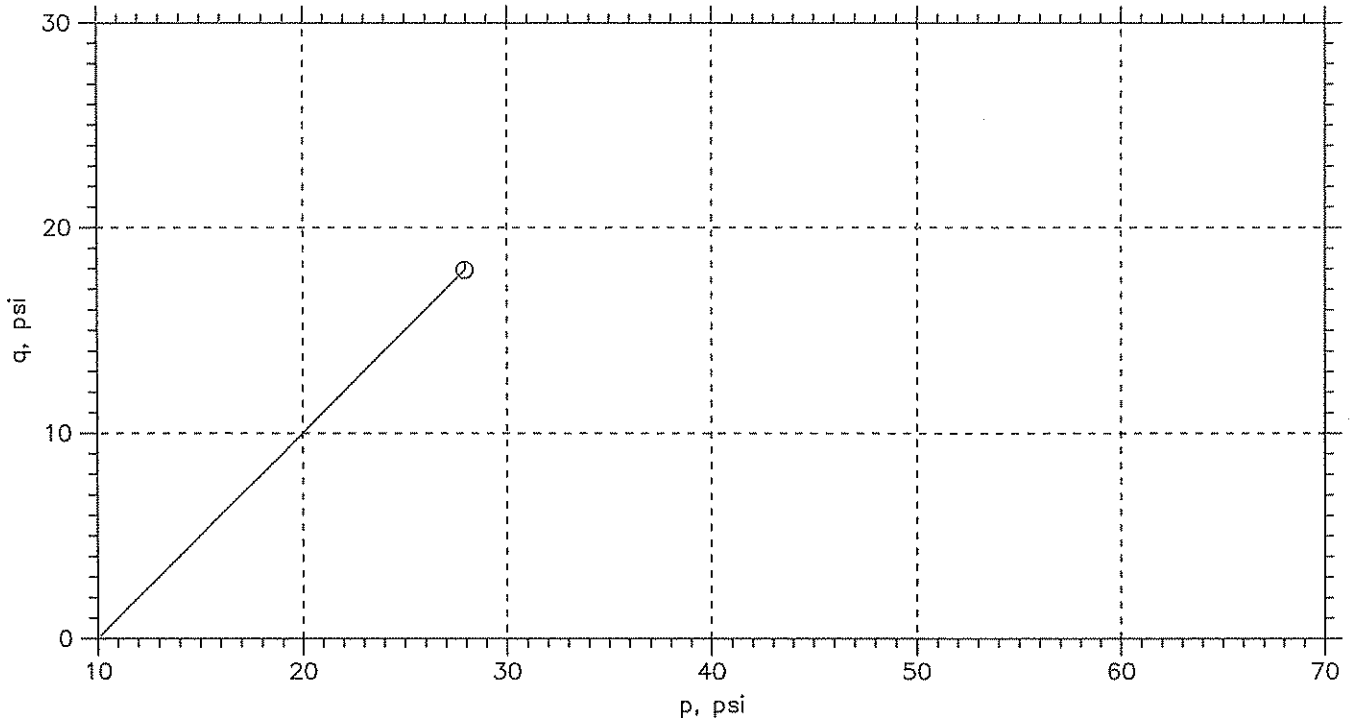
Project Kingston Ash Pond
 Sample ID STN-22, 49.5' - 50.0'

Project No. 175569042
 Test Number 560
 c = 24.0 psi

$\phi = 0.0$ deg.
 Failure Criterion: Maximum Deviator Stress

Mohr Failure Envelope

Deviator Stress vs. Axial Strain


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

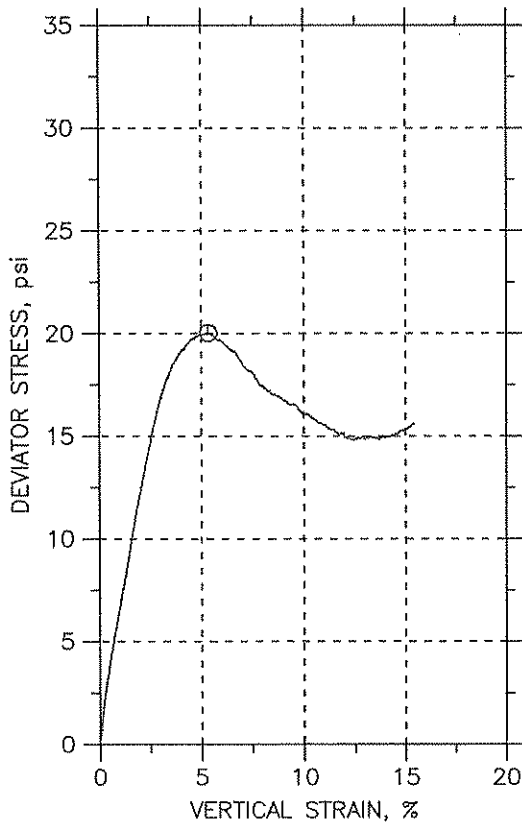
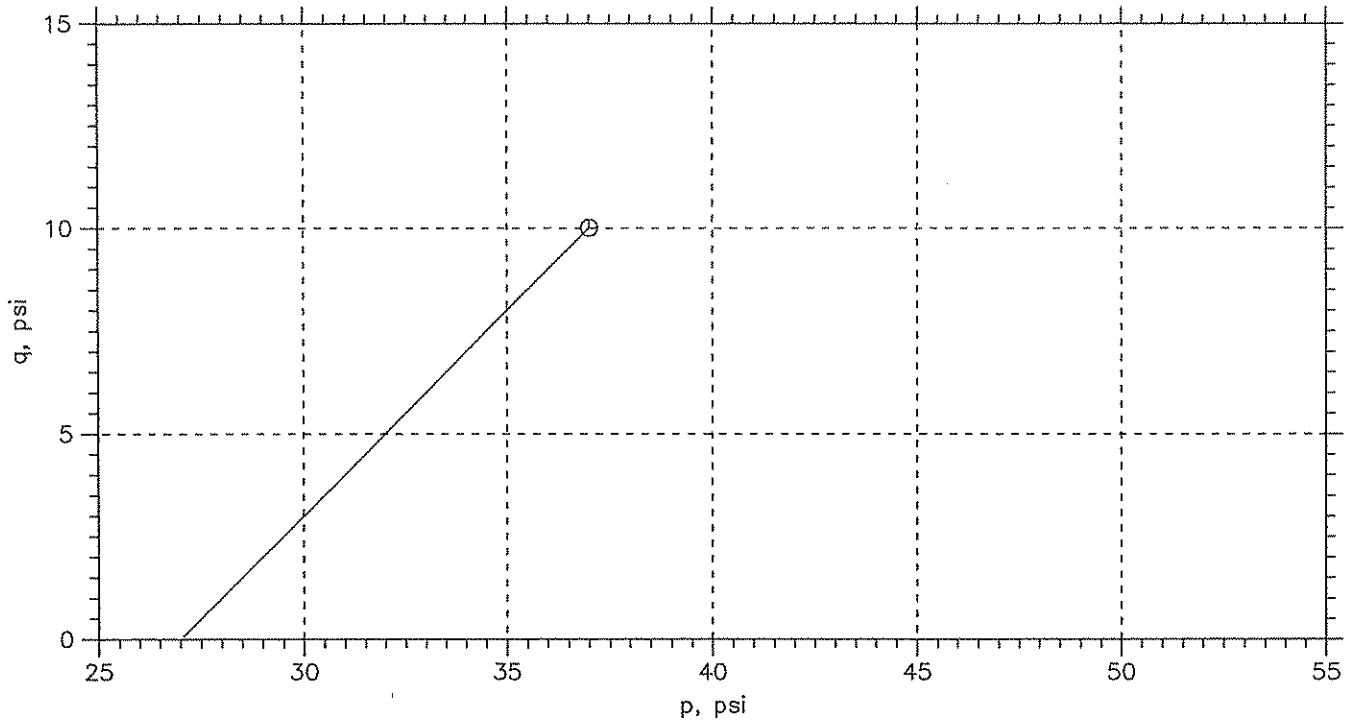


Symbol	⊙			
Sample No.	---			
Test No.	UU13.1			
Depth	12.6-13.1			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.834			
Height, in	5.927			
Water Content, %	23.2			
Dry Density, pcf	103.1			
Saturation, %	101.6			
Void Ratio	0.605			
Confining Stress, psi	10			
Undrained Strength, psi	17.95			
Max. Dev. Stress, psi	35.89			
Strain at Failure, %	15.3			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

GeoTesting express <small>a subsidiary of Geotemp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-27				
	Sample Type: tube				
	Description: Brown lean clay with sand				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

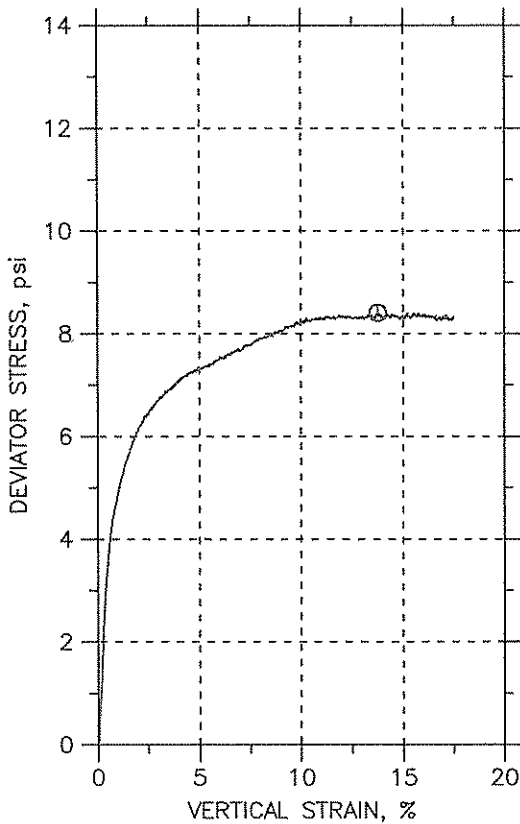
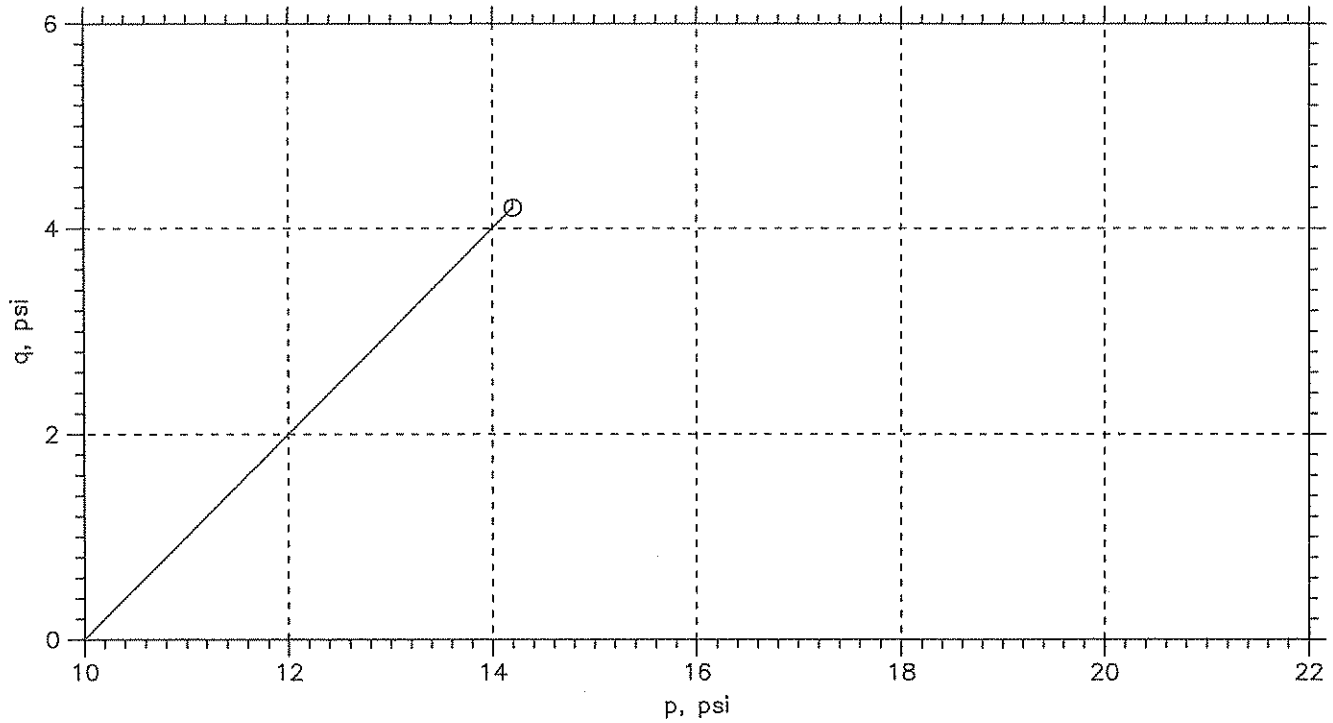


Symbol	⊙			
Sample No.	---			
Test No.	UU7.1			
Depth	44.7-45.2'			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.854			
Height, in	5.94			
Water Content, %	20.6			
Dry Density, pcf	106.2			
Saturation, %	97.8			
Void Ratio	0.558			
Confining Stress, psi	27			
Undrained Strength, psi	10.01			
Max. Dev. Stress, psi	20.02			
Strain at Failure, %	5.35			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-27				
	Sample Type: tube				
	Description: Gray Sandy lean clay				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

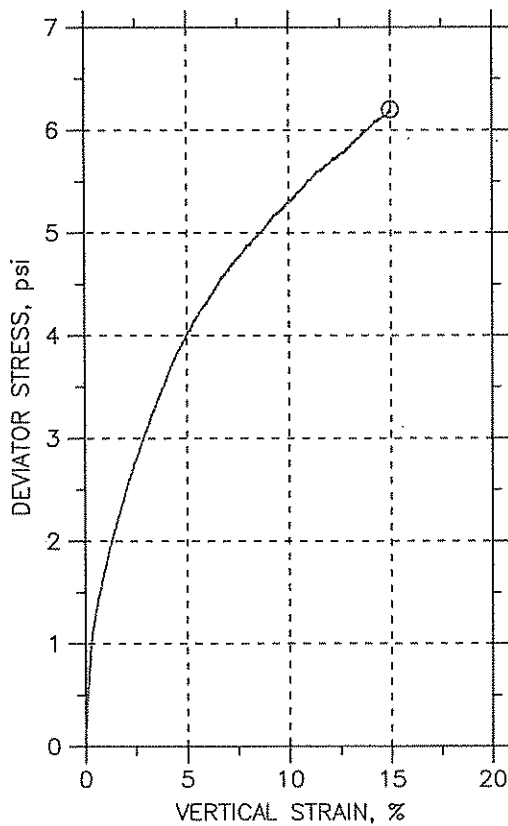
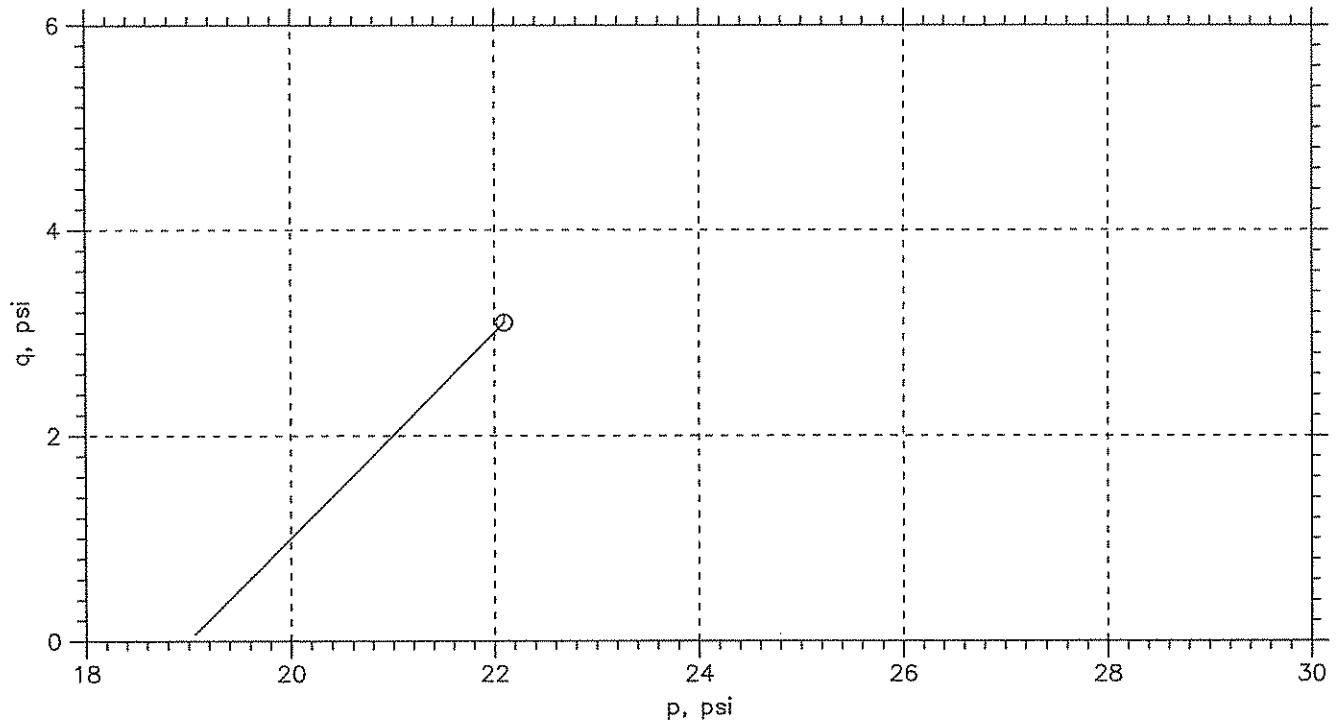


Symbol	⊙			
Sample No.	---			
Test No.	UU2.1			
Depth	20.5-21 ft			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.847			
Height, in	6.023			
Water Content, %	35.9			
Dry Density, pcf	85.32			
Saturation, %	101.4			
Void Ratio	0.939			
Confining Stress, psi	10			
Undrained Strength, psi	4.203			
Max. Dev. Stress, psi	8.405			
Strain at Failure, %	13.8			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

Geotesting express <small>a subsidiary of Geosamp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-31				
	Sample Type: tube				
	Description: Brown sandy silt				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

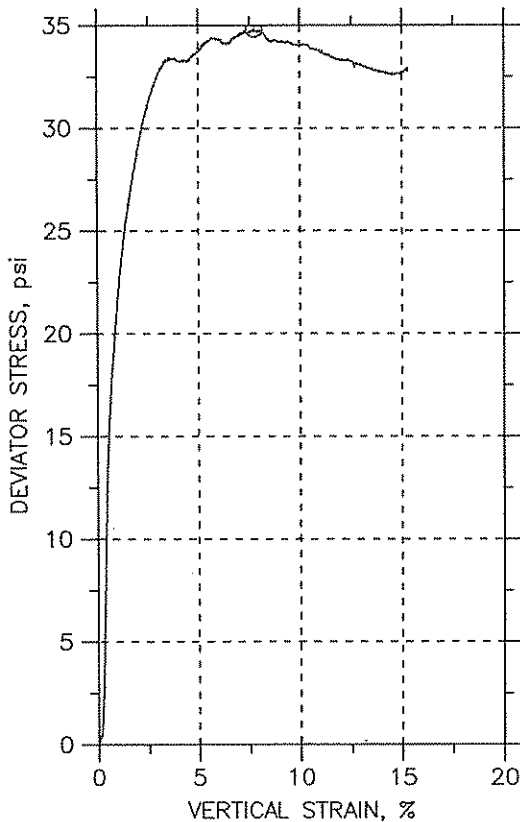
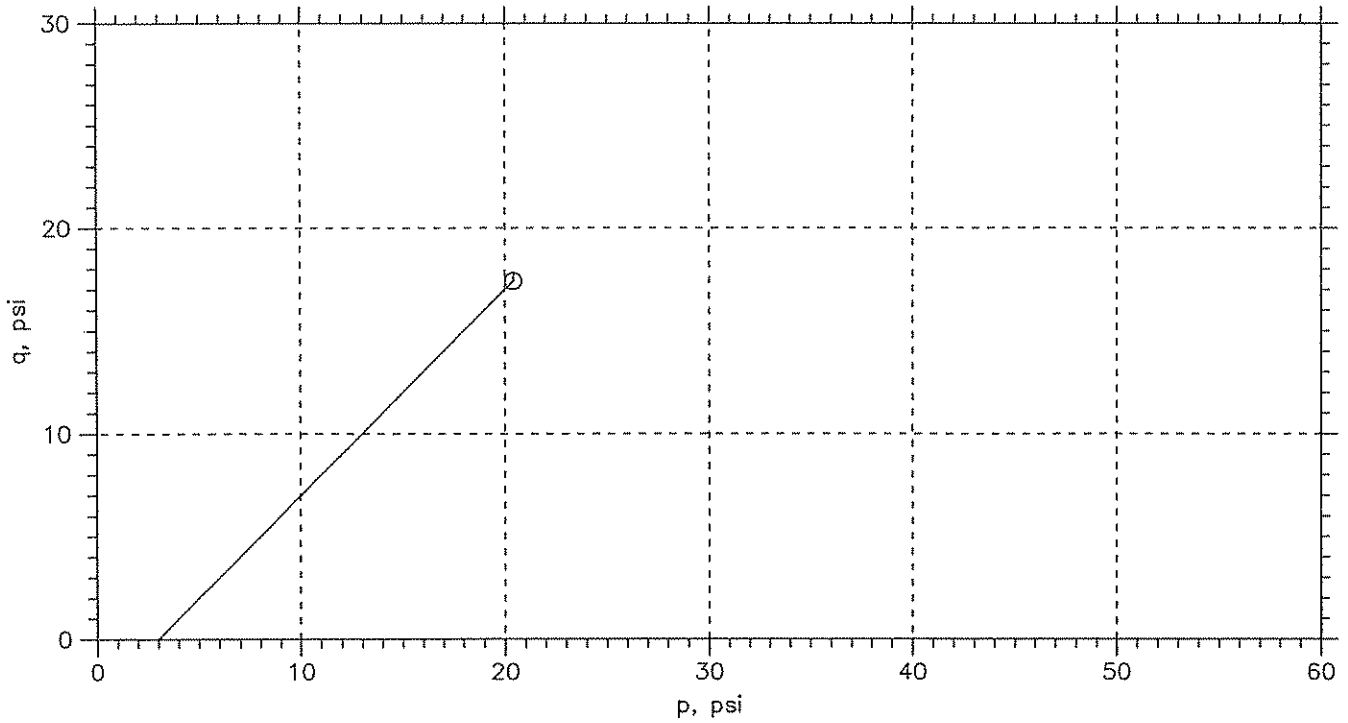


Symbol	⊙			
Sample No.	---			
Test No.	UU3.1			
Depth	38-38.5 ft			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.903			
Height, in	5.811			
Water Content, %	22.5			
Dry Density, pcf	103.5			
Saturation, %	99.6			
Void Ratio	0.599			
Confining Stress, psi	19			
Undrained Strength, psi	3.1			
Max. Dev. Stress, psi	6.2			
Strain at Failure, %	15			
Strain Rate, %/min	0.5			
Measured Specific Gravity	2.65			
Liquid Limit	42			
Plastic Limit	22			
Plasticity Index	20			

GeoTesting express <small>a Subsidiary of Geosorp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-31				
	Sample Type: tube				
	Description: Gray-Brown Lean clay				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

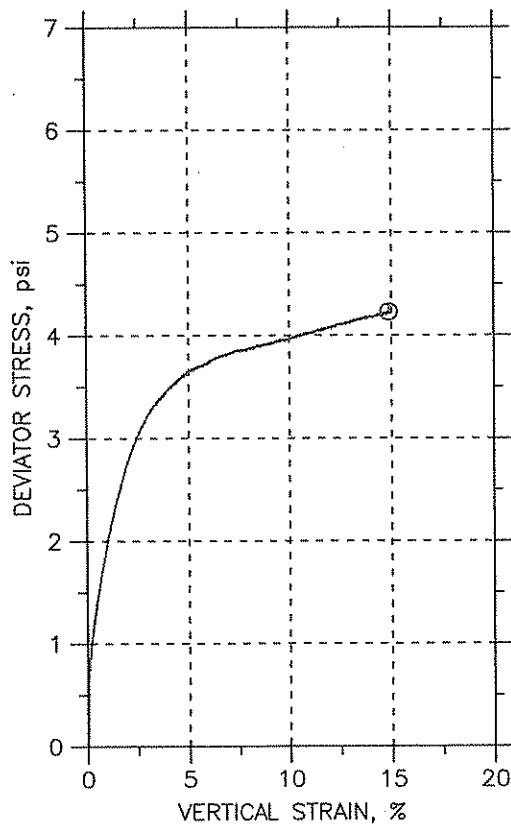
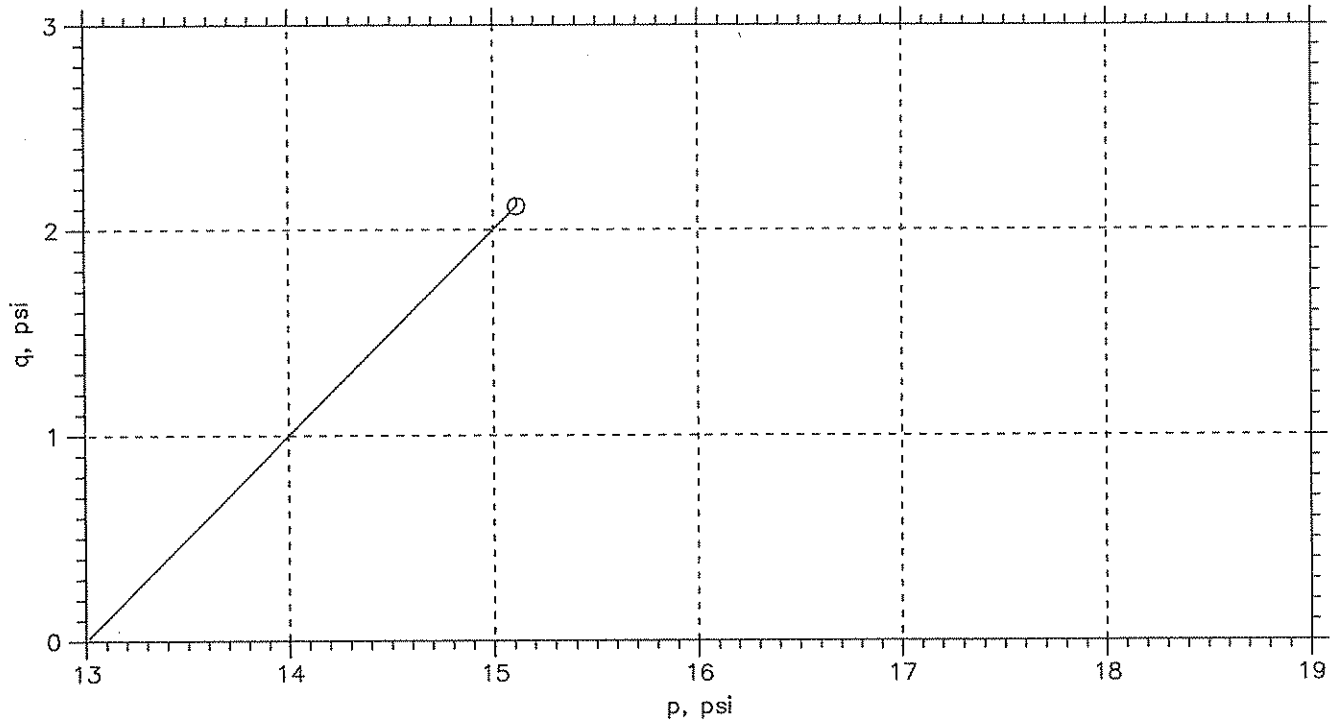


Symbol	⊙			
Sample No.	---			
Test No.	UU10.1			
Depth	5.3-5.8 ft			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.83			
Height, in	5.962			
Water Content, %	23.6			
Dry Density, pcf	101.1			
Saturation, %	98.2			
Void Ratio	0.637			
Confining Stress, psi	3			
Undrained Strength, psi	17.42			
Max. Dev. Stress, psi	34.84			
Strain at Failure, %	7.75			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	36			
Plastic Limit	19			
Plasticity Index	17			

GeoTesting express <small>a subsidiary of Geoscape Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-32				
	Sample Type: tube				
	Description: Gray-Brown Lean clay with sand				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



Symbol	⊙			
Sample No.	---			
Test No.	UU1.1			
Depth	29-29.5 ft			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.901			
Height, in	6.037			
Water Content, %	28.0			
Dry Density, pcf	93.56			
Saturation, %	96.7			
Void Ratio	0.768			
Confining Stress, psi	13			
Undrained Strength, psi	2.114			
Max. Dev. Stress, psi	4.229			
Strain at Failure, %	14.9			
Strain Rate, %/min	0.3			
Measured Specific Gravity	2.65			
Liquid Limit	38			
Plastic Limit	23			
Plasticity Index	15			

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-36				
	Sample Type: tube				
	Description: Gray-Brown Lean clay with sand				
Remarks: 2054					

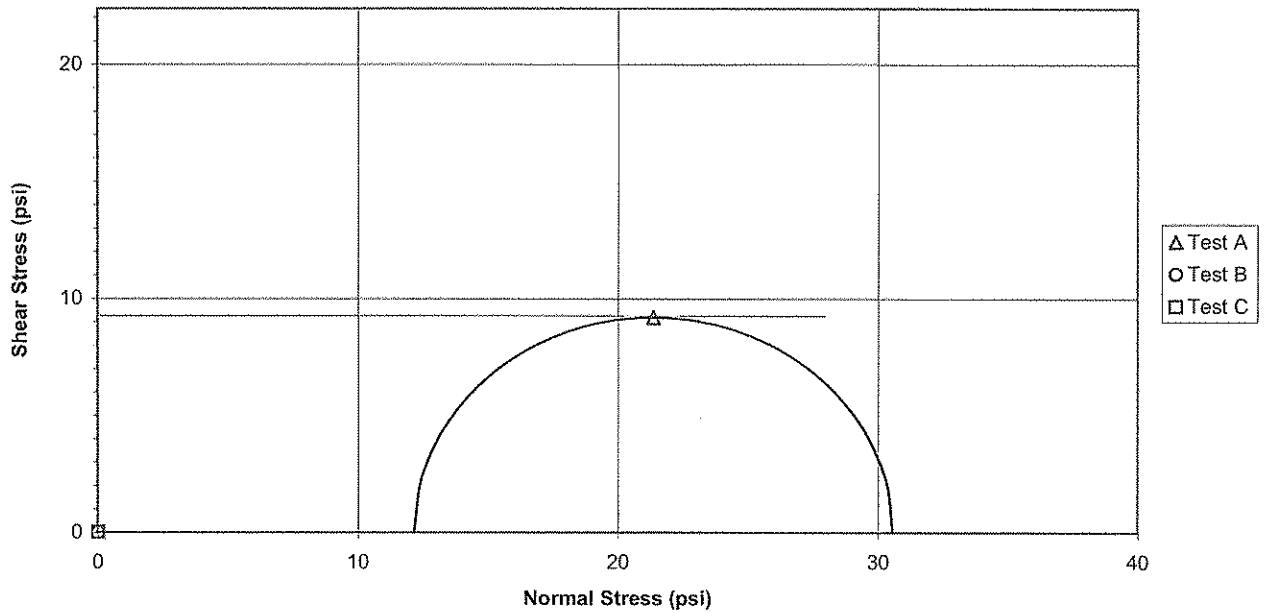
Phase calculations based on start and end of test.

Project Kingston Ash Pond
 Sample ID STN-41, 15.1' - 15.6'

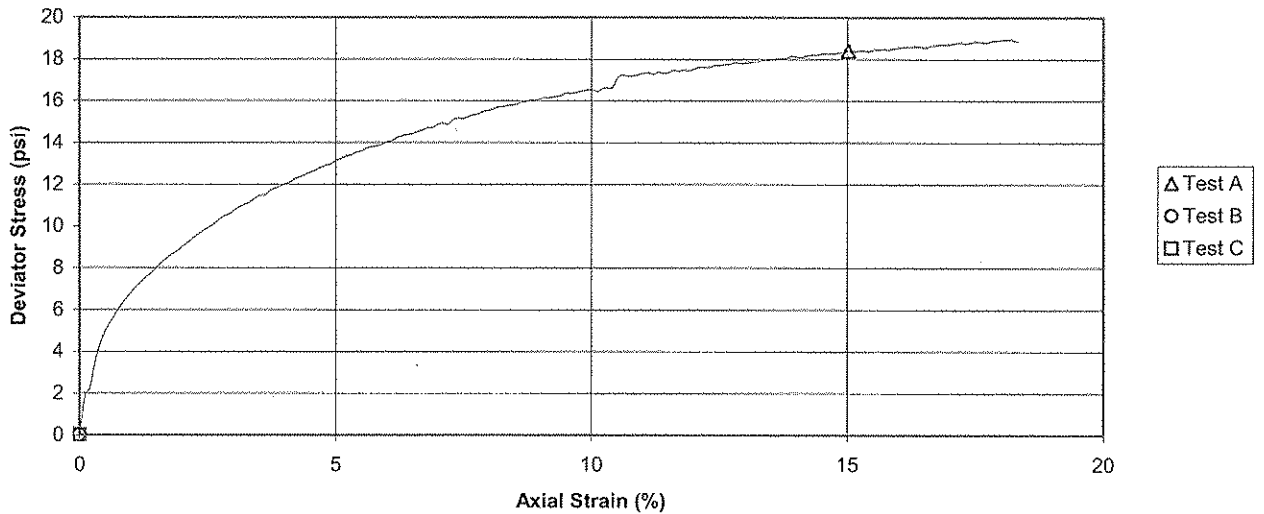
Project No. 175569042
 Test Number 563
 c = 9.3 psi

$\phi = 0.0$ deg.
 Failure Criterion: Maximum Deviator Stress

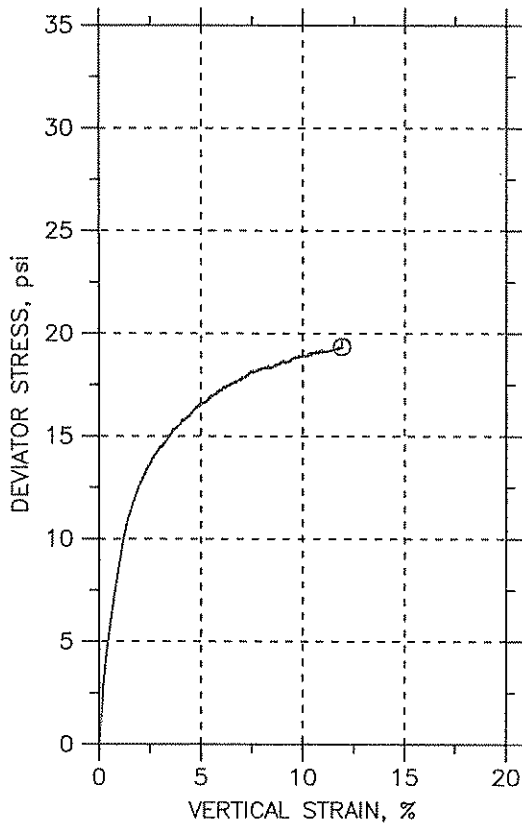
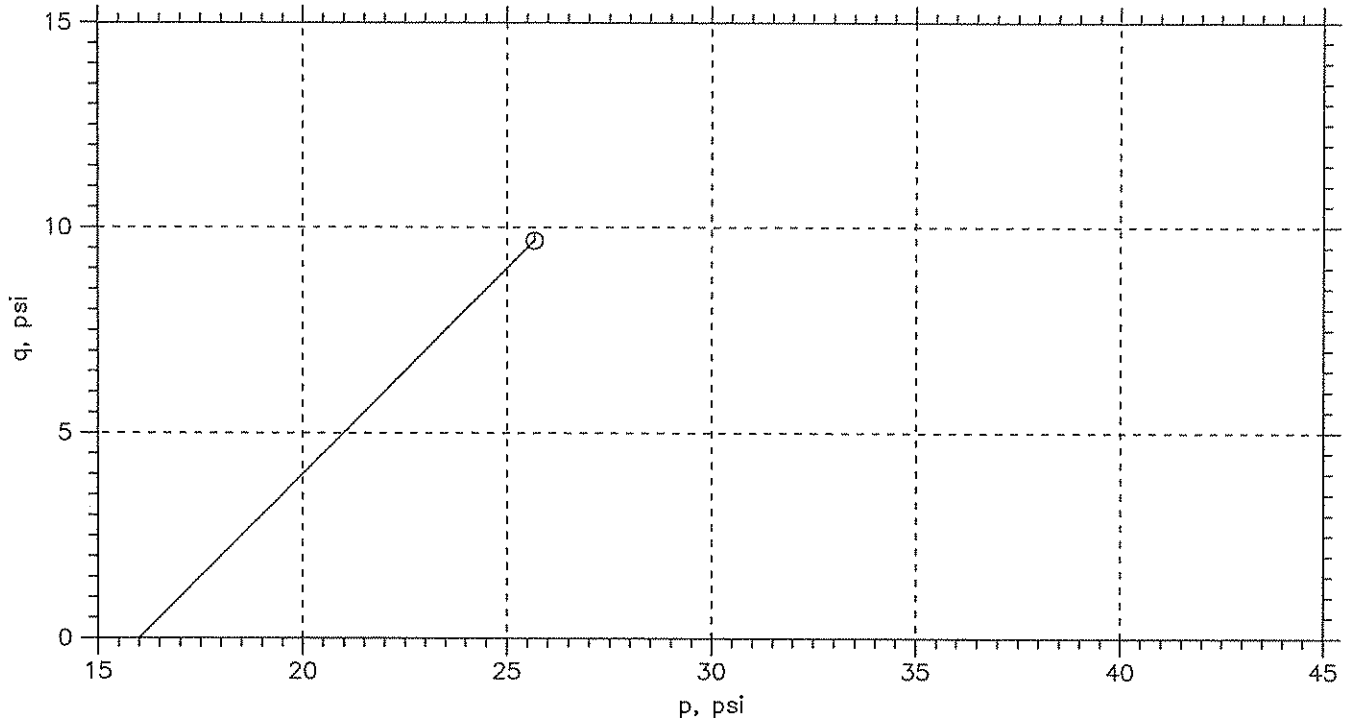
Mohr Failure Envelope



Deviator Stress vs. Axial Strain



UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

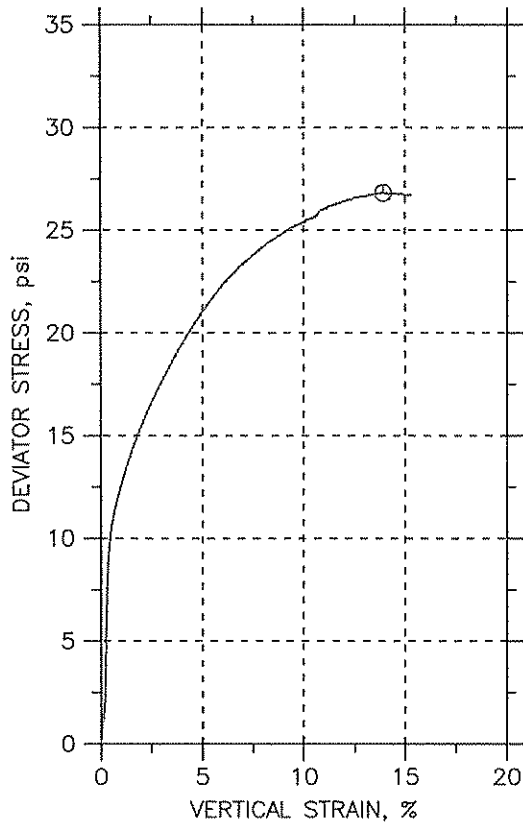
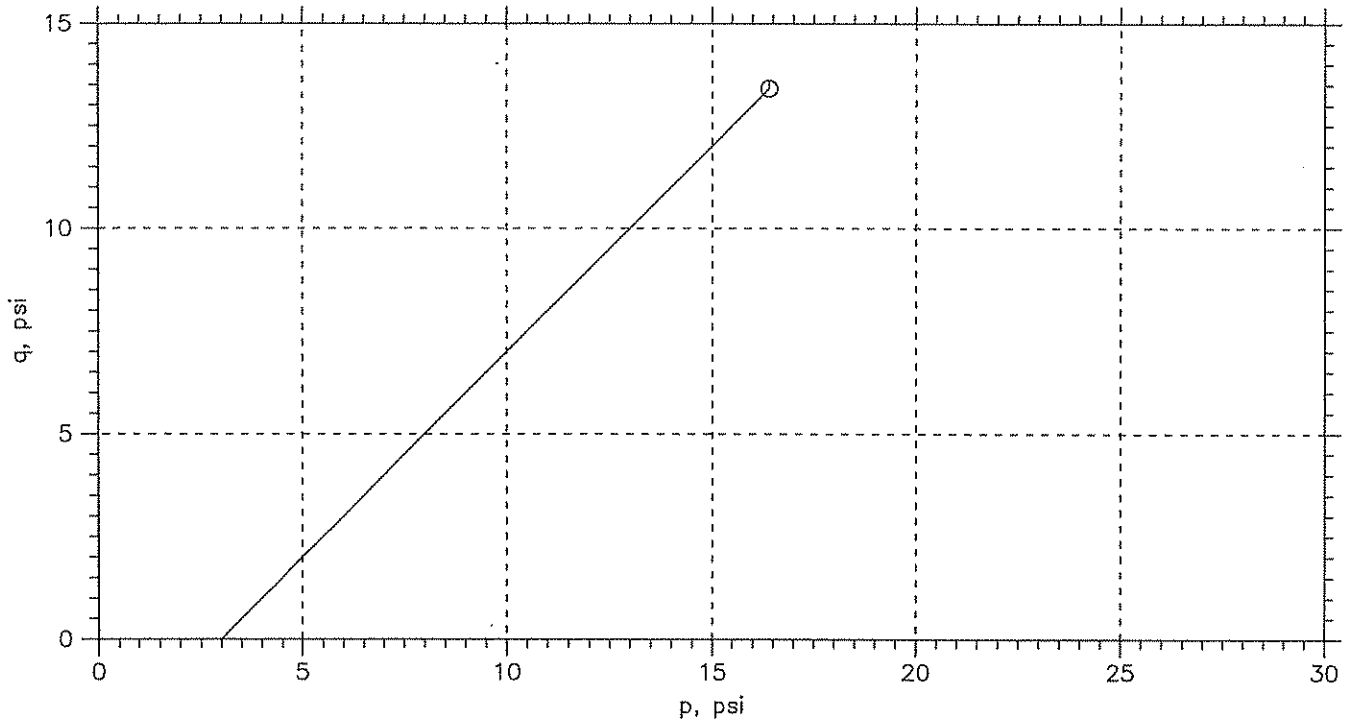


Symbol	⊙			
Sample No.	---			
Test No.	UU6.1			
Depth	29.1-29.6			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.828			
Height, in	5.928			
Water Content, %	20.6			
Dry Density, pcf	110.6			
Saturation, %	110.2			
Void Ratio	0.495			
Confining Stress, psi	16			
Undrained Strength, psi	9.678			
Max. Dev. Stress, psi	19.36			
Strain at Failure, %	11.9			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	27			
Plastic Limit	20			
Plasticity Index	7			

Geotesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-43				
	Sample Type: tube				
	Description: Gray-Brown Sandy silty clay				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

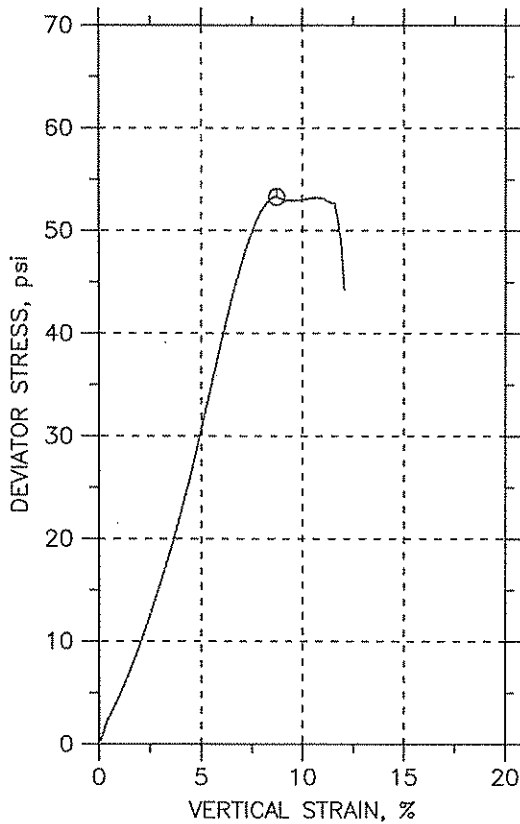
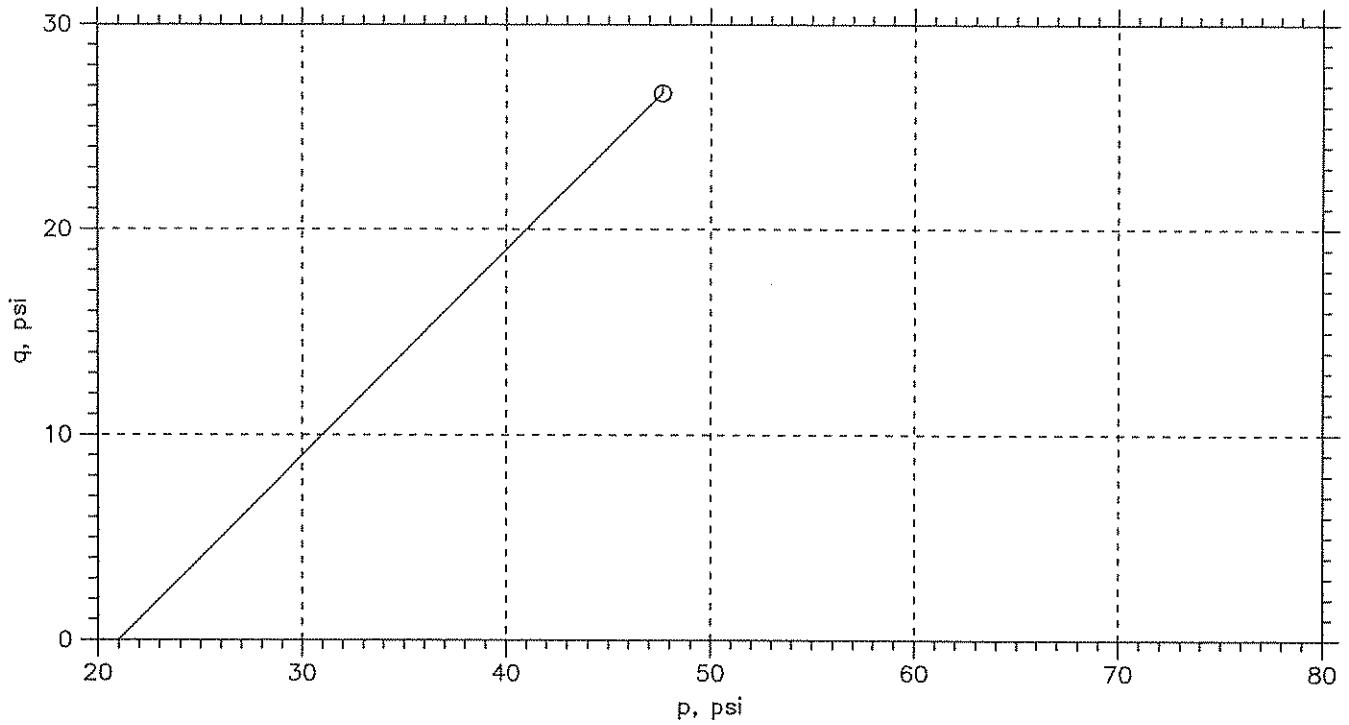


Symbol	⊙			
Sample No.	---			
Test No.	UU9.1			
Depth	4-5.5 ft			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.853			
Height, in	5.963			
Water Content, %	24.8			
Dry Density, pcf	102.8			
Saturation, %	107.7			
Void Ratio	0.61			
Confining Stress, psi	3			
Undrained Strength, psi	13.41			
Max. Dev. Stress, psi	26.82			
Strain at Failure, %	13.9			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	39			
Plastic Limit	19			
Plasticity Index	20			

GeoTesting express <small>a subsidiary of Geosamp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-48				
	Sample Type: tube				
	Description: Gray-Brown lean clay with sand				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



Symbol	⊙			
Sample No.	---			
Test No.	UU11.1			
Depth	33.5-34 ft			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.86			
Height, in	5.785			
Water Content, %	17.0			
Dry Density, pcf	111.6			
Saturation, %	93.4			
Void Ratio	0.482			
Confining Stress, psi	21			
Undrained Strength, psi	26.65			
Max. Dev. Stress, psi	53.3			
Strain at Failure, %	8.72			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px dashed black; width: 40px; height: 40px;"></div> <div style="border: 1px dashed black; width: 40px; height: 40px;"></div> <div style="border: 1px dashed black; width: 40px; height: 40px;"></div> <div style="border: 1px dashed black; width: 40px; height: 40px;"></div> </div>
	Location: Roane, TN	
	Project No.: GTX-1464	
	Boring No.: STN-48	
	Sample Type: tube	
	Description: Brown silty sand (Sample Crumbled @ approx.12% strain test shut down)	
Remarks: 2054		

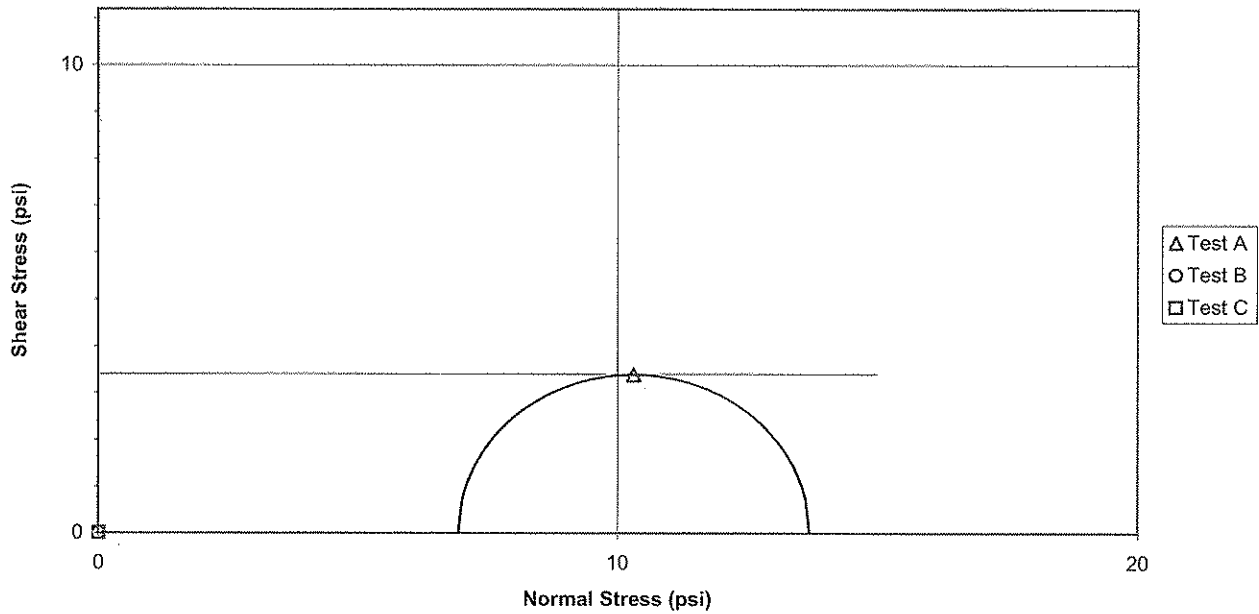
Phase calculations based on start and end of test.

Project Kingston Ash Pond
 Sample ID STN-50, 9.0' - 9.5'

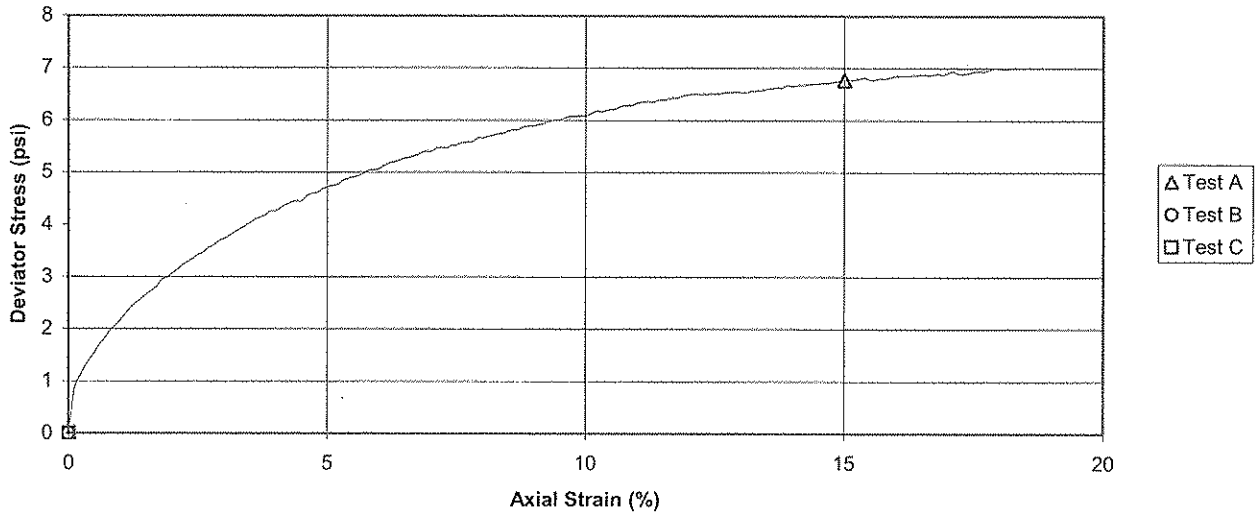
Project No. 175569042
 Test Number 545
 c = 3.4 psi

$\phi = 0.0 \text{ deg.}$
 Failure Criterion: Maximum Deviator Stress

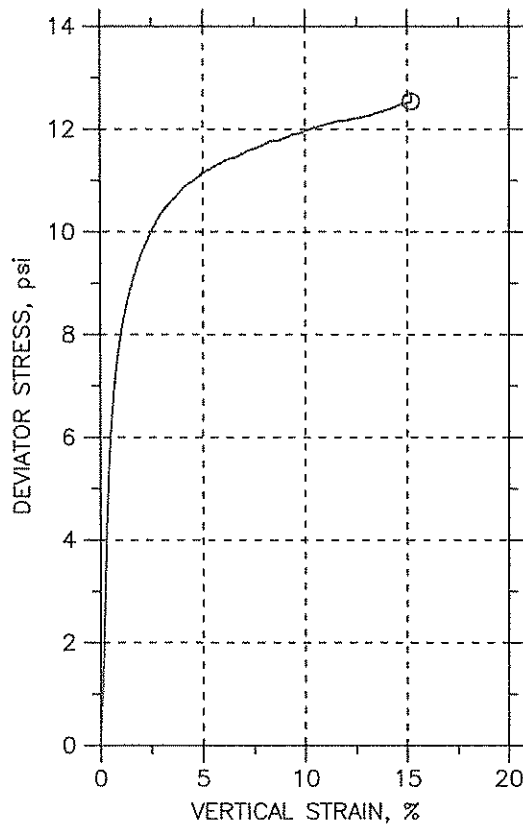
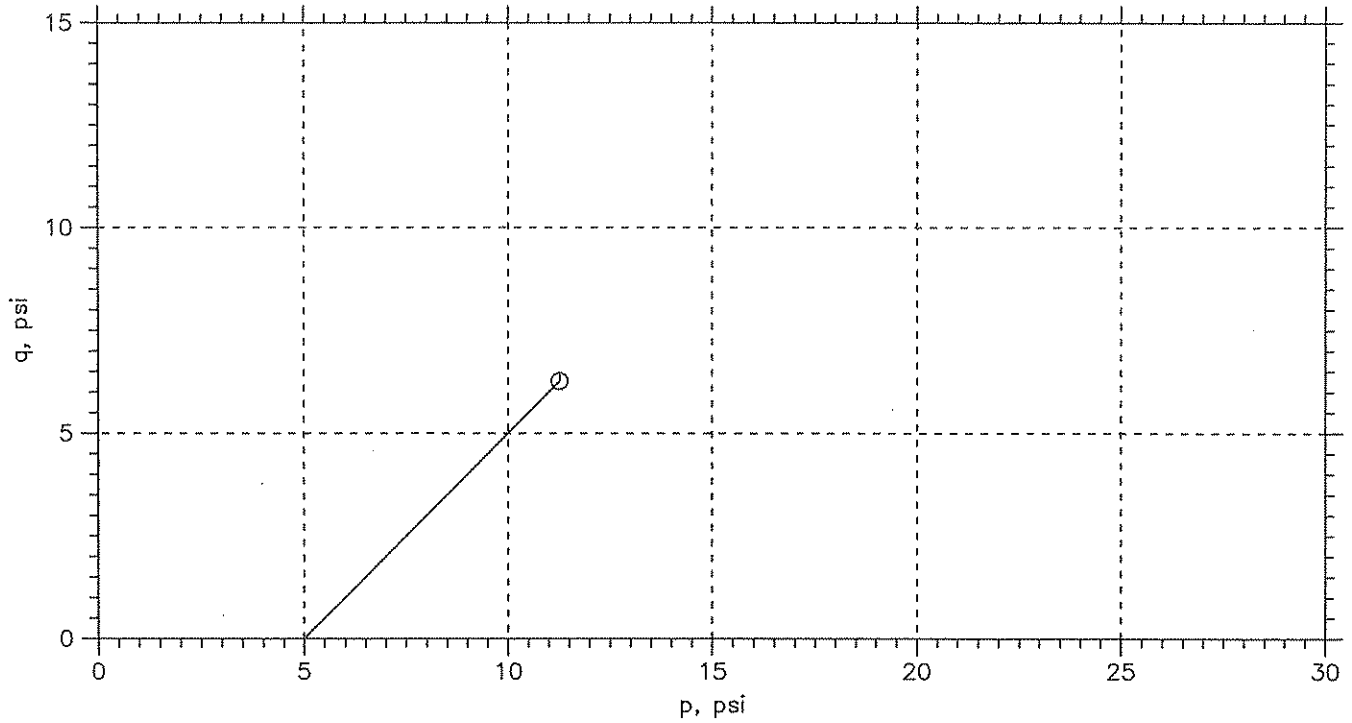
Mohr Failure Envelope



Deviator Stress vs. Axial Strain



UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

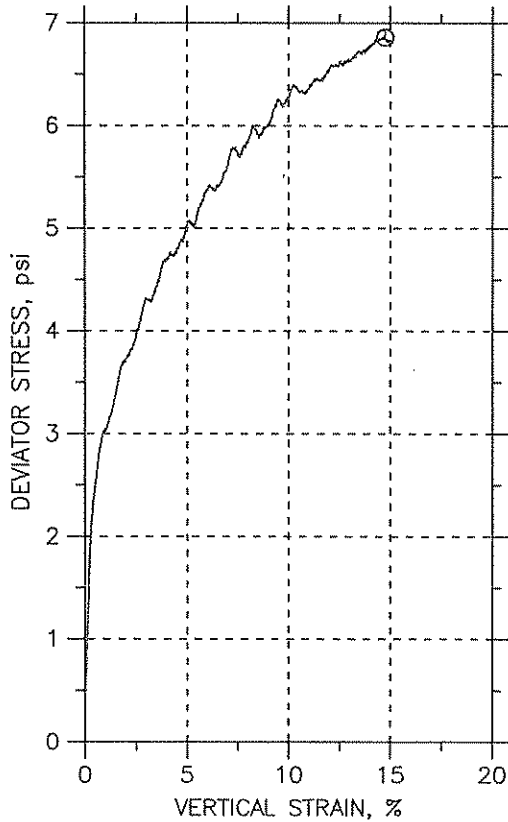
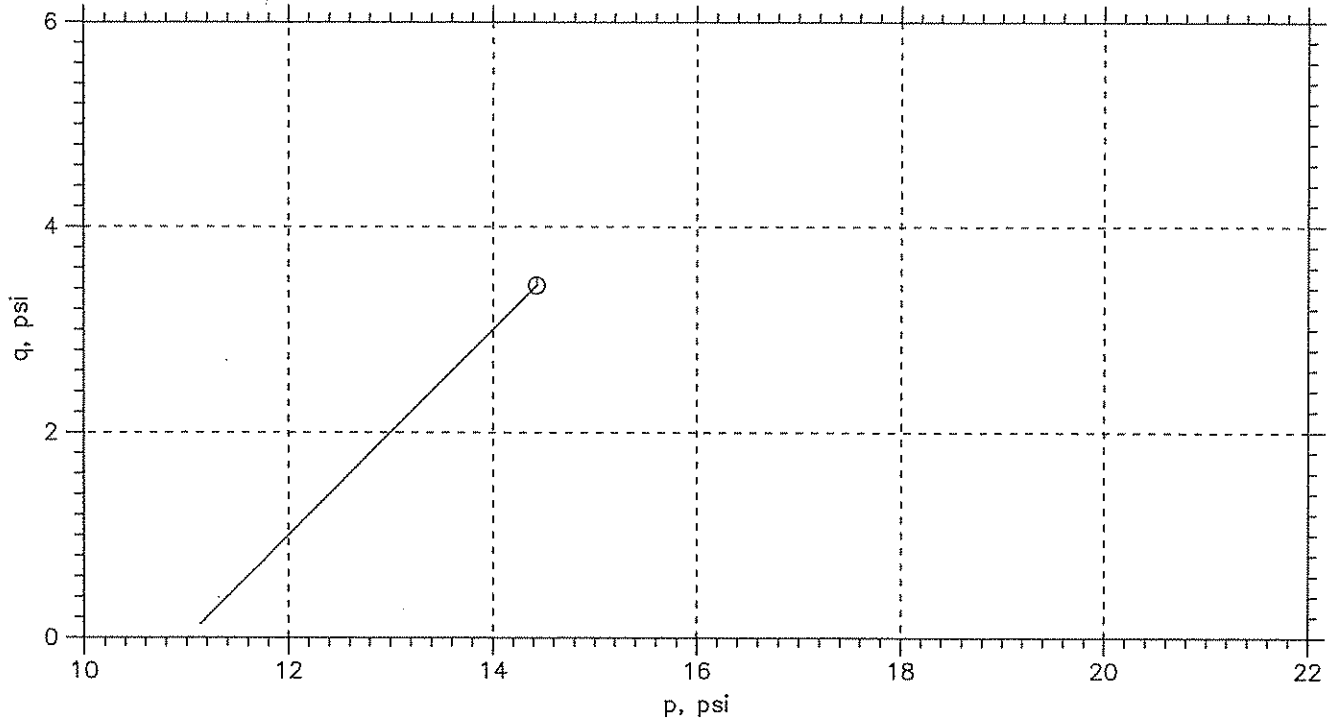


Symbol	⊙			
Sample No.	---			
Test No.	UU12.1			
Depth	9.3-9.8 ft			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.874			
Height, in	6.021			
Water Content, %	21.2			
Dry Density, pcf	104.9			
Saturation, %	97.6			
Void Ratio	0.577			
Confining Stress, psi	5			
Undrained Strength, psi	6.269			
Max. Dev. Stress, psi	12.54			
Strain at Failure, %	15.2			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-63				
	Sample Type: tube				
	Description: Gray Sandy lean clay				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

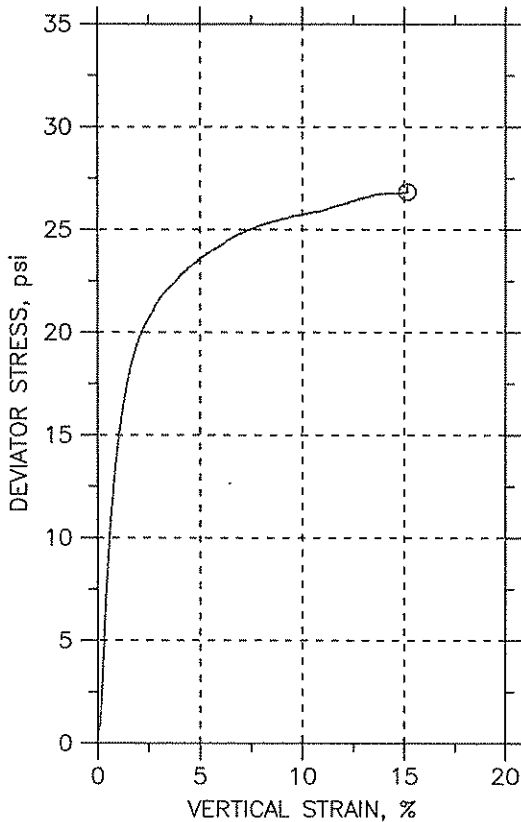
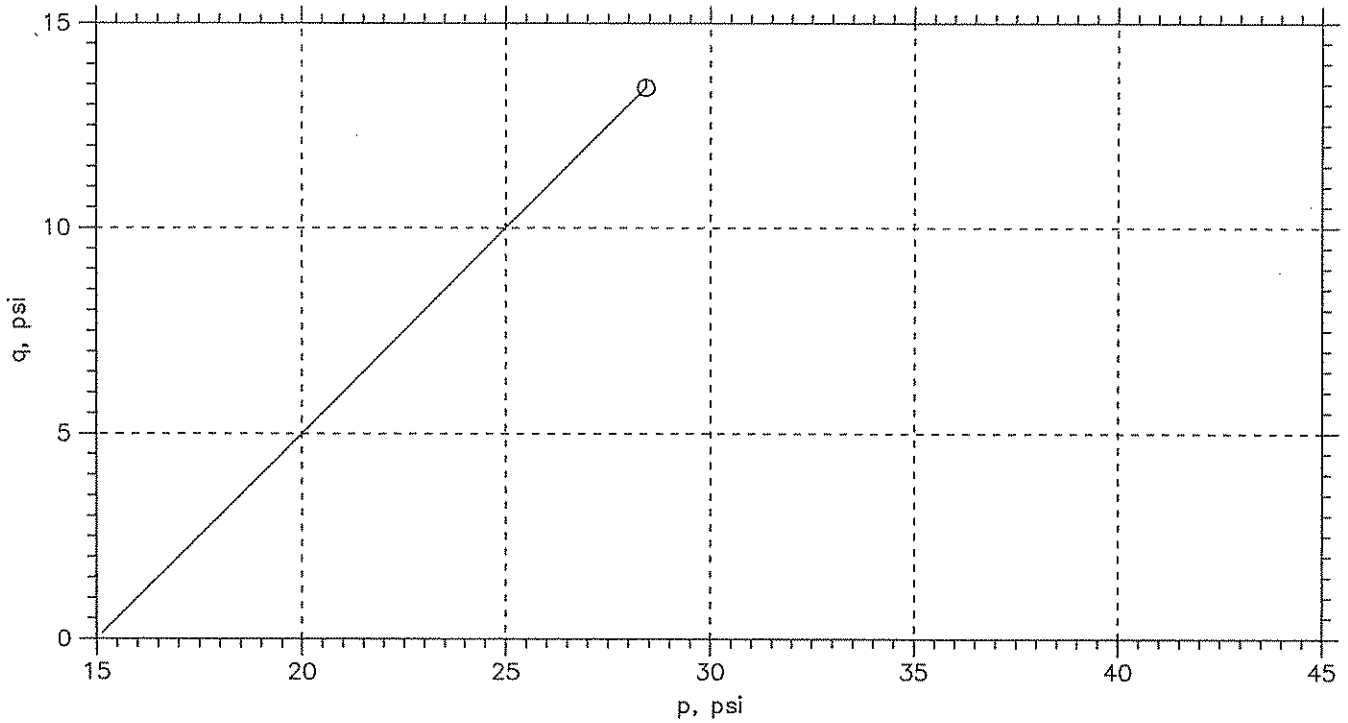


Symbol	⊙			
Sample No.	---			
Test No.	UU4.1			
Depth	20-20.5 ft			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.834			
Height, in	5.994			
Water Content, %	24.8			
Dry Density, pcf	102.7			
Saturation, %	107.4			
Void Ratio	0.611			
Confining Stress, psi	11			
Undrained Strength, psi	3.43			
Max. Dev. Stress, psi	6.86			
Strain at Failure, %	14.8			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-64				
	Sample Type: tube				
	Description: Gray sandy lean clay				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

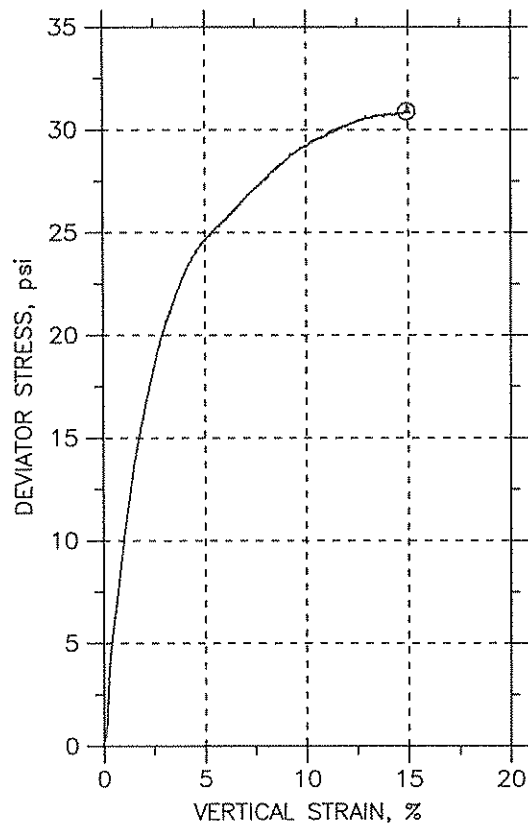
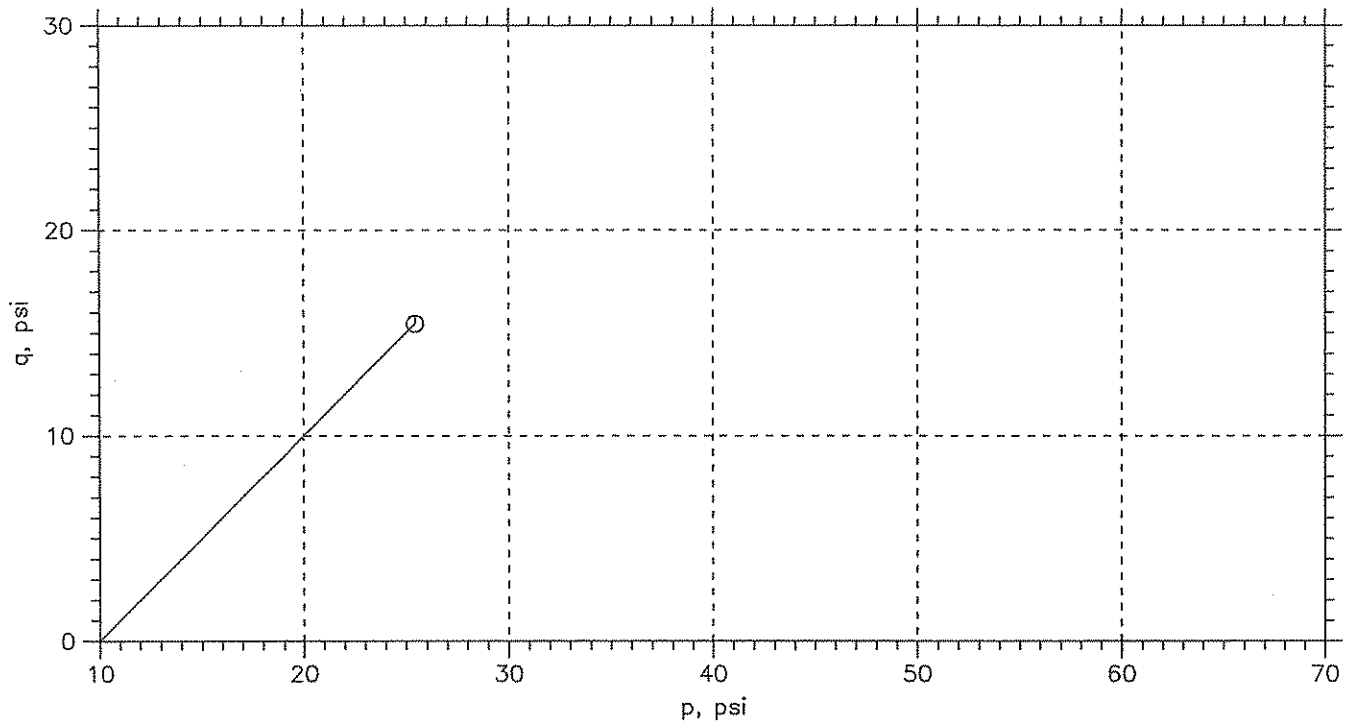


Symbol	⊙			
Sample No.	---			
Test No.	UU5.1			
Depth	30-30.5 ft			
Tested by	MM			
Test Date	5/16/09			
Checked by	JM			
Check Date				
Diameter, in	2.843			
Height, in	5.977			
Water Content, %	23.8			
Dry Density, pcf	103.6			
Saturation, %	105.4			
Void Ratio	0.597			
Confining Stress, psi	15			
Undrained Strength, psi	13.42			
Max. Dev. Stress, psi	26.84			
Strain at Failure, %	15.2			
Strain Rate, %/min	1			
Measured Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

Geotesting express <small>a subsidiary of Geosimp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-64				
	Sample Type: tube				
	Description: Brown silty sand				
Remarks: 2054					

Phase calculations based on start and end of test.

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



Symbol	⊙			
Sample No.	---			
Test No.	UU8.1			
Depth	13.5-14 ft			
Tested by	MM			
Test Date	5/13/09			
Checked by	JM			
Check Date				
Diameter, in	2.852			
Height, in	5.996			
Water Content, %	18.6			
Dry Density, pcf	113.			
Saturation, %	106.4			
Void Ratio	0.463			
Confining Stress, psi	10			
Undrained Strength, psi	15.45			
Max. Dev. Stress, psi	30.9			
Strain at Failure, %	14.9			
Strain Rate, %/min	0.3			
Measured Specific Gravity	2.65			
Liquid Limit	30			
Plastic Limit	22			
Plasticity Index	8			

GeoTesting express <small>a subsidiary of Geosynp Corporation</small>	Project: Kingson Ash Pond				
	Location: Roane, TN				
	Project No.: GTX-1464				
	Boring No.: STN-65				
	Sample Type: tube				
	Description: Gray-Brown Lean clay with sand				
Remarks: 2054					

Phase calculations based on start and end of test.

Unconfined Compressive Strength Test Results



**Unconfined Compressive Strength
of Cohesive Soil**
KM 64-522

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / ST-1, 35.0'-35.5' Lab ID 185A
 Visual Description Lean Clay with Sand (CL), brown, moist, firm

Recovered 1.4'
 Test Interval 35.0' - 35.5'

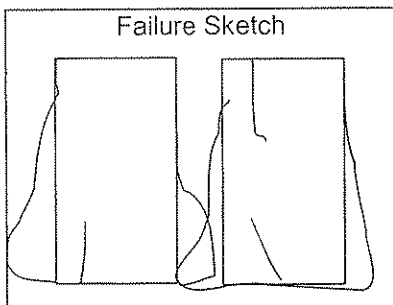
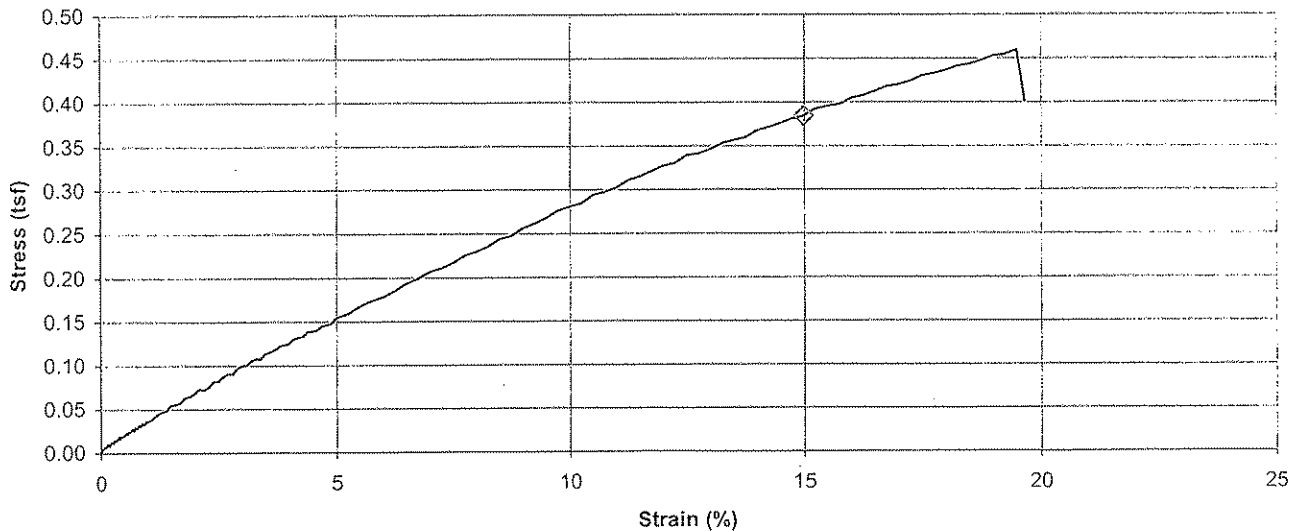
Specimen Type: Undisturbed LL 28 Date Extruded 04/07/2009
 PL 17 Date Tested 04/20/2009
 PI 11

Initial Wet Density (pcf) 127.0
 Initial Dry Density (pcf) 103.6
 Initial Moisture Content (%) 23.7
 At Test Moisture Content (%) 22.5
 Specific Gravity 2.69
 Degree of Saturation (%) 100.3
 Average Height (in) 6.001
 Average Diameter (in) 2.885
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 0.38
 Undrained Shear Strength (tsf) 0.19
 Strain at Maximum Stress (%) 15.0
 Strain rate to failure (% / min.) 1.00

Stress vs. Strain



Pocket Penetrometer Reading (tsf) .25
 Torvane Reading (kg/cm²) N/A

Comments _____

Reviewed By *[Signature]*



**Unconfined Compressive Strength
of Cohesive Soil**
ASTM D 2166

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-55 / ST-2, 44.0'-46.0' Lab ID 188B
 Visual Description Lean Clay with Sand (CL), brown, moist, firm

Recovered 1.3'
 Test Interval 44.6' - 45.1'

Specimen Type: Undisturbed

LL N/A
 PL N/A
 PI N/A

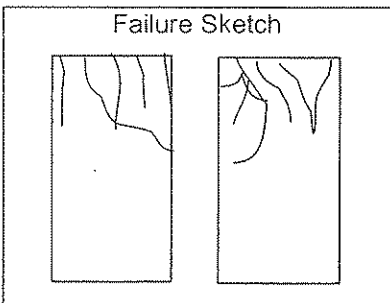
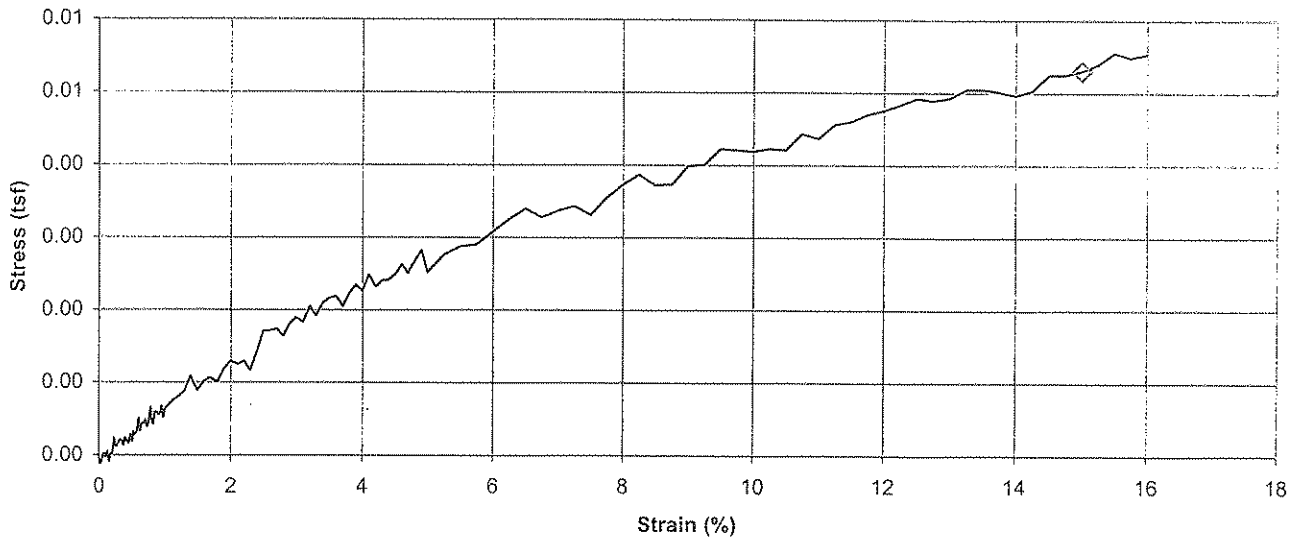
Date Extruded 04/07/2009
 Date Tested 04/20/2009

Initial Wet Density (pcf) 126.6
 Initial Dry Density (pcf) 101.6
 Initial Moisture Content (%) 24.7
 At Test Moisture Content (%) 24.7
 Specific Gravity N/A
 Degree of Saturation (%) N/A
 Average Height (in) 5.968
 Average Diameter (in) 2.884
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 0.01
 Undrained Shear Strength (tsf) 0.00
 Strain at Maximum Stress (%) 15.0
 Strain rate to failure (% / min.) 1.00

Stress vs. Strain



Pocket Penetrometer Reading (tsf) .25
 Torvane Reading (kg/cm²) N/A

Comments _____

Reviewed By [Signature]



Unconfined Compressive Strength of Cohesive Soil

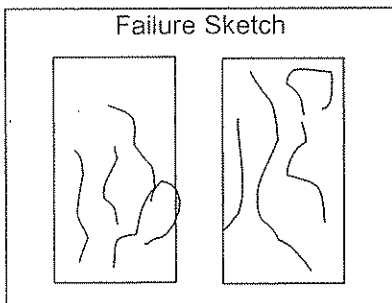
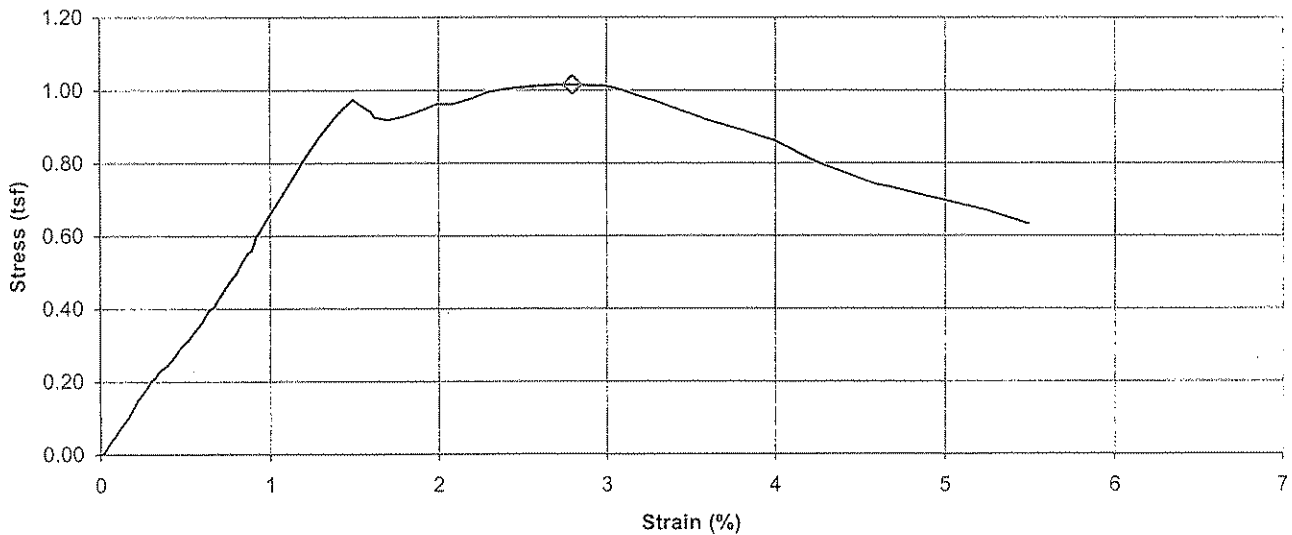
KM 64-522

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-55 / ST-1, 42.6'-43.1' Lab ID 187B
 Visual Description Sandy Lean Clay (CL), brown, moist, firm

Recovered 1.4'
 Test Interval 42.6' - 43.1'

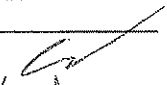
Specimen Type: <u>Undisturbed</u>	LL <u>27</u>	Date Extruded <u>04/07/2009</u>
	PL <u>18</u>	Date Tested <u>04/20/2009</u>
	PI <u>9</u>	
Initial Wet Density (pcf) <u>128.0</u>	Initial MC Taken <u>Before Test, From Trimmings</u>	
Initial Dry Density (pcf) <u>106.1</u>	At Test MC Taken <u>After Test, From Center of Specimen</u>	
Initial Moisture Content (%) <u>20.4</u>		
At Test Moisture Content (%) <u>20.7</u>		
Specific Gravity <u>2.69</u>		
Degree of Saturation (%) <u>94.6</u>	Unconfined Compressive Strength (tsf) <u>1.01</u>	
Average Height (in) <u>6.016</u>	Undrained Shear Strength (tsf) <u>0.51</u>	
Average Diameter (in) <u>2.880</u>	Strain at Maximum Stress (%) <u>2.8</u>	
Height to Diameter Ratio <u>2.1</u>	Strain rate to failure (% / min.) <u>1.00</u>	

Stress vs. Strain



Pocket Penetrometer Reading (tsf) 3.75
 Torvane Reading (kg/cm²) N/A

Comments _____

Reviewed By 

Classification Test Results



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-2, 14.0'-14.5' Lab ID 529
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 7-1-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 18.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 23
 Plastic Limit: 15
 Plasticity Index: 8
 Activity Index: 0.38

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	58.7
	0.02	38.2
	0.005	25.7
	0.002	21.1
estimated	0.001	18.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	40.9	40.9
Silt	33.0	37.6
Clay	25.7	21.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-4 (2)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-2, 14.0'-14.5'

 Project Number 175569042
 Lab ID 529
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: N/A
 Particle Hardness: N/A

 Tested By: DB
 Test Date: 06-26-2009
 Date Received: 05-27-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

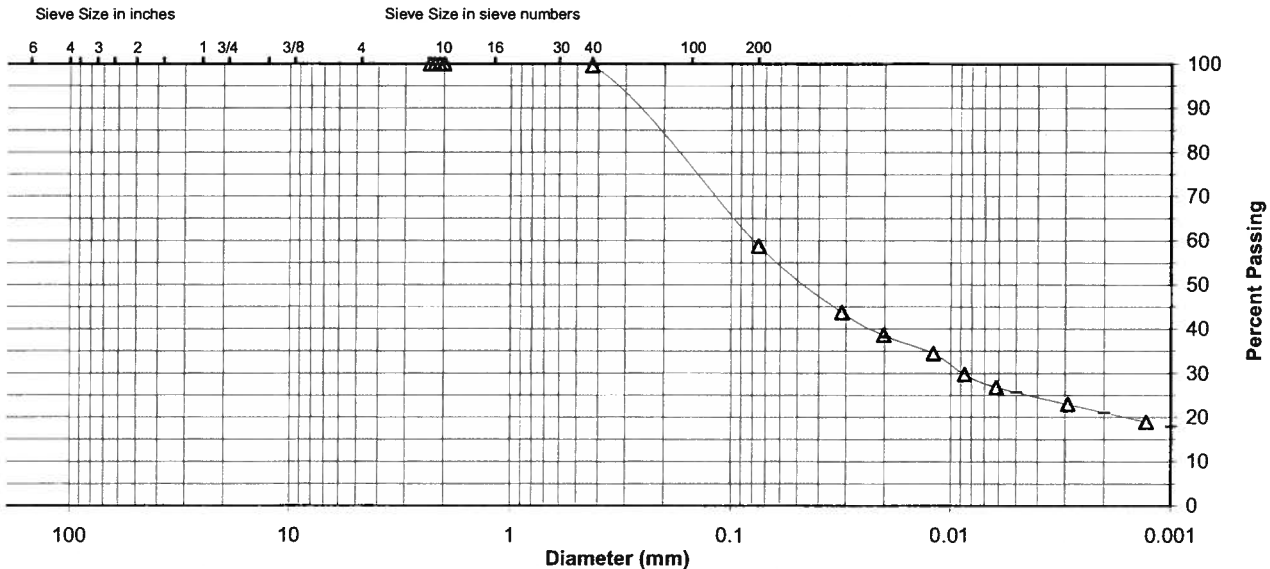
 Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	58.7
0.02 mm	38.2
0.005 mm	25.7
0.002 mm	21.1
0.001 mm	18.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.4	40.9	33.0	25.7	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.4		40.9	37.6		21.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-3, 12.5'-13.0' Lab ID 538
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 25.4

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 56
 Plastic Limit: 19
 Plasticity Index: 37
 Activity Index: 0.66

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.6
No. 10	2	97.7
No. 40	0.425	94.5
No. 200	0.075	82.9
	0.02	72.8
	0.005	60.0
	0.002	55.5
estimated	0.001	52.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.4	2.3
Coarse Sand	1.9	3.2
Medium Sand	3.2	---
Fine Sand	11.6	11.6
Silt	22.9	27.4
Clay	60.0	55.5

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-6 (32)

Comments: _____



Project Name Kingston Ash Pond
Source STN-3, 12.5'-13.0'

Project Number 175569042
Lab ID 538

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RM
Test Date: 06-23-2009
Date Received: 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.6
No. 10	97.7

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

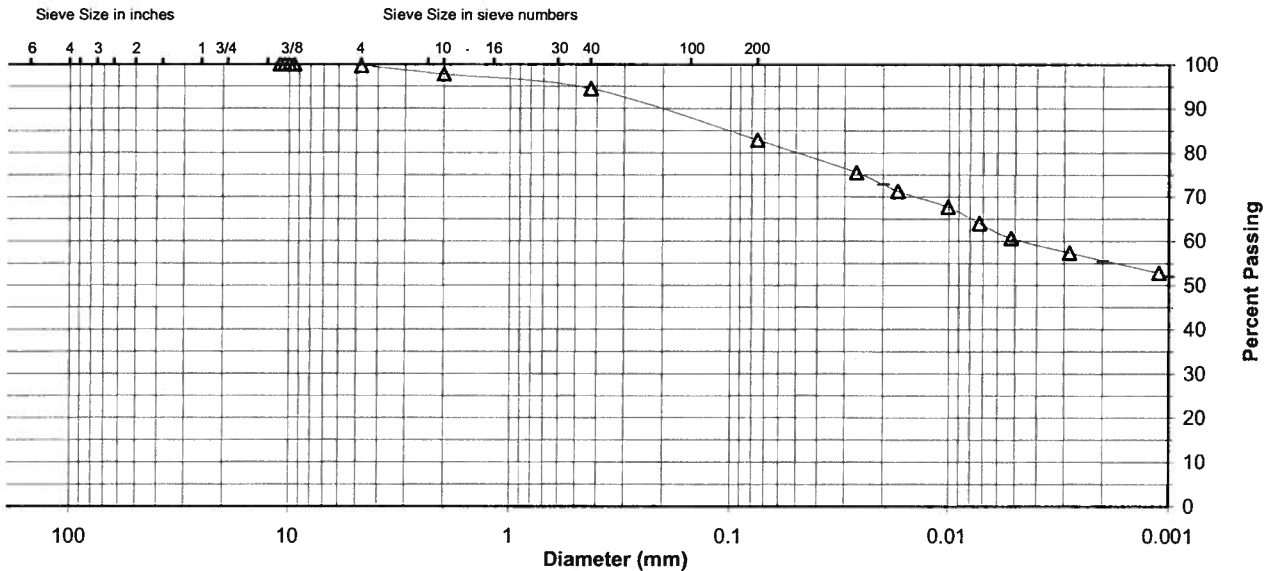
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.5
No. 200	82.9
0.02 mm	72.8
0.005 mm	60.0
0.002 mm	55.5
0.001 mm	52.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.4	1.9	3.2	11.6	22.9	60.0
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	2.3		3.2	11.6	27.4		55.5



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-3, 31.0'-32.5', 32.5'-34.0' Lab ID 977
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 25
 Plastic Limit: 17
 Plasticity Index: 8
 Activity Index: 0.44

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.8
No. 10	2	99.8
No. 40	0.425	99.4
No. 200	0.075	59.2
	0.02	32.2
	0.005	22.0
	0.002	18.0
estimated	0.001	17.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.2	0.2
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	40.2	40.2
Silt	37.2	41.2
Clay	22.0	18.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification
 Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-4 (2)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-3, 31.0'-32.5', 32.5'-34.0'

 Project Number 171468117
 Lab ID 977
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: Rounded
 Particle Hardness: Hard and Durable

 Tested By: RHB
 Test Date: 04-29-2009
 Date Received: 04-23-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.8
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

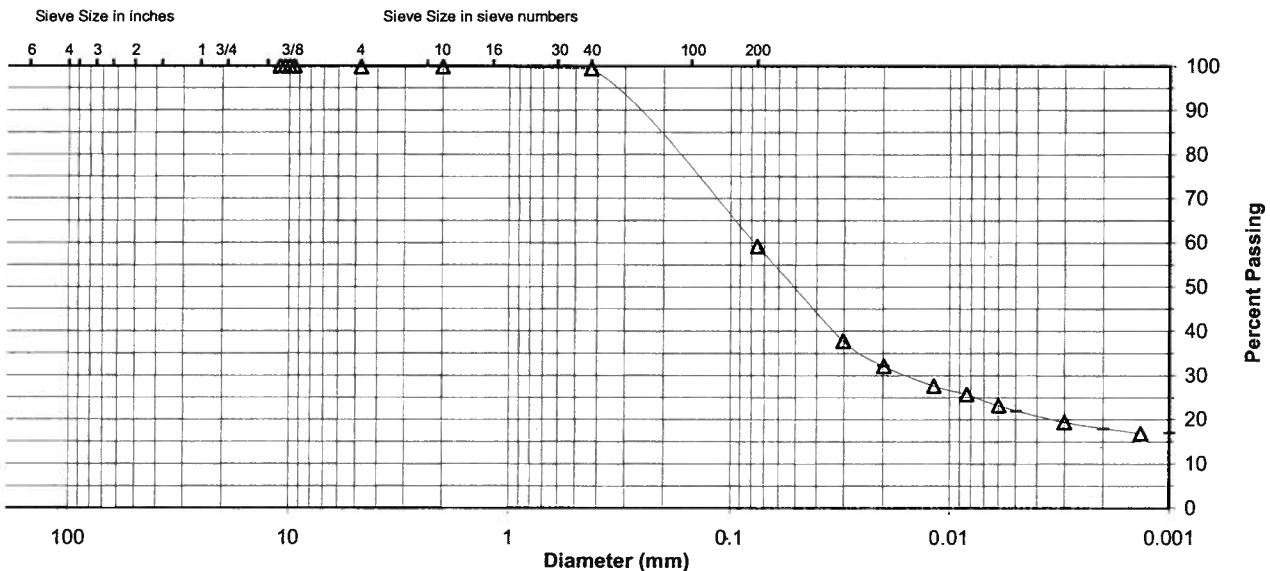
 Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.4
No. 200	59.2
0.02 mm	32.2
0.005 mm	22.0
0.002 mm	18.0
0.001 mm	17.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.2	0.0	0.4	40.2	37.2	22.0
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.2		0.4	40.2	41.2		18.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-3, 40.0'-41.5', 41.5'-43.0' Lab ID 984
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.8
No. 10	2	99.8
No. 40	0.425	99.7
No. 200	0.075	37.5
	0.02	17.0
	0.005	11.0
	0.002	8.0
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM	AASHTO
	(%)	(%)
Gravel	0.2	0.2
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	62.2	62.2
Silt	26.5	29.5
Clay	11.0	8.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-3, 40.0'-41.5', 41.5'-43.0'

Project Number 171468117
 Lab ID 984

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Rounded
 Particle Hardness: Hard and Durable

Tested By: RHB
 Test Date: 05-04-2009
 Date Received 04-23-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.8
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

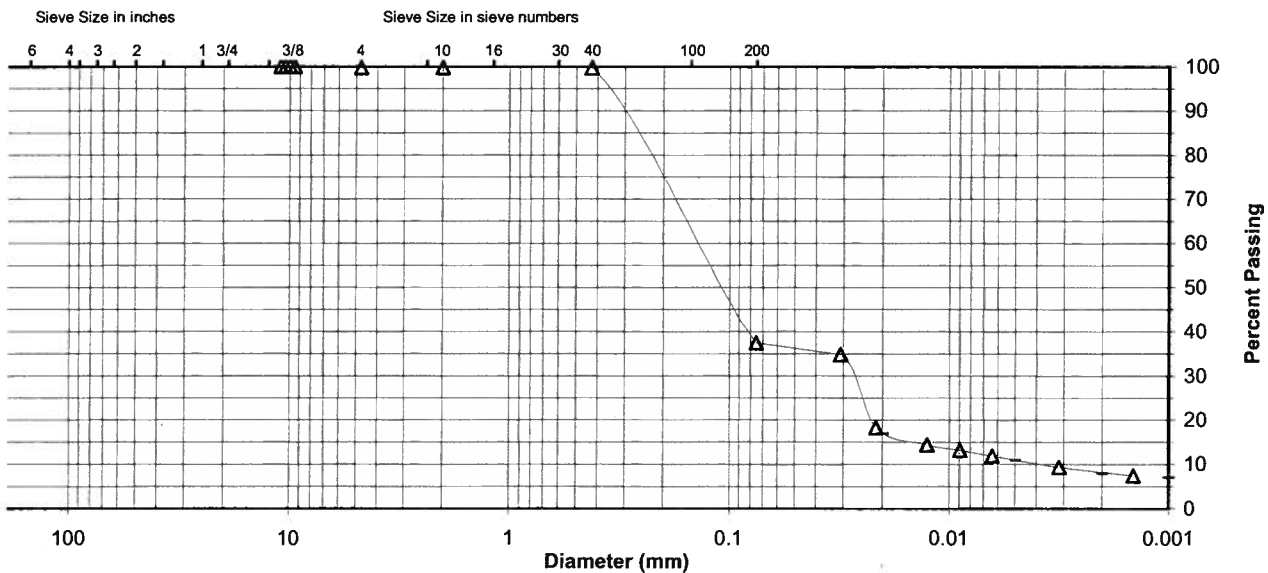
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	37.5
0.02 mm	17.0
0.005 mm	11.0
0.002 mm	8.0
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.2	0.0	0.1	62.2	26.5	11.0	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.2		0.1		62.2	29.5		8.0

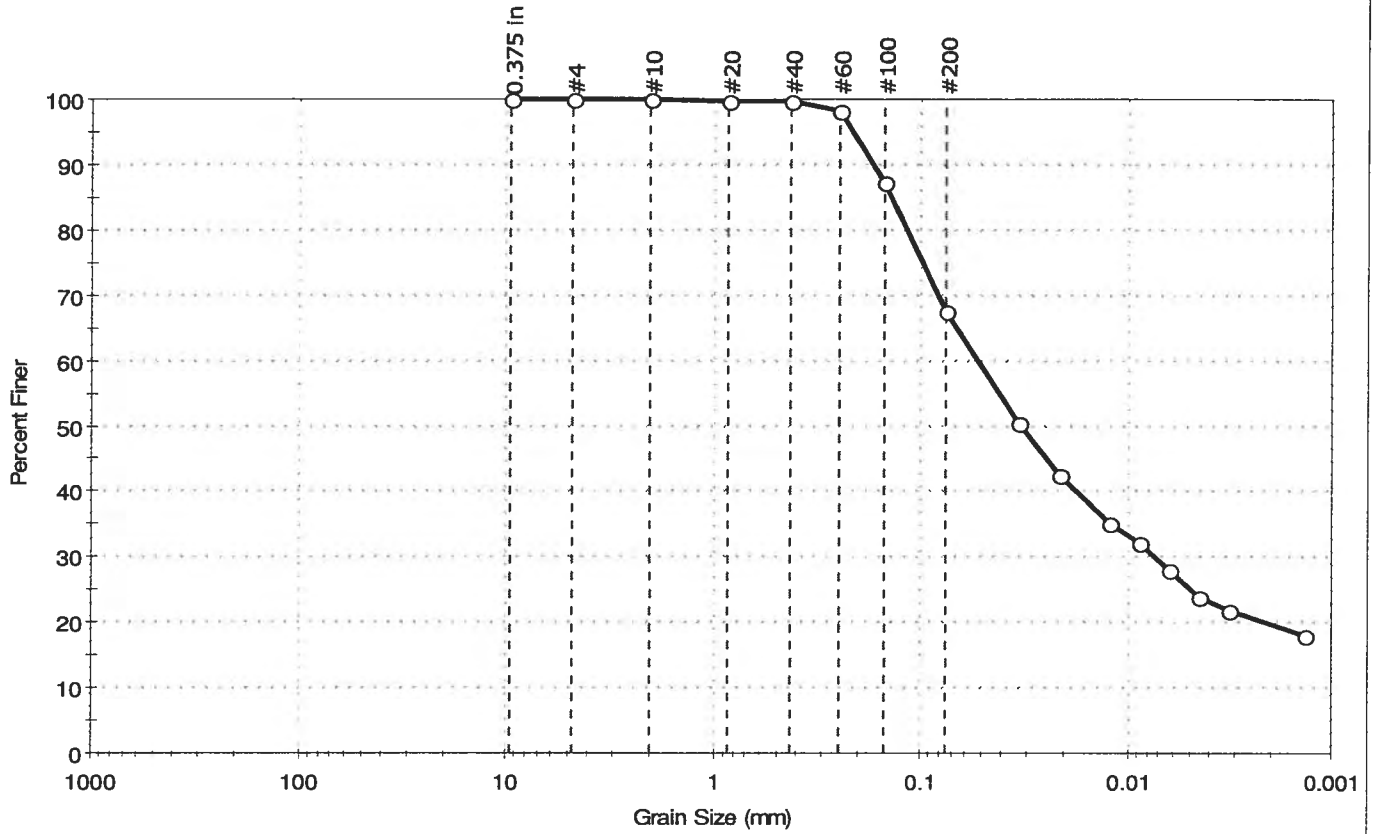


Comments _____

Reviewed By _____

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-3D	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: ST-4	Test Date: 05/17/09	Test Id: 152284	
Depth: 31.0-31.6 ft			
Test Comment: ---			
Sample Description: Moist, olive brown sandy silty clay			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.1	32.4	67.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	98		
#100	0.15	87		
#200	0.075	67		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0332	51		
---	0.0210	42		
---	0.0124	35		
---	0.0088	32		
---	0.0063	28		
---	0.0045	24		
---	0.0032	22		
---	0.0014	18		

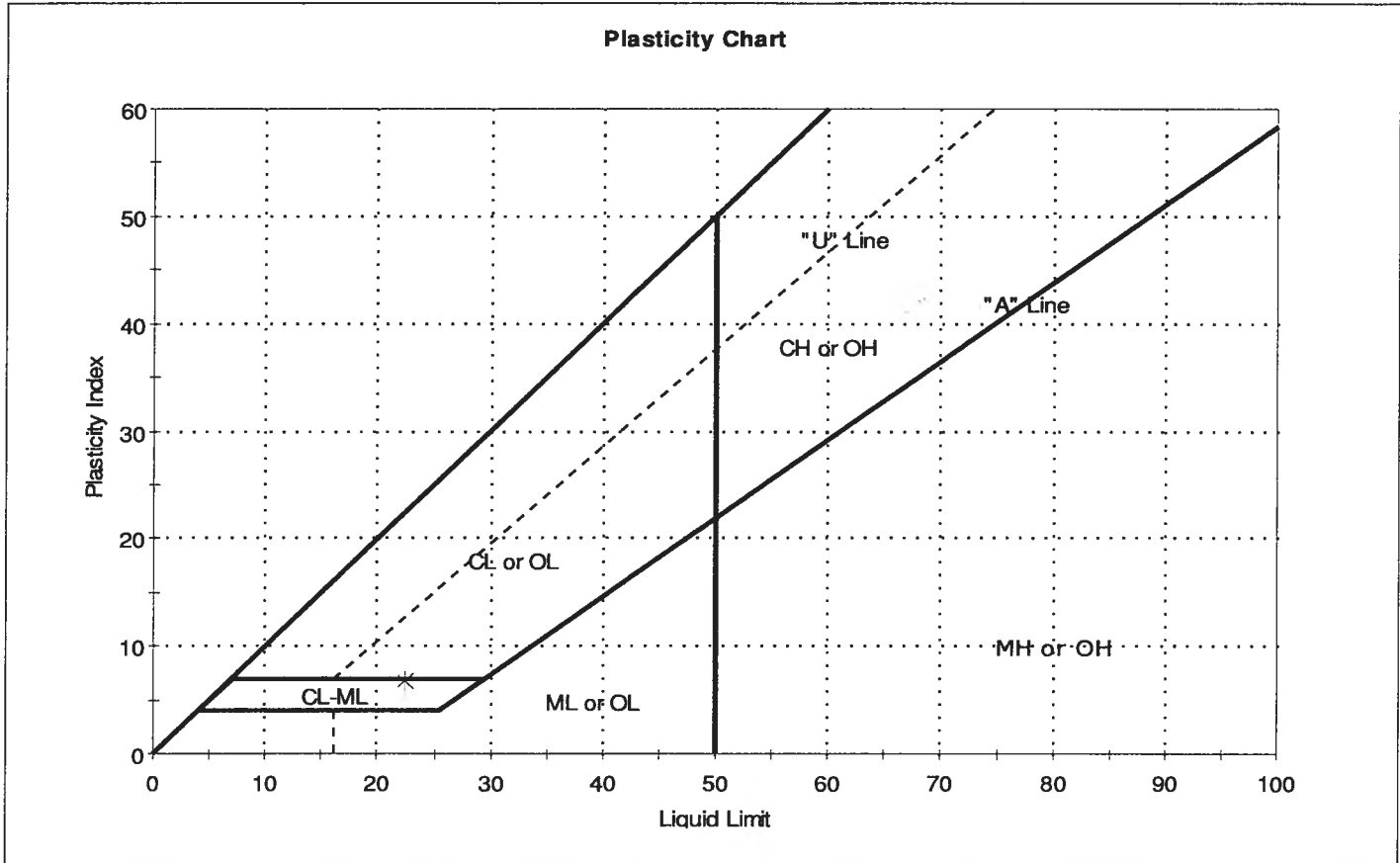
Coefficients	
D ₈₅ = 0.1379 mm	D ₃₀ = 0.0074 mm
D ₆₀ = 0.0524 mm	D ₁₅ = N/A
D ₅₀ = 0.0322 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification	
ASTM	Sandy silty clay (CL-ML)
AASHTO	Silty Soils (A-4 (1))

Sample/Test Description	
Sand/Gravel Particle Shape	: ---
Sand/Gravel Hardness	: ---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Project No: GTX-9015
Location: Roane, TN		
Boring ID: STN-3D	Sample Type: tube	Tested By: cam
Sample ID: ST-4	Test Date: 05/18/09	Checked By: jdt
Depth: 31.0-31.6 ft	Test Id: 152283	
Test Comment: ---		
Sample Description: Moist, olive brown sandy silty clay		
Sample Comment: ---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-4	STN-3D	31.0-31.6 ft	19	22	16	6	1	Sandy silty clay (CL-ML)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: SLOW

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-4, 42.5'-44.0', 44.0'-45.5' Lab ID 1023
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	100.0
No. 200	0.075	19.6
	0.02	7.4
	0.005	4.1
	0.002	3.1
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.0
Medium Sand	0.0	---
Fine Sand	80.4	80.4
Silt	15.5	16.5
Clay	4.1	3.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-4, 42.5'-44.0', 44.0'-45.5'

Project Number 171468117
 Lab ID 1023

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: N/A
 Particle Hardness: N/A

Tested By: RHB
 Test Date: 04-28-2009
 Date Received 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

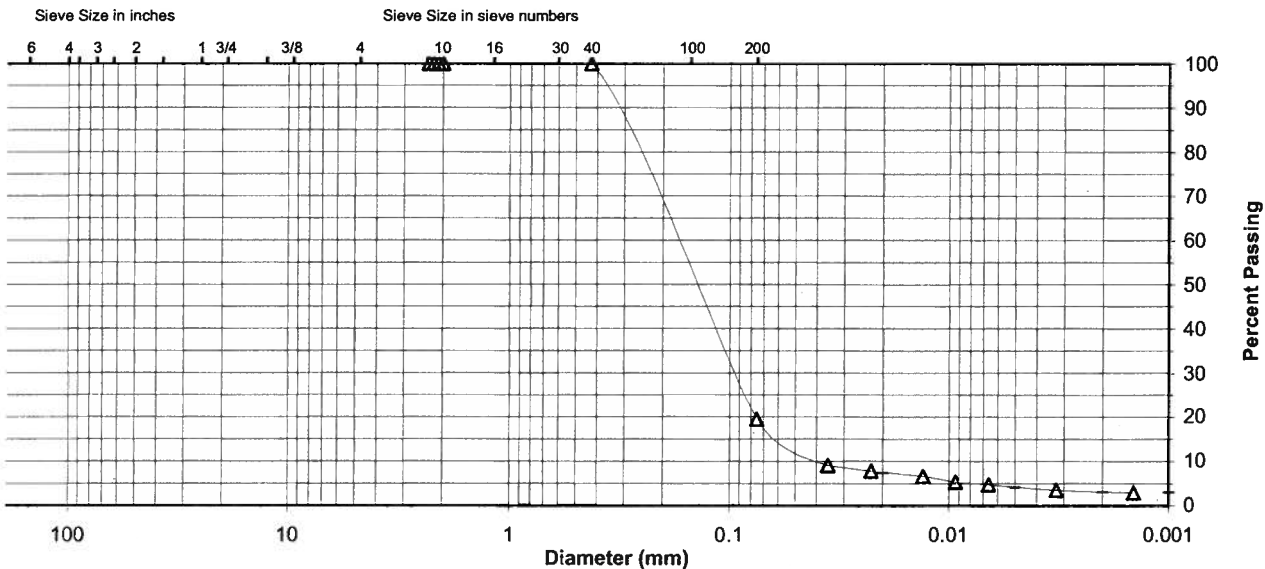
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	100.0
No. 200	19.6
0.02 mm	7.4
0.005 mm	4.1
0.002 mm	3.1
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.0	80.4	15.5	4.1
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.0	80.4	16.5		3.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-5, 6.5'-8.0', 8.0'-9.5' Lab ID 1713
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 61
 Plastic Limit: 24
 Plasticity Index: 37
 Activity Index: 0.67

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.2
No. 4	4.75	98.4
No. 10	2	97.5
No. 40	0.425	93.2
No. 200	0.075	82.0
	0.02	76.4
	0.005	61.3
	0.002	55.1
estimated	0.001	51.9

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.6	2.5
Coarse Sand	0.9	4.3
Medium Sand	4.3	—
Fine Sand	11.2	11.2
Silt	20.7	26.9
Clay	61.3	55.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.72

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-6 (32)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-5, 6.5'-8.0', 8.0'-9.5'

Project Number 171468117
 Lab ID 1713

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-20-2009
 Date Received 05-08-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.2
No. 4	98.4
No. 10	97.5

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

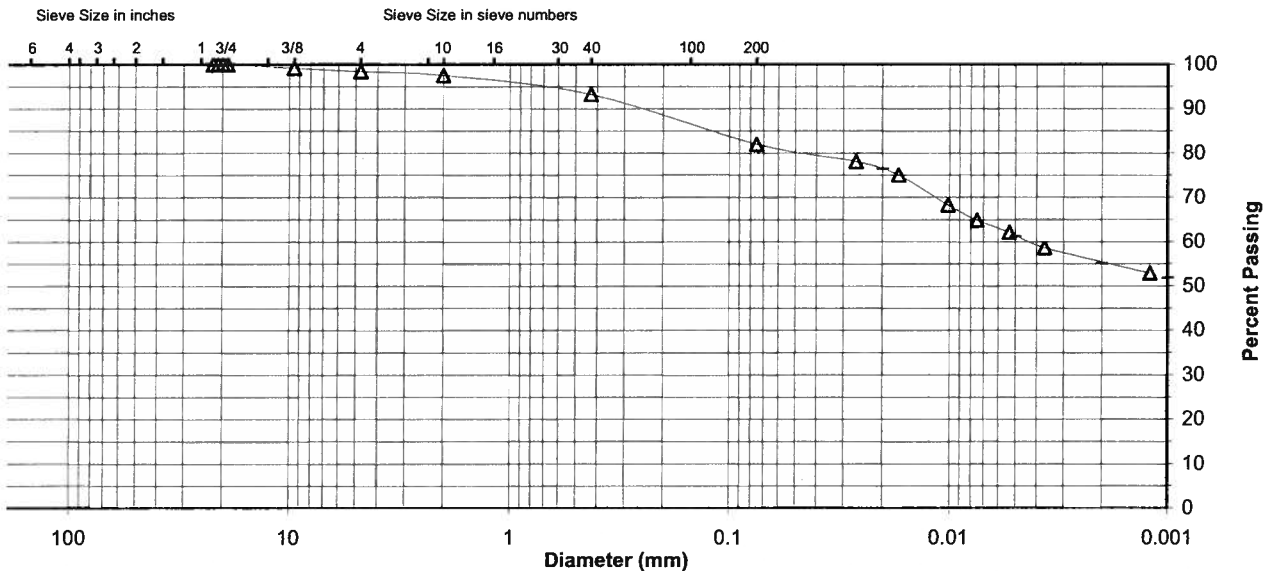
Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	93.2
No. 200	82.0
0.02 mm	76.4
0.005 mm	61.3
0.002 mm	55.1
0.001 mm	51.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.6	0.9	4.3	11.2	20.7	61.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	2.5		4.3		11.2	26.9	55.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-5, 29.5'-31.0', 31.0'-32.5' Lab ID 1728
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 26
 Plastic Limit: 17
 Plasticity Index: 9
 Activity Index: 0.43

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.8
No. 40	0.425	99.5
No. 200	0.075	61.9
	0.02	41.1
	0.005	25.2
	0.002	20.8
estimated	0.001	17.2

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.1	0.2
Coarse Sand	0.1	0.3
Medium Sand	0.3	---
Fine Sand	37.6	37.6
Silt	36.7	41.1
Clay	25.2	20.8

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-4 (3)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-5, 29.5'-31.0', 31.0'-32.5'

Project Number 171468117
 Lab ID 1728

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-20-2009
 Date Received 05-08-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.9
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

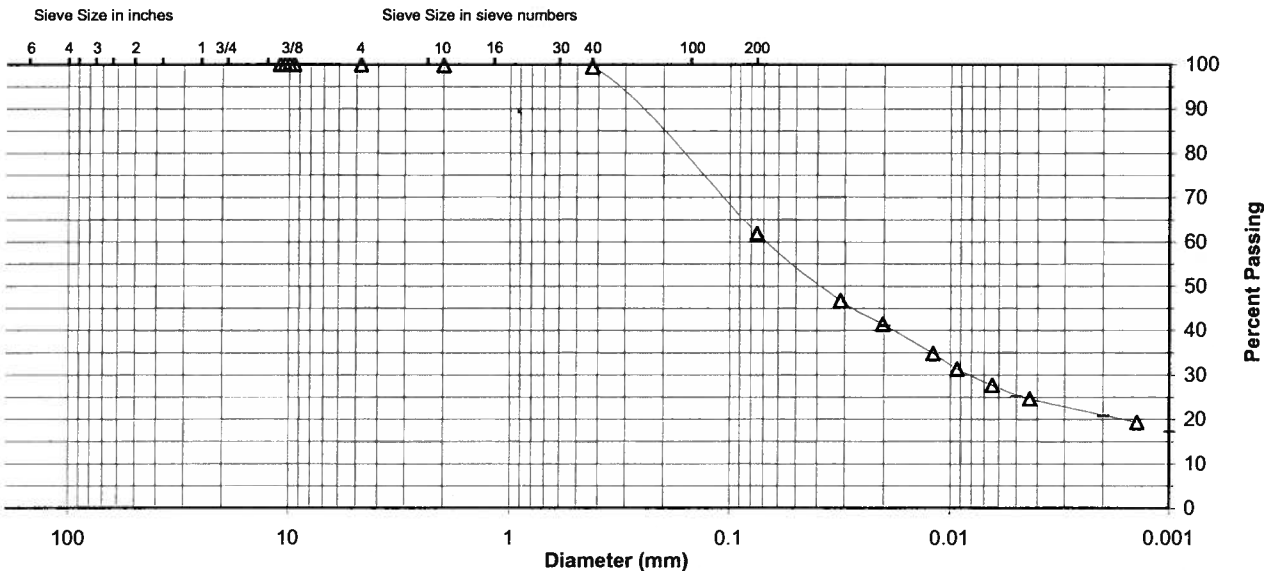
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	61.9
0.02 mm	41.1
0.005 mm	25.2
0.002 mm	20.8
0.001 mm	17.2

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.1	0.1	0.3	37.6	36.7	25.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.2		0.3		37.6	41.1	20.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name <u>Kingston Ash Pond</u> Source <u>STN-5, 40.5'-42.0', 42.0'-43.5'</u>	Project Number <u>171468117</u> Lab ID <u>1735</u>
County <u>Roane (TN)</u> Sample Type <u>SPT Comp</u>	Date Received <u>5-8-09</u> Date Reported <u>6-5-09</u>

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	
		Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.0
No. 200	0.075	31.3
	0.02	15.8
	0.005	9.9
	0.002	7.6
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.0
Medium Sand	1.0	---
Fine Sand	67.7	67.7
Silt	21.4	23.7
Clay	9.9	7.6

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand

AASHTO Classification: A-2-4 (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-5, 40.5'-42.0', 42.0'-43.5'

 Project Number 171468117
 Lab ID 1735
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: Angular
 Particle Hardness: Hard and Durable

 Tested By: BWT
 Test Date: 05-20-2009
 Date Received 05-08-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

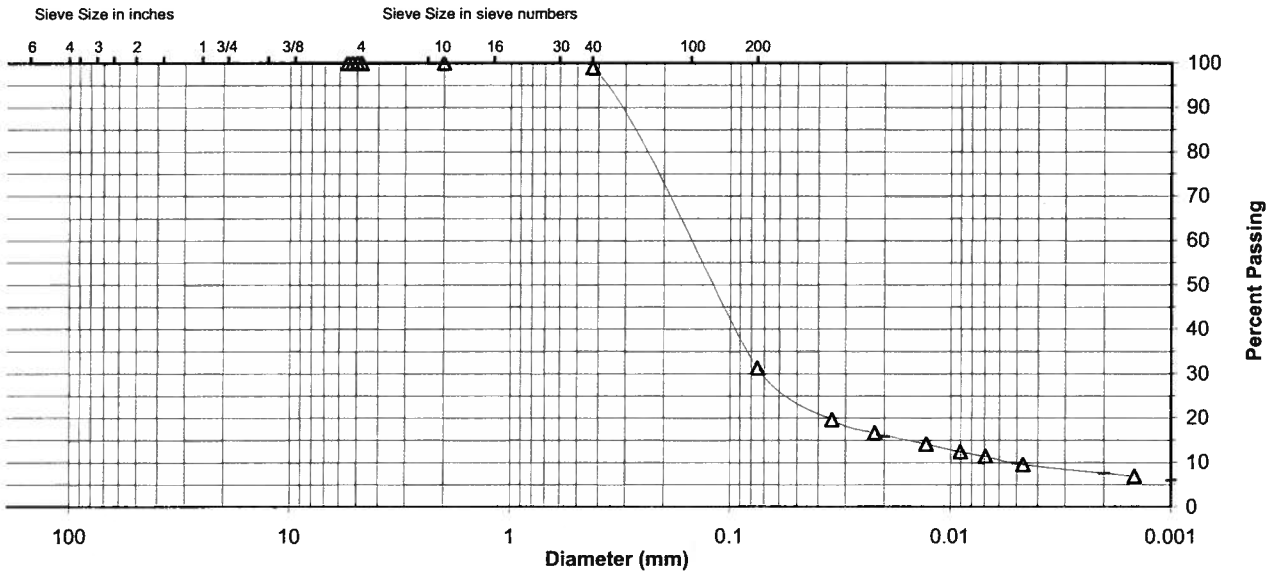
 Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.0
No. 200	31.3
0.02 mm	15.8
0.005 mm	9.9
0.002 mm	7.6
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.0	67.7	21.4	9.9
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		1.0	67.7	23.7		7.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-6, 6.0'-7.5', 7.5'-9.0' Lab ID 1788
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.3
No. 4	4.75	96.0
No. 10	2	91.6
No. 40	0.425	79.9
No. 200	0.075	57.4
	0.02	33.4
	0.005	12.2
	0.002	8.2
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	4.0	8.4
Coarse Sand	4.4	11.7
Medium Sand	11.7	---
Fine Sand	22.5	22.5
Silt	45.2	49.2
Clay	12.2	8.2

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.40

Classification

Unified Group Symbol: ML
 Group Name: Sandy silt
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-6, 6.0'-7.5', 7.5'-9.0'

Project Number 171468117
 Lab ID 1788

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-20-2009
 Date Received 05-08-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.3
No. 4	96.0
No. 10	91.6

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

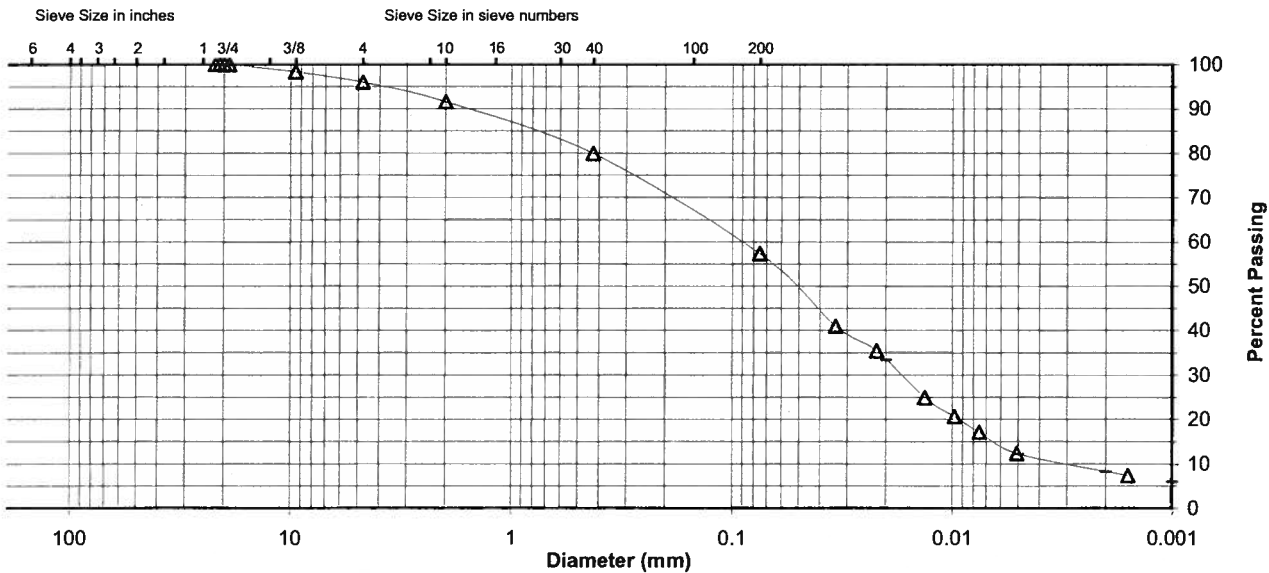
Specific Gravity 2.4

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	79.9
No. 200	57.4
0.02 mm	33.4
0.005 mm	12.2
0.002 mm	8.2
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	4.0	4.4	11.7	22.5	45.2	12.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	8.4		11.7		22.5	49.2	8.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-6, 46.5'-48.0', 48.0'-49.5' Lab ID 1816
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 18
 Plastic Limit: 15
 Plasticity Index: 3
 Activity Index: 0.19

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.7
No. 10	2	99.5
No. 40	0.425	99.2
No. 200	0.075	51.9
	0.02	30.4
	0.005	19.9
	0.002	15.7
estimated	0.001	13.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.63

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.3	0.5
Coarse Sand	0.2	0.3
Medium Sand	0.3	---
Fine Sand	47.3	47.3
Silt	32.0	36.2
Clay	19.9	15.7

Classification
 Unified Group Symbol: ML
 Group Name: Sandy silt
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-6, 46.5'-48.0', 48.0'-49.5'

Project Number 171468117
Lab ID 1816

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-20-2009
Date Received 05-08-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.7
No. 10	99.5

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

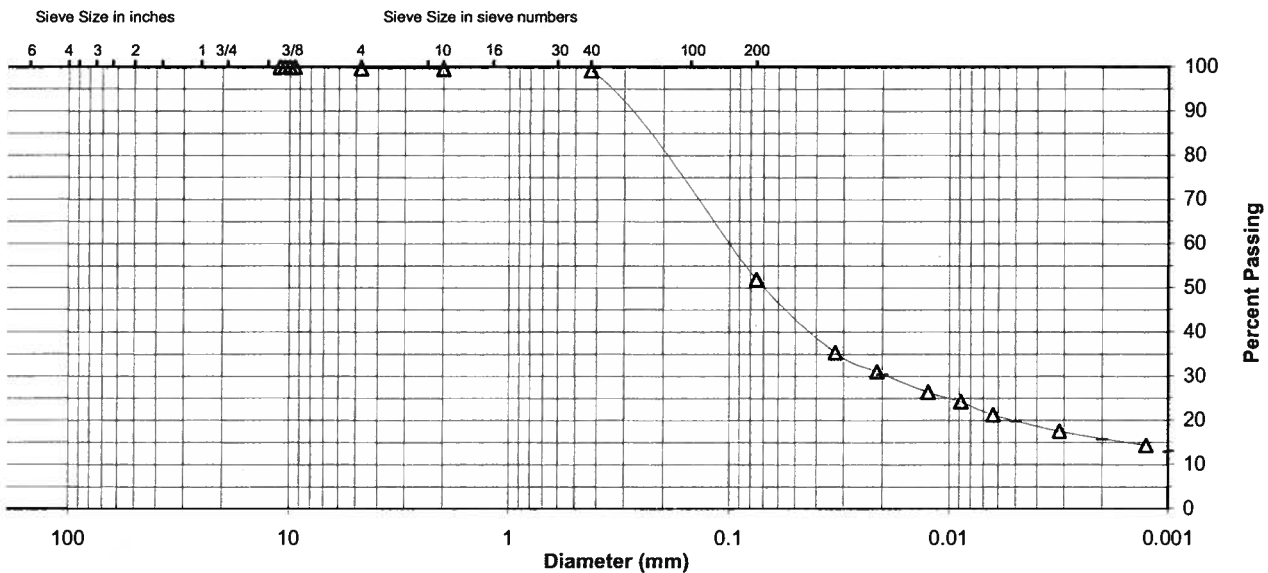
Specific Gravity 2.63

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.2
No. 200	51.9
0.02 mm	30.4
0.005 mm	19.9
0.002 mm	15.7
0.001 mm	13.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.3	0.2	0.3	47.3	32.0	19.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	0.5		0.3		47.3	36.2	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-8, 15.5'-16.0' Lab ID 555
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 20.6

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.8
No. 10	2	99.8
No. 40	0.425	99.4
No. 200	0.075	63.1
	0.02	37.7
	0.005	25.9
	0.002	20.9
estimated	0.001	17.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.2	0.2
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	36.3	36.3
Silt	37.2	42.2
Clay	25.9	20.9

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 23
 Plastic Limit: 15
 Plasticity Index: 8
 Activity Index: 0.38

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-4 (2)

Comments: _____



Project Name Kingston Ash Pond
Source STN-8, 15.5'-16.0'

Project Number 175569042
Lab ID 555

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-09-2009
Date Received 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.8
No. 10	99.8

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

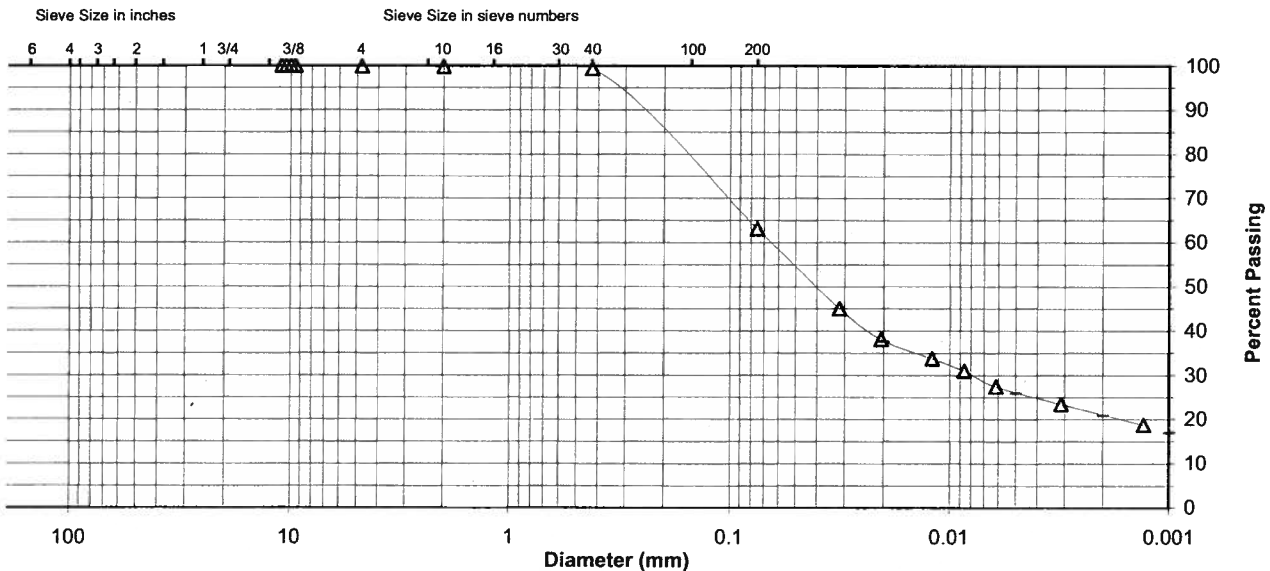
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.4
No. 200	63.1
0.02 mm	37.7
0.005 mm	25.9
0.002 mm	20.9
0.001 mm	17.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.2	0.0	0.4	36.3	37.2	25.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.2		0.4		36.3	42.2	20.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-8, 22.0'-23.5', 23.5'-25.0' Lab ID 1177
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	19.4
	0.02	8.6
	0.005	6.4
	0.002	5.2
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	80.2	80.2
Silt	13.0	14.2
Clay	6.4	5.2

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.73

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-8, 22.0'-23.5', 23.5'-25.0'

Project Number 171468117
Lab ID 1177

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: RHB
Test Date: 04-29-2009
Date Received: 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

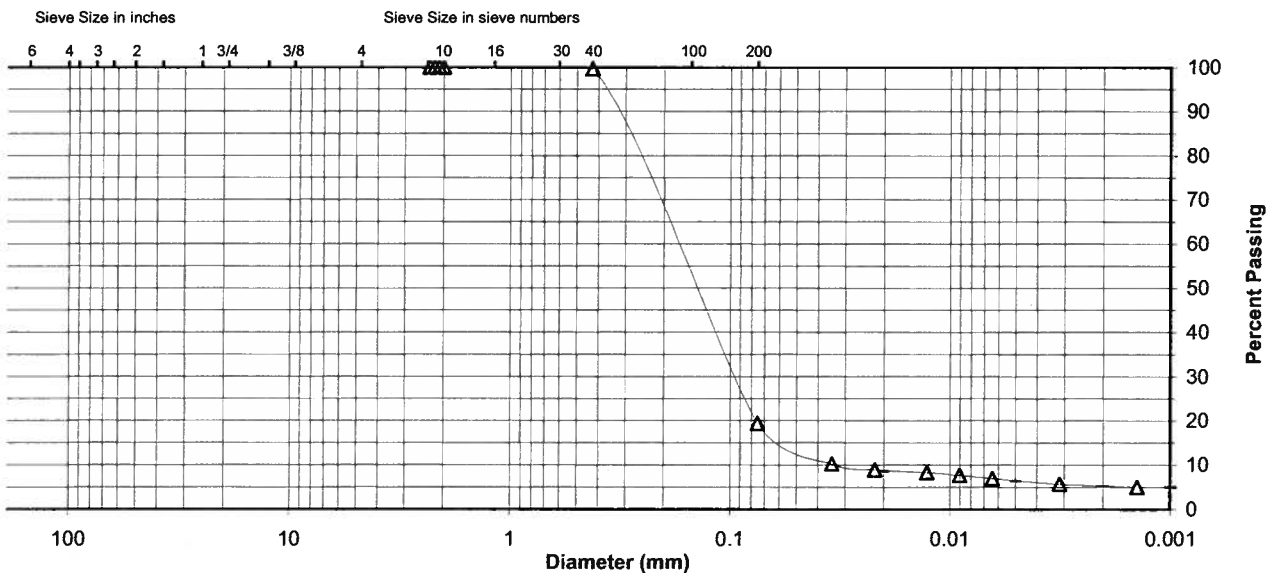
Specific Gravity 2.73

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	19.4
0.02 mm	8.6
0.005 mm	6.4
0.002 mm	5.2
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	80.2	13.0	6.4
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.4		80.2	14.2	5.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-8, 49.0'-50.5', 50.5'-52.0' Lab ID 1196
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.2
No. 4	4.75	91.1
No. 10	2	89.4
No. 40	0.425	83.1
No. 200	0.075	11.6
	0.02	4.1
	0.005	3.3
	0.002	2.7
estimated	0.001	2.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	8.9	10.6
Coarse Sand	1.7	6.3
Medium Sand	6.3	---
Fine Sand	71.5	71.5
Silt	8.3	8.9
Clay	3.3	2.7

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: SP-SM
 Group Name: Poorly graded sand with silt
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-8, 49.0'-50.5', 50.5'-52.0'

Project Number 171468117
Lab ID 1196

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded and Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 05-05-2009
Date Received: 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.2
No. 4	91.1
No. 10	89.4

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

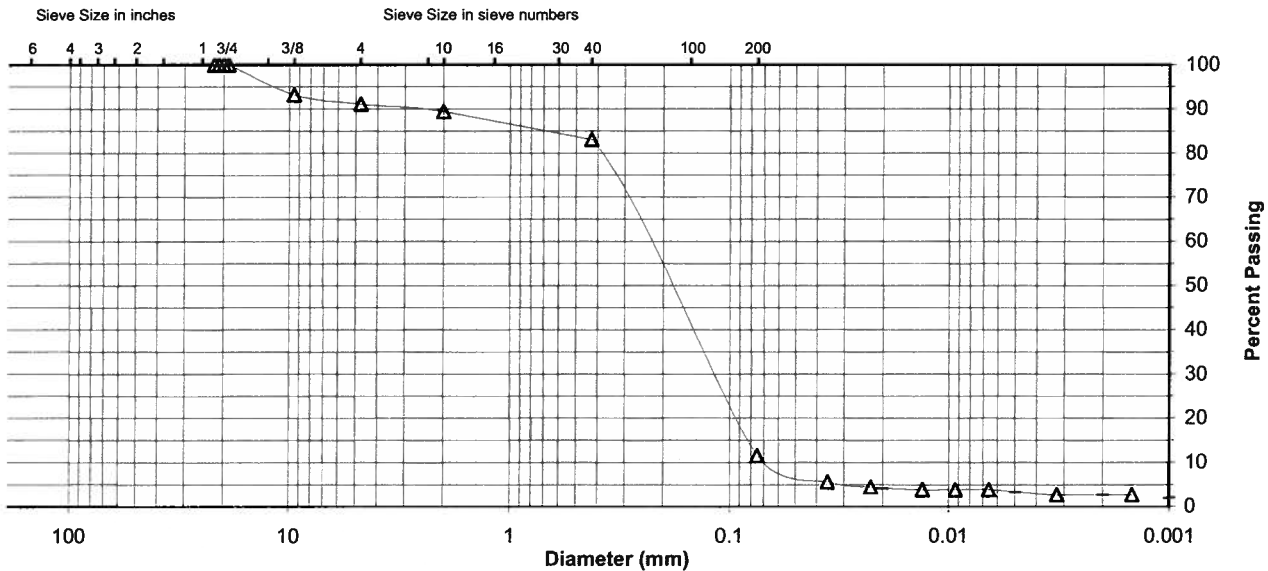
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	83.1
No. 200	11.6
0.02 mm	4.1
0.005 mm	3.3
0.002 mm	2.7
0.001 mm	2.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	8.9	1.7	6.3	71.5	8.3	3.3	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	10.6		6.3		71.5	8.9		2.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-9, 25.0'-26.5', 26.5'-28.0' Lab ID 1216
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-14-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	95.7
No. 4	4.75	91.1
No. 10	2	88.9
No. 40	0.425	85.7
No. 200	0.075	34.1
	0.02	15.3
	0.005	9.1
	0.002	7.7
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	8.9	11.1
Coarse Sand	2.2	3.2
Medium Sand	3.2	---
Fine Sand	51.6	51.6
Silt	25.0	26.4
Clay	9.1	7.7

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.63

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-9, 25.0'-26.5', 26.5'-28.0'

Project Number 171468117
Lab ID 1216

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 05-05-2009
Date Received: 04-23-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	95.7
No. 4	91.1
No. 10	88.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

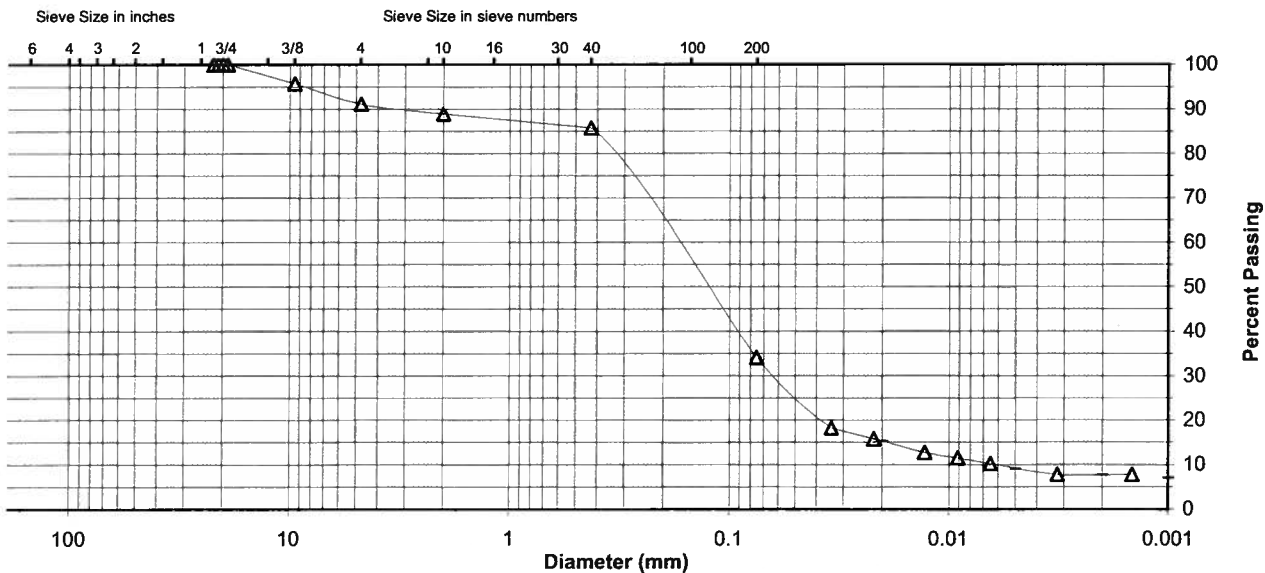
Specific Gravity 2.63

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.7
No. 200	34.1
0.02 mm	15.3
0.005 mm	9.1
0.002 mm	7.7
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	8.9	2.2	3.2	51.6	25.0	9.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	11.1		3.2		51.6	26.4	7.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-9, 49.0'-50.5', 50.5'-52.0', 52.0'-53.5' Lab ID 1233
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	19.7
	0.02	8.6
	0.005	6.0
	0.002	4.4
estimated	0.001	4.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	80.0	80.0
Silt	13.7	15.3
Clay	6.0	4.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-9, 49.0'-50.5', 50.5'-52.0', 52.0'-53.5'

Project Number 171468117
Lab ID 1233

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 04-29-2009
Date Received 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

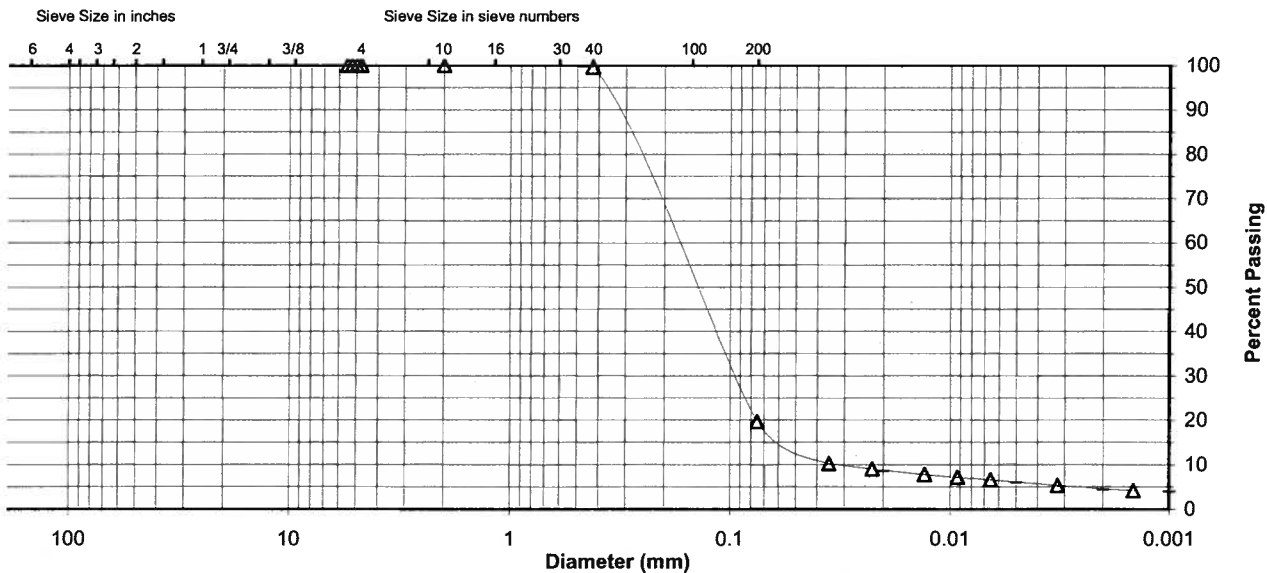
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	19.7
0.02 mm	8.6
0.005 mm	6.0
0.002 mm	4.4
0.001 mm	4.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.3	80.0	13.7	6.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.3		80.0	15.3	4.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-10, 43.0'-44.5', 44.5'-46.0' Lab ID 1620
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 21
 Plastic Limit: 16
 Plasticity Index: 5
 Activity Index: 0.36

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.3
No. 200	0.075	58.3
	0.02	31.9
	0.005	18.4
	0.002	14.2
estimated	0.001	12.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.7
Medium Sand	0.7	---
Fine Sand	41.0	41.0
Silt	39.9	44.1
Clay	18.4	14.2

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay

AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-10, 43.0'-44.5', 44.5'-46.0'

Project Number 171468117
 Lab ID 1620

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Rounded
 Particle Hardness: Hard and Durable

Tested By: CM
 Test Date: 05-19-2009
 Date Received 05-08-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

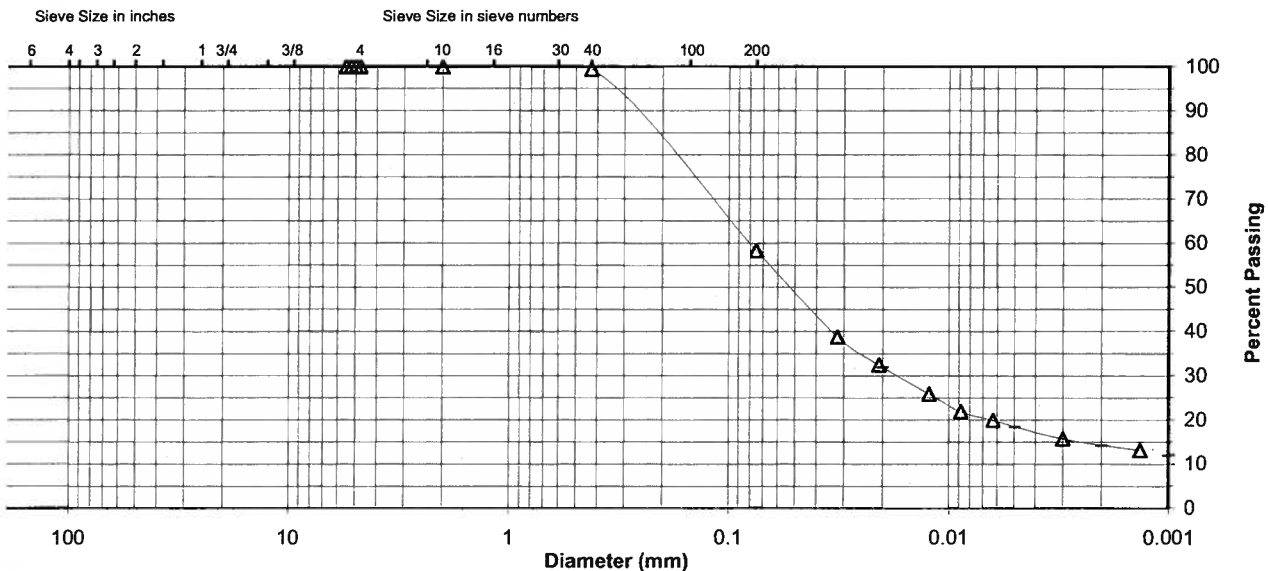
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	58.3
0.02 mm	31.9
0.005 mm	18.4
0.002 mm	14.2
0.001 mm	12.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.7	41.0	39.9	18.4
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.7		41.0	44.1	14.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-10, 52.0'-53.5', 53.5'-55.0' Lab ID 1627
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.4
No. 200	0.075	41.1
	0.02	23.2
	0.005	13.2
	0.002	10.0
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.6
Medium Sand	0.6	---
Fine Sand	58.3	58.3
Silt	27.9	31.1
Clay	13.2	10.0

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.62

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-10, 52.0'-53.5', 53.5'-55.0'

Project Number 171468117
 Lab ID 1627

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Soft

Tested By: CM
 Test Date: 05-19-2009
 Date Received 05-08-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

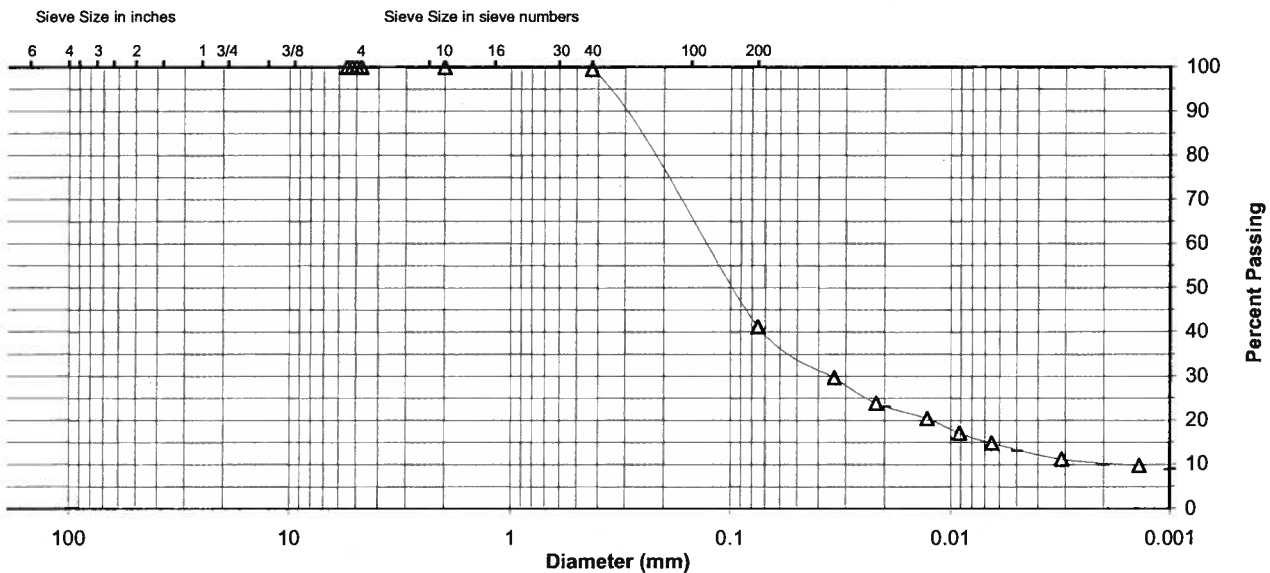
Specific Gravity 2.62

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.4
No. 200	41.1
0.02 mm	23.2
0.005 mm	13.2
0.002 mm	10.0
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.6	58.3	27.9	13.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.6		58.3	31.1	10.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-11, 9.0'-10.5', 10.5'-12.0' Lab ID 91
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 46
 Plastic Limit: 18
 Plasticity Index: 28
 Activity Index: 0.65

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.7
No. 4	4.75	98.2
No. 10	2	96.9
No. 40	0.425	91.1
No. 200	0.075	76.3
	0.02	64.9
	0.005	51.1
	0.002	43.3
estimated	0.001	40.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.8	3.1
Coarse Sand	1.3	5.8
Medium Sand	5.8	---
Fine Sand	14.8	14.8
Silt	25.2	33.0
Clay	51.1	43.3

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification
 Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-7-6 (20)

Comments: _____



Project Name Kingston Ash Pond
Source STN-11, 9.0'-10.5', 10.5'-12.0'

Project Number 175569042
Lab ID 91

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-26-2009
Date Received 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.7
No. 4	98.2
No. 10	96.9

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

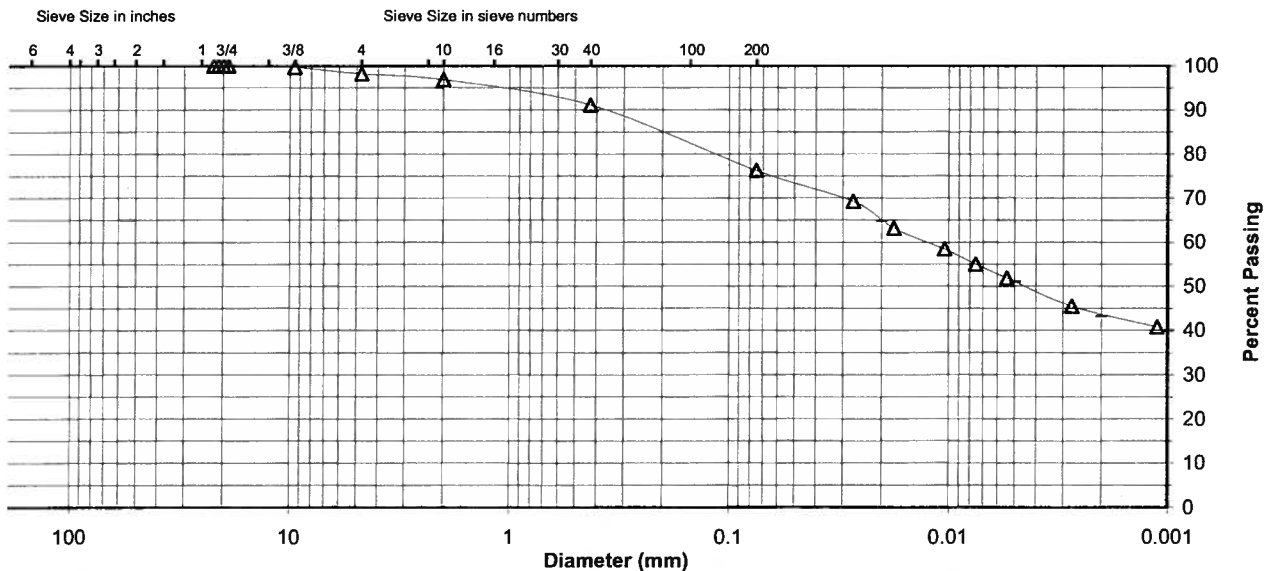
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	91.1
No. 200	76.3
0.02 mm	64.9
0.005 mm	51.1
0.002 mm	43.3
0.001 mm	40.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.8	1.3	5.8	14.8	25.2	51.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	3.1		5.8		14.8	33.0	43.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-11, 37.5'-39.0', 39.0'-40.5' Lab ID 111
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.7
No. 40	0.425	99.2
No. 200	0.075	43.8
	0.02	22.0
	0.005	15.3
	0.002	11.8
estimated	0.001	10.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.1	0.3
Coarse Sand	0.2	0.5
Medium Sand	0.5	---
Fine Sand	55.4	55.4
Silt	28.5	32.0
Clay	15.3	11.8

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-11, 37.5'-39.0', 39.0'-40.5'

Project Number 175569042
Lab ID 111

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CM
Test Date: 05-28-2009
Date Received 05-22-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.9
No. 10	99.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

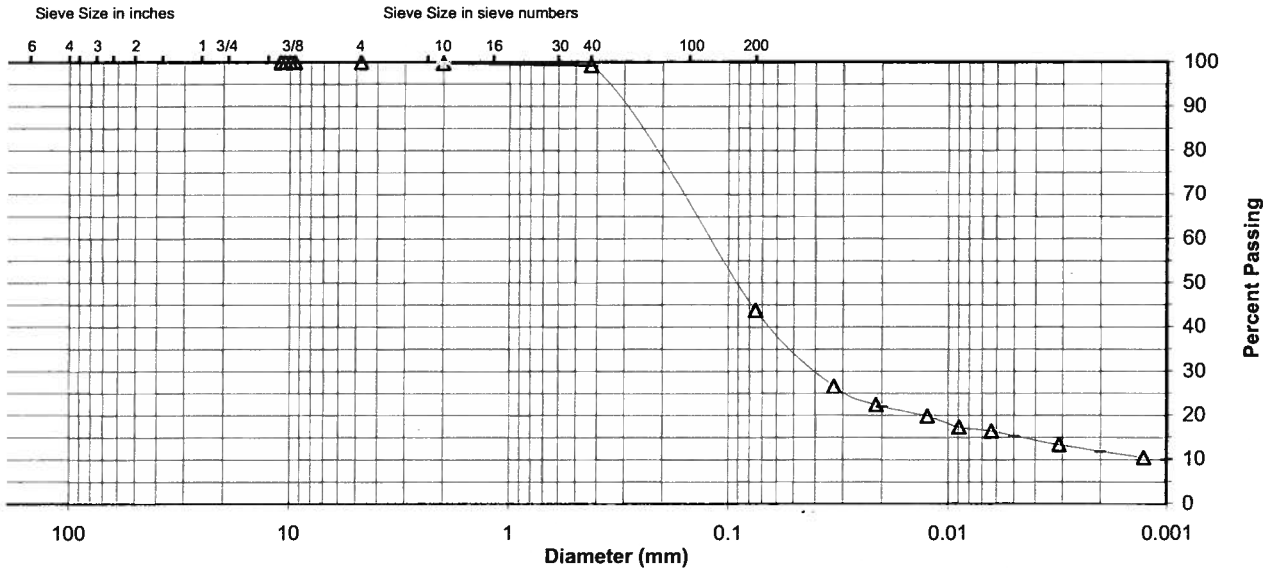
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.2
No. 200	43.8
0.02 mm	22.0
0.005 mm	15.3
0.002 mm	11.8
0.001 mm	10.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.1	0.2	0.5	55.4	28.5	15.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	0.3		0.5		55.4	11.8	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-12, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0' Lab ID 132
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 51
 Plastic Limit: 20
 Plasticity Index: 31
 Activity Index: 0.78

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	94.9
3/8"	9.5	91.2
No. 4	4.75	86.3
No. 10	2	79.3
No. 40	0.425	75.0
No. 200	0.075	65.1
	0.02	56.7
	0.005	46.9
	0.002	39.9
estimated	0.001	36.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	13.7	20.7
Coarse Sand	7.0	4.3
Medium Sand	4.3	—
Fine Sand	9.9	9.9
Silt	18.2	25.2
Clay	46.9	39.9

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CH/CL
 Group Name: Sandy fat clay

AASHTO Classification: A-7-6 (18)

Comments: _____



Project Name Kingston Ash Pond
Source STN-12, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'

Project Number 175569042
Lab ID 132

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CM
Test Date: 05-28-2009
Date Received 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	94.9
3/8"	91.2
No. 4	86.3
No. 10	79.3

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

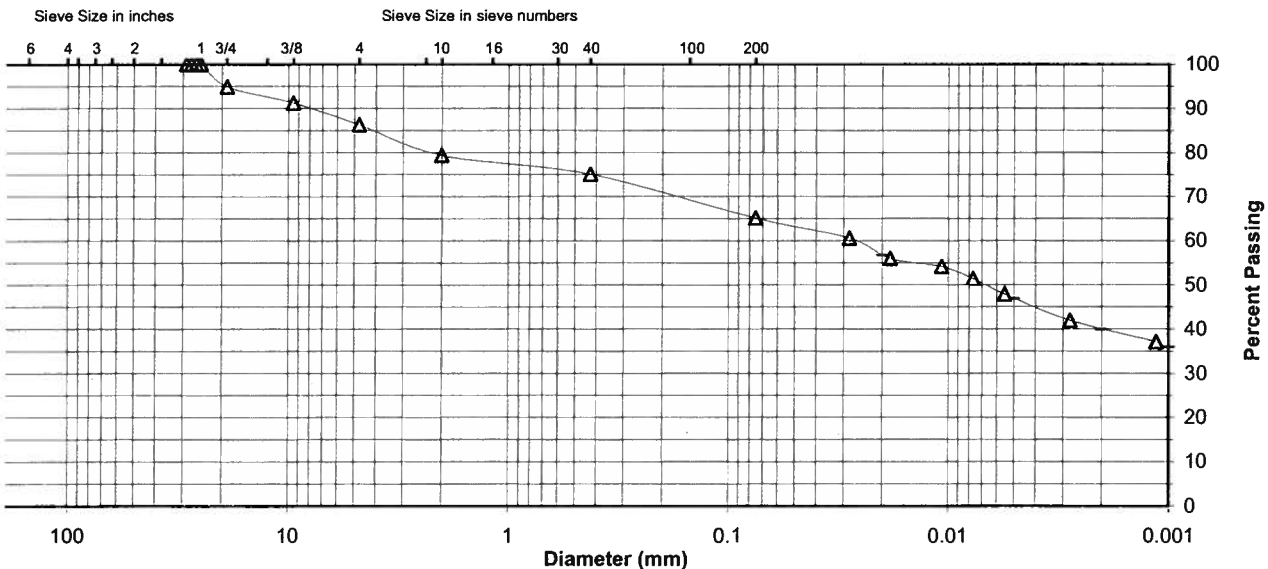
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	75.0
No. 200	65.1
0.02 mm	56.7
0.005 mm	46.9
0.002 mm	39.9
0.001 mm	36.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	5.1	8.6	7.0	4.3	9.9	18.2	46.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	20.7		4.3		9.9	25.2	39.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-12, 40.0'-41.5', 41.5'-43.0' Lab ID 154
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 24
 Plastic Limit: 18
 Plasticity Index: 6
 Activity Index: 0.33

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.3
No. 200	0.075	62.0
	0.02	35.0
	0.005	23.9
	0.002	18.0
estimated	0.001	16.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.6
Medium Sand	0.6	---
Fine Sand	37.3	37.3
Silt	38.1	44.0
Clay	23.9	18.0

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay

AASHTO Classification: A-4 (1)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-12, 40.0'-41.5', 41.5'-43.0'

Project Number 175569042
 Lab ID 154

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: DG
 Test Date: 05-27-2009
 Date Received 05-22-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

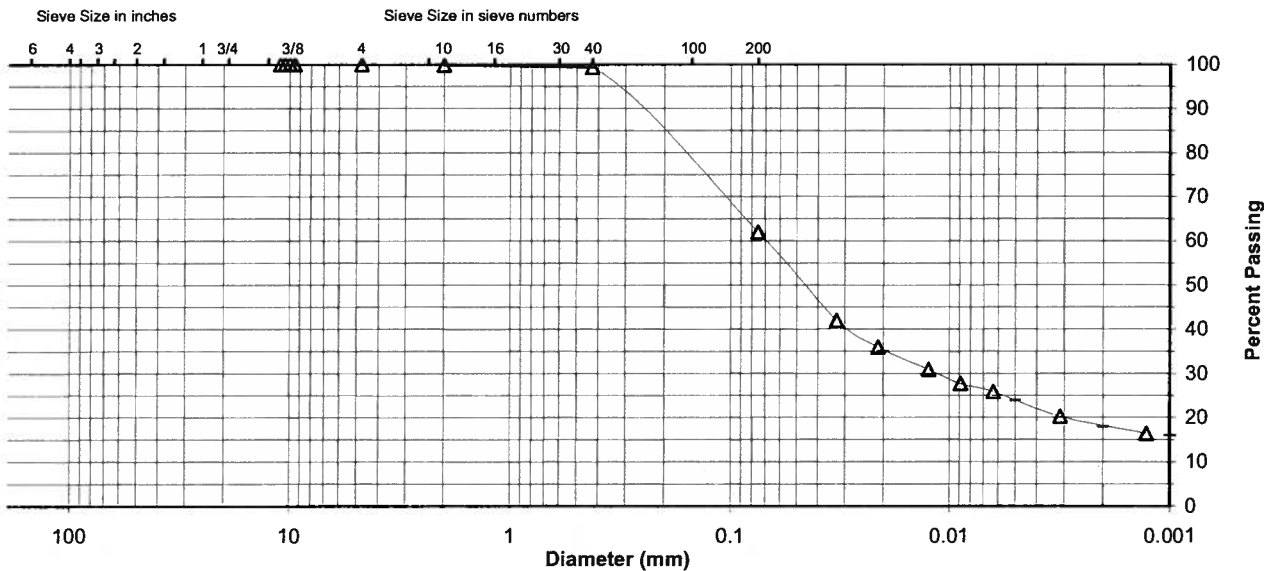
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	62.0
0.02 mm	35.0
0.005 mm	23.9
0.002 mm	18.0
0.001 mm	16.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	0.6	37.3	38.1	23.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.1		0.6		37.3	44.0	18.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-12, 50.5'-52.0', 52.0'-53.5' Lab ID 162
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	31.7
	0.02	15.0
	0.005	11.1
	0.002	8.9
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	68.0	68.0
Silt	20.6	22.8
Clay	11.1	8.9

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
 Group Name: Silty sand

AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-12, 50.5'-52.0', 52.0'-53.5'

Project Number 175569042
Lab ID 162

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DG
Test Date: 05-27-2009
Date Received 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

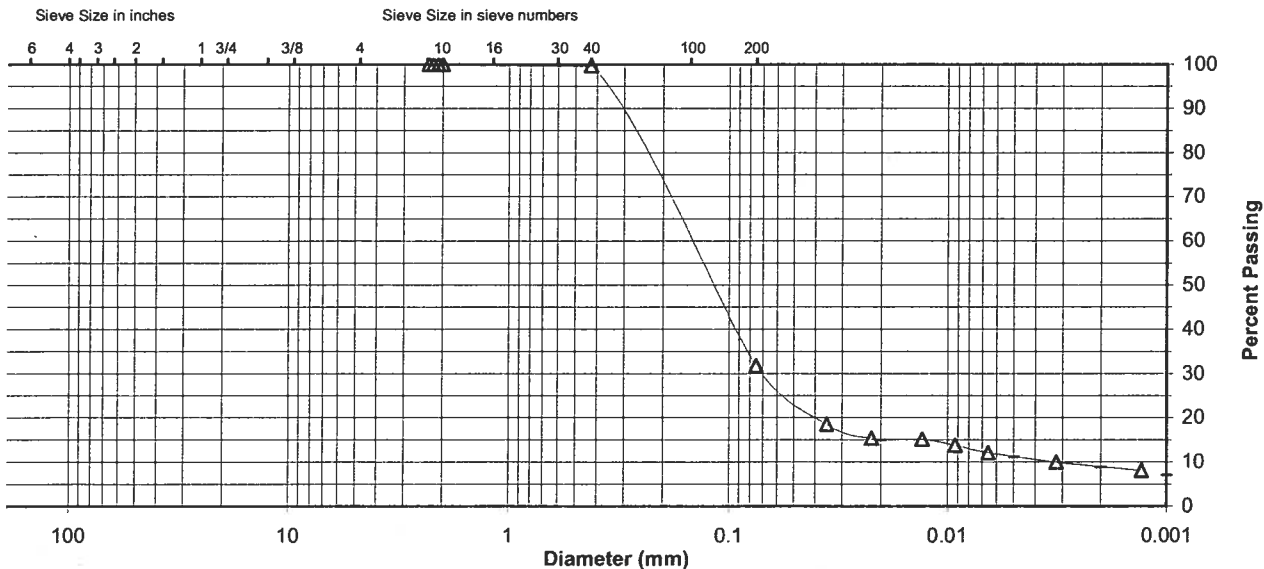
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	31.7
0.02 mm	15.0
0.005 mm	11.1
0.002 mm	8.9
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.3	68.0	20.6	11.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.3		68.0	22.8	8.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-14, 1.5'-3.0', 3.0'-4.5' Lab ID 802
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 41
 Plastic Limit: 21
 Plasticity Index: 20
 Activity Index: 0.80

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.4
No. 4	4.75	94.8
No. 10	2	89.0
No. 40	0.425	74.2
No. 200	0.075	57.6
	0.02	43.7
	0.005	30.1
	0.002	24.7
estimated	0.001	22.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.2	11.0
Coarse Sand	5.8	14.8
Medium Sand	14.8	—
Fine Sand	16.6	16.6
Silt	27.5	32.9
Clay	30.1	24.7

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-7-6 (9)

Comments: _____



Project Name Kingston Ash Pond
Source STN-14, 1.5'-3.0', 3.0'-4.5'

Project Number 171468117
Lab ID 802

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2009
Date Received 04-14-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.4
No. 4	94.8
No. 10	89.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

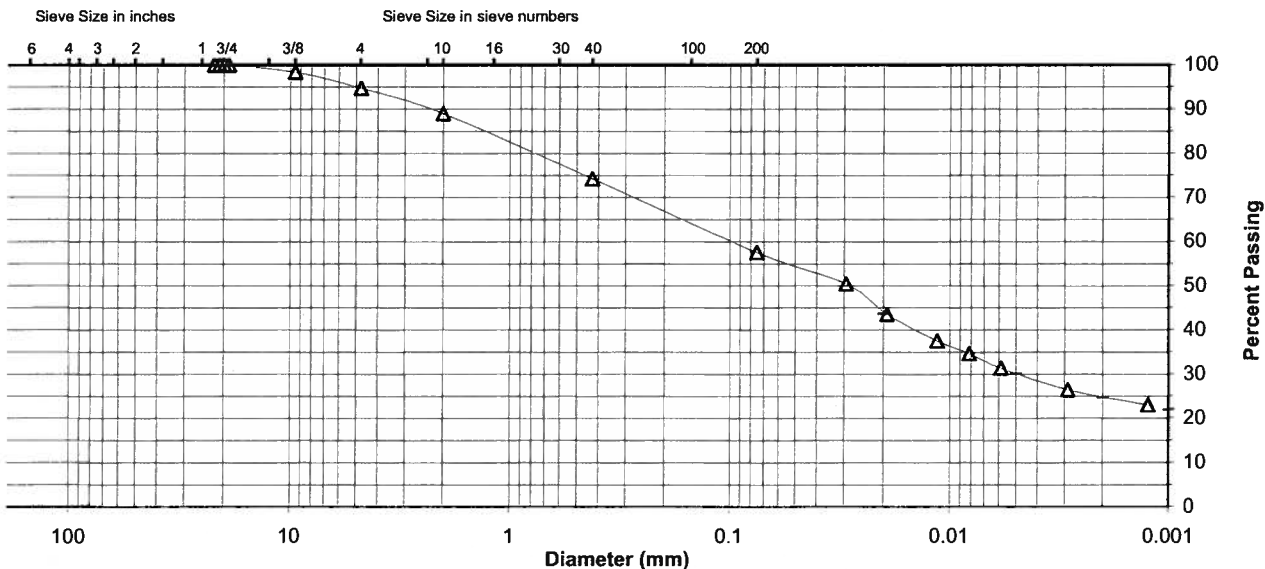
Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	74.2
No. 200	57.6
0.02 mm	43.7
0.005 mm	30.1
0.002 mm	24.7
0.001 mm	22.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.2	5.8	14.8	16.6	27.5	30.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	11.0		14.8		16.6	32.9	24.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-14, 24.2'-24.7' Lab ID 513
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content
 Test Method: ASTM D 2216
 Moisture Content (%): 19.2

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 22
 Plastic Limit: 17
 Plasticity Index: 5
 Activity Index: 0.29

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.3
No. 200	0.075	65.2
	0.02	39.0
	0.005	22.5
	0.002	17.1
estimated	0.001	13.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.7
Medium Sand	0.7	---
Fine Sand	34.1	34.1
Silt	42.7	48.1
Clay	22.5	17.1

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay
 AASHTO Classification: A-4 (1)

Comments: _____



Project Name Kingston Ash Pond
Source STN-14, 24.2'-24.7'

Project Number 175569042
Lab ID 513

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: CSM
Test Date: 06-17-2009
Date Received: 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

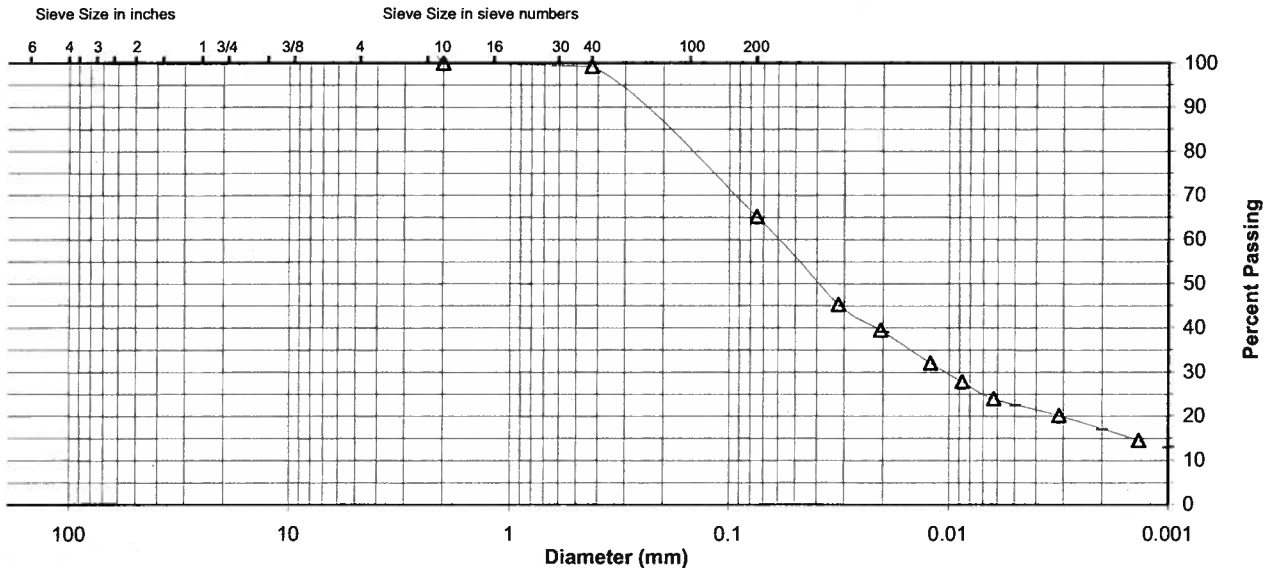
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	65.2
0.02 mm	39.0
0.005 mm	22.5
0.002 mm	17.1
0.001 mm	13.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.7	34.1	42.7	22.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.7		34.1	48.1	17.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-14, 31.5'-33.0', 33.0'-34.5' Lab ID 819
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.2
No. 200	0.075	24.9
	0.02	12.4
	0.005	10.1
	0.002	8.3
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.8
Medium Sand	0.8	---
Fine Sand	74.3	74.3
Silt	14.8	16.6
Clay	10.1	8.3

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-14, 31.5'-33.0', 33.0'-34.5'

Project Number 171468117
Lab ID 819

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-27-2009
Date Received: 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

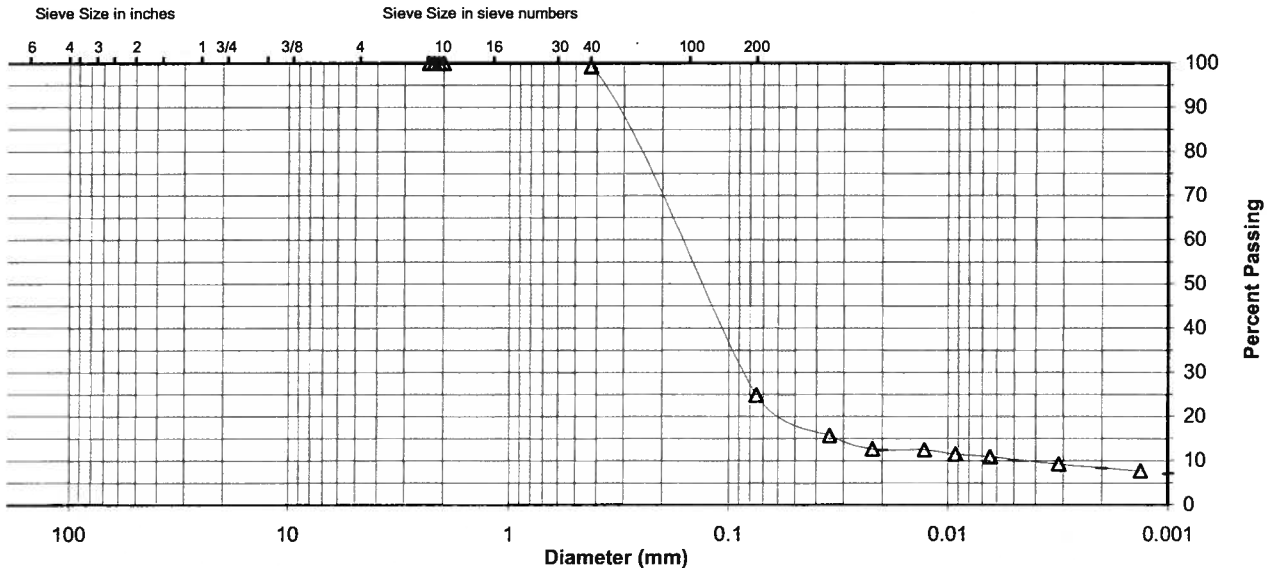
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.2
No. 200	24.9
0.02 mm	12.4
0.005 mm	10.1
0.002 mm	8.3
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.8	74.3	14.8	10.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.8		74.3	16.6	8.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-15, 12.0'-12.5' Lab ID 511
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content
 Test Method: ASTM D 2216
 Moisture Content (%): 30.3

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 55
 Plastic Limit: 23
 Plasticity Index: 32
 Activity Index: 0.80

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.8
No. 4	4.75	97.6
No. 10	2	73.1
No. 40	0.425	68.4
No. 200	0.075	62.1
	0.02	56.7
	0.005	47.6
	0.002	40.3
estimated	0.001	38.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	2.4	26.9
Coarse Sand	24.5	4.7
Medium Sand	4.7	---
Fine Sand	6.3	6.3
Silt	14.5	21.8
Clay	47.6	40.3

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.71

Classification
 Unified Group Symbol: CH
 Group Name: Sandy fat clay
 AASHTO Classification: A-7-6 (18)

Comments: _____



Project Name Kingston Ash Pond
Source STN-15, 12.0'-12.5'

Project Number 175569042
Lab ID 511

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CP
Test Date: 06-16-2009
Date Received 05-27-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.8
No. 4	97.6
No. 10	73.1

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

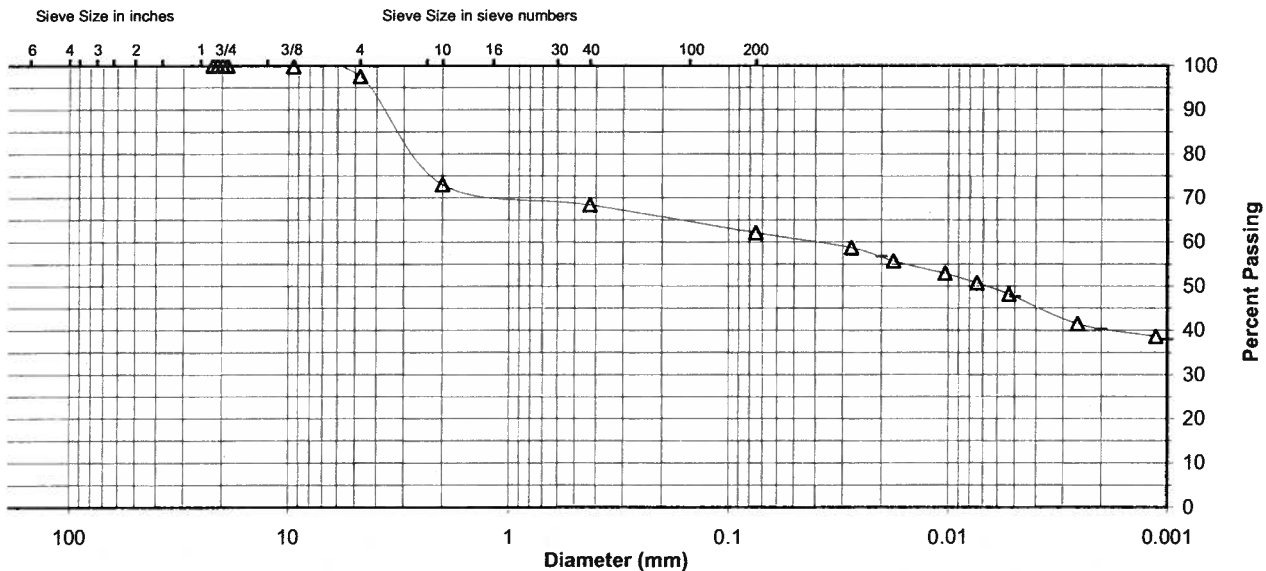
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	68.4
No. 200	62.1
0.02 mm	56.7
0.005 mm	47.6
0.002 mm	40.3
0.001 mm	38.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.4	24.5	4.7	6.3	14.5	47.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	26.9		4.7		6.3	21.8	40.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-15, 30.5'-32.0', 32.0'-33.5' Lab ID 879
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.5
No. 4	4.75	93.6
No. 10	2	91.7
No. 40	0.425	87.7
No. 200	0.075	36.2
	0.02	18.2
	0.005	8.2
	0.002	3.9
estimated	0.001	2.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	6.4	8.3
Coarse Sand	1.9	4.0
Medium Sand	4.0	---
Fine Sand	51.5	51.5
Silt	28.0	32.3
Clay	8.2	3.9

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-15, 30.5'-32.0', 32.0'-33.5'

Project Number 171468117
Lab ID 879

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 04-29-2009
Date Received: 04-23-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.5
No. 4	93.6
No. 10	91.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

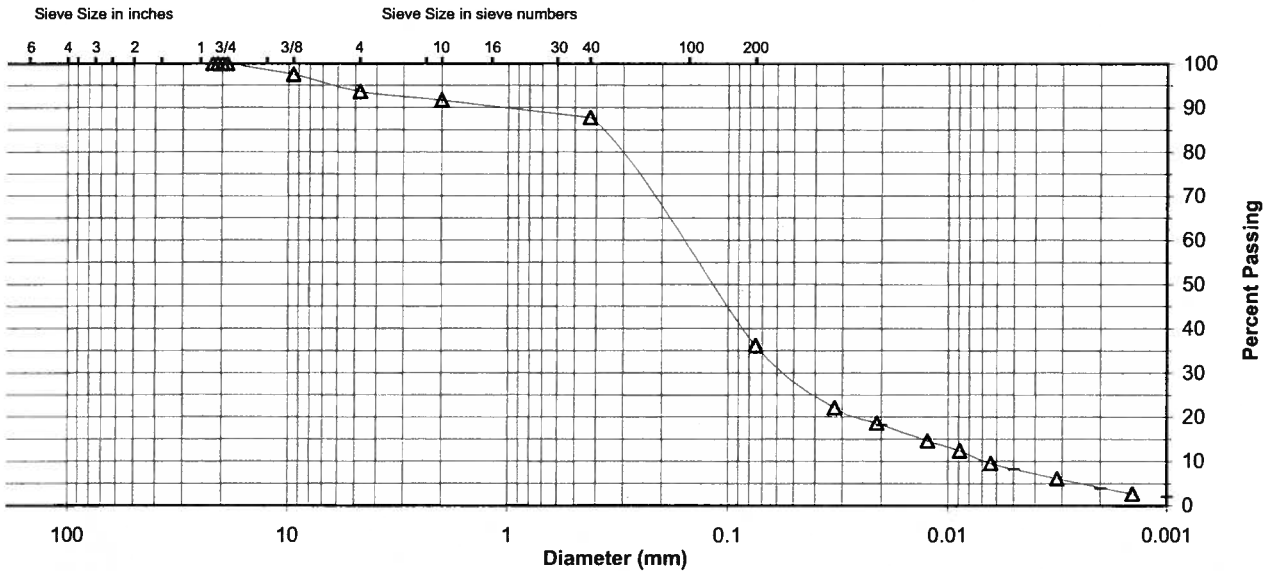
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	87.7
No. 200	36.2
0.02 mm	18.2
0.005 mm	8.2
0.002 mm	3.9
0.001 mm	2.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	6.4	1.9	4.0	51.5	28.0	8.2	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	8.3		4.0		51.5	32.3		3.9



Comments _____

Reviewed By _____

Client: Stantec Consulting Services

Project: Kingston Ash Pond

Location: Roane, TN

Project No: GTX-9015

Boring ID: ST-15D

Sample Type: tube

Tested By: jbr

Sample ID: ST-5

Test Date: 05/19/09

Checked By: jdt

Depth: --- 33.0' - 35.0'

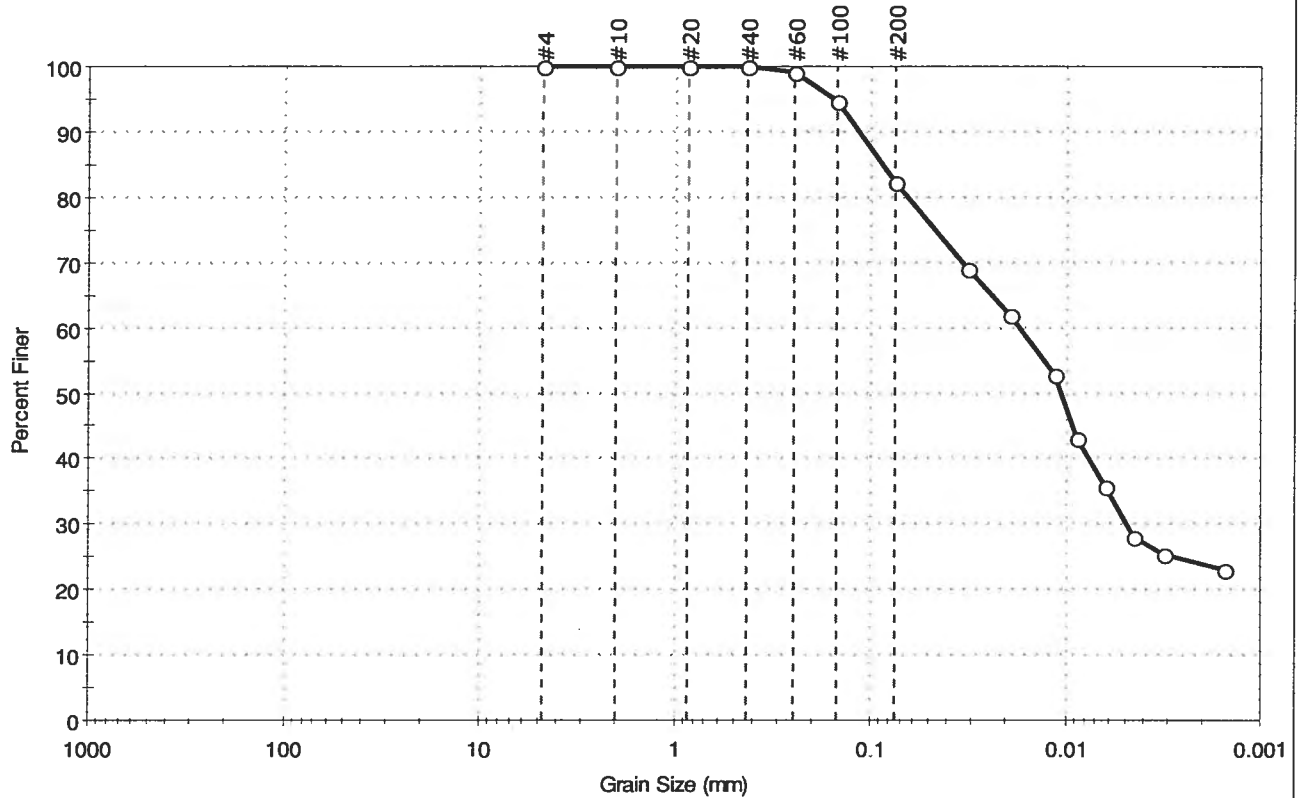
Test Id: 152414

Test Comment: ---

Sample Description: Moist, yellowish brown clay with sand

Sample Comment: ---

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	17.6	82.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	95		
#200	0.075	82		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0321	69		
---	0.0191	62		
---	0.0113	53		
---	0.0087	43		
---	0.0063	36		
---	0.0045	28		
---	0.0031	25		
---	0.0015	23		

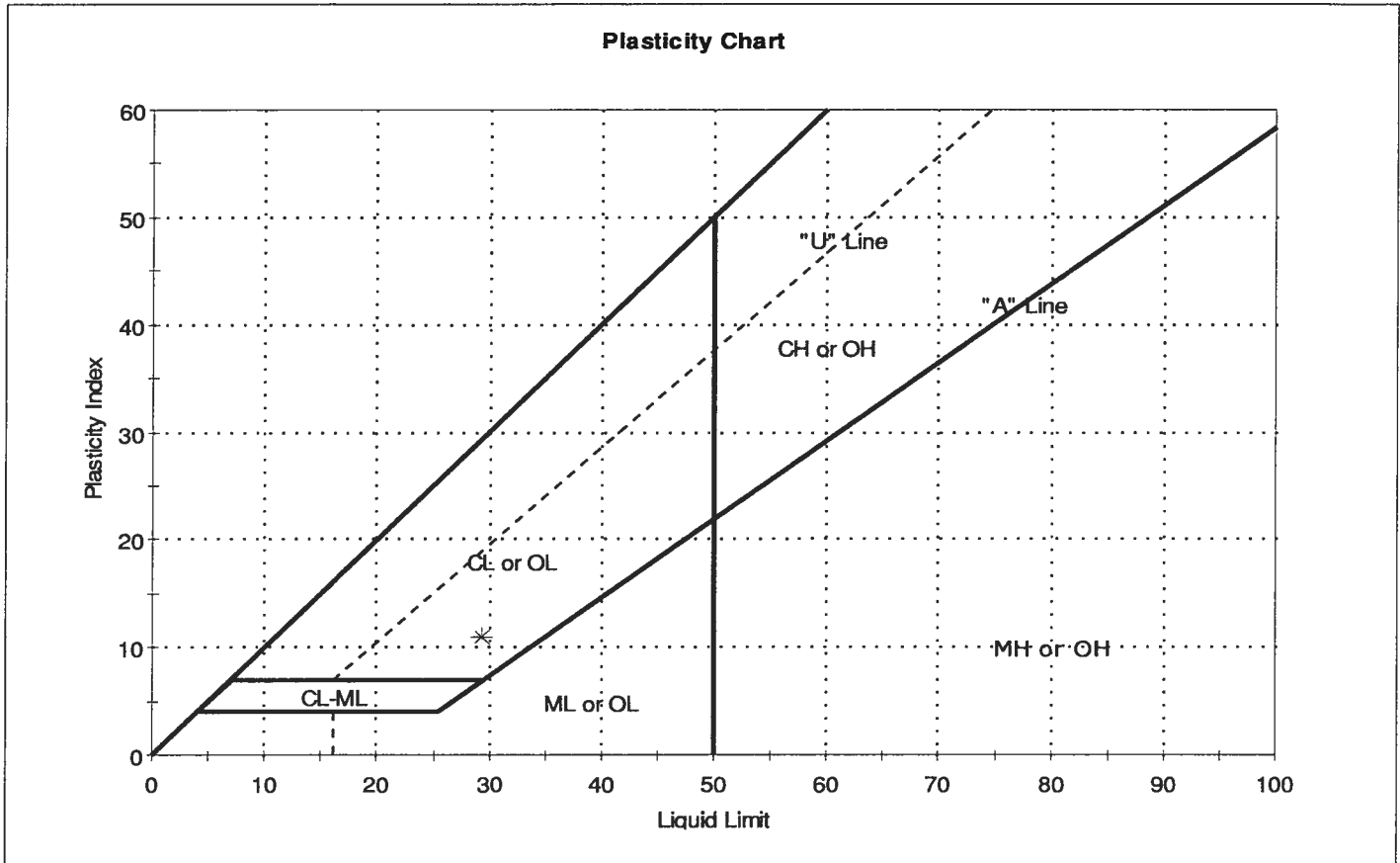
Coefficients	
D ₈₅ = 0.0869 mm	D ₃₀ = 0.0049 mm
D ₆₀ = 0.0172 mm	D ₁₅ = N/A
D ₅₀ = 0.0105 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification	
ASTM	lean clay with sand (CL)
AASHTO	Clayey Soils (A-6 (8))

Sample/Test Description	
Sand/Gravel Particle Shape :	---
Sand/Gravel Hardness :	---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: ST-15D	Sample Type: tube	Tested By: cam	Checked By: jdt
Sample ID: ST-5	Test Date: 05/18/09	Test Id: 152411	
Depth: --- 33.0' - 35.0'			
Test Comment: ---			
Sample Description: Moist, yellowish brown clay with sand			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-5	ST-15D	33.0' - 35.0'	24	29	18	11	1	lean clay with sand (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: NONE

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-16, 9.0'-10.5', 10.5'-12.0' Lab ID 241
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 65
 Plastic Limit: 24
 Plasticity Index: 41
 Activity Index: 0.79

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.8
No. 4	4.75	99.4
No. 10	2	98.3
No. 40	0.425	94.0
No. 200	0.075	79.8
	0.02	68.9
	0.005	57.7
	0.002	51.8
estimated	0.001	47.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.6	1.7
Coarse Sand	1.1	4.3
Medium Sand	4.3	---
Fine Sand	14.2	14.2
Silt	22.1	28.0
Clay	57.7	51.8

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.73

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (35)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-16, 9.0'-10.5', 10.5'-12.0'

Project Number 175569042
 Lab ID 241

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: TLK
 Test Date: 06-05-2009
 Date Received 05-26-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.8
No. 4	99.4
No. 10	98.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

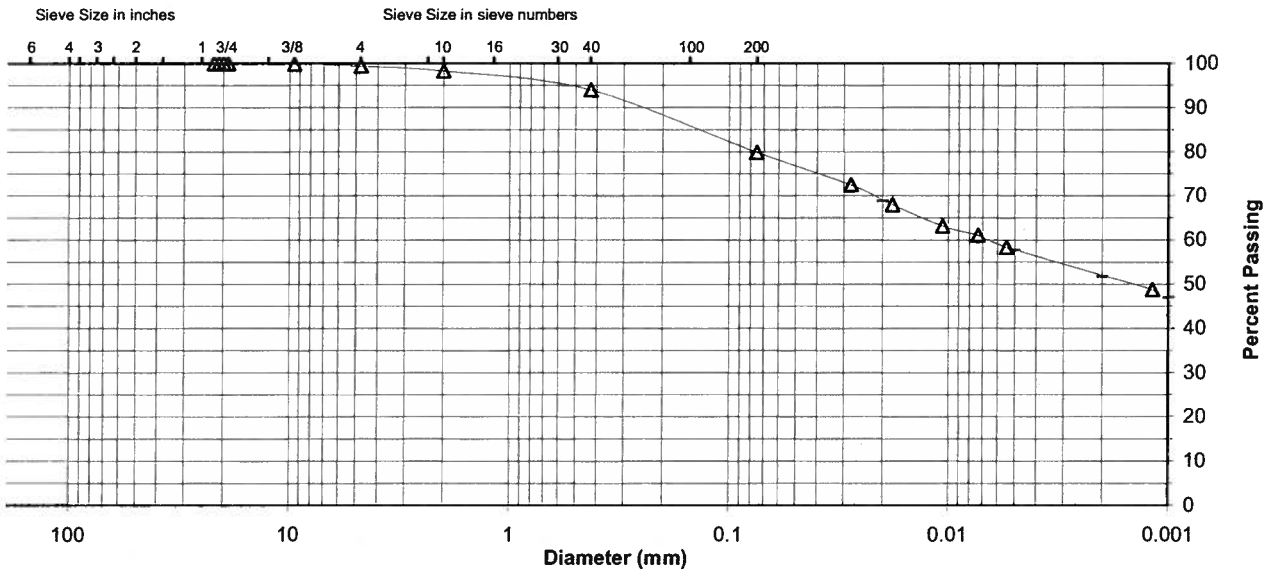
Specific Gravity 2.73

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.0
No. 200	79.8
0.02 mm	68.9
0.005 mm	57.7
0.002 mm	51.8
0.001 mm	47.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.6	1.1	4.3	14.2	22.1	57.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	
	1.7		4.3		14.2	28.0	
						51.8	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-16, 34.5'-36.0', 36.0'-37.5', 37.5'-39.0' Lab ID 259
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 15
 Plastic Limit: 15
 Plasticity Index: 0
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	98.8
No. 200	0.075	46.4
	0.02	25.8
	0.005	15.7
	0.002	12.1
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	1.1
Medium Sand	1.1	---
Fine Sand	52.4	52.4
Silt	30.7	34.3
Clay	15.7	12.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-16, 34.5'-36.0', 36.0'-37.5', 37.5'-39.0'

Project Number 175569042
Lab ID 259

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-04-2009
Date Received: 05-26-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

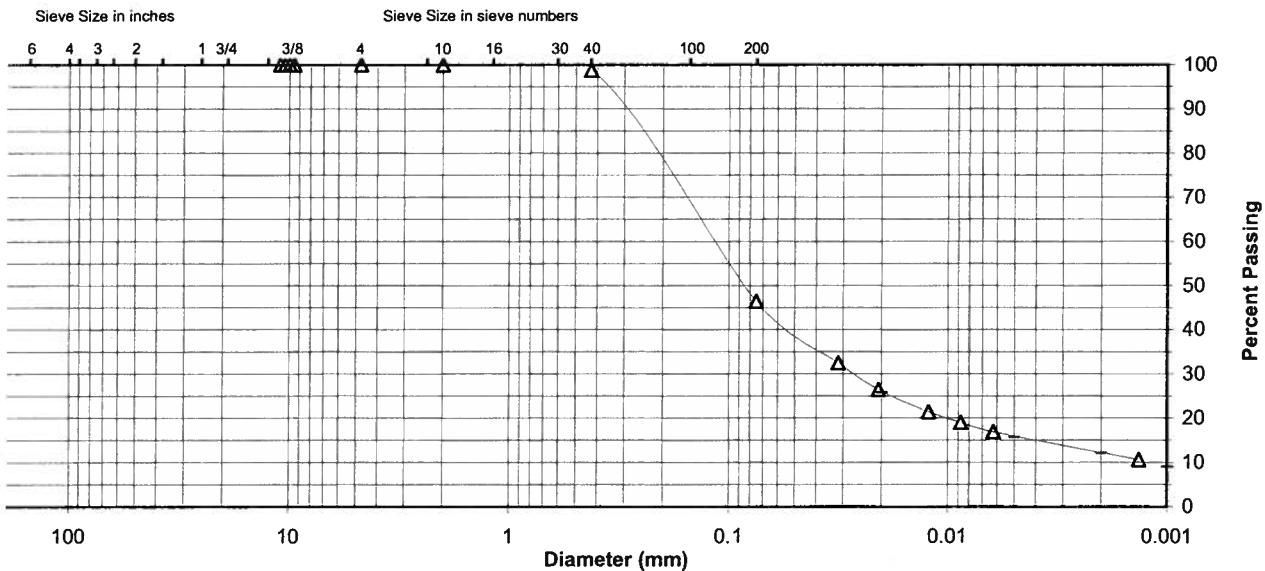
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.8
No. 200	46.4
0.02 mm	25.8
0.005 mm	15.7
0.002 mm	12.1
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	1.1	52.4	30.7	15.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.1		1.1		52.4	34.3	12.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-18, 36.5'-38.0', 38.0'-39.5' Lab ID 925
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.4
No. 4	4.75	98.1
No. 10	2	97.9
No. 40	0.425	92.1
No. 200	0.075	23.5
	0.02	11.0
	0.005	5.5
	0.002	3.6
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.9	2.1
Coarse Sand	0.2	5.8
Medium Sand	5.8	---
Fine Sand	68.6	68.6
Silt	18.0	19.9
Clay	5.5	3.6

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.70

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-18, 36.5'-38.0', 38.0'-39.5'

Project Number 171468117
Lab ID 925

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded and Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 04-29-2009
Date Received 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.4
No. 4	98.1
No. 10	97.9

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

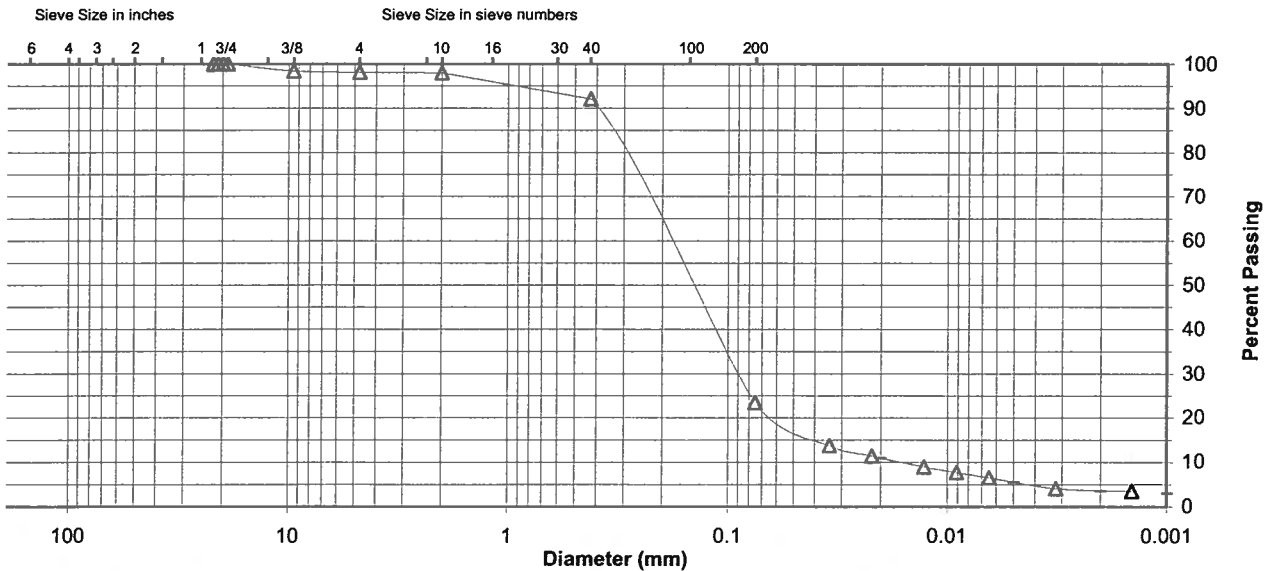
Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	92.1
No. 200	23.5
0.02 mm	11.0
0.005 mm	5.5
0.002 mm	3.6
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	1.9	0.2	5.8	68.6	18.0	5.5	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	2.1		5.8		68.6	19.9		3.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-19 / SPT-17, 28.5'-30.0' & STN-19 / SPT-18, 30.0'-31.5' Lab ID 496
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	95.5
3/8"	9.5	81.9
No. 4	4.75	78.3
No. 10	2	76.0
No. 40	0.425	74.4
No. 200	0.075	16.5
	0.02	6.7
	0.005	4.9
	0.002	3.8
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	21.7	24.0
Coarse Sand	2.3	1.6
Medium Sand	1.6	---
Fine Sand	57.9	57.9
Silt	11.6	12.7
Clay	4.9	3.8

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-19 / SPT-17, 28.5'-30.0' & STN-19 / SPT-18, 30.0'-31.5'

Project Number 171468117
Lab ID 496

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: DRB
Test Date: 04-16-2009
Date Received 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	95.5
3/8"	81.9
No. 4	78.3
No. 10	76.0

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

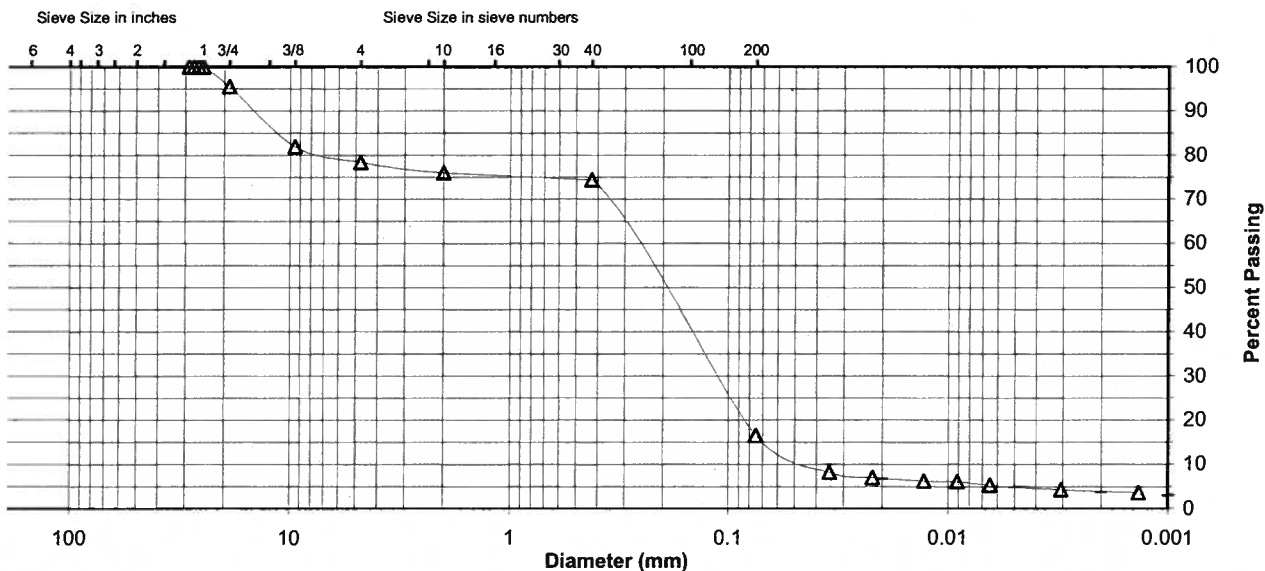
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	74.4
No. 200	16.5
0.02 mm	6.7
0.005 mm	4.9
0.002 mm	3.8
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	4.5	17.2	2.3	1.6	57.9	11.6	4.9	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	24.0		1.6		57.9	12.7		3.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-19, 39.7'-40.2' Lab ID 518
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content
 Test Method: ASTM D 2216
 Moisture Content (%): 22.0

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 23
 Plastic Limit: 17
 Plasticity Index: 6
 Activity Index: 0.35

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	58.7
	0.02	34.4
	0.005	22.0
	0.002	17.4
estimated	0.001	14.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	41.0	41.0
Silt	36.7	41.3
Clay	22.0	17.4

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay

AASHTO Classification: A-4 (1)

Comments: _____



Project Name Kingston Ash Pond
Source STN-19, 39.7'-40.2'

Project Number 175569042
Lab ID 518

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-09-2009
Date Received: 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

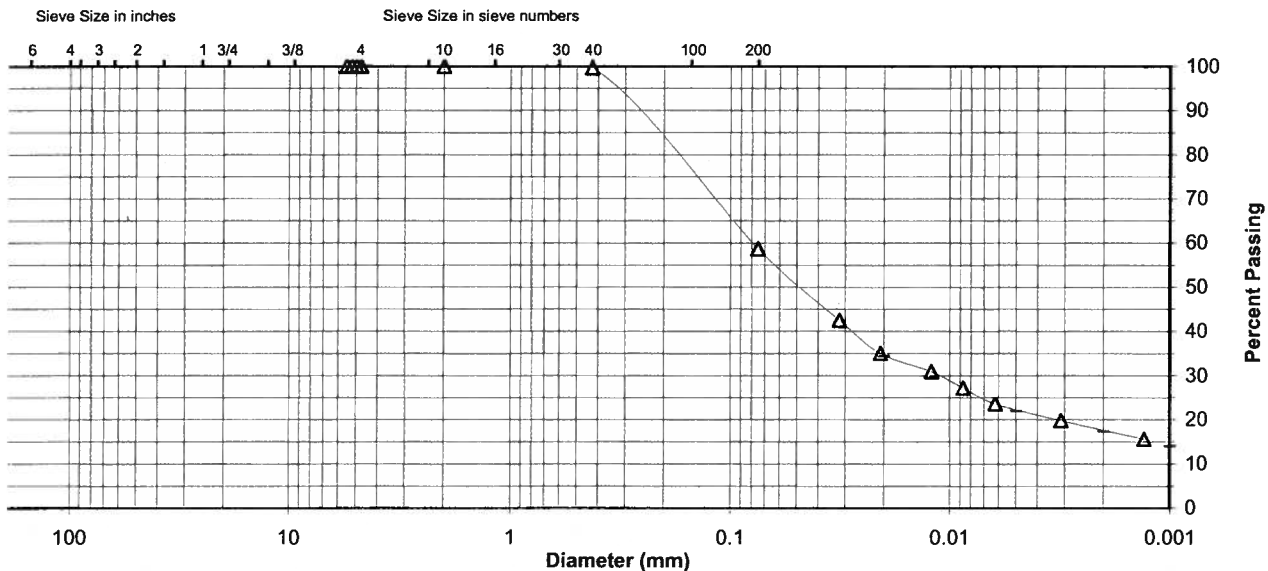
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	58.7
0.02 mm	34.4
0.005 mm	22.0
0.002 mm	17.4
0.001 mm	14.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.3	41.0	36.7	22.0
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.3	41.0	41.3		17.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-19 / SPT-27, 45.5'-47.0' & STN-19 / SPT-28, 47.0'-48.5' Lab ID 507
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.5
No. 200	0.075	39.6
	0.02	19.8
	0.005	12.9
	0.002	9.6
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.5
Medium Sand	0.5	---
Fine Sand	59.9	59.9
Silt	26.7	30.0
Clay	12.9	9.6

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-19 / SPT-27, 45.5'-47.0' & STN-19 / SPT-28, 47.0'-48.5'

Project Number 171468117
Lab ID 507

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DRB
Test Date: 04-16-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

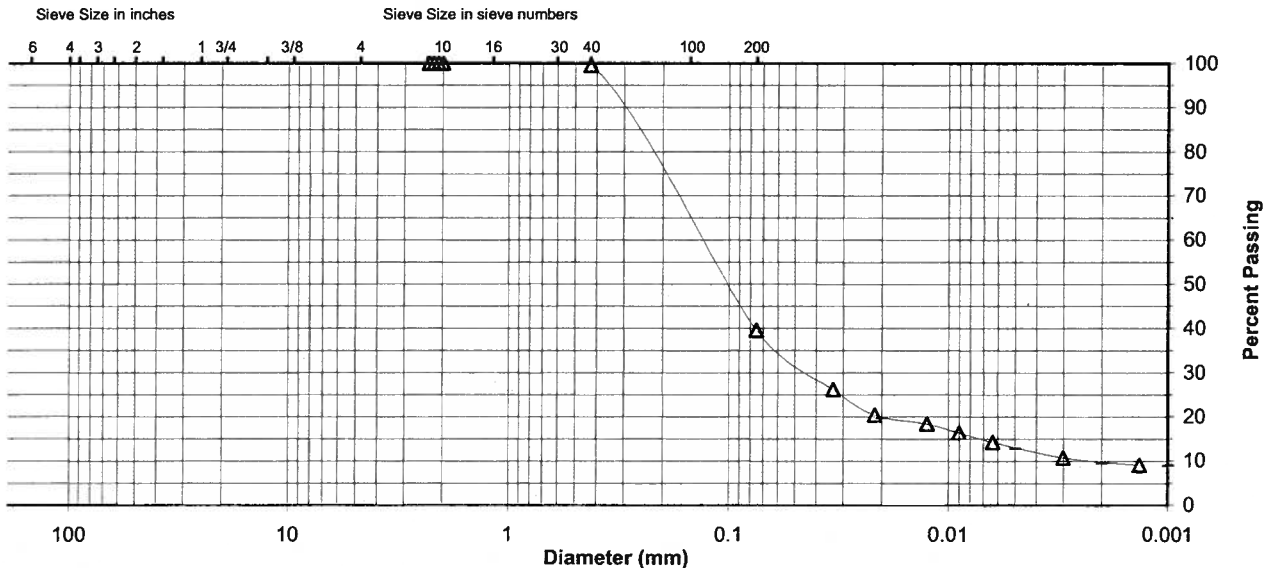
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	39.6
0.02 mm	19.8
0.005 mm	12.9
0.002 mm	9.6
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.5	59.9	26.7	12.9
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.5	59.9	30.0		9.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-19 / SPT-37, 60.5'-62.0' & STN-19 / SPT-38, 62.0'-63.5' Lab ID 520
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	89.4
3/4"	19	81.4
3/8"	9.5	69.7
No. 4	4.75	63.9
No. 10	2	58.1
No. 40	0.425	50.2
No. 200	0.075	14.1
	0.02	7.9
	0.005	4.8
	0.002	3.7
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	36.1	41.9
Coarse Sand	5.8	7.9
Medium Sand	7.9	---
Fine Sand	36.1	36.1
Silt	9.3	10.4
Clay	4.8	3.7

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-1-b (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-19 / SPT-37, 60.5'-62.0' & STN-19 / SPT-38, 62.0'-63.5'

Project Number 171468117
Lab ID 520

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: DRB
Test Date: 04-16-2009
Date Received 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	89.4
3/4"	81.4
3/8"	69.7
No. 4	63.9
No. 10	58.1

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

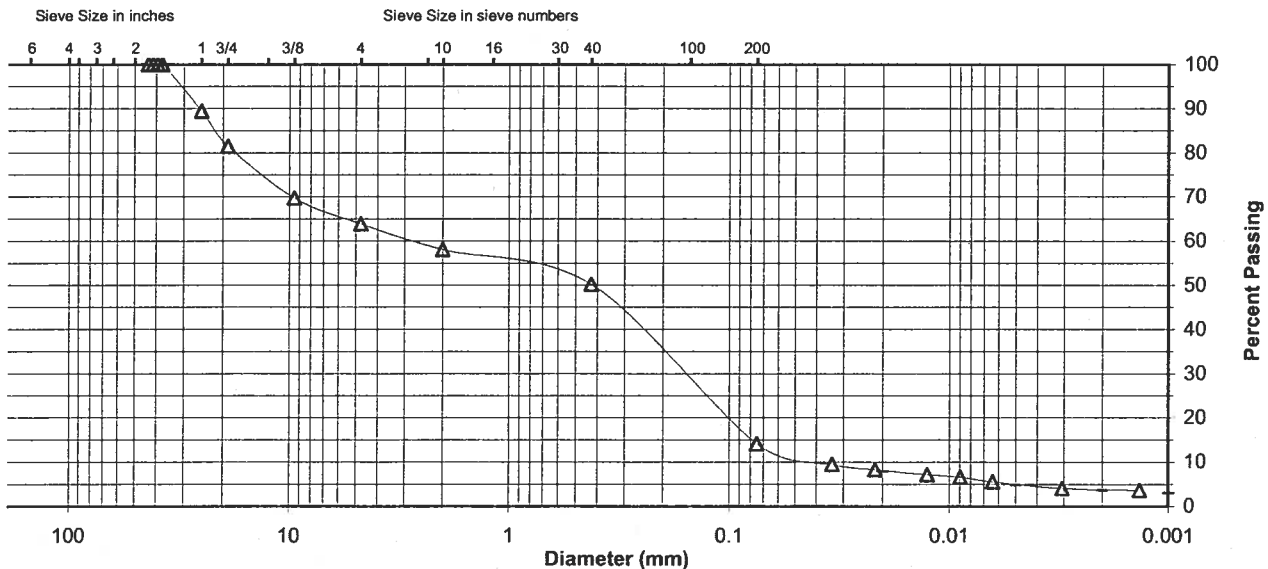
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	50.2
No. 200	14.1
0.02 mm	7.9
0.005 mm	4.8
0.002 mm	3.7
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	18.6	17.5	5.8	7.9	36.1	9.3	4.8
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	41.9		7.9		36.1	10.4	3.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / SPT-6, 7.5'-9.0' & STN-20 / SPT-7, 9.0'-10.5' Lab ID 103
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	94.9
3/4"	19	94.1
3/8"	9.5	87.3
No. 4	4.75	81.1
No. 10	2	73.1
No. 40	0.425	55.7
No. 200	0.075	31.5
	0.02	12.0
	0.005	3.4
	0.002	0.5
estimated	0.001	0.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	18.9	26.9
Coarse Sand	8.0	17.4
Medium Sand	17.4	---
Fine Sand	24.2	24.2
Silt	28.1	31.0
Clay	3.4	0.5

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.32

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-20 / SPT-6, 7.5'-9.0' & STN-20 / SPT-7, 9.0'-10.5'

Project Number 171468117
Lab ID 103

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-09-2009
Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	94.9
3/4"	94.1
3/8"	87.3
No. 4	81.1
No. 10	73.1

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

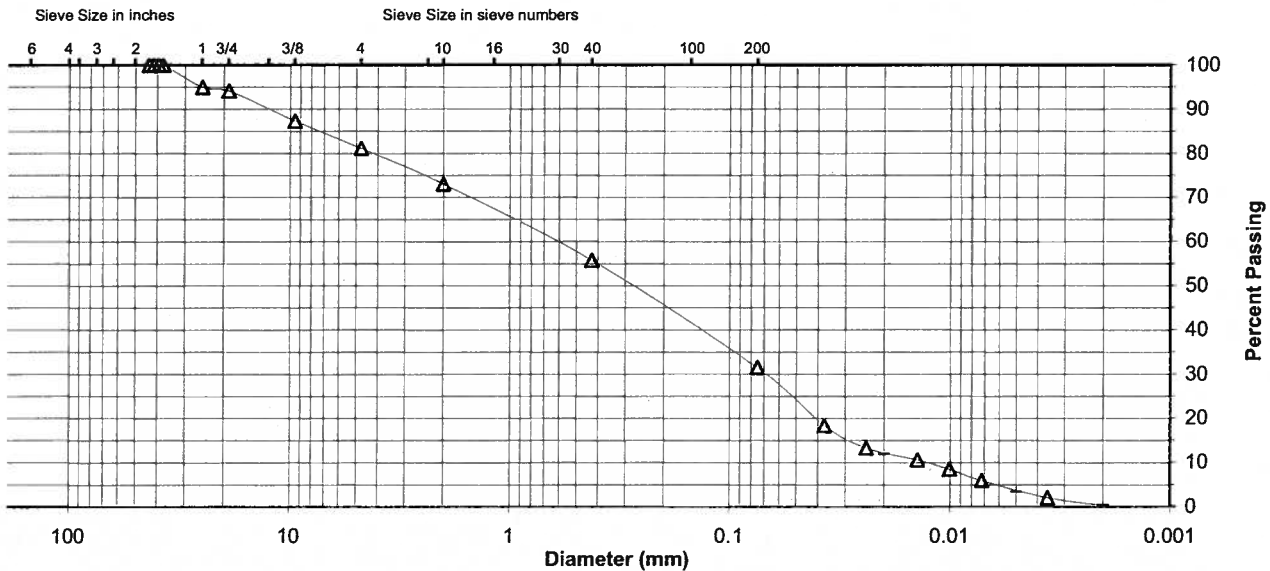
Specific Gravity 2.32

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	55.7
No. 200	31.5
0.02 mm	12.0
0.005 mm	3.4
0.002 mm	0.5
0.001 mm	0.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	5.9	13.0	8.0	17.4	24.2	28.1	3.4
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	26.9		17.4		24.2	31.0	0.5



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / SPT-12, 16.5'-18.0' & STN-20 / SPT-13, 18.0'-19.5' Lab ID 111
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	93.4
3/4"	19	93.4
3/8"	9.5	93.4
No. 4	4.75	92.9
No. 10	2	92.5
No. 40	0.425	91.8
No. 200	0.075	85.7
	0.02	50.6
	0.005	9.5
	0.002	0.0
estimated	0.001	0.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	7.1	7.5
Coarse Sand	0.4	0.7
Medium Sand	0.7	---
Fine Sand	6.1	6.1
Silt	76.2	85.7
Clay	9.5	0.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.25

Classification
 Unified Group Symbol: ML
 Group Name: Silt
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-20 / SPT-12, 16.5'-18.0' & STN-20 / SPT-13, 18.0'-19.5'

Project Number 171468117
Lab ID 111

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-09-2009
Date Received: 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	93.4
3/4"	93.4
3/8"	93.4
No. 4	92.9
No. 10	92.5

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

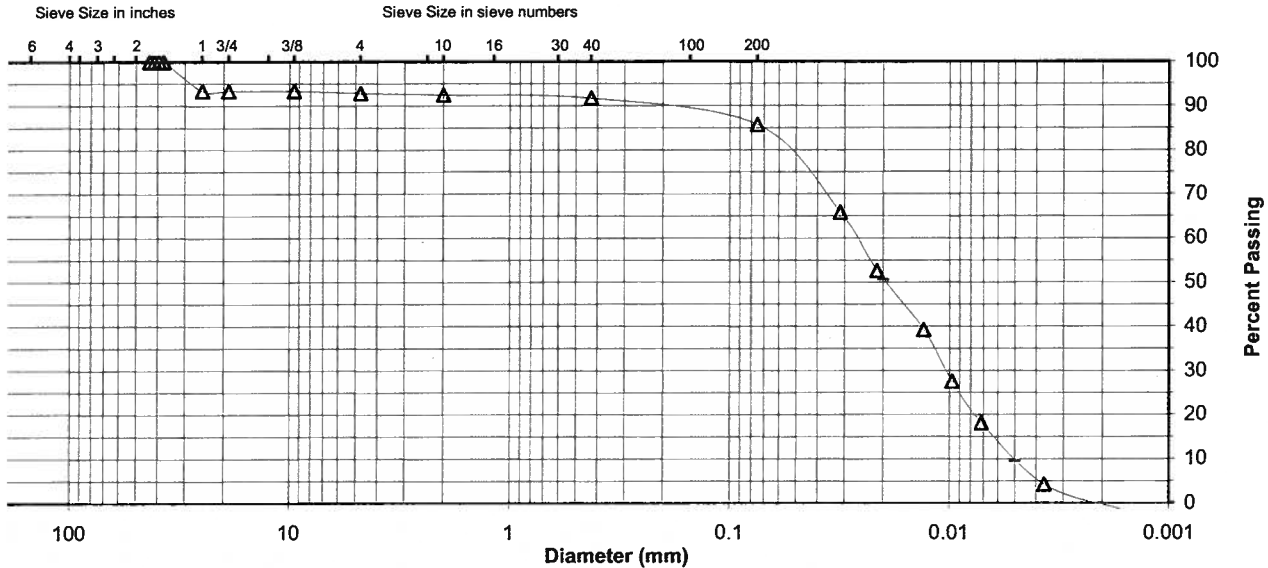
Specific Gravity 2.25

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	91.8
No. 200	85.7
0.02 mm	50.6
0.005 mm	9.5
0.002 mm	0.0
0.001 mm	0.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	6.6	0.5	0.4	0.7	6.1	76.2	9.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	7.5		0.7		6.1	85.7	0.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / SPT-22, 31.5'-33.0' & STN-20 / SPT-23, 33.0'-34.5' Lab ID 122
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 19
 Plastic Limit: 16
 Plasticity Index: 3
 Activity Index: 0.21

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	56.4
	0.02	29.9
	0.005	18.5
	0.002	13.6
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	43.5	43.5
Silt	37.9	42.8
Clay	18.5	13.6

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification
 Unified Group Symbol: ML
 Group Name: Sandy silt
 AASHTO Classification: A-4 (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-20 / SPT-22, 31.5'-33.0' & STN-20 / SPT-23, 33.0'-34.5'

Project Number 171468117
 Lab ID 122

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 04-09-2009
 Date Received 03-24-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

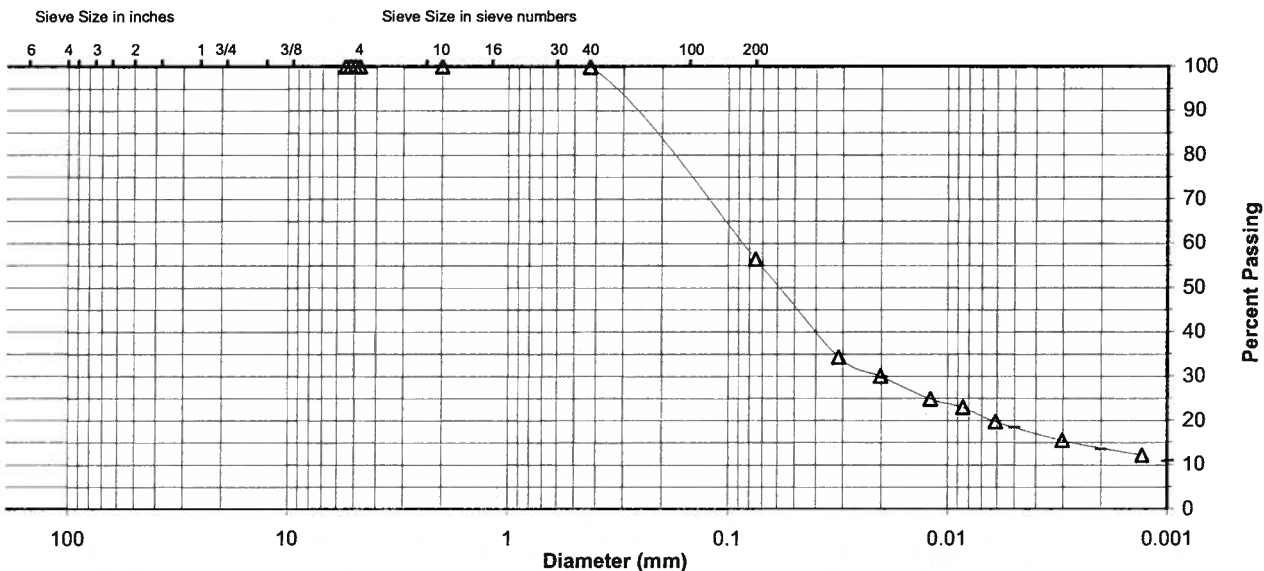
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	56.4
0.02 mm	29.9
0.005 mm	18.5
0.002 mm	13.6
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.1	43.5	37.9	18.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.1		43.5	42.8	13.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / ST-1, 35.0'-35.5' Lab ID 185A
 County Roane (TN) Date Received 3-24-09
 Sample Type ST Date Reported 5-20-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 22.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 28
 Plastic Limit: 17
 Plasticity Index: 11
 Activity Index: 0.44

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.8
No. 4	4.75	99.8
No. 10	2	99.8
No. 40	0.425	99.6
No. 200	0.075	71.7
	0.02	51.6
	0.005	31.1
	0.002	25.4
estimated	0.001	21.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.2	0.2
Coarse Sand	0.0	0.2
Medium Sand	0.2	---
Fine Sand	27.9	27.9
Silt	40.6	46.3
Clay	31.1	25.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-6 (6)

Comments: _____



Project Name Kingston Ash Pond
Source STN-20 / ST-1, 35.0'-35.5'

Project Number 171468117
Lab ID 185A

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: DG
Test Date: 04-22-2009
Date Received: 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.8
No. 4	99.8
No. 10	99.8

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

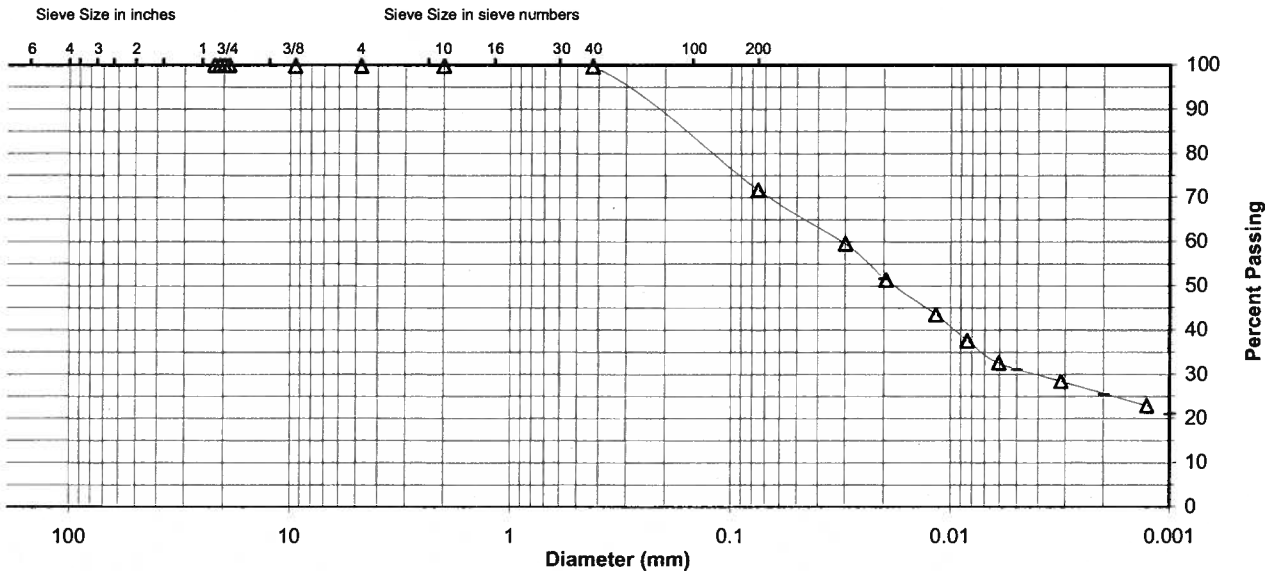
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	71.7
0.02 mm	51.6
0.005 mm	31.1
0.002 mm	25.4
0.001 mm	21.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.2	0.0	0.2	27.9	40.6	31.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.2		0.2		27.9	46.3	25.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-20 / SPT-32, 51.0'-52.5' & STN-20 / SPT-33, 52.5'-54.0' Lab ID 134
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	98.7
No. 200	0.075	23.8
	0.02	10.0
	0.005	6.6
	0.002	5.0
estimated	0.001	3.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.3
Medium Sand	1.3	---
Fine Sand	74.9	74.9
Silt	17.2	18.8
Clay	6.6	5.0

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-20 / SPT-32, 51.0'-52.5' & STN-20 / SPT-33, 52.5'-54.0'

Project Number 171468117
Lab ID 134

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-09-2008
Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

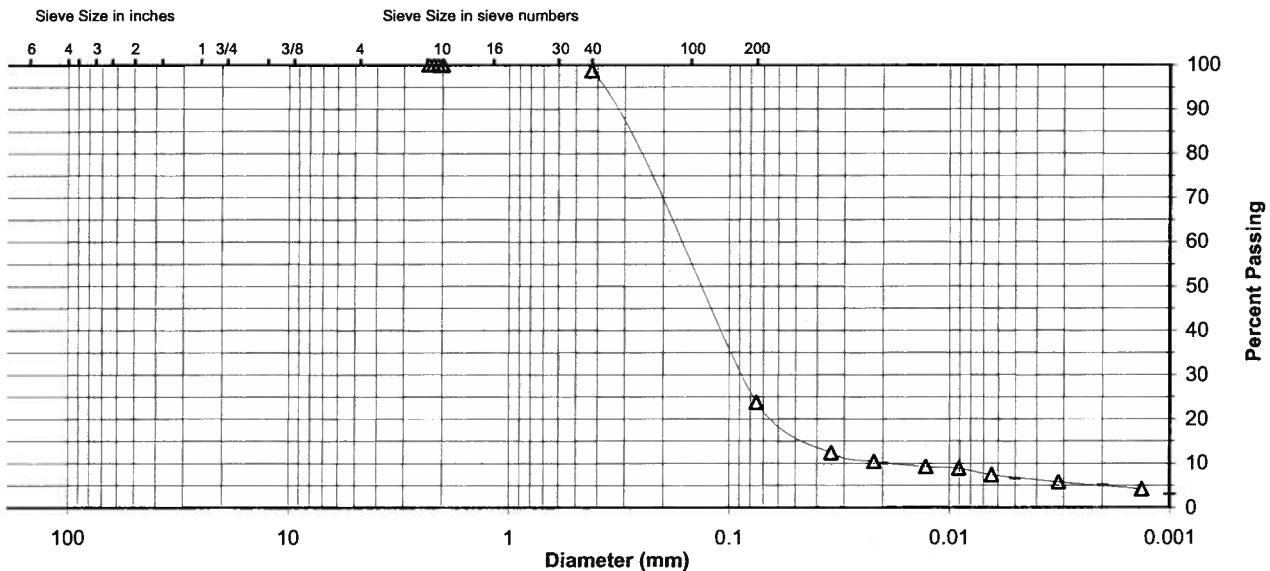
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.7
No. 200	23.8
0.02 mm	10.0
0.005 mm	6.6
0.002 mm	5.0
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.3	74.9	17.2	6.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		1.3		74.9	18.8	5.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-21, 39.5'-41.0', 41.0'-42.5' Lab ID 1659
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	98.9
No. 200	0.075	33.9
	0.02	19.7
	0.005	12.1
	0.002	9.4
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.1
Medium Sand	1.1	---
Fine Sand	65.0	65.0
Silt	21.8	24.5
Clay	12.1	9.4

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-21, 39.5'-41.0', 41.0'-42.5'

Project Number 171468117
 Lab ID 1659

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: N/A
 Particle Hardness: N/A
 Tested By: CM
 Test Date: 05-19-2009
 Date Received 05-08-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

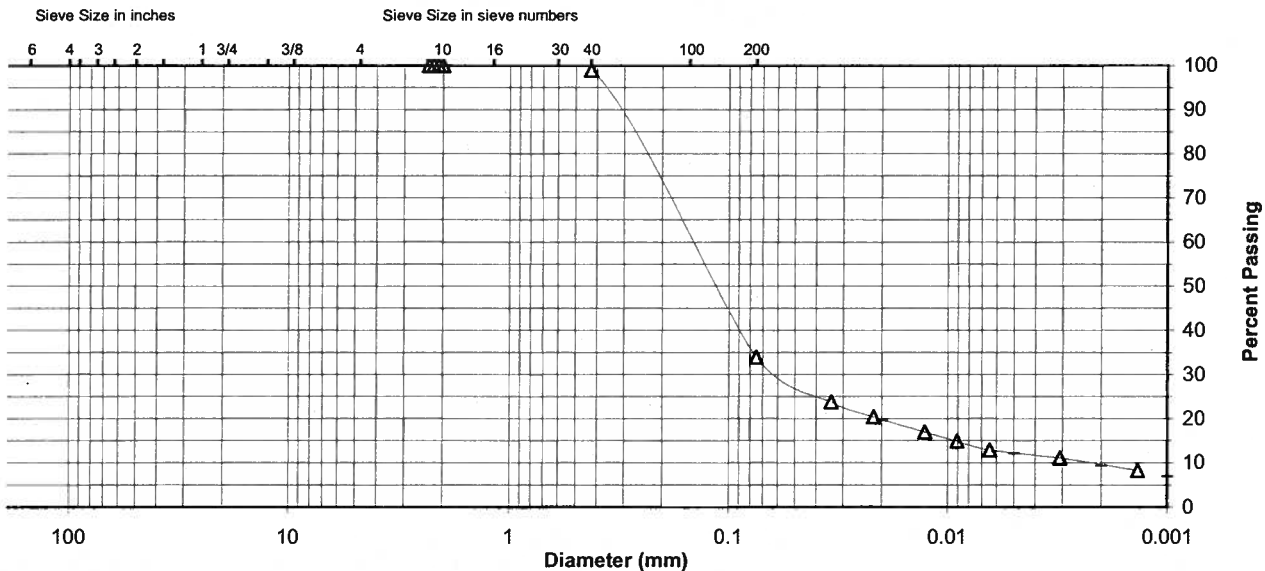
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.9
No. 200	33.9
0.02 mm	19.7
0.005 mm	12.1
0.002 mm	9.4
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.1	65.0	21.8	12.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		1.1		65.0	24.5	9.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-22, 51.5'-53.0', 53.0'-54.5' Lab ID 1704
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.9
No. 40	0.425	99.2
No. 200	0.075	29.9
	0.02	18.0
	0.005	10.6
	0.002	7.9
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.1	0.1
Coarse Sand	0.0	0.7
Medium Sand	0.7	---
Fine Sand	69.3	69.3
Silt	19.3	22.0
Clay	10.6	7.9

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.64

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-22, 51.5'-53.0', 53.0'-54.5'

Project Number 171468117
Lab ID 1704

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-20-2009
Date Received: 05-08-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.9
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

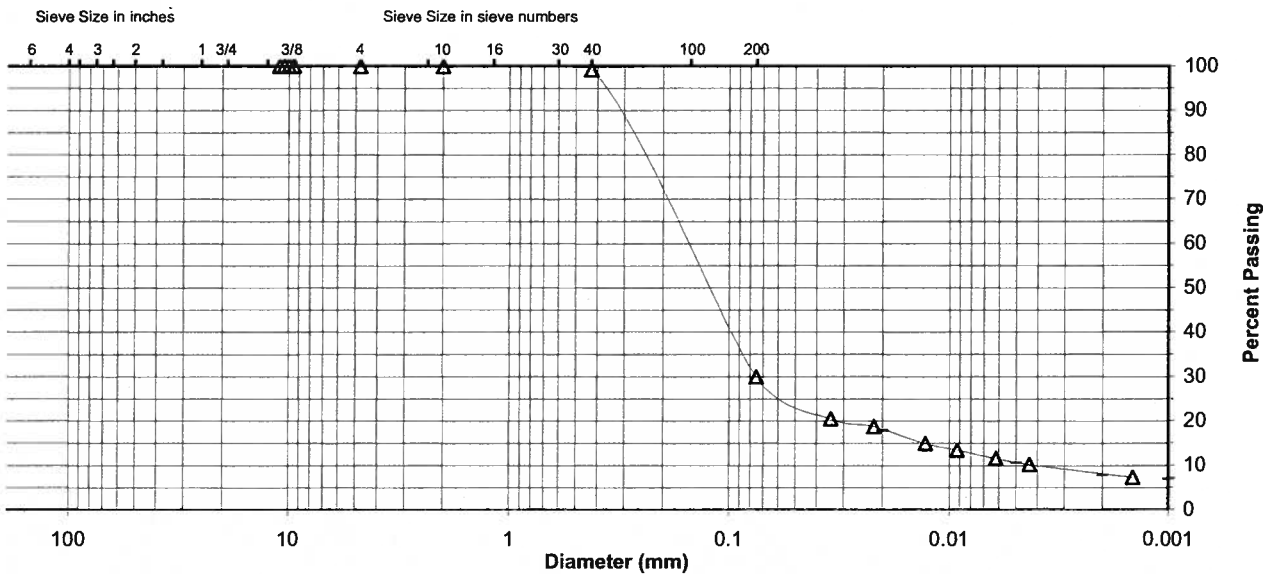
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.2
No. 200	29.9
0.02 mm	18.0
0.005 mm	10.6
0.002 mm	7.9
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.1	0.0	0.7	69.3	19.3	10.6	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.1		0.7		69.3	22.0		7.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-23, 9.0'-10.5', 10.5'-12.0', 12.0'-13.5' Lab ID 281
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 47
 Plastic Limit: 19
 Plasticity Index: 28
 Activity Index: 0.64

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	94.6
3/4"	19	94.6
3/8"	9.5	93.7
No. 4	4.75	93.0
No. 10	2	91.1
No. 40	0.425	86.2
No. 200	0.075	72.5
	0.02	60.9
	0.005	48.8
	0.002	43.6
estimated	0.001	41.0

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.74

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	7.0	8.9
Coarse Sand	1.9	4.9
Medium Sand	4.9	---
Fine Sand	13.7	13.7
Silt	23.7	28.9
Clay	48.8	43.6

Classification
 Unified Group Symbol: CL
 Group Name: Lean clay with sand

AASHTO Classification: A-7-6 (19)

Comments: _____



Project Name Kingston Ash Pond
Source STN-23, 9.0'-10.5', 10.5'-12.0', 12.0'-13.5'

Project Number 175569042
Lab ID 281

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-05-2009
Date Received: 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	94.6
3/4"	94.6
3/8"	93.7
No. 4	93.0
No. 10	91.1

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

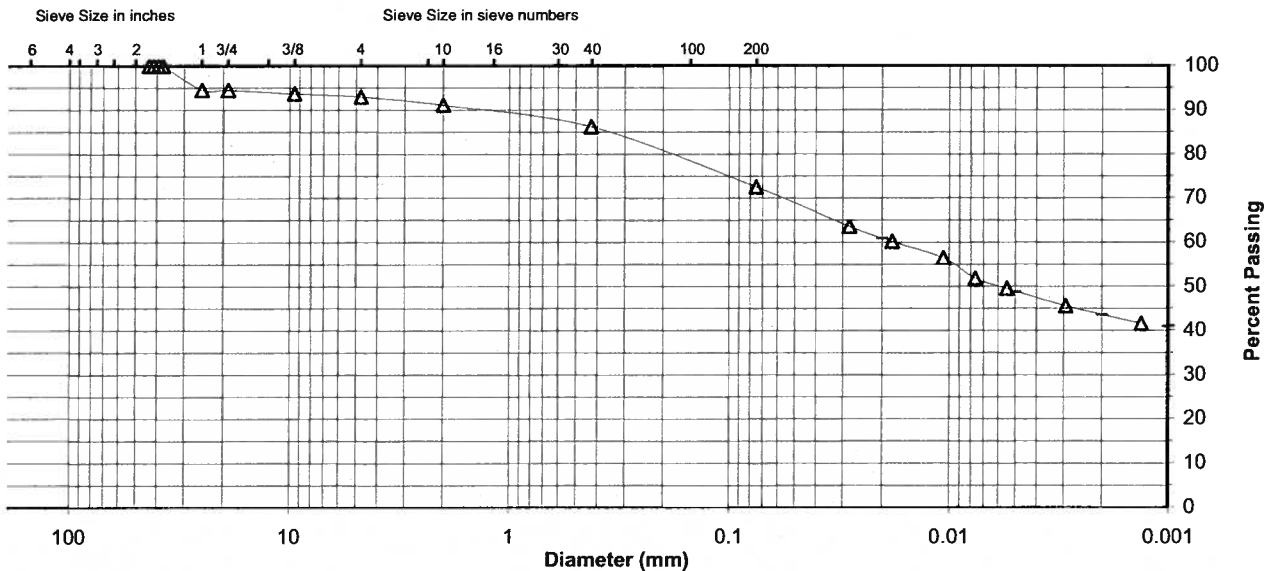
Specific Gravity 2.74

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	86.2
No. 200	72.5
0.02 mm	60.9
0.005 mm	48.8
0.002 mm	43.6
0.001 mm	41.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	5.4	1.6	1.9	4.9	13.7	23.7	48.8
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	8.9		4.9		13.7	28.9	43.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-23, 48.5'-50.0', 50.0'-51.5' Lab ID 307
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 16
 Plastic Limit: 17
 Plasticity Index: -1
 Activity Index: -0.10

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	54.3
	0.02	27.0
	0.005	14.1
	0.002	9.8
estimated	0.001	8.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	45.6	45.6
Silt	40.2	44.5
Clay	14.1	9.8

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: ML
 Group Name: Sandy silt

AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-23, 48.5'-50.0', 50.0'-51.5'

Project Number 175569042
Lab ID 307

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 06-05-2009
Date Received: 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

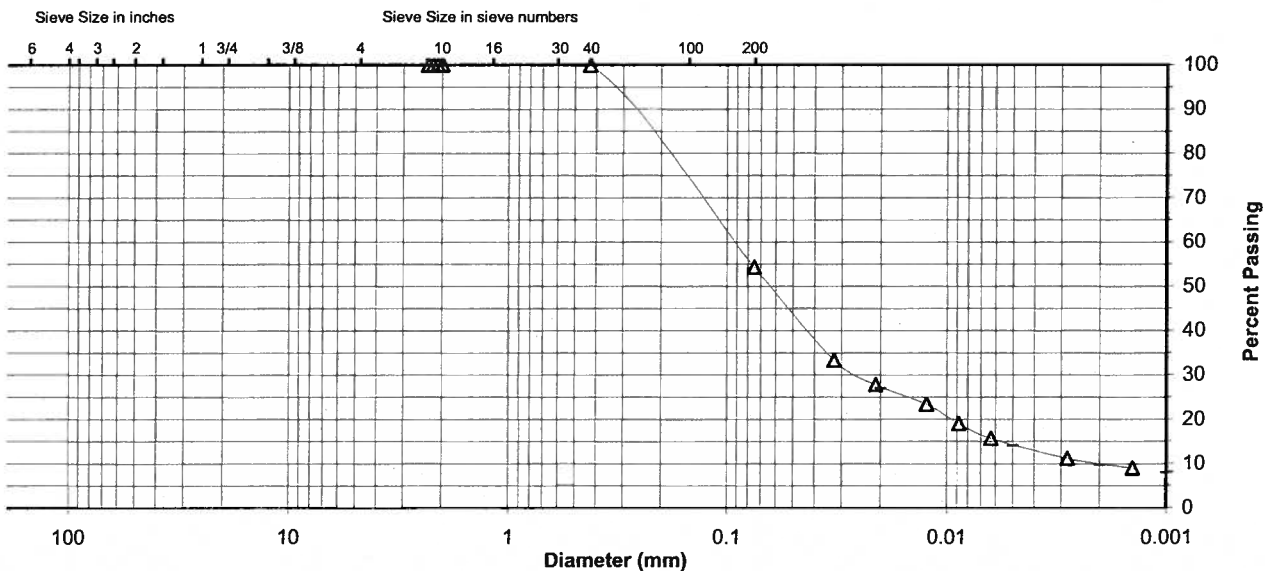
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	54.3
0.02 mm	27.0
0.005 mm	14.1
0.002 mm	9.8
0.001 mm	8.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.1	45.6	40.2	14.1
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.1	45.6	44.5		9.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-24, 43.5'-45.0', 45.0'-46.5' Lab ID 346
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	39.4
	0.02	19.9
	0.005	12.1
	0.002	9.2
estimated	0.001	8.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	60.2	60.2
Silt	27.3	30.2
Clay	12.1	9.2

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-24, 43.5'-45.0', 45.0'-46.5'

 Project Number 175569042
 Lab ID 346
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: N/A
 Particle Hardness: N/A

 Tested By: BWT
 Test Date: 06-08-2009
 Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

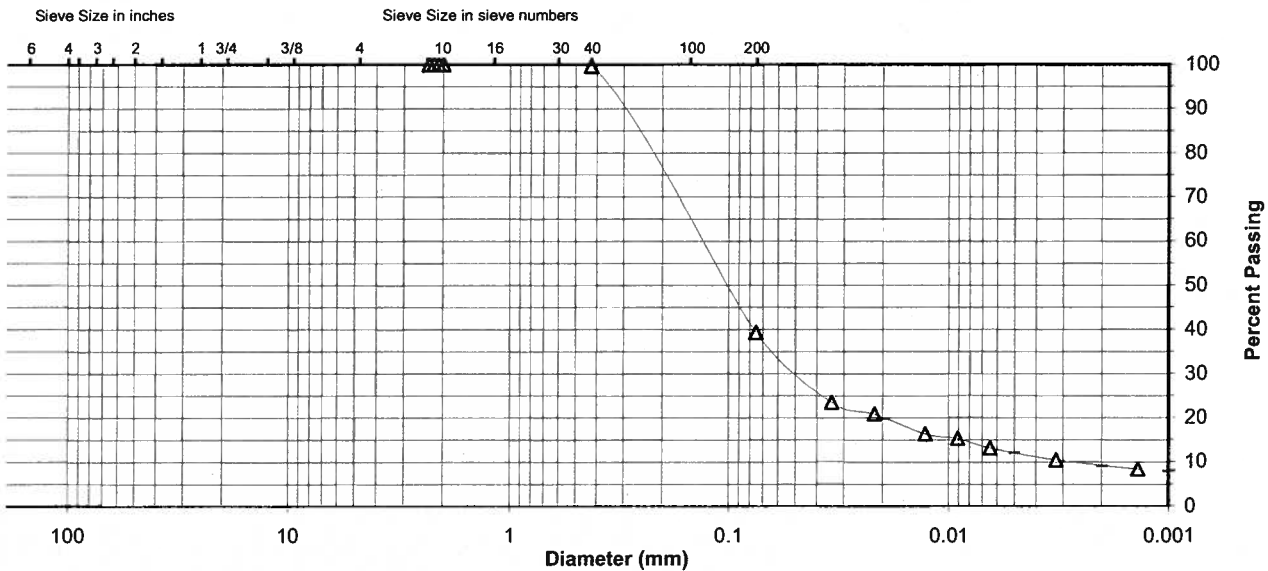
 Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	39.4
0.02 mm	19.9
0.005 mm	12.1
0.002 mm	9.2
0.001 mm	8.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	60.2	27.3	12.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.4		60.2	30.2	9.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-26 /SPT-9, 14.0'-15.5' & STN-26 /SPT-10, 15.5'-17.0' & STN-26 /SPT-11, 17.0'-18.5' Lab ID 199
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 26
 Plastic Limit: 16
 Plasticity Index: 10
 Activity Index: 0.45

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.6
No. 10	2	98.9
No. 40	0.425	97.6
No. 200	0.075	56.3
	0.02	31.2
	0.005	25.6
	0.002	21.8
estimated	0.001	17.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.4	1.1
Coarse Sand	0.7	1.3
Medium Sand	1.3	---
Fine Sand	41.3	41.3
Silt	30.7	34.5
Clay	25.6	21.8

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-4 (3)

Comments: _____



Project Name Kingston Ash Pond
Source STN-26 /SPT-9, 14.0'-15.5' & STN-26 /SPT-10, 15.5'-17.0' & STN-26 /SPT-11, 17.0'-18.5'

Project Number 171468117
Lab ID 199

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Weathered and Friable

Tested By: DRB
Test Date: 04-16-2009
Date Received: 03-30-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.6
No. 10	98.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

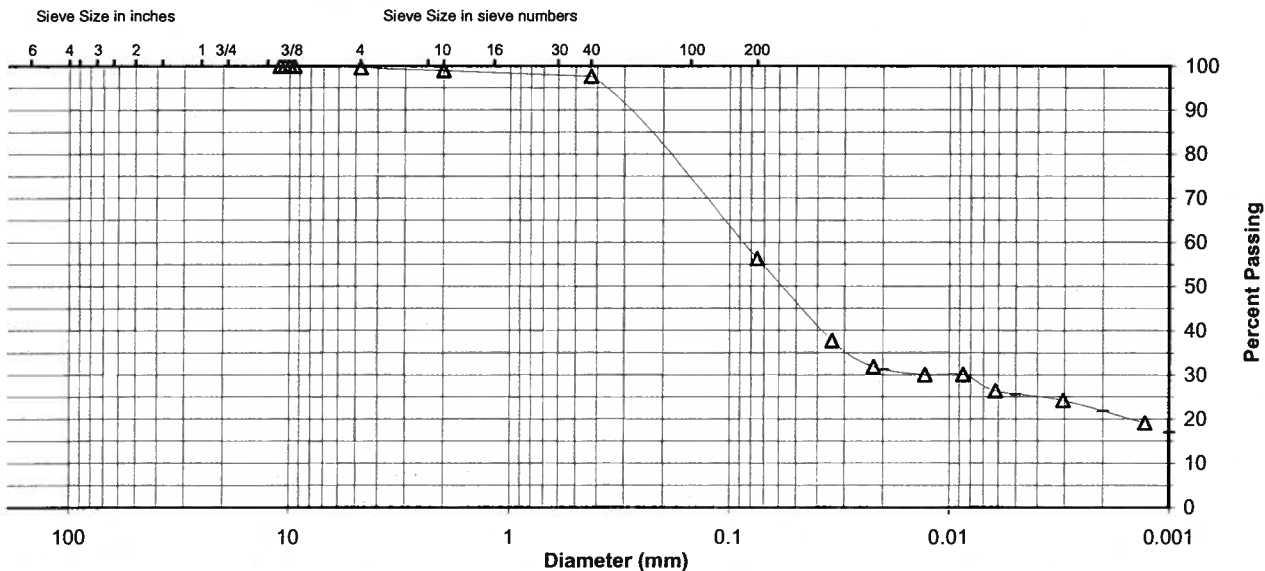
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.6
No. 200	56.3
0.02 mm	31.2
0.005 mm	25.6
0.002 mm	21.8
0.001 mm	17.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.4	0.7	1.3	41.3	30.7	25.6	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	1.1		1.3		41.3	34.5		21.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-26 / SPT-16, 26.5'-28.0' & STN-26 / SPT-17, 28.0'-29.5' Lab ID 208
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 20
 Plastic Limit: 18
 Plasticity Index: 2
 Activity Index: 0.15

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.8
No. 200	0.075	49.6
	0.02	24.2
	0.005	16.3
	0.002	12.7
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.2
Medium Sand	0.2	---
Fine Sand	50.2	50.2
Silt	33.3	36.9
Clay	16.3	12.7

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
 Group Name: Silty sand

AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-26 / SPT-16, 26.5'-28.0' & STN-26 / SPT-17, 28.0'-29.5'

Project Number 171468117
Lab ID 208

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DRB
Test Date: 04-16-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

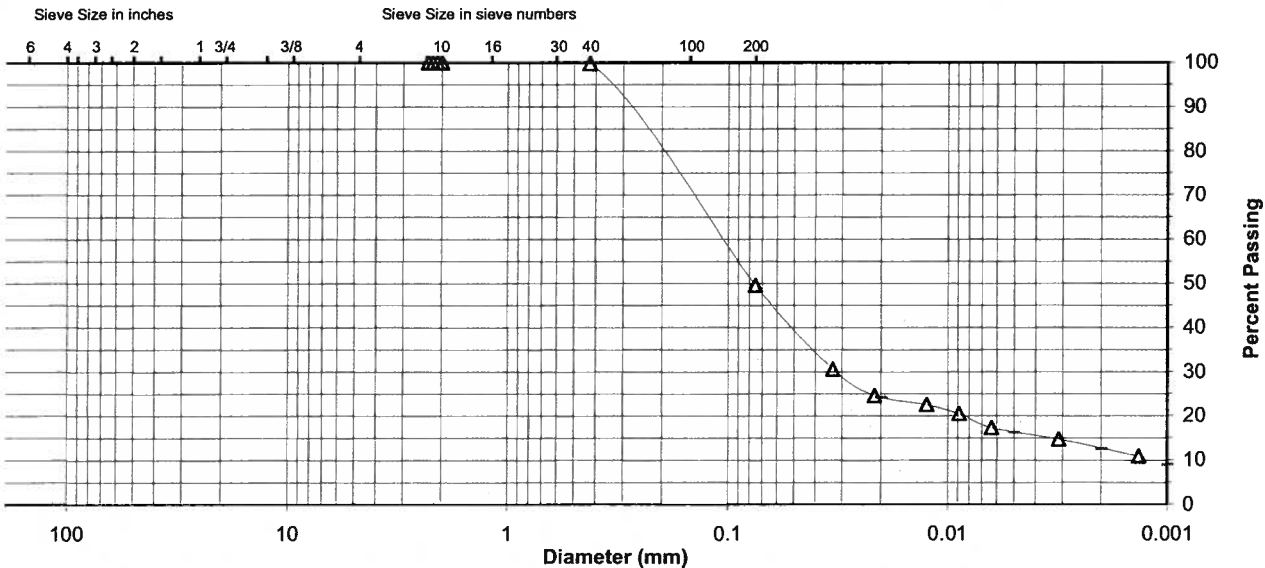
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.8
No. 200	49.6
0.02 mm	24.2
0.005 mm	16.3
0.002 mm	12.7
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.2	50.2	33.3	16.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.2		50.2	36.9	12.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-26 / SPT-25, 40.0'-41.5' & STN-26 / SPT-26, 41.5'-43.0' Lab ID 218
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	44.7
	0.02	22.2
	0.005	13.3
	0.002	9.4
estimated	0.001	8.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	55.2	55.2
Silt	31.4	35.3
Clay	13.3	9.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-26 / SPT-25, 40.0'-41.5' & STN-26 / SPT-26, 41.5'-43.0'

Project Number 171468117
Lab ID 218

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DRB
Test Date: 04-16-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

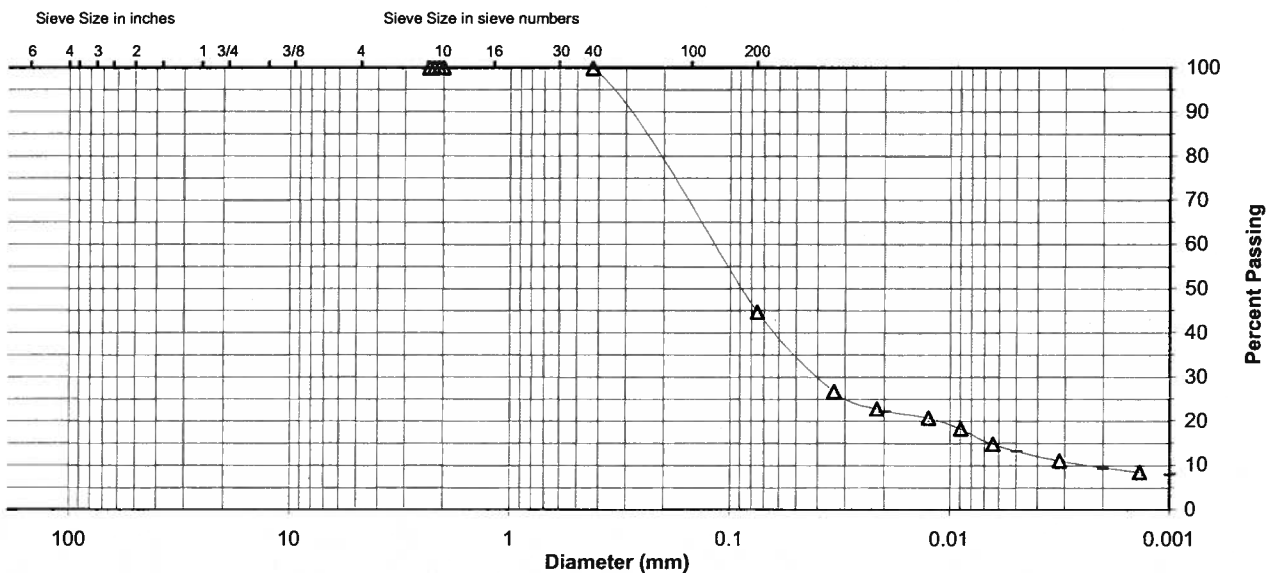
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	44.7
0.02 mm	22.2
0.005 mm	13.3
0.002 mm	9.4
0.001 mm	8.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.1	55.2	31.4	13.3	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.1		55.2	35.3		9.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-27 / SPT-5, 8.0'-9.5' & STN-27 / SPT-6, 9.5'-11.0' Lab ID 368
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 56
 Plastic Limit: 21
 Plasticity Index: 35
 Activity Index: 0.78

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.0
No. 4	4.75	95.2
No. 10	2	90.8
No. 40	0.425	85.4
No. 200	0.075	72.9
	0.02	58.9
	0.005	50.2
	0.002	45.0
estimated	0.001	40.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	4.8	9.2
Coarse Sand	4.4	5.4
Medium Sand	5.4	---
Fine Sand	12.5	12.5
Silt	22.7	27.9
Clay	50.2	45.0

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.72

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-6 (25)

Comments: _____



Project Name Kingston Ash Pond
Source STN-27 / SPT-5, 8.0'-9.5' & STN-27 / SPT-6, 9.5'-11.0'

Project Number 171468117
Lab ID 368

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Weathered and Friable

Tested By: DRB
Test Date: 04-16-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.0
No. 4	95.2
No. 10	90.8

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

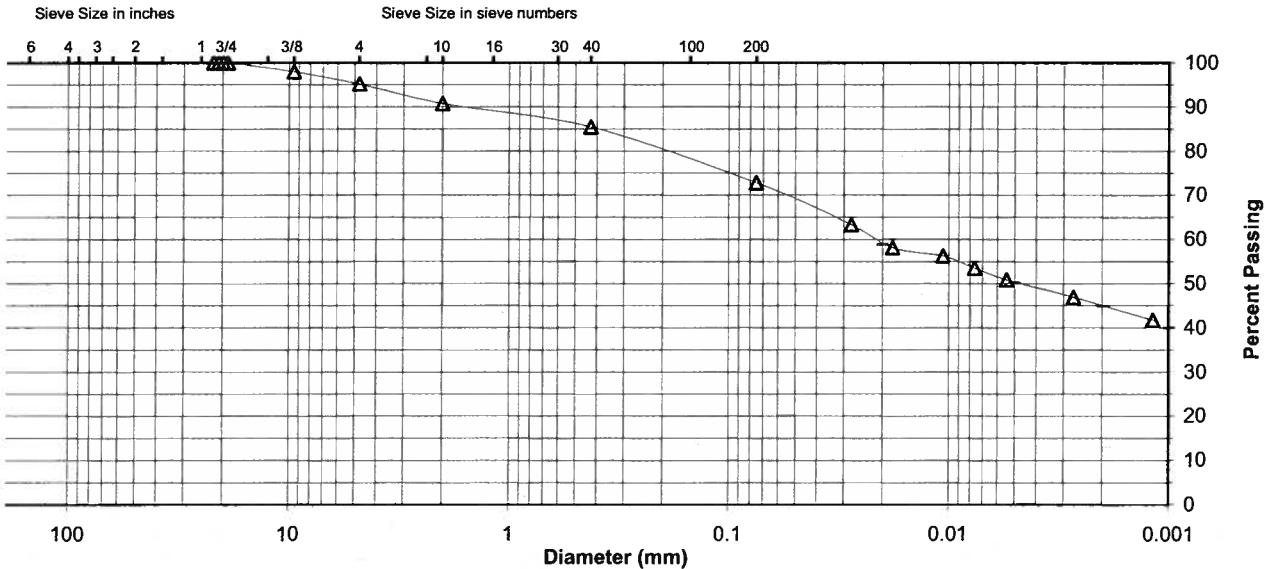
Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.4
No. 200	72.9
0.02 mm	58.9
0.005 mm	50.2
0.002 mm	45.0
0.001 mm	40.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	4.8	4.4	5.4	12.5	22.7	50.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	9.2		5.4		12.5	27.9	45.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-27 / SPT-12, 22.5'-24.0' & STN-27 / SPT-13, 24.0'-25.5' Lab ID 377
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	88.1
No. 4	4.75	76.8
No. 10	2	64.4
No. 40	0.425	47.7
No. 200	0.075	25.1
	0.02	7.8
	0.005	1.6
	0.002	0.3
estimated	0.001	0.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	23.2	35.6
Coarse Sand	12.4	16.7
Medium Sand	16.7	---
Fine Sand	22.6	22.6
Silt	23.5	24.8
Clay	1.6	0.3

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.42

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-1-b (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-27 / SPT-12, 22.5'-24.0' & STN-27 / SPT-13, 24.0'-25.5'

Project Number 171468117
Lab ID 377

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: KWS
Test Date: 04-15-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	88.1
No. 4	76.8
No. 10	64.4

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

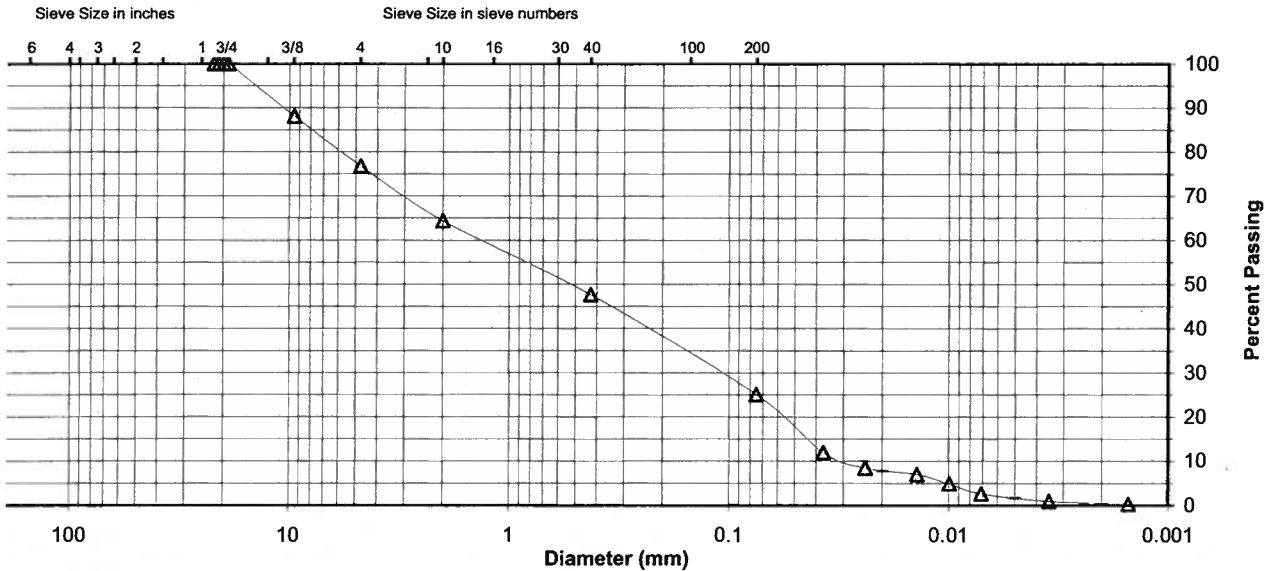
Specific Gravity 2.42

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	47.7
No. 200	25.1
0.02 mm	7.8
0.005 mm	1.6
0.002 mm	0.3
0.001 mm	0.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	23.2	12.4	16.7	22.6	23.5	1.6	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	35.6		16.7		22.6	24.8		0.3

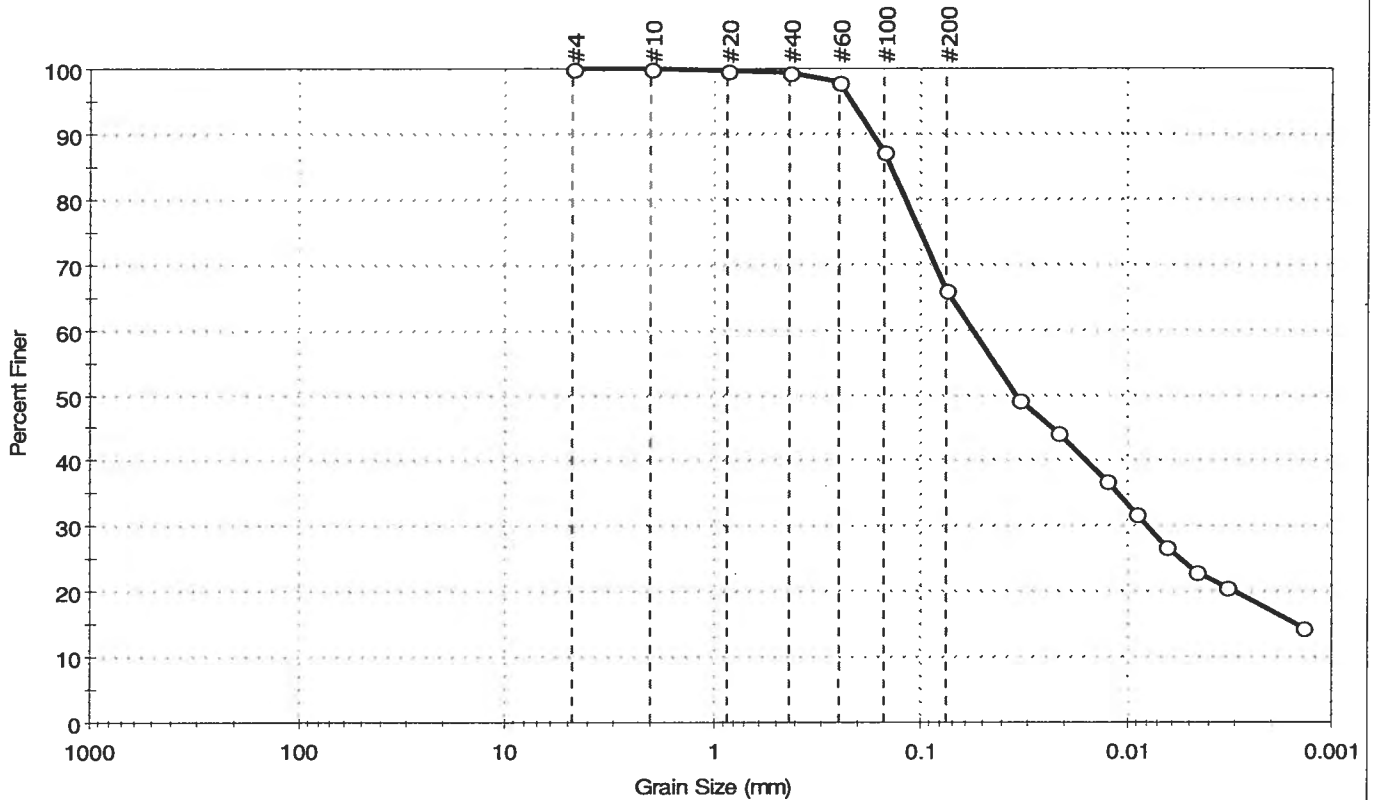


Comments _____

Reviewed By _____

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-27	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: S #348	Test Date: 05/17/09	Test Id: 152225	
Depth: 30.3-30.8 ft			
Test Comment: ---			
Sample Description: Moist, olive brown sandy silty clay			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	33.9	66.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	98		
#100	0.15	87		
#200	0.075	66		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0335	49		
---	0.0216	44		
---	0.0126	37		
---	0.0090	32		
---	0.0064	27		
---	0.0046	23		
---	0.0033	21		
---	0.0014	14		

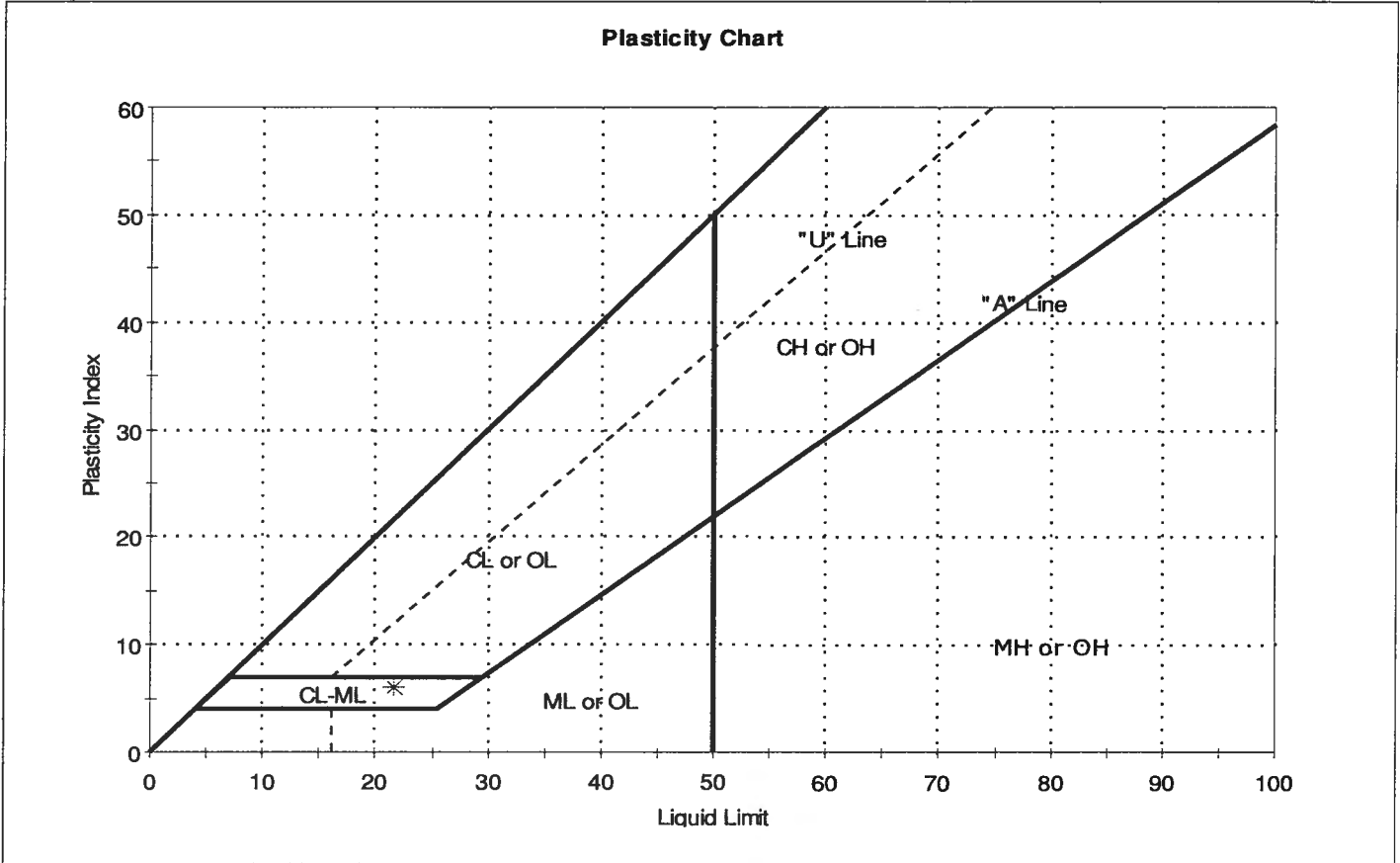
Coefficients	
D ₈₅ = 0.1391 mm	D ₃₀ = 0.0079 mm
D ₆₀ = 0.0559 mm	D ₁₅ = 0.0015 mm
D ₅₀ = 0.0345 mm	D ₁₀ = 0.0008 mm
C _u = N/A	C _c = N/A

Classification	
<u>ASTM</u>	Sandy silty clay (CL-ML)
<u>AASHTO</u>	Silty Soils (A-4 (1))

Sample/Test Description	
Sand/Gravel Particle Shape :	---
Sand/Gravel Hardness :	---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-27	Sample Type: tube	Tested By: cam	Checked By: jdt
Sample ID: S #348	Test Date: 05/13/09	Test Id: 152222	
Depth: 30.3-30.8 ft			
Test Comment: ---			
Sample Description: Moist, olive brown sandy silty clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S #348	STN-27	30.3-30.8 ft	19	22	16	6	1	Sandy silty clay (CL-ML)

Sample Prepared using the WET method
 0% Retained on #40 Sieve
 Dry Strength: HIGH
 Dilatancy: SLOW
 Toughness: LOW

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Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-27 / SPT-28, 50.5'-52.0' & STN-27 / SPT-29, 52.0'-53.5' Lab ID 398
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 19
 Plastic Limit: 18
 Plasticity Index: 1
 Activity Index: 0.07

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	56.5
	0.02	27.0
	0.005	19.3
	0.002	13.8
estimated	0.001	10.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	--
Fine Sand	43.4	43.4
Silt	37.2	42.7
Clay	19.3	13.8

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: ML
 Group Name: Sandy silt
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-27 / SPT-28, 50.5'-52.0' & STN-27 / SPT-29, 52.0'-53.5'

Project Number 171468117
Lab ID 398

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Weathered and Friable

Tested By: KWS
Test Date: 04-15-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

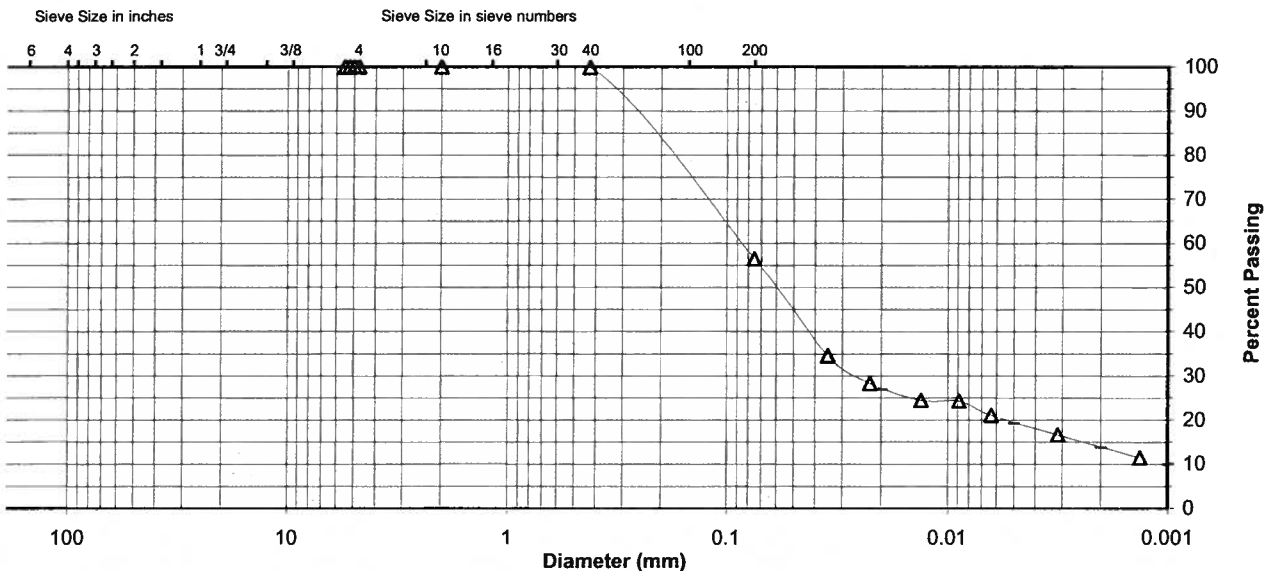
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	56.5
0.02 mm	27.0
0.005 mm	19.3
0.002 mm	13.8
0.001 mm	10.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.1	43.4	37.2	19.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.1		43.4	42.7	13.8

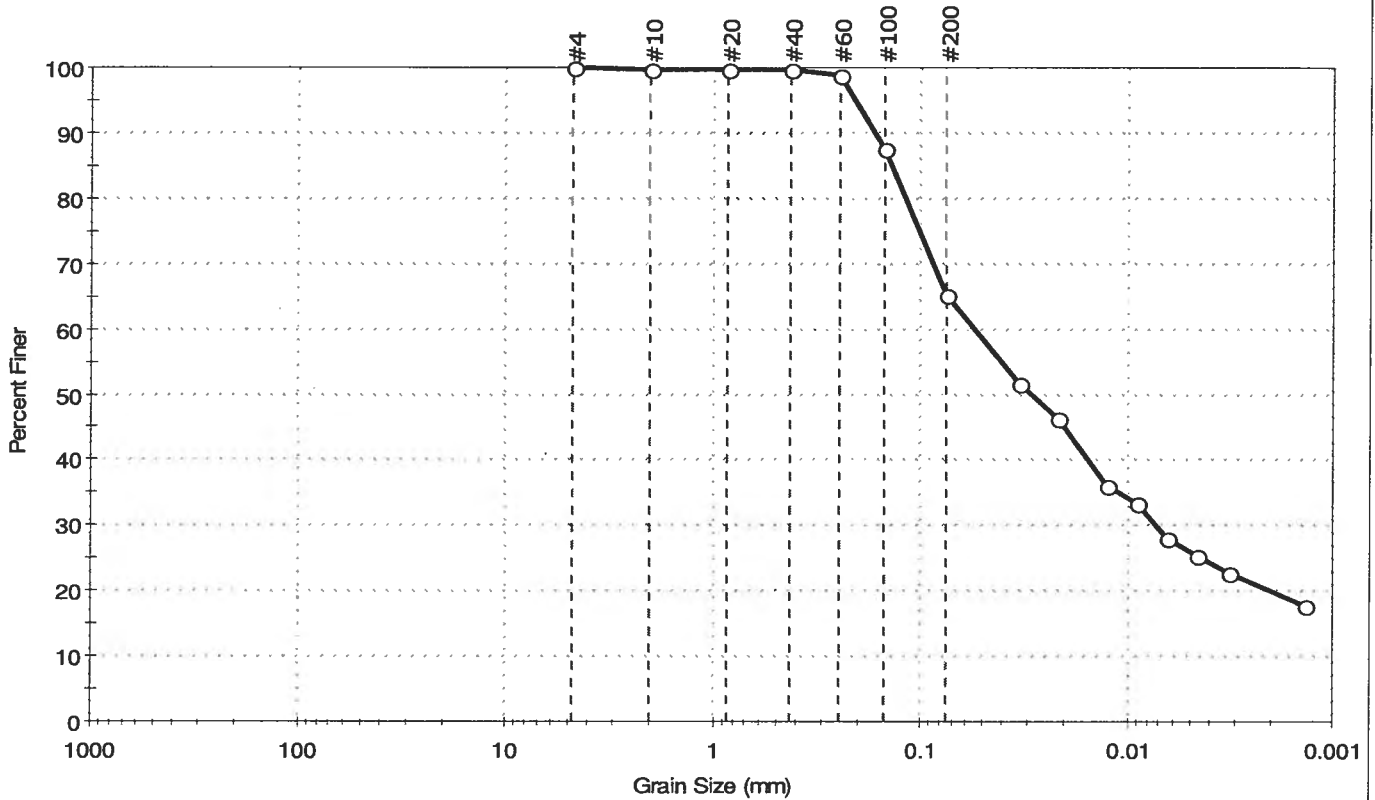


Comments _____

Reviewed By _____

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-27B	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: ST-4	Test Date: 05/17/09	Test Id: 152290	
Depth: 32.0-34.0 ft			
Test Comment: ---			
Sample Description: Moist, olive gray sandy clay			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	34.9	65.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	87		
#200	0.075	65		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0337	51		
---	0.0216	46		
---	0.0127	36		
---	0.0090	33		
---	0.0064	28		
---	0.0046	25		
---	0.0033	23		
---	0.0014	18		

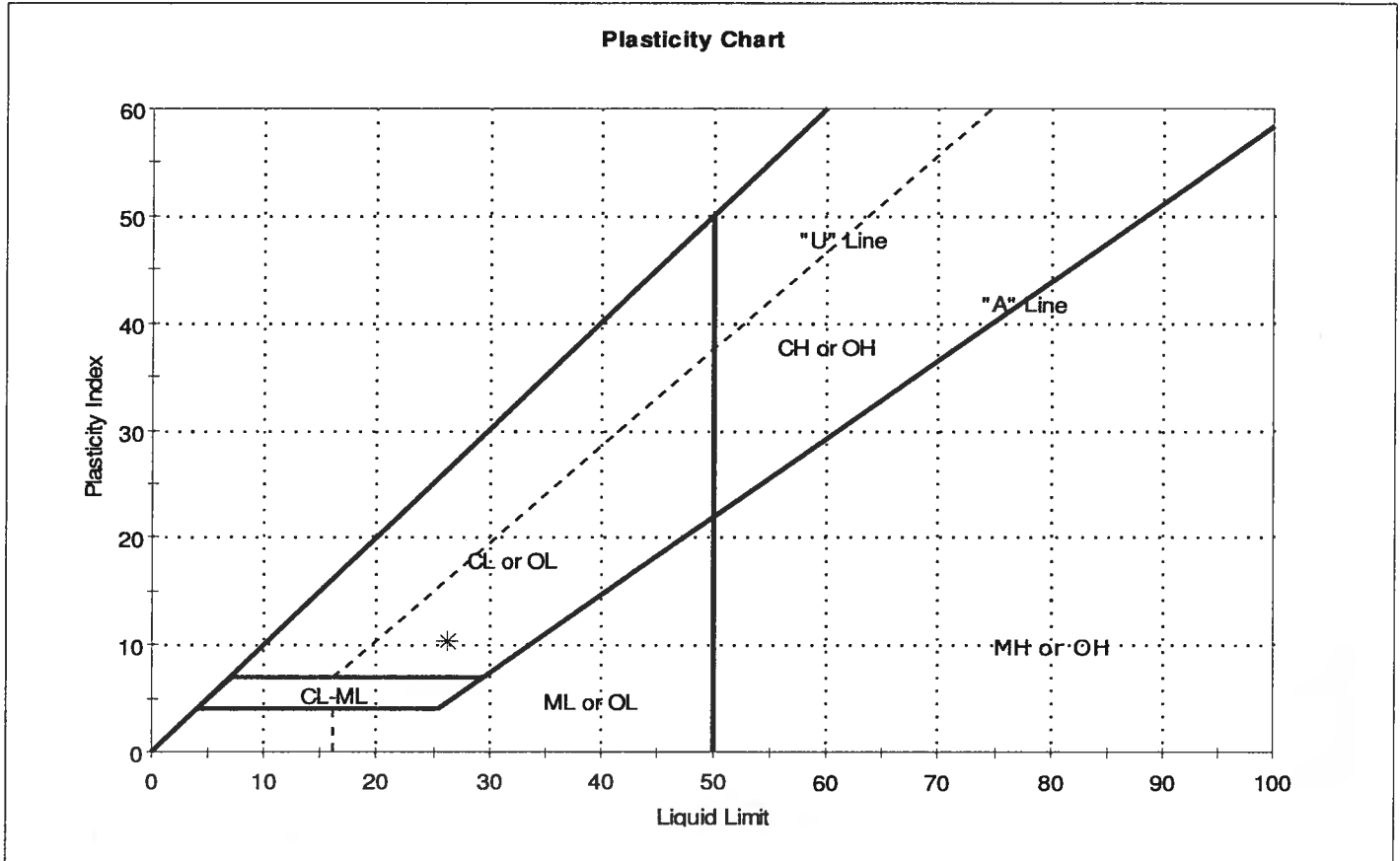
Coefficients	
D ₈₅ = 0.1390 mm	D ₃₀ = 0.0073 mm
D ₆₀ = 0.0555 mm	D ₁₅ = N/A
D ₅₀ = 0.0297 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification	
ASTM	Sandy lean clay (CL)
AASHTO	Clayey Soils (A-6 (4))

Sample/Test Description	
Sand/Gravel Particle Shape :	---
Sand/Gravel Hardness :	---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Project No: GTX-9015
Location: Roane, TN	Boring ID: STN-27B	Sample Type: tube
Tested By: cam	Sample ID: ST-4	Test Date: 05/13/09
Checked By: jdt	Depth: 32.0-34.0 ft	Test Id: 152286
Test Comment: ---	Sample Description: Moist, olive gray sandy clay	Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-4	STN-27B	32.0-34.0 ft	24	26	16	10	1	Sandy lean clay (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

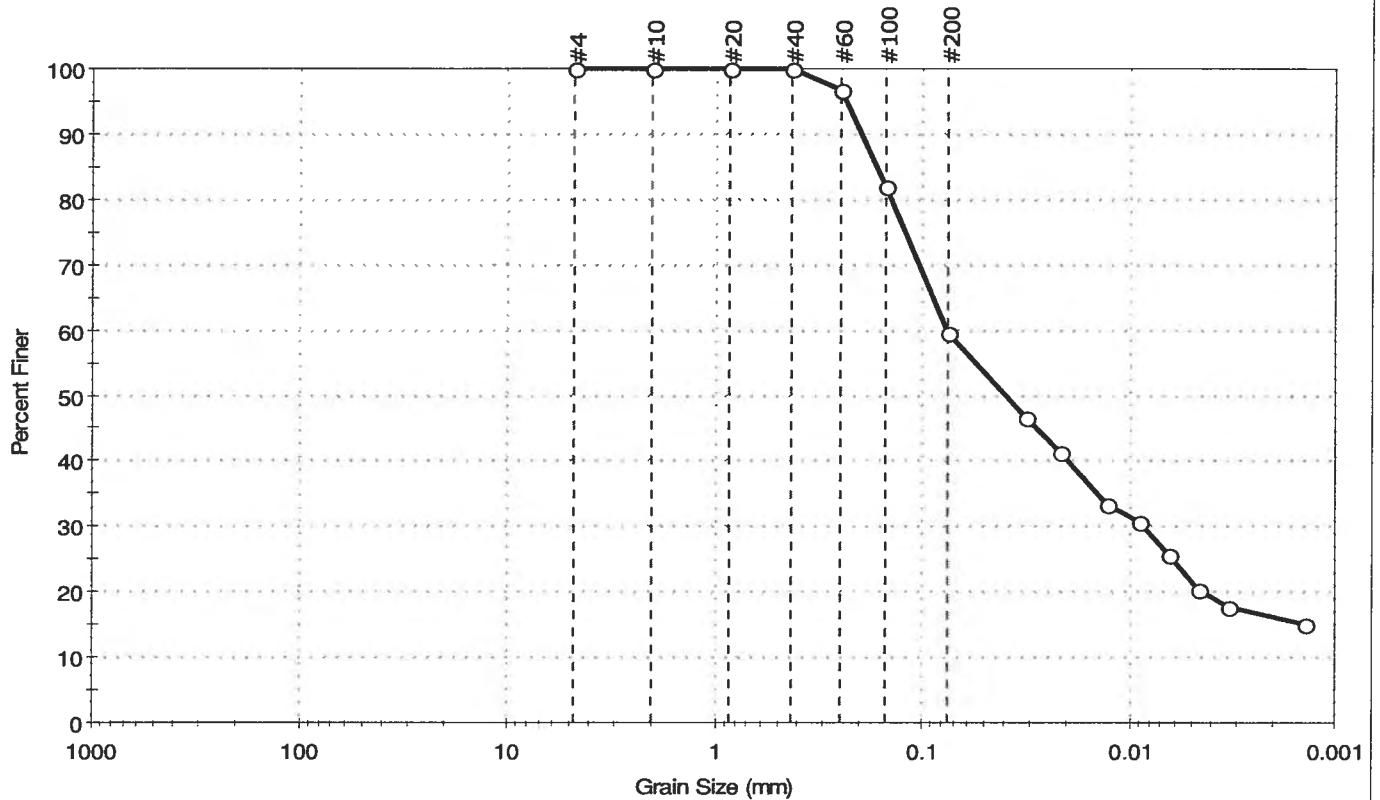
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-27B	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: ST-5	Test Date: 05/17/09	Test Id: 152291	
Depth: 34.0-36.0 ft			
Test Comment: ---			
Sample Description: Moist, yellowish brown sandy silty clay			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	40.5	59.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	97		
#100	0.15	82		
#200	0.075	59		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0319	47		
---	0.0219	41		
---	0.0128	33		
---	0.0090	31		
---	0.0065	26		
---	0.0046	20		
---	0.0033	18		
---	0.0014	15		

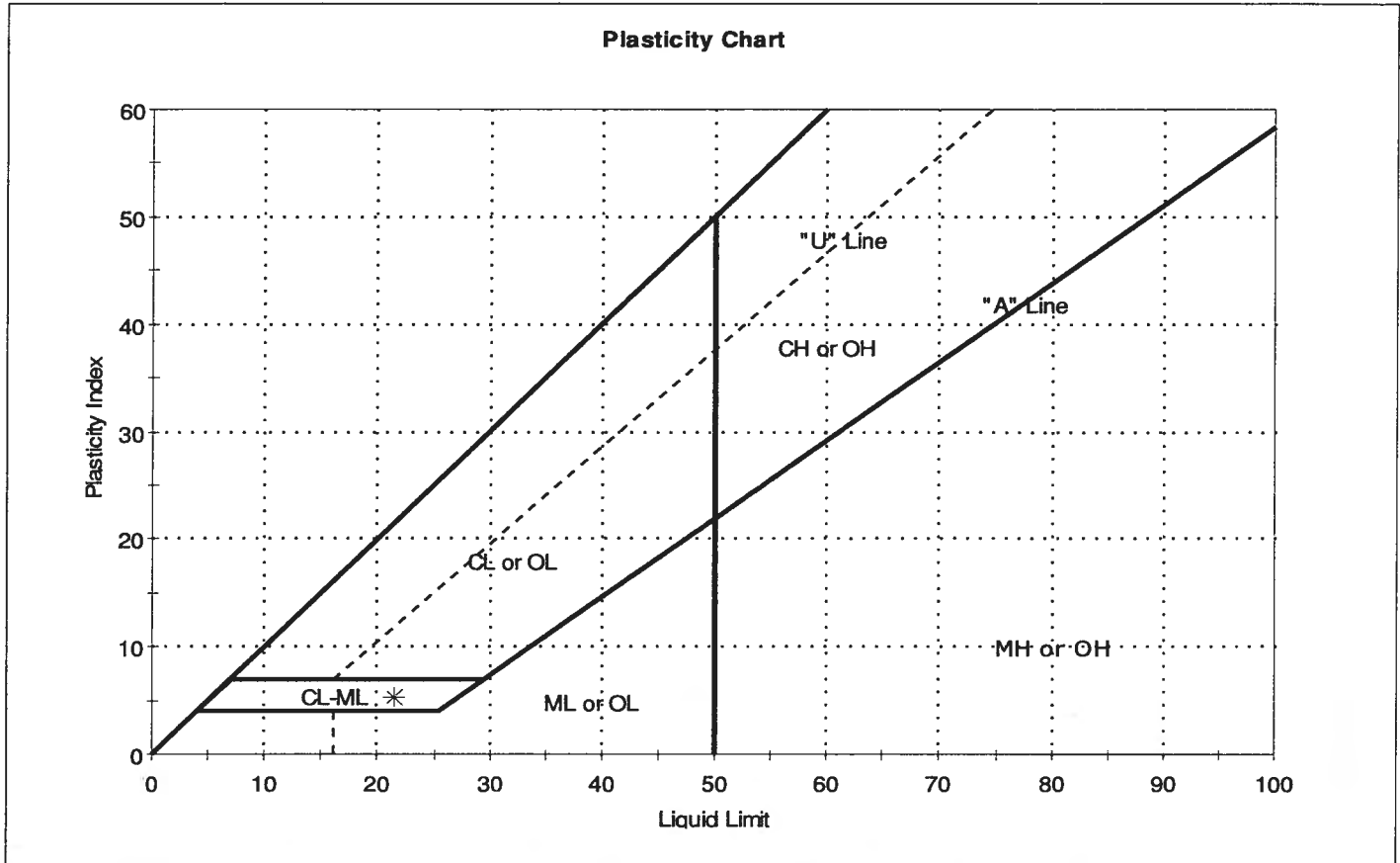
Coefficients	
D ₈₅ = 0.1668 mm	D ₃₀ = 0.0086 mm
D ₆₀ = 0.0763 mm	D ₁₅ = N/A
D ₅₀ = 0.0401 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification	
ASTM	Sandy silty clay (CL-ML)
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description	
Sand/Gravel Particle Shape :	---
Sand/Gravel Hardness :	---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-27B	Sample Type: tube	Tested By: cam	Checked By: jdt
Sample ID: ST-5	Test Date: 05/15/09	Test Id: 152287	
Depth: 34.0-36.0 ft			
Test Comment: ---	Sample Description: Moist, yellowish brown sandy silty clay		
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05

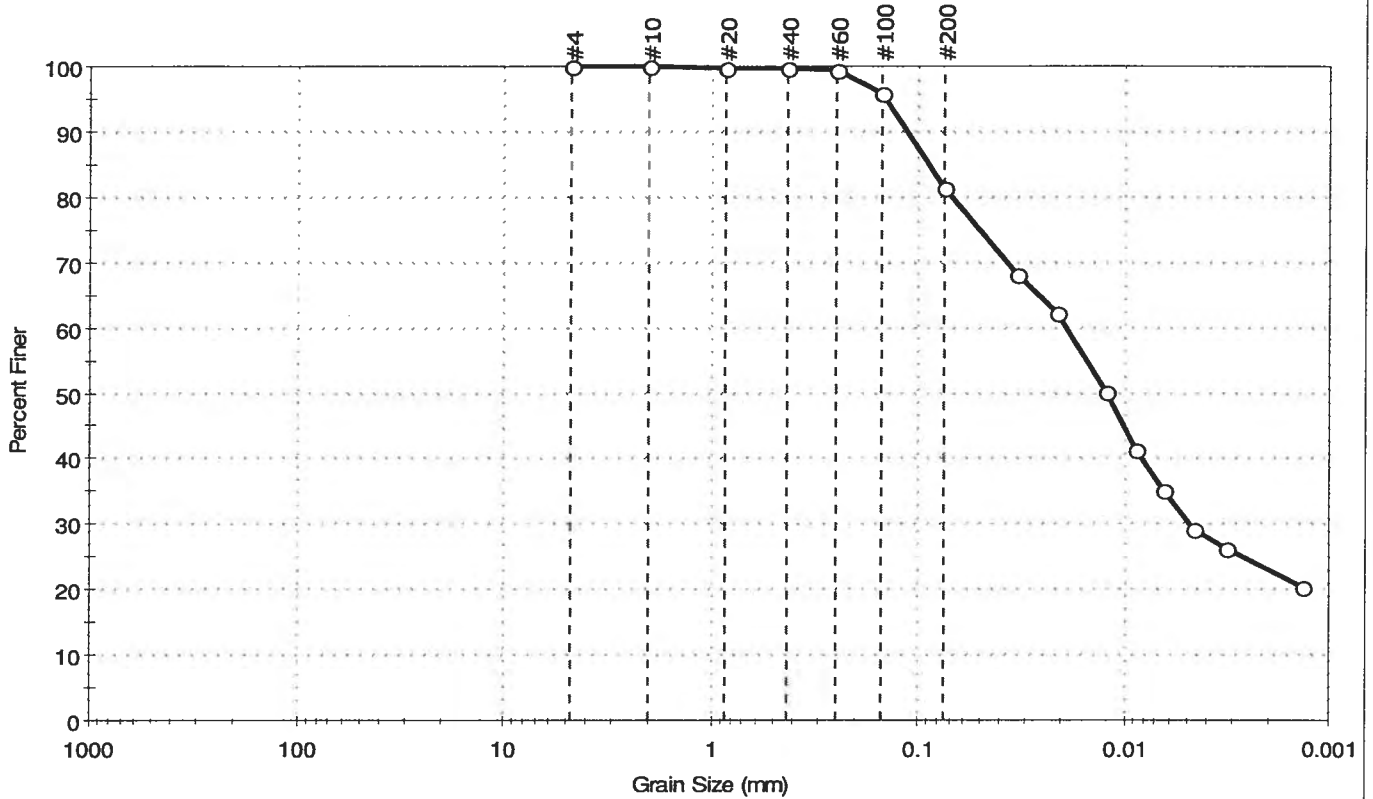


Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-5	STN-27B	34.0-36.0 ft	19	21	16	5	1	Sandy silty clay (CL-ML)

Sample Prepared using the WET method
 0% Retained on #40 Sieve
 Dry Strength: VERY HIGH
 Dilatancy: NONE
 Toughness: LOW

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: ST-28	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: ST-1	Test Date: 05/17/09	Test Id: 152415	
Depth: 37.5-39.5 ft			
Test Comment: ---			
Sample Description: Moist, dark olive gray clay with sand			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	18.7	81.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	96		
#200	0.075	81		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0334	68		
---	0.0211	62		
---	0.0124	50		
---	0.0088	41		
---	0.0064	35		
---	0.0046	29		
---	0.0033	26		
---	0.0014	20		

Coefficients

D ₈₅ = 0.0894 mm	D ₃₀ = 0.0048 mm
D ₆₀ = 0.0191 mm	D ₁₅ = N/A
D ₅₀ = 0.0123 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

ASTM lean clay with sand (CL)

AASHTO Clayey Soils (A-6 (12))

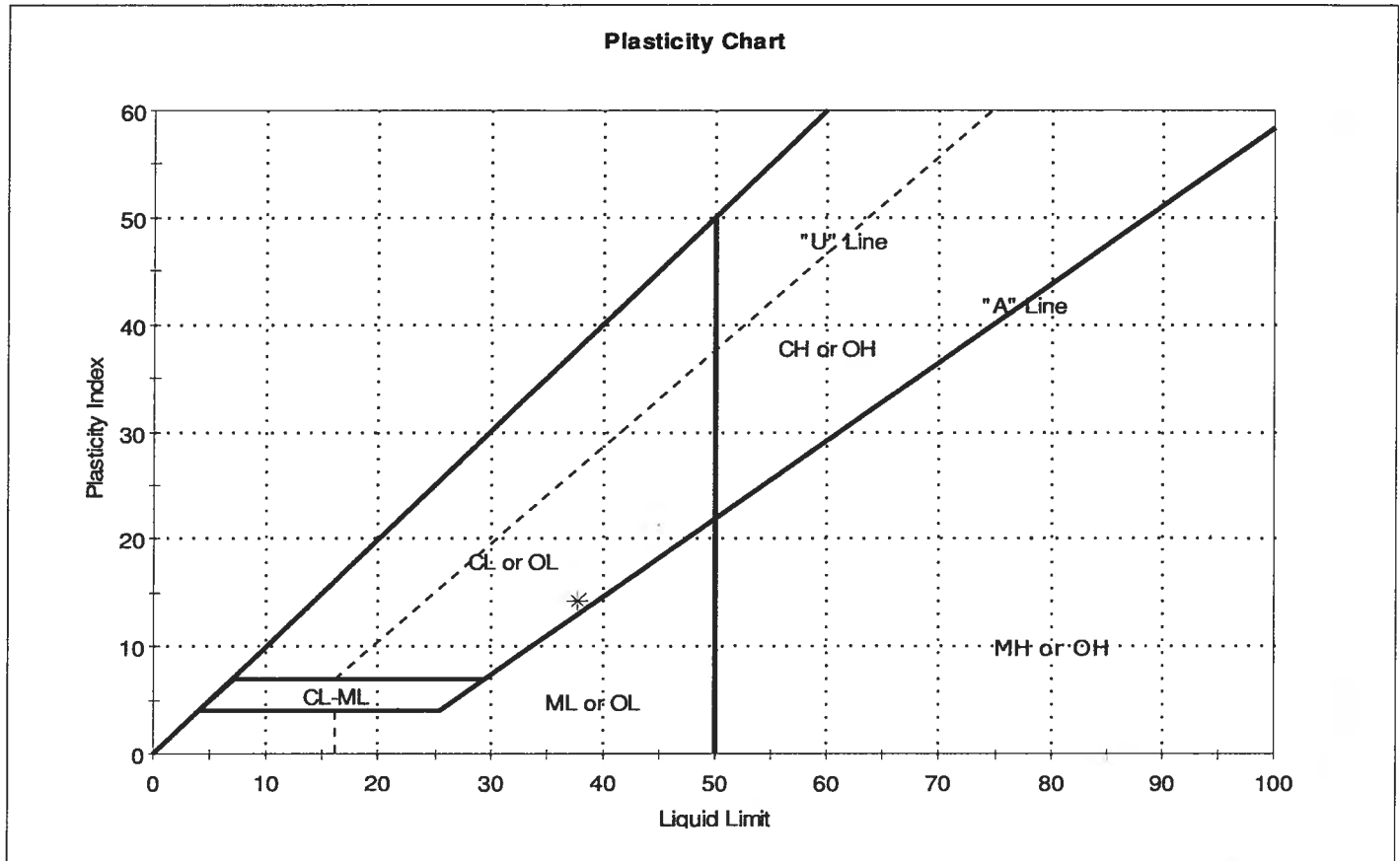
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client: Stantec Consulting Services	Project No: GTX-9015
Project: Kingston Ash Pond	Tested By: cam
Location: Roane, TN	Checked By: jdt
Boring ID: ST-28	Sample Type: tube
Sample ID: ST-1	Test Date: 05/18/09
Depth: 37.5-39.5 ft	Test Id: 152412
Test Comment: ---	
Sample Description: Moist, dark olive gray clay with sand	
Sample Comment: ---	

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-1	ST-28	37.5-39.5 ft	37	38	23	15	1	lean clay with sand (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-28, 50.5'-52.0', 52.0'-53.5' Lab ID 32
 County Kingston, Tennessee Date Received 5-12-09
 Sample Type SPT Comp Date Reported 6-1-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 16
 Plastic Limit: 17
 Plasticity Index: -1
 Activity Index: -0.08

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	98.3
No. 200	0.075	46.1
	0.02	25.9
	0.005	16.9
	0.002	13.1
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.7
Medium Sand	1.7	—
Fine Sand	52.2	52.2
Silt	29.2	33.0
Clay	16.9	13.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.64

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-28, 50.5'-52.0', 52.0'-53.5'

Project Number 175569042
Lab ID 32

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-21-2009
Date Received 05-12-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

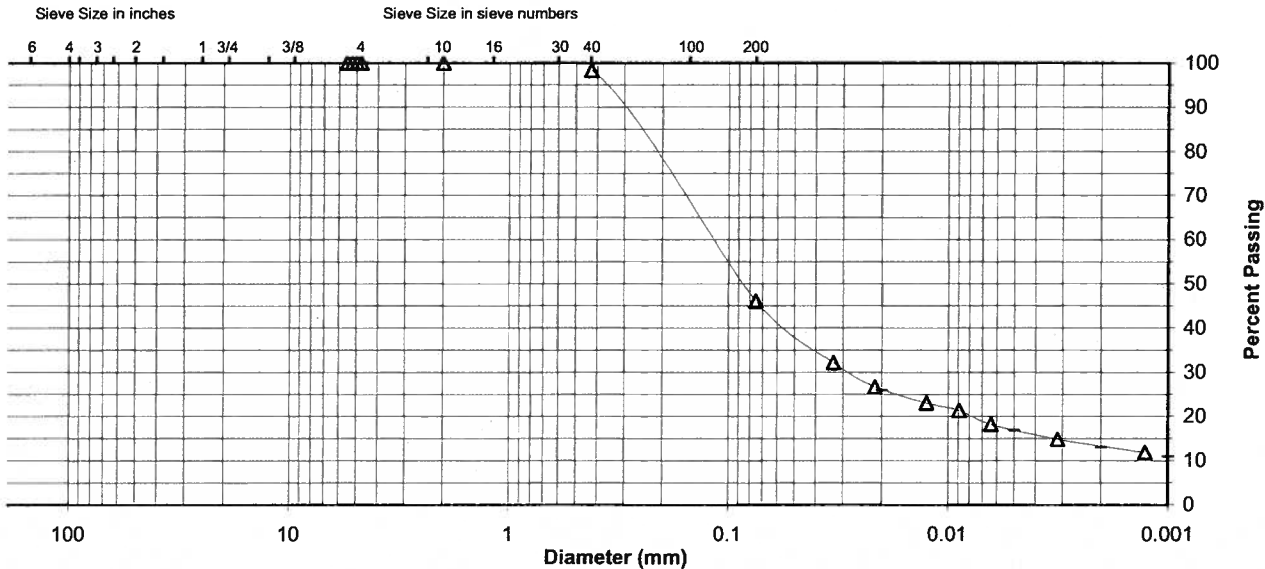
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.3
No. 200	46.1
0.02 mm	25.9
0.005 mm	16.9
0.002 mm	13.1
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.7	52.2	29.2	16.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		1.7		52.2	33.0	13.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-29, 47.5'-49.0', 49.0'-50.5' Lab ID 68
 County Kingston, Tennessee Date Received 5-12-09
 Sample Type SPT Comp Date Reported 6-1-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 28
 Plastic Limit: 18
 Plasticity Index: 10
 Activity Index: 0.43

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	98.3
No. 200	0.075	80.5
	0.02	51.4
	0.005	30.6
	0.002	22.7
estimated	0.001	17.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.7
Medium Sand	1.7	---
Fine Sand	17.8	17.8
Silt	49.9	57.8
Clay	30.6	22.7

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-4 (6)

Comments: _____



Project Name Kingston Ash Pond
Source STN-29, 47.5'-49.0', 49.0'-50.5'

Project Number 175569042
Lab ID 68

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-21-2009
Date Received 05-12-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

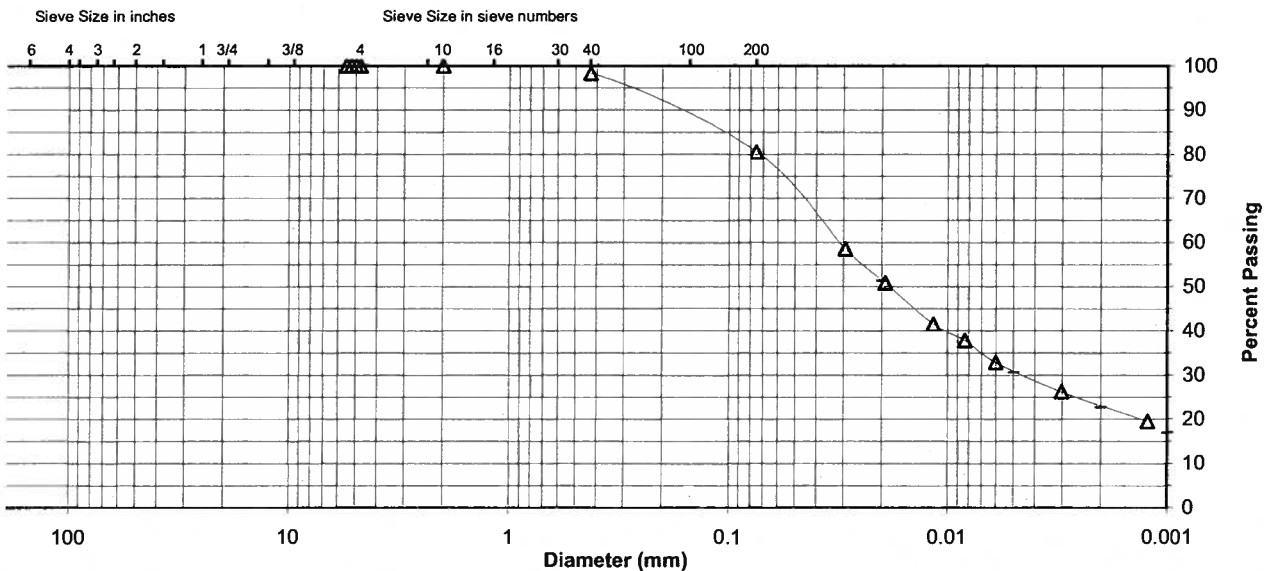
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.3
No. 200	80.5
0.02 mm	51.4
0.005 mm	30.6
0.002 mm	22.7
0.001 mm	17.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.7	17.8	49.9	30.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		1.7		17.8	57.8	22.7



Comments _____

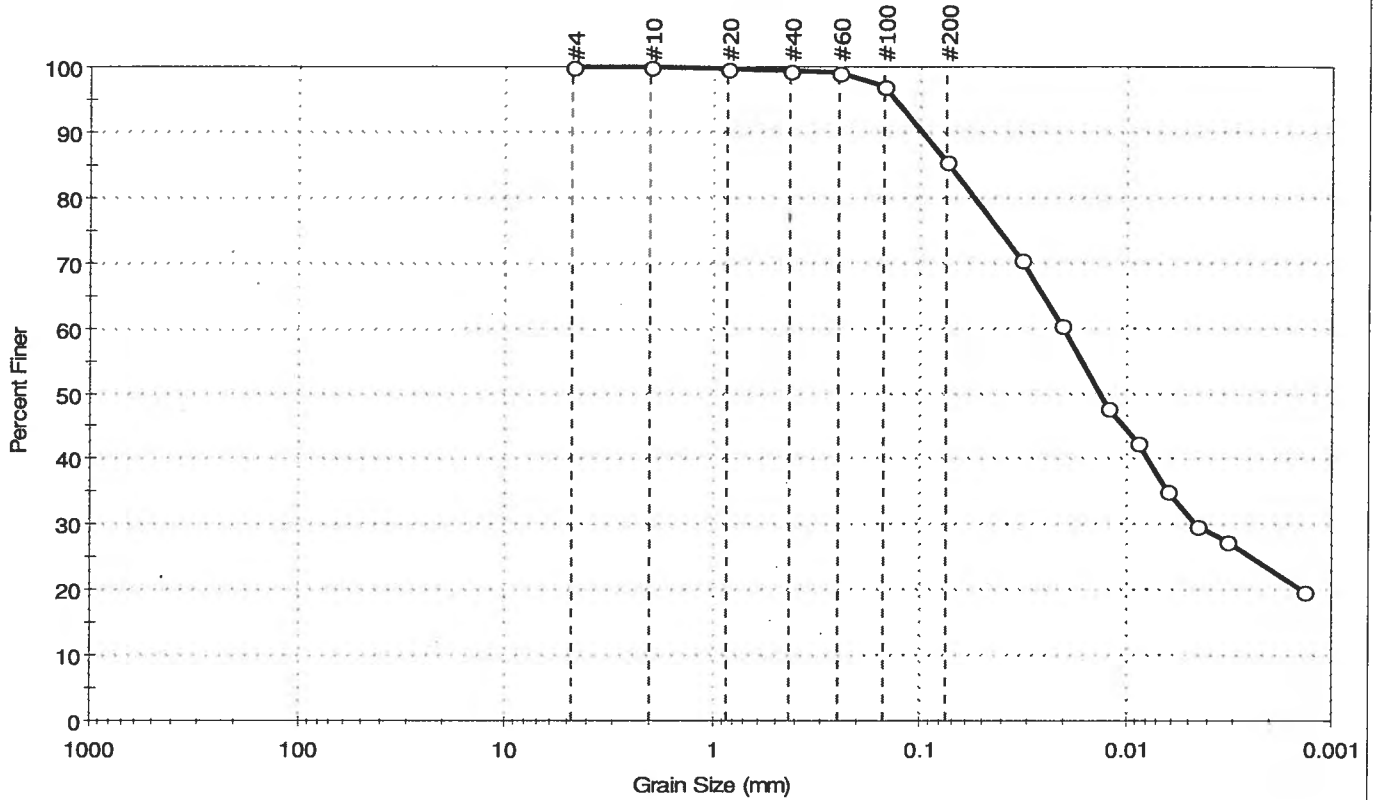
Reviewed By _____

Client: Stantec Consulting Services
 Project: Kingston Ash Pond
 Location: Roane, TN
 Boring ID: ST-29
 Sample ID: ST-7
 Depth: 60.0-62.0 ft
 Test Comment: ---
 Sample Description: Moist, dark olive gray clay
 Sample Comment: ---

Project No: GTX-9015
 Tested By: jbr
 Checked By: jdt

Sample Type: tube
 Test Date: 05/17/09
 Test Id: 152416

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	14.5	85.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	97		
#200	0.075	85		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0326	71		
---	0.0208	60		
---	0.0123	48		
---	0.0088	43		
---	0.0063	35		
---	0.0045	30		
---	0.0032	27		
---	0.0014	20		

Coefficients

D ₈₅ = 0.0731 mm	D ₃₀ = 0.0046 mm
D ₆₀ = 0.0204 mm	D ₁₅ = N/A
D ₅₀ = 0.0135 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

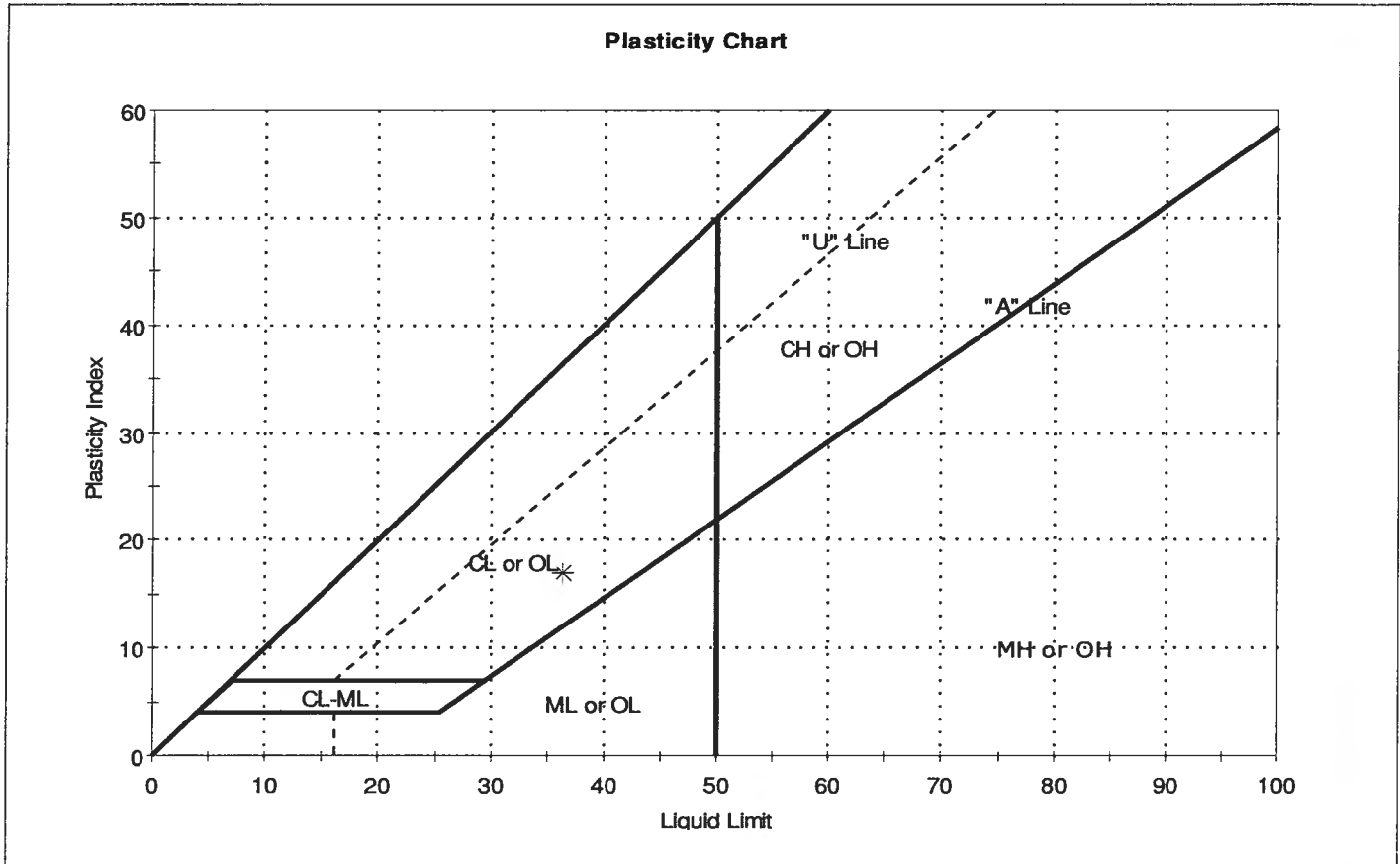
ASTM	lean clay (CL)
AASHTO	Clayey Soils (A-6 (15))

Sample/Test Description

Sand/Gravel Particle Shape : ---
 Sand/Gravel Hardness : ---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: ST-29	Sample Type: tube	Tested By: cam	Checked By: jdt
Sample ID: ST-7	Test Date: 05/18/09	Test Id: 152413	
Depth: 60.0-62.0 ft			
Test Comment: ---			
Sample Description: Moist, dark olive gray clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	ST-7	ST-29	60.0-62.0 ft	26	36	19	17	0	lean clay (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: SLOW

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-29, 62.0'-63.5', 63.5'-65.0' Lab ID 76
 County Kingston, Tennessee Date Received 5-12-09
 Sample Type SPT Comp Date Reported 6-1-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	95.2
3/8"	9.5	92.0
No. 4	4.75	87.0
No. 10	2	83.7
No. 40	0.425	60.9
No. 200	0.075	15.3
	0.02	8.3
	0.005	5.5
	0.002	3.9
estimated	0.001	2.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	13.0	16.3
Coarse Sand	3.3	22.8
Medium Sand	22.8	---
Fine Sand	45.6	45.6
Silt	9.8	11.4
Clay	5.5	3.9

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.56

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-29, 62.0'-63.5', 63.5'-65.0'

Project Number 175569042
Lab ID 76

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-21-2009
Date Received 05-12-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	95.2
3/8"	92.0
No. 4	87.0
No. 10	83.7

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

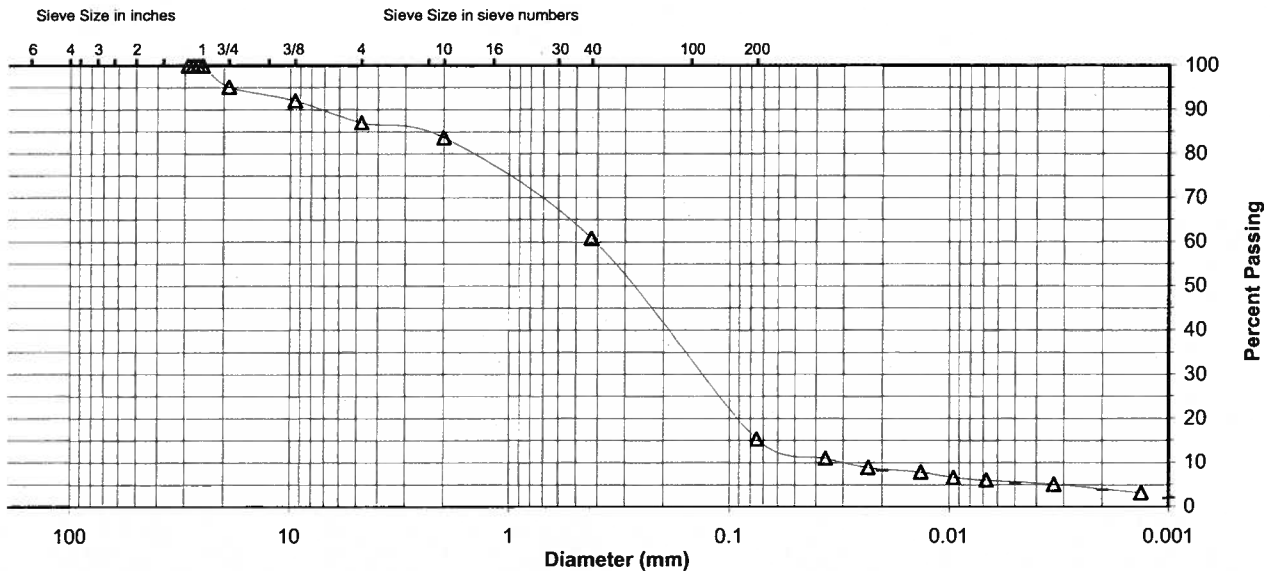
Specific Gravity 2.56

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	60.9
No. 200	15.3
0.02 mm	8.3
0.005 mm	5.5
0.002 mm	3.9
0.001 mm	2.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	4.8	8.2	3.3	22.8	45.6	9.8	5.5	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	16.3		22.8		45.6	11.4		3.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-31 / SPT-15, 25.5'-27.0' & STN-31 / SPT-16, 27.0'-28.5' Lab ID 281
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 22
 Plastic Limit: 18
 Plasticity Index: 4
 Activity Index: 0.25

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	55.6
	0.02	29.9
	0.005	20.9
	0.002	16.4
estimated	0.001	14.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	—
Fine Sand	44.3	44.3
Silt	34.7	39.2
Clay	20.9	16.4

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification
 Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils
ASTM D 422

Project Name Kingston Ash Pond
Source STN-31 / SPT-15, 25.5'-27.0' & STN-31 / SPT-16, 27.0'-28.5'

Project Number 171468117
Lab ID 281

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421
Particle Shape: Angular
Particle Hardness: Hard and Durable
Tested By: BWT
Test Date: 04-17-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

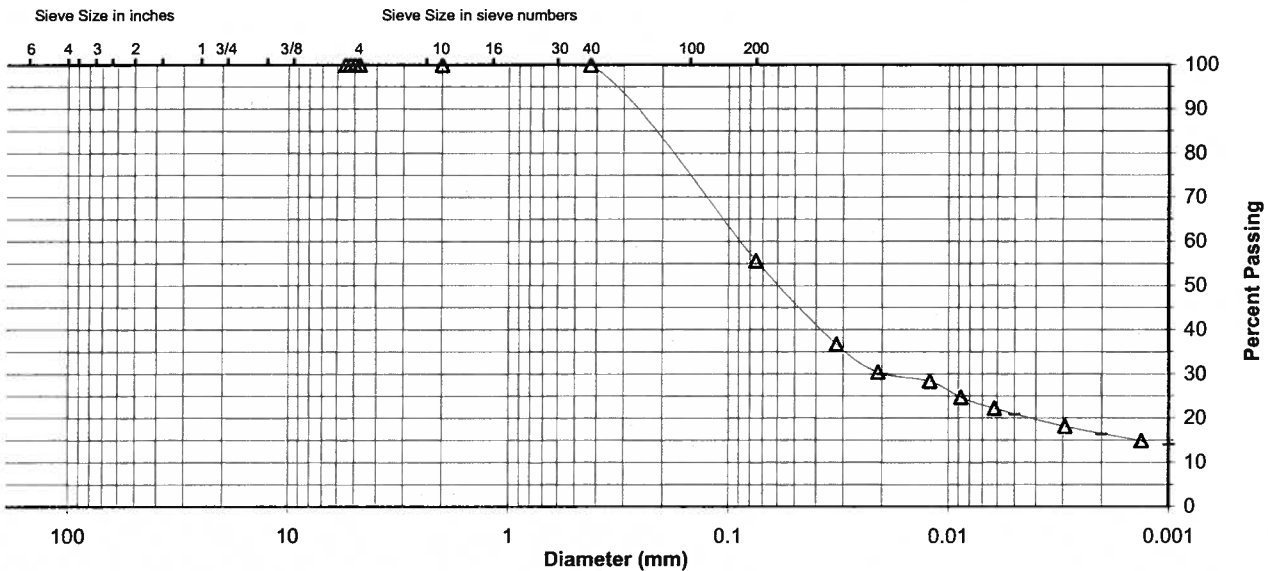
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	55.6
0.02 mm	29.9
0.005 mm	20.9
0.002 mm	16.4
0.001 mm	14.0

Particle Size Distribution

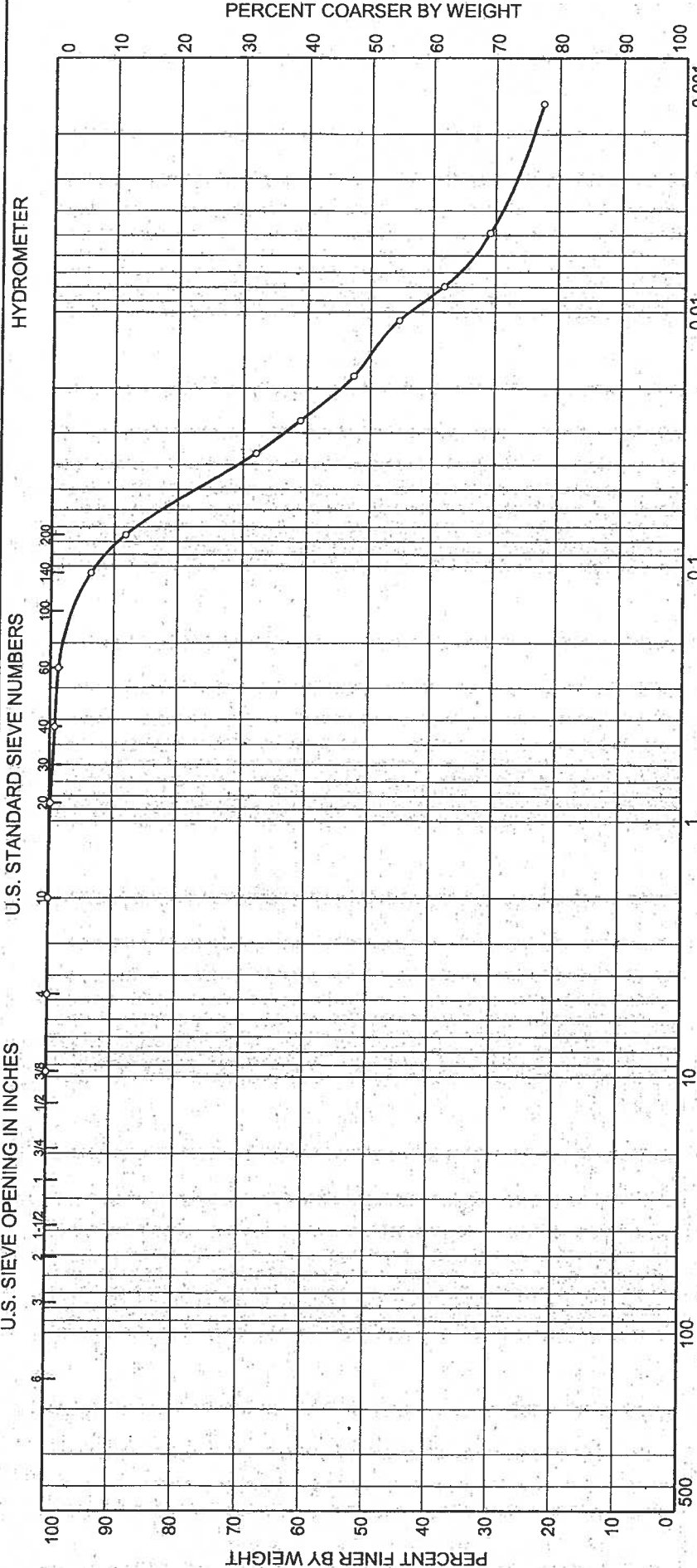
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.1	44.3	34.7	20.9	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.1		44.3	39.2		16.4



Comments _____

Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140



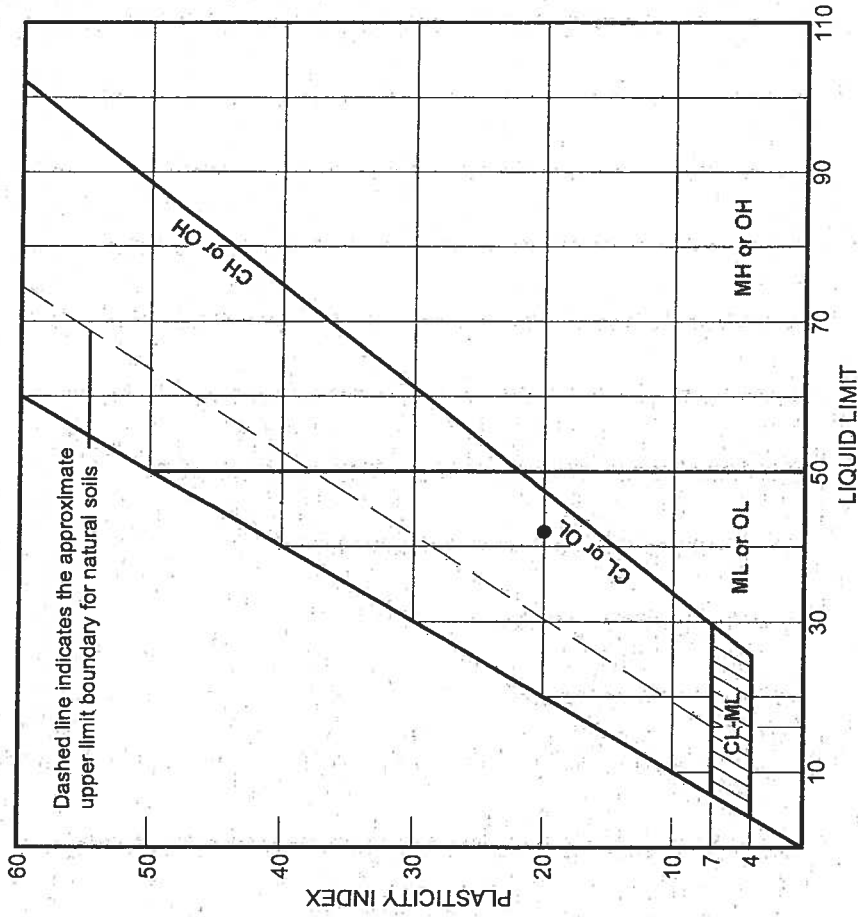
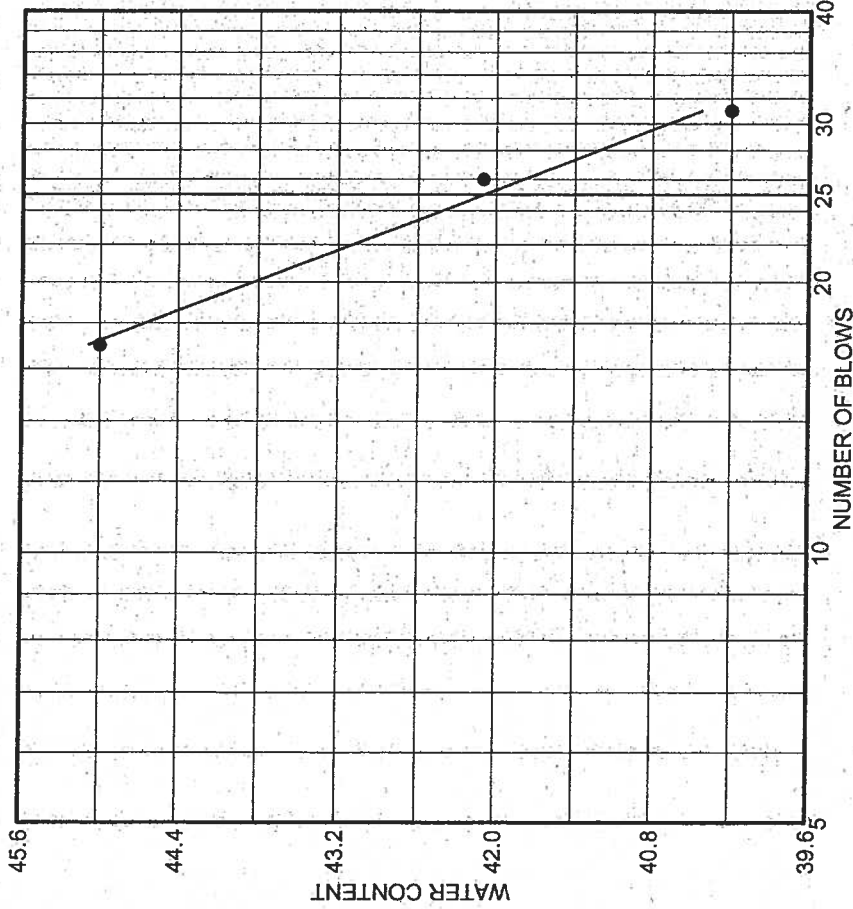
% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	11.8	57.1	31.1

SOURCE	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
STN-31	38-38.5 ft	May 09	CL	Gray Brown Lean clay		42	22

Client STANTEC
 Project Kingston Ash Pond
 Project No. GTX-1464 Lab no. _____

GeoTesting Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	STN-31	38-38.5 ft	May 09	CL	Gray Brown Lean clay		42	20

Client STANTEC

Project Kingston Ash Pond

Project No. GTX-1464 Lab no. _____

GeoTesting Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-31 / SPT-26, 46.0'-47.5' & STN-31 / SPT-27, 47.5'-49.0' Lab ID 293
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 30
 Plastic Limit: 23
 Plasticity Index: 7
 Activity Index: 0.41

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.8
No. 200	0.075	73.4
	0.02	44.5
	0.005	24.1
	0.002	17.2
estimated	0.001	12.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.2
Medium Sand	0.2	---
Fine Sand	26.4	26.4
Silt	49.3	56.2
Clay	24.1	17.2

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.57

Classification

Unified Group Symbol: ML
 Group Name: Silt with sand
 AASHTO Classification: A-4 (4)

Comments: _____



Project Name Kingston Ash Pond
Source STN-31 / SPT-26, 46.0'-47.5' & STN-31 / SPT-27, 47.5'-49.0'

Project Number 171468117
Lab ID 293

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-21-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

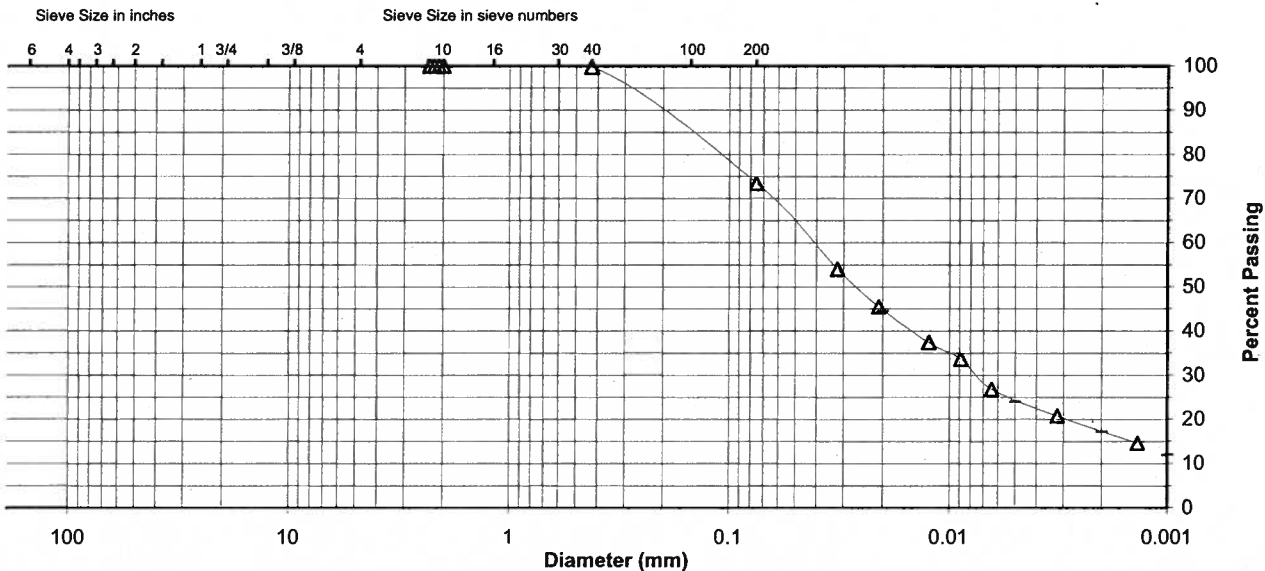
Specific Gravity 2.57

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.8
No. 200	73.4
0.02 mm	44.5
0.005 mm	24.1
0.002 mm	17.2
0.001 mm	12.0

Particle Size Distribution

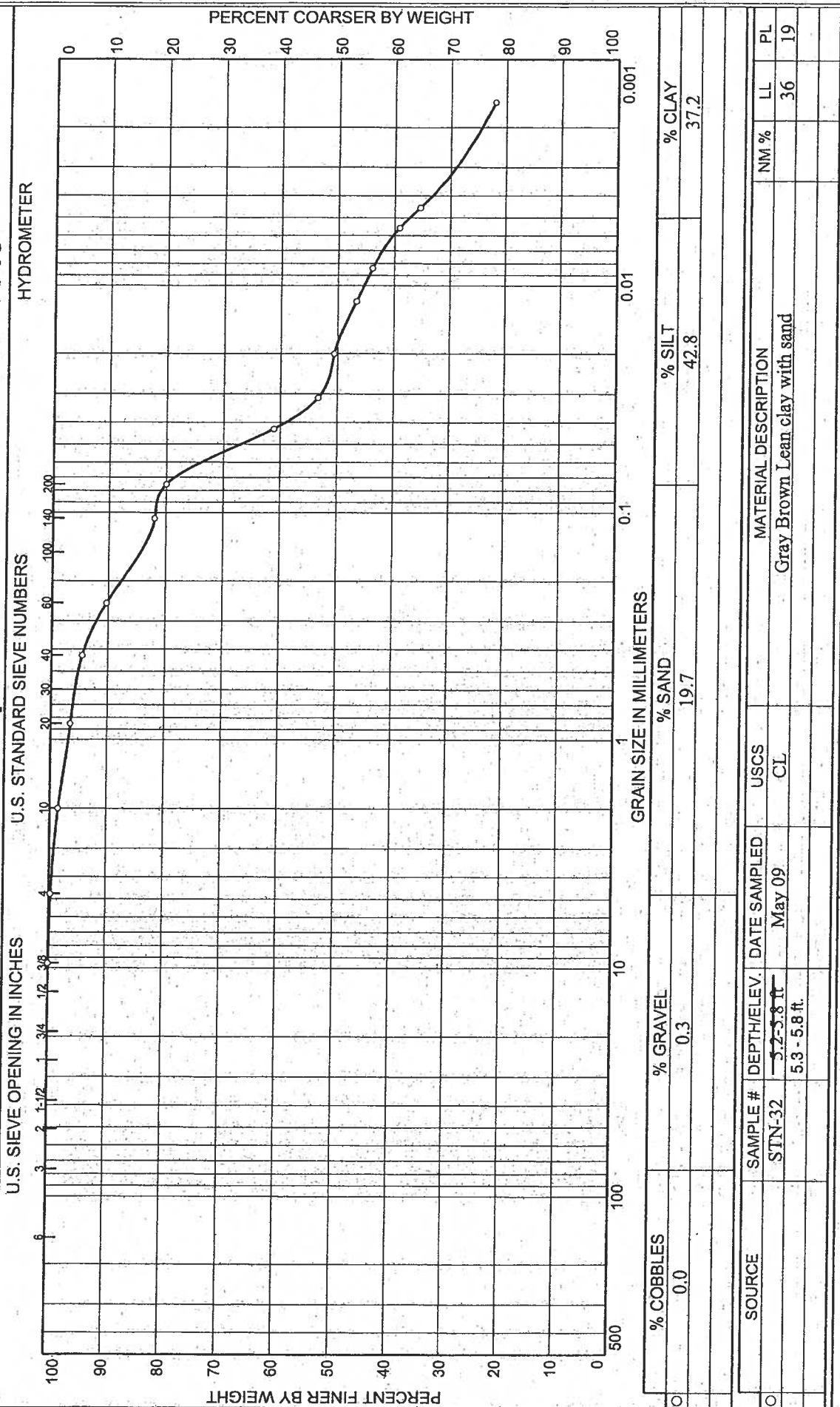
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.2	26.4	49.3	24.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.2		26.4	56.2	17.2



Comments _____

Reviewed By _____

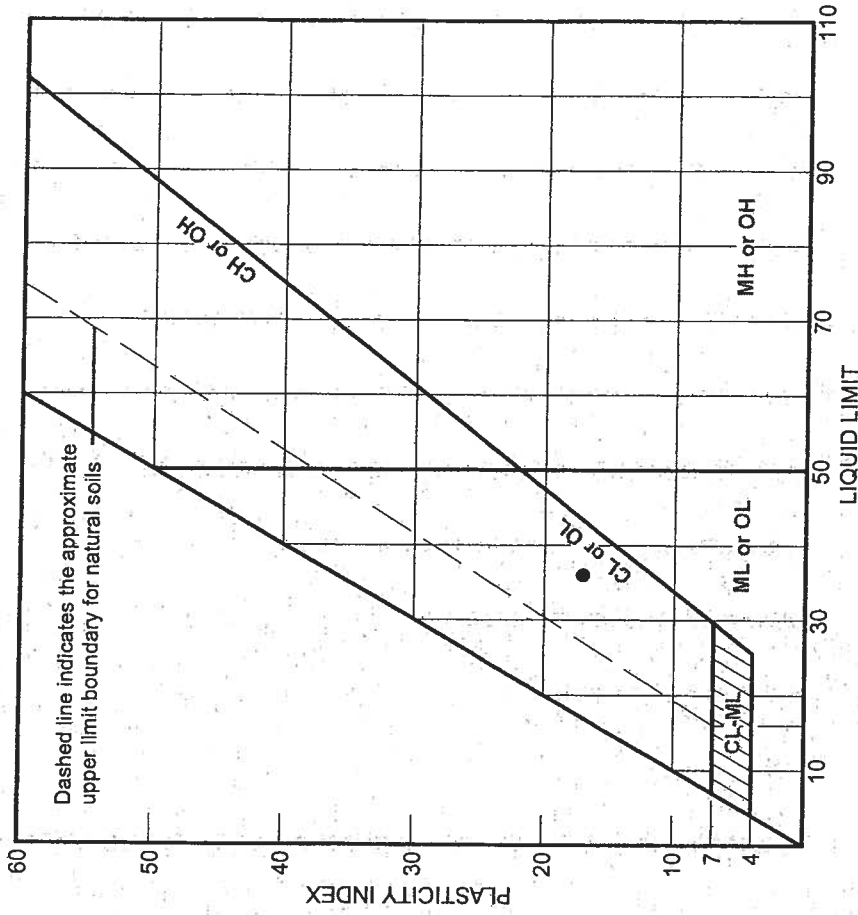
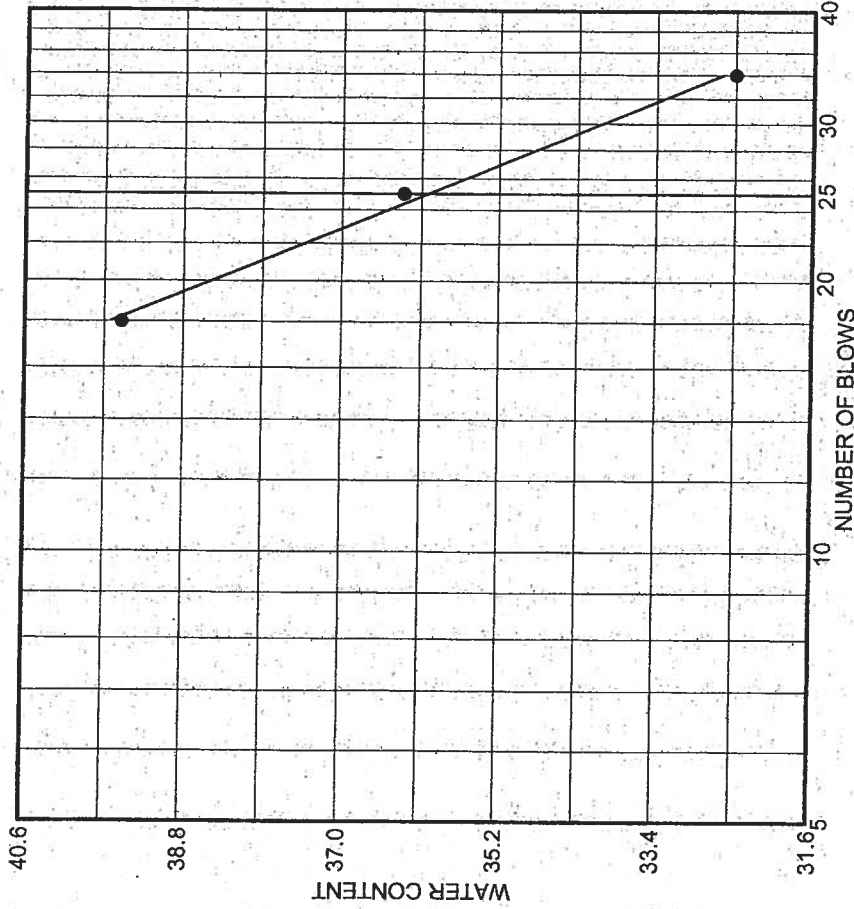
Particle Size Distribution Report ASTM D422/ASTM D1140



% COBBLES 0.0	% GRAVEL 0.3	% SAND 19.7	% SILT 42.8	% CLAY 37.2
SOURCE: STN-32 DEPTH/ELEV.: 5.2-5.8 ft DATE SAMPLED: May 09 USCS: CL MATERIAL DESCRIPTION: Gray Brown Lean clay with sand				
Client STANTEC				
Project Kingston Ash Pond				
Project No. GTX-1464			Lab no.	

GeoTesting
Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
	S1N-32	5.2-5.8 ft	May 09	CL	Gray Brown Lean clay with sand		36	17
		5.3 - 5.8 ft						

Client STANTEC
 Project Kingston Ash Pond
 Project No. GTX-1464 Lab no.

GeoTesting Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-32 / SPT-11, 19.0'-20.5' & STN-32 / SPT-12, 20.5'-22.0' Lab ID 534
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 59
 Plastic Limit: 20
 Plasticity Index: 39
 Activity Index: 0.72

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.0
No. 4	4.75	98.5
No. 10	2	97.4
No. 40	0.425	94.5
No. 200	0.075	78.3
	0.02	65.0
	0.005	58.3
	0.002	54.0
estimated	0.001	51.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.5	2.6
Coarse Sand	1.1	2.9
Medium Sand	2.9	---
Fine Sand	16.2	16.2
Silt	20.0	24.3
Clay	58.3	54.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.73

Classification
 Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-6 (31)

Comments: _____



Project Name Kingston Ash Pond
Source STN-32 / SPT-11, 19.0'-20.5' & STN-32 / SPT-12, 20.5'-22.0'

Project Number 171468117
Lab ID 534

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-20-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.0
No. 4	98.5
No. 10	97.4

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

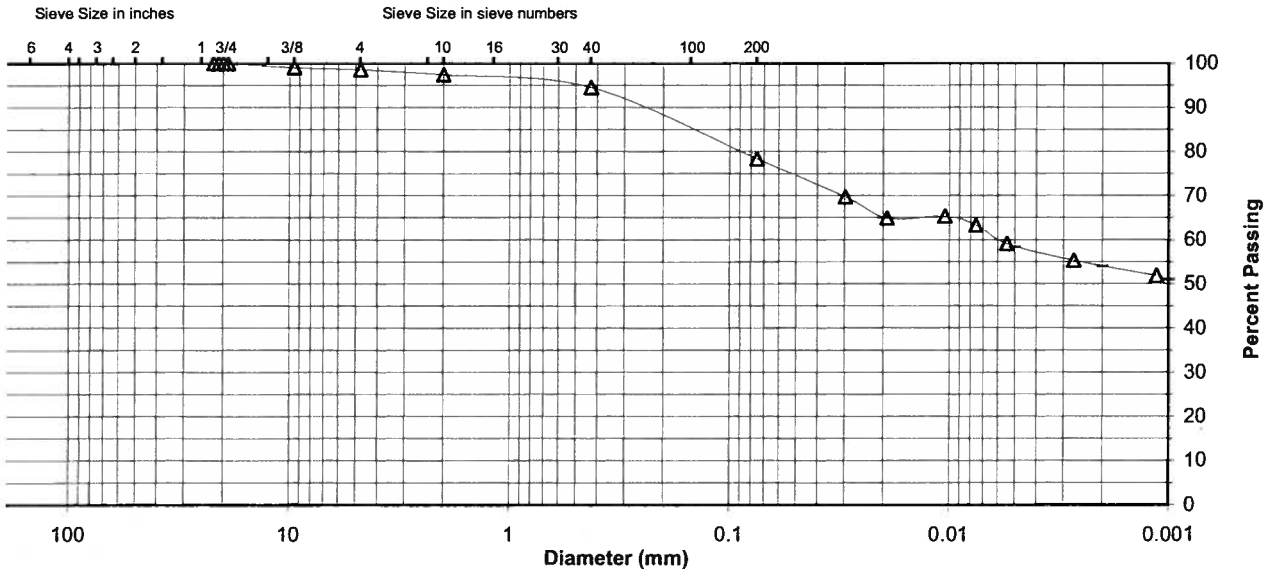
Specific Gravity 2.73

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.5
No. 200	78.3
0.02 mm	65.0
0.005 mm	58.3
0.002 mm	54.0
0.001 mm	51.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.5	1.1	2.9	16.2	20.0	58.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	2.6		2.9		16.2	24.3	54.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-32 /SPT-24, 38.5'-40.0' & STN-32 /SPT-25A, 40.0'-41.0' Lab ID 546
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	98.6
3/8"	9.5	92.5
No. 4	4.75	86.3
No. 10	2	83.4
No. 40	0.425	78.7
No. 200	0.075	72.3
	0.02	66.5
	0.005	55.9
	0.002	46.9
estimated	0.001	43.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	13.7	16.6
Coarse Sand	2.9	4.7
Medium Sand	4.7	---
Fine Sand	6.4	6.4
Silt	16.4	25.4
Clay	55.9	46.9

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 65
 Plastic Limit: 23
 Plasticity Index: 42
 Activity Index: 0.89

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.73

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-6 (30)

Comments: _____



Project Name Kingston Ash Pond
Source STN-32 /SPT-24, 38.5'-40.0' & STN-32 /SPT-25A, 40.0'-41.0'

Project Number 171468117
Lab ID 546

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-17-2009
Date Received 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	98.6
3/8"	92.5
No. 4	86.3
No. 10	83.4

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

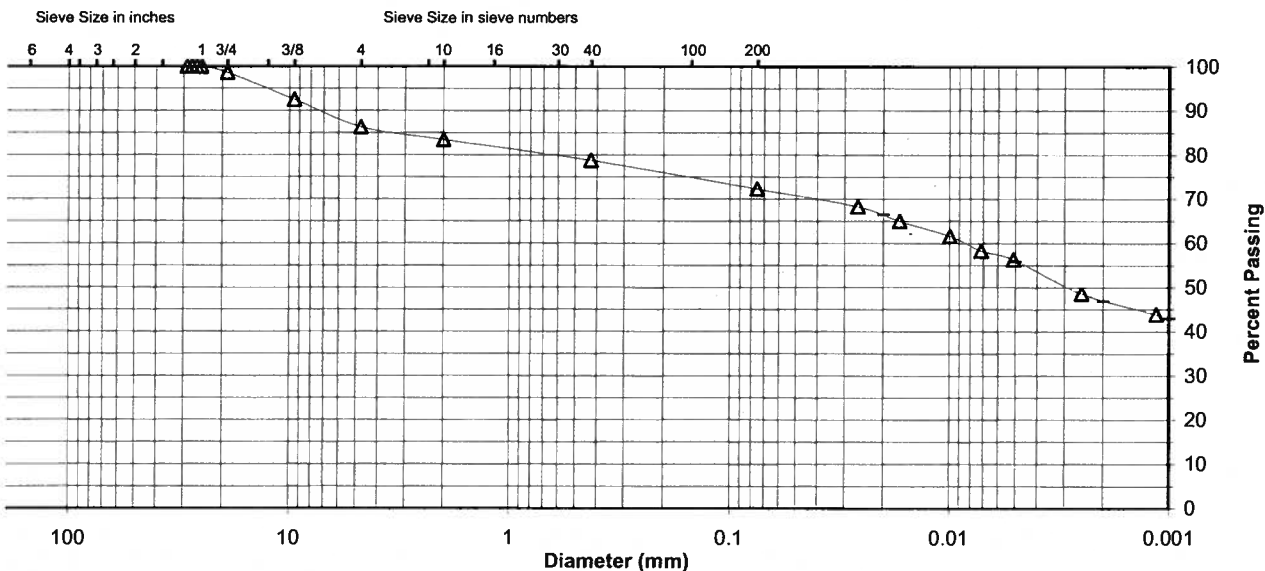
Specific Gravity 2.73

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	78.7
No. 200	72.3
0.02 mm	66.5
0.005 mm	55.9
0.002 mm	46.9
0.001 mm	43.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	1.4	12.3	2.9	4.7	6.4	16.4	55.9	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	16.6		4.7		6.4	25.4		46.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-34, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0' Lab ID 366
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 52
 Plastic Limit: 20
 Plasticity Index: 32
 Activity Index: 0.73

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.2
No. 4	4.75	97.3
No. 10	2	96.6
No. 40	0.425	92.4
No. 200	0.075	69.4
	0.02	58.4
	0.005	49.4
	0.002	43.9
estimated	0.001	40.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	2.7	3.4
Coarse Sand	0.7	4.2
Medium Sand	4.2	—
Fine Sand	23.0	23.0
Silt	20.0	25.5
Clay	49.4	43.9

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.74

Classification

Unified Group Symbol: CH
 Group Name: Sandy fat clay

AASHTO Classification: A-7-6 (21)

Comments: _____



Project Name Kingston Ash Pond
Source STN-34, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0'

Project Number 175569042
Lab ID 366

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-08-2009
Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.2
No. 4	97.3
No. 10	96.6

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

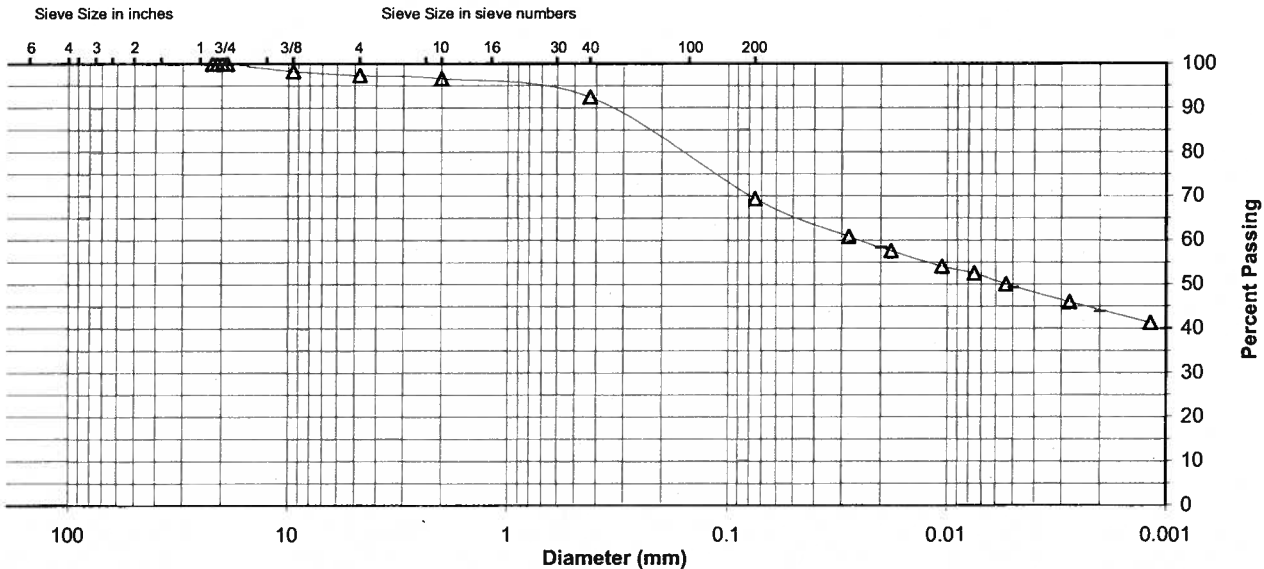
Specific Gravity 2.74

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	92.4
No. 200	69.4
0.02 mm	58.4
0.005 mm	49.4
0.002 mm	43.9
0.001 mm	40.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.7	0.7	4.2	23.0	20.0	49.4
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	3.4		4.2		23.0	25.5	43.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-34, 42.5'-44.0', 44.0'-45.5' Lab ID 389
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 28
 Plastic Limit: 18
 Plasticity Index: 10
 Activity Index: 0.50

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.3
No. 4	4.75	98.0
No. 10	2	97.2
No. 40	0.425	91.4
No. 200	0.075	73.4
	0.02	44.4
	0.005	26.9
	0.002	20.1
estimated	0.001	15.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	2.0	2.8
Coarse Sand	0.8	5.8
Medium Sand	5.8	—
Fine Sand	18.0	18.0
Silt	46.5	53.3
Clay	26.9	20.1

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-4 (5)

Comments: _____



Project Name Kingston Ash Pond
Source STN-34, 42.5'-44.0', 44.0'-45.5'

Project Number 175569042
Lab ID 389

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-09-2009
Date Received: 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.3
No. 4	98.0
No. 10	97.2

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

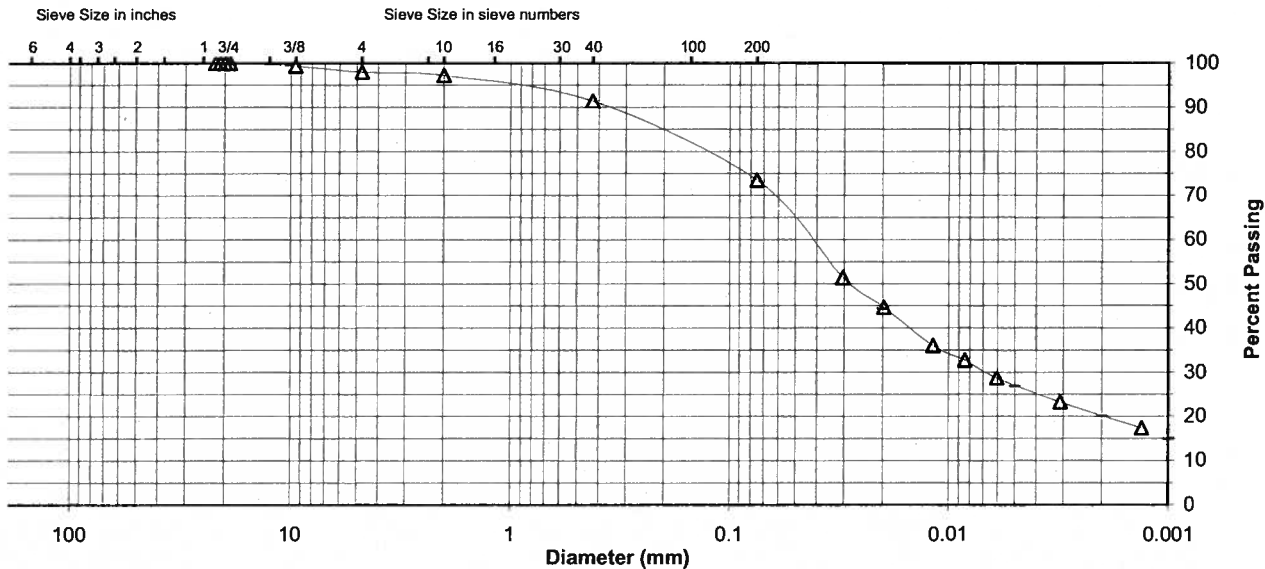
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	91.4
No. 200	73.4
0.02 mm	44.4
0.005 mm	26.9
0.002 mm	20.1
0.001 mm	15.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.0	0.8	5.8	18.0	46.5	26.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	2.8		5.8		18.0	53.3	20.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-36 /SPT-3, 3.0'-4.5' & STN-36 /SPT-4, 4.5'-6.0' & STN-36 /SPT-5, 6.0'-7.5' Lab ID 236
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 35
 Plastic Limit: 21
 Plasticity Index: 14
 Activity Index: 0.93

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	88.8
No. 4	4.75	78.2
No. 10	2	69.2
No. 40	0.425	53.2
No. 200	0.075	38.6
	0.02	28.7
	0.005	19.2
	0.002	14.6
estimated	0.001	13.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	21.8	30.8
Coarse Sand	9.0	16.0
Medium Sand	16.0	---
Fine Sand	14.6	14.6
Silt	19.4	24.0
Clay	19.2	14.6

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.75

Classification

Unified Group Symbol: SC
 Group Name: Clayey sand with gravel
 AASHTO Classification: A-6 (2)

Comments: _____



Project Name Kingston Ash Pond
Source STN-36 /SPT-3, 3.0'-4.5' & STN-36 /SPT-4, 4.5'-6.0' & STN-36 /SPT-5, 6.0'-7.5'

Project Number 171468117
Lab ID 236

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-17-2009
Date Received 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	88.8
No. 4	78.2
No. 10	69.2

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

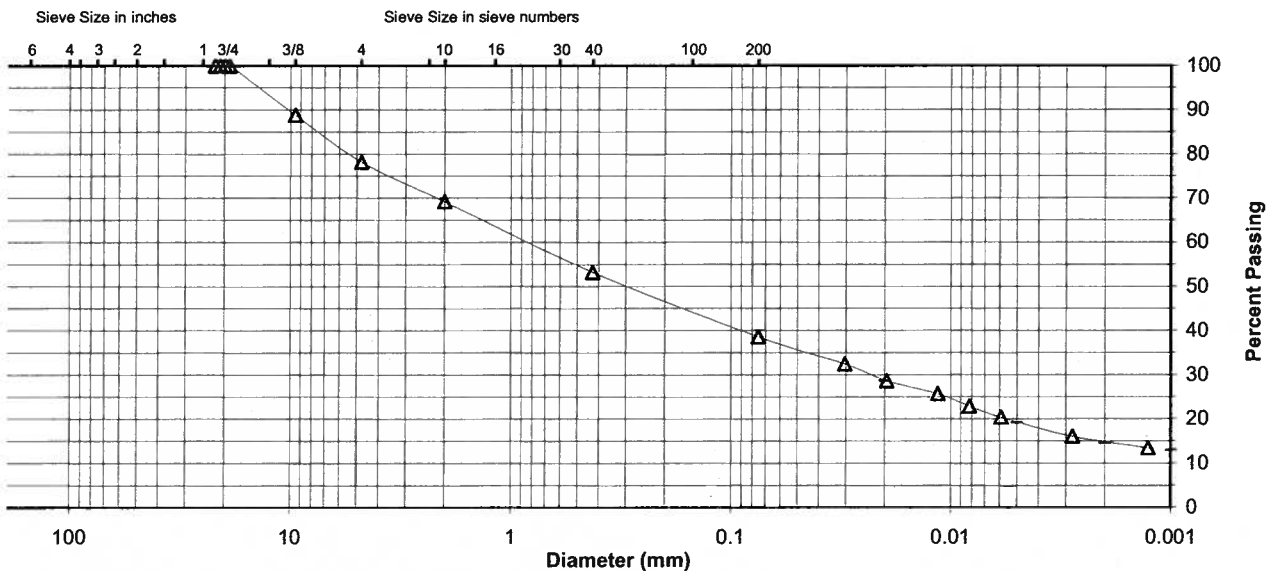
Specific Gravity 2.75

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	53.2
No. 200	38.6
0.02 mm	28.7
0.005 mm	19.2
0.002 mm	14.6
0.001 mm	13.0

Particle Size Distribution

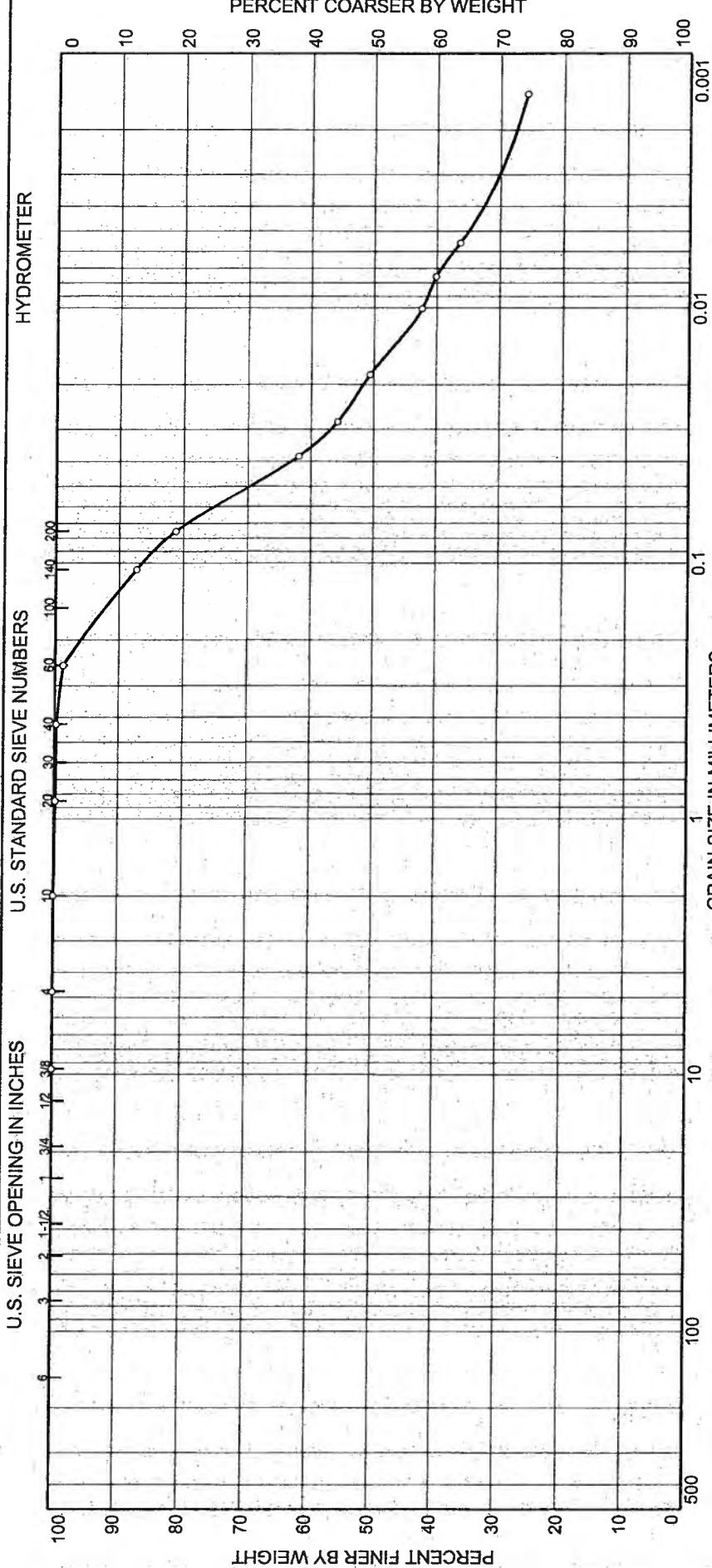
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	21.8	9.0	16.0	14.6	19.4	19.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	30.8		16.0		14.6	24.0	14.6



Comments _____

Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140



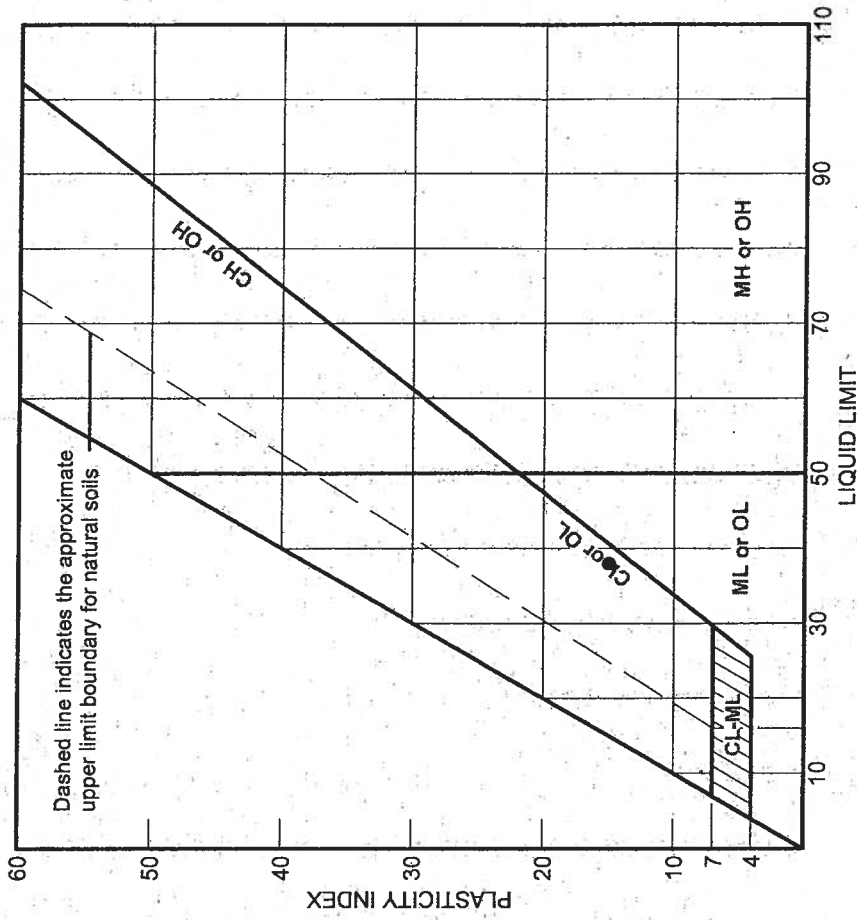
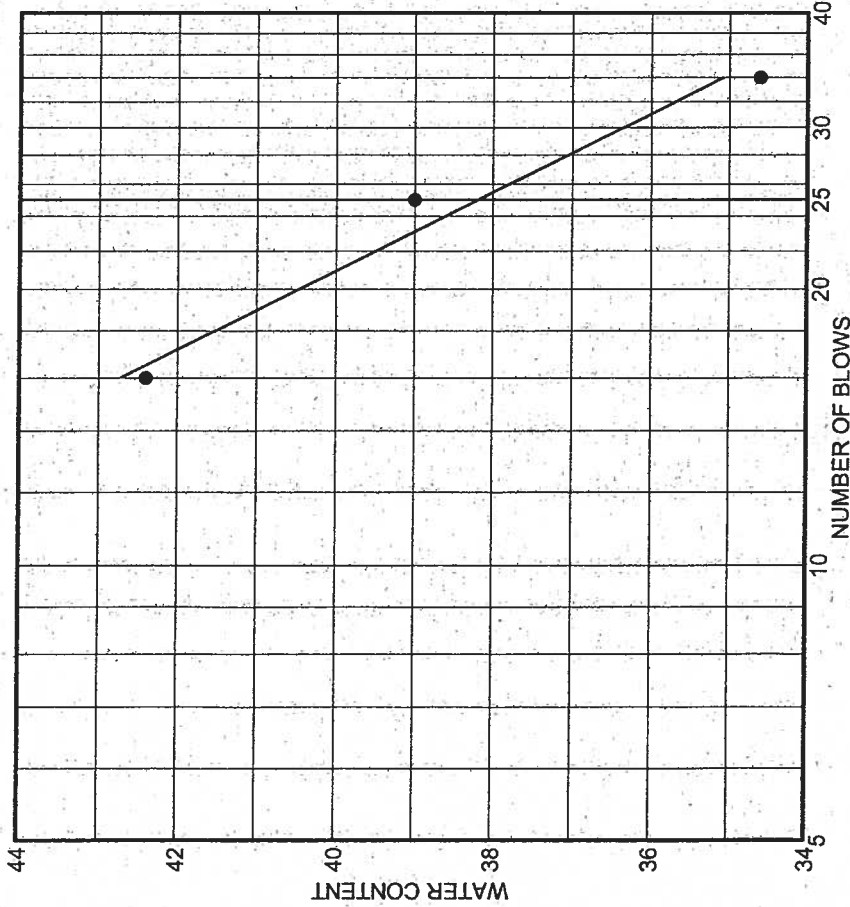
% COBBLES	% GRAVEL	% SAND
0.0	0.0	18.8
		% SILT
		46.2
		% CLAY
		35.0

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION
	STN-36	20.5-21-ft	May 09	CL	Gray-Brown Lean clay with sand
		29.0 - 29.5 ft.			

Client STANTEC	
Project Kingston Ash Pond	
Project No. GTX-1464	Lab no.

GeoTesting Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	STN-36	20.5-21 ft	May 09	CL	Gray-Brown Lean clay with sand		38	15
		29.0 - 29.5 ft.						

Client STANTEC
 Project Kingston Ash Pond

GeoTesting
Express Inc.

Project No. GTX-1464 Lab no.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-36 / SPT-21, 34.0'-35.5' & STN-36 / SPT-22, 35.5'-37.0' Lab ID 259
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.0
No. 4	4.75	83.9
No. 10	2	77.3
No. 40	0.425	69.8
No. 200	0.075	17.9
	0.02	12.2
	0.005	6.0
	0.002	4.3
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	16.1	22.7
Coarse Sand	6.6	7.5
Medium Sand	7.5	---
Fine Sand	51.9	51.9
Silt	11.9	13.6
Clay	6.0	4.3

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-36 / SPT-21, 34.0'-35.5' & STN-36 / SPT-22, 35.5'-37.0'

Project Number 171468117
Lab ID 259

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Soft

Tested By: DG
Test Date: 04-21-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.0
No. 4	83.9
No. 10	77.3

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

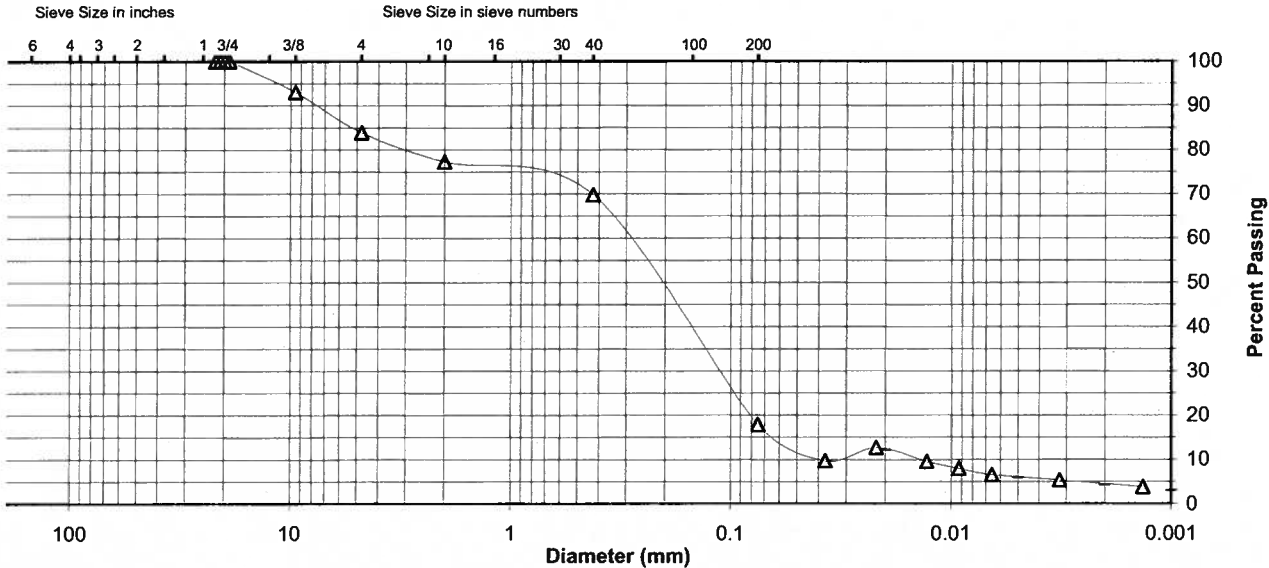
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	69.8
No. 200	17.9
0.02 mm	12.2
0.005 mm	6.0
0.002 mm	4.3
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	16.1	6.6	7.5	51.9	11.9	6.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	22.7		7.5		51.9	13.6	4.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-37 / SPT-3, 3.0'-4.5' & STN-37 / SPT-4, 4.5'-6.0' Lab ID 301
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 45
 Plastic Limit: 18
 Plasticity Index: 27
 Activity Index: 1.04

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	95.2
No. 4	4.75	91.7
No. 10	2	84.7
No. 40	0.425	84.4
No. 200	0.075	59.8
	0.02	43.9
	0.005	31.1
	0.002	25.6
estimated	0.001	22.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	8.3	15.3
Coarse Sand	7.0	0.3
Medium Sand	0.3	---
Fine Sand	24.6	24.6
Silt	28.7	34.2
Clay	31.1	25.6

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-7-6 (13)

Comments: _____



Project Name Kingston Ash Pond
Source STN-37 / SPT-3, 3.0'-4.5' & STN-37 / SPT-4, 4.5'-6.0'

Project Number 171468117
Lab ID 301

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-21-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	95.2
No. 4	91.7
No. 10	84.7

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

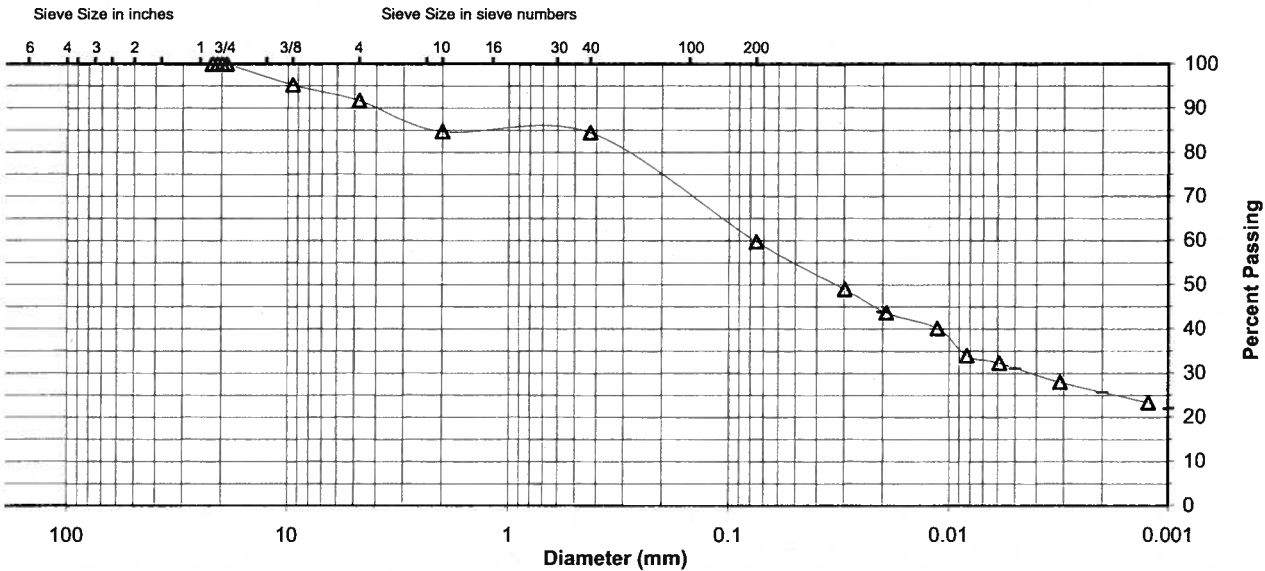
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	84.4
No. 200	59.8
0.02 mm	43.9
0.005 mm	31.1
0.002 mm	25.6
0.001 mm	22.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	8.3	7.0	0.3	24.6	28.7	31.1	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	15.3		0.3		24.6	34.2		25.6

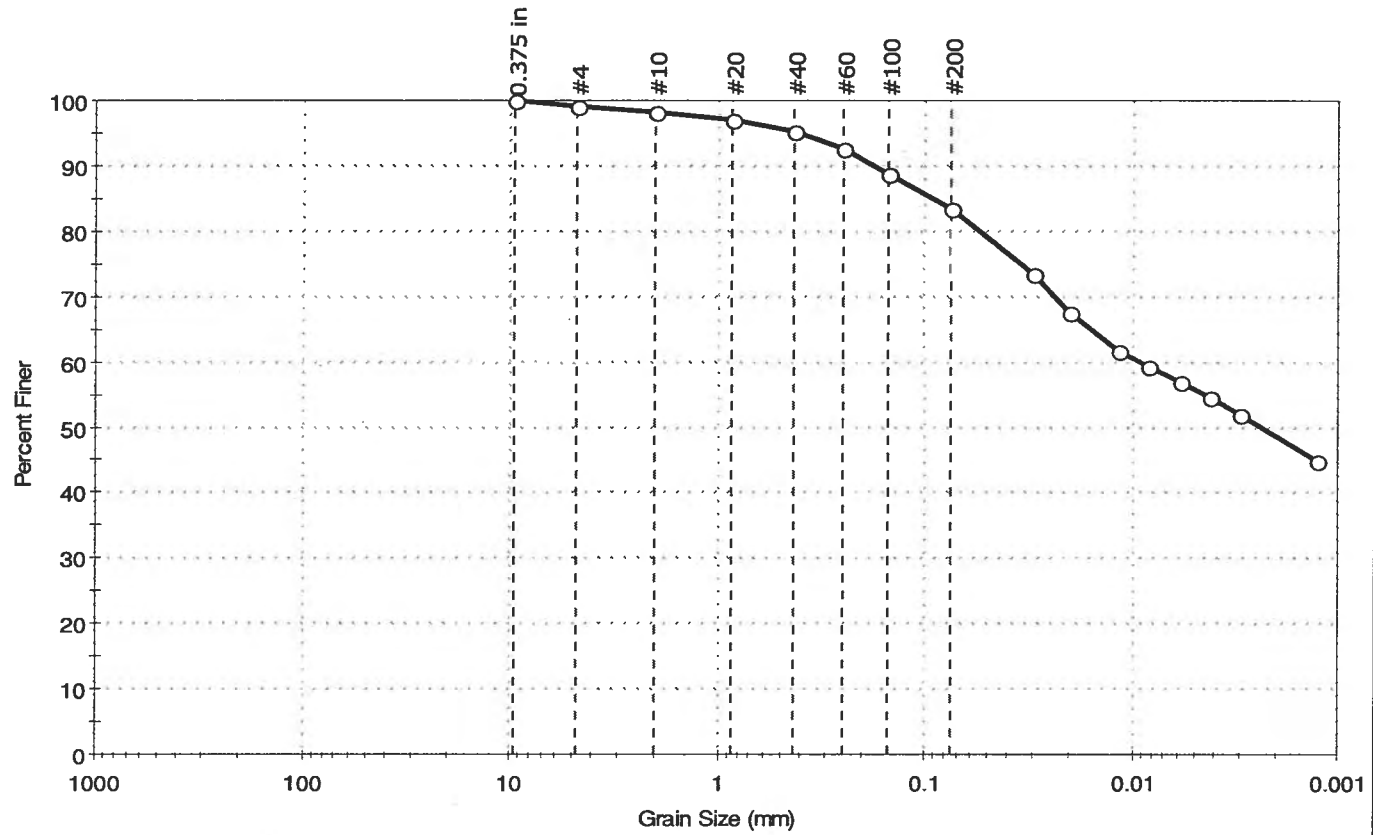


Comments _____

Reviewed By _____

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-37	Sample Type: tube	Tested By: jbr	Checked By: jdt
Sample ID: S #342B	Test Date: 05/17/09	Test Id: 152223	
Depth: 14.3-14.8 ft			
Test Comment: ---			
Sample Description: Moist, reddish yellow clay with sand			
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.8	15.6	83.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	97		
#40	0.42	95		
#60	0.25	93		
#100	0.15	89		
#200	0.075	84		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0300	74		
---	0.0200	68		
---	0.0116	62		
---	0.0083	59		
---	0.0059	57		
---	0.0042	54		
---	0.0030	52		
---	0.0013	45		

Coefficients

D ₈₅ = 0.0900 mm	D ₃₀ = N/A
D ₆₀ = 0.0093 mm	D ₁₅ = N/A
D ₅₀ = 0.0023 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

ASTM	fat clay with sand (CH)
AASHTO	Clayey Soils (A-7-6 (31))

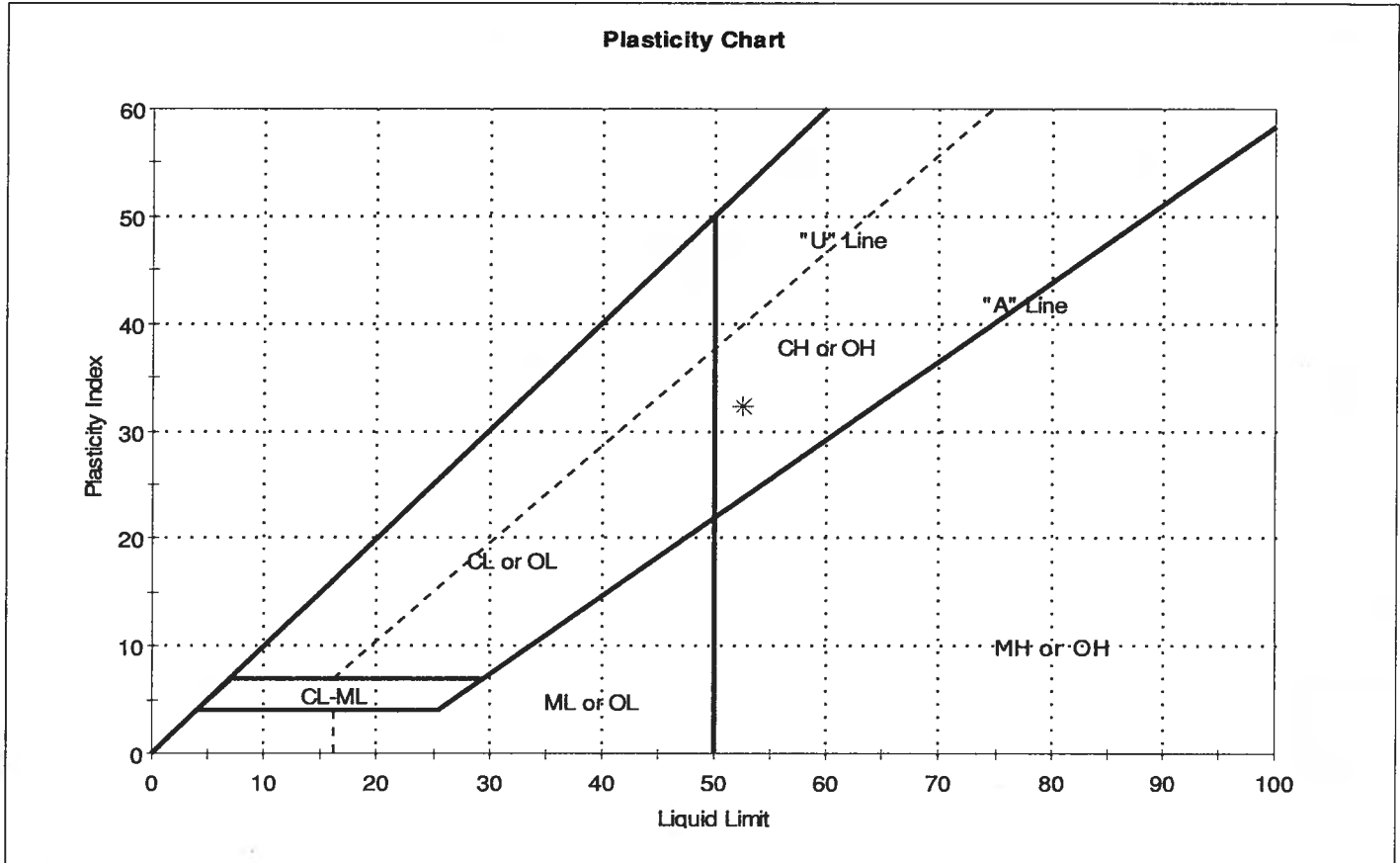
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client: Stantec Consulting Services	Project: Kingston Ash Pond	Location: Roane, TN	Project No: GTX-9015
Boring ID: STN-37	Sample Type: tube	Tested By: cam	
Sample ID: S #342B	Test Date: 05/18/09	Checked By: jdt	
Depth: 14.3-14.8 ft	Test Id: 152220		
Test Comment: ---			
Sample Description: Moist, reddish yellow clay with sand			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S #342B	STN-37	14.3-14.8 ft	27	52	20	32	0	fat clay with sand (CH)

Sample Prepared using the WET method

5% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: SLOW

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-37 / SPT-18, 29.5'-31.0' & STN-37 / SPT-19, 31.0'-32.5' Lab ID 317
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.7
No. 4	4.75	99.7
No. 10	2	99.4
No. 40	0.425	99.2
No. 200	0.075	70.4
	0.02	52.6
	0.005	37.0
	0.002	31.1
estimated	0.001	26.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.3	0.6
Coarse Sand	0.3	0.2
Medium Sand	0.2	---
Fine Sand	28.8	28.8
Silt	33.4	39.3
Clay	37.0	31.1

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 31
 Plastic Limit: 17
 Plasticity Index: 14
 Activity Index: 0.45

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-6 (8)

Comments: _____



Project Name Kingston Ash Pond
Source STN-37 / SPT-18, 29.5'-31.0' & STN-37 / SPT-19, 31.0'-32.5'

Project Number 171468117
Lab ID 317

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421
Particle Shape: Angular
Particle Hardness: Soft

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.7
No. 4	99.7
No. 10	99.4

Tested By: DG
Test Date: 04-22-2009
Date Received: 03-30-2009

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

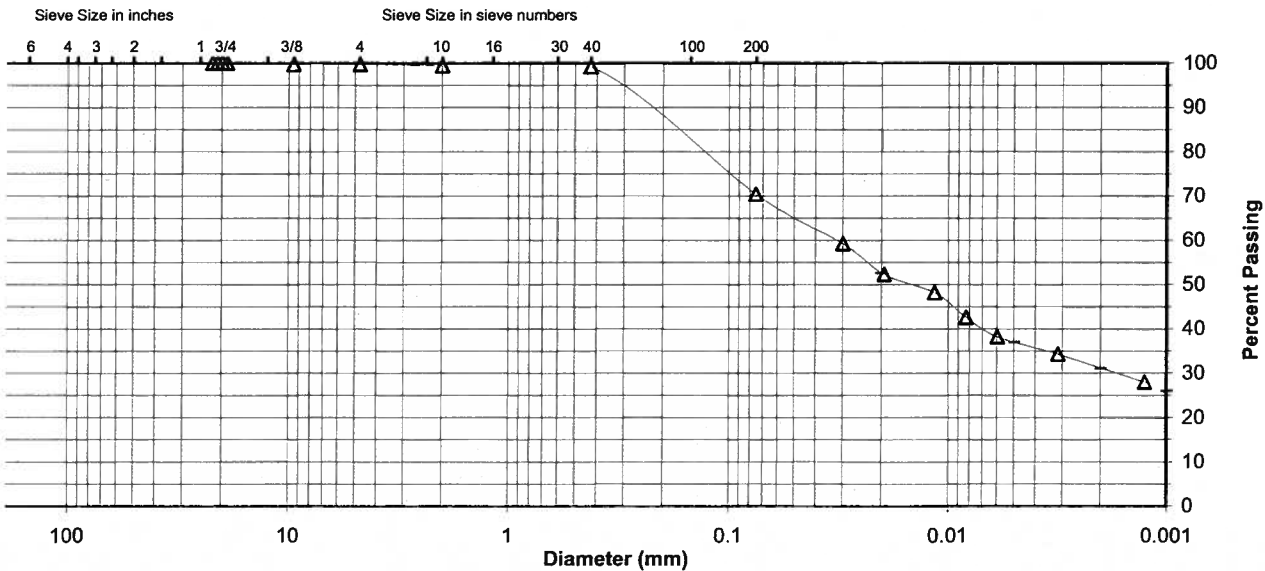
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.2
No. 200	70.4
0.02 mm	52.6
0.005 mm	37.0
0.002 mm	31.1
0.001 mm	26.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.3	0.3	0.2	28.8	33.4	37.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.6		0.2		28.8	39.3	31.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-37 / SPT-25, 42.0'-43.5' & STN-37 / SPT-26, 43.5'-45.0' Lab ID 325
 County Roane (TN) Date Received 3-30-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	---
3/4"	19	92.4
3/8"	9.5	88.3
No. 4	4.75	87.6
No. 10	2	85.9
No. 40	0.425	81.9
No. 200	0.075	13.9
	0.02	8.4
	0.005	7.2
	0.002	5.8
estimated	0.001	4.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	12.4	14.1
Coarse Sand	1.7	4.0
Medium Sand	4.0	---
Fine Sand	68.0	68.0
Silt	6.7	8.1
Clay	7.2	5.8

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.65

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-37 / SPT-25, 42.0'-43.5' & STN-37 / SPT-26, 43.5'-45.0'

Project Number 171468117
Lab ID 325

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: DG
Test Date: 04-22-2009
Date Received: 03-30-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	---
3/4"	92.4
3/8"	88.3
No. 4	87.6
No. 10	85.9

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

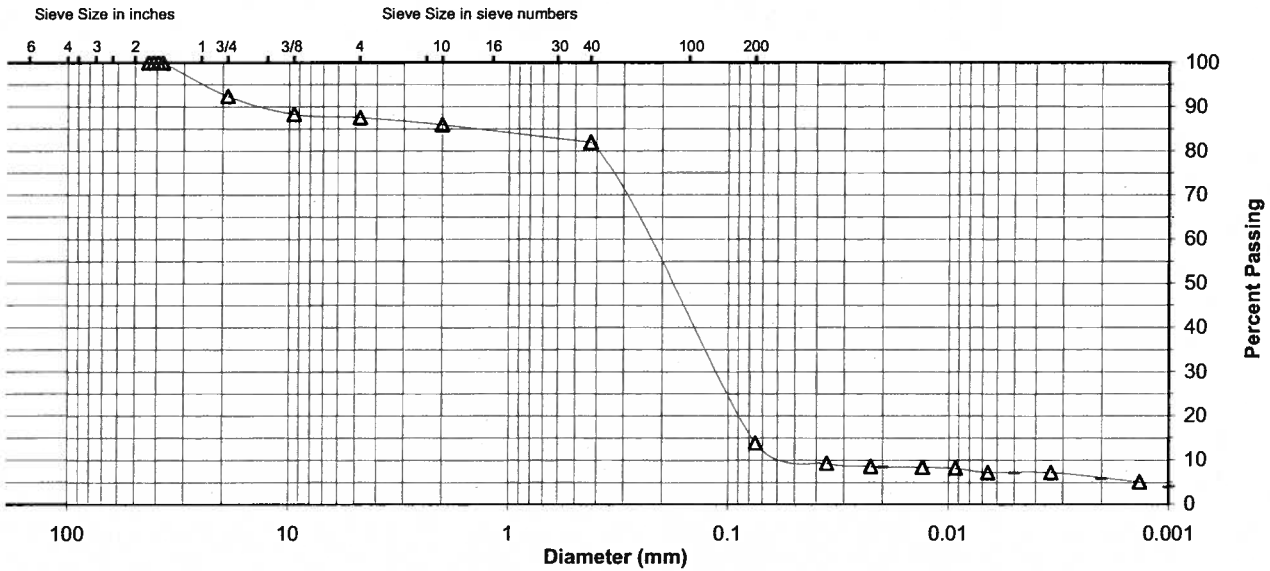
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	81.9
No. 200	13.9
0.02 mm	8.4
0.005 mm	7.2
0.002 mm	5.8
0.001 mm	4.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	7.6	4.8	1.7	4.0	68.0	6.7	7.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	14.1		4.0		68.0	8.1	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-38, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0' Lab ID 411
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 47
 Plastic Limit: 20
 Plasticity Index: 27
 Activity Index: 0.63

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.9
No. 4	4.75	94.8
No. 10	2	91.5
No. 40	0.425	83.8
No. 200	0.075	69.6
	0.02	59.4
	0.005	49.5
	0.002	43.4
estimated	0.001	40.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.2	8.5
Coarse Sand	3.3	7.7
Medium Sand	7.7	---
Fine Sand	14.2	14.2
Silt	20.1	26.2
Clay	49.5	43.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.75

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-7-6 (18)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-38, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0'

Project Number 175569042
 Lab ID 411

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: Angular
 Particle Hardness: Hard and Durable
 Tested By: BWT
 Test Date: 06-09-2009
 Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.9
No. 4	94.8
No. 10	91.5

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

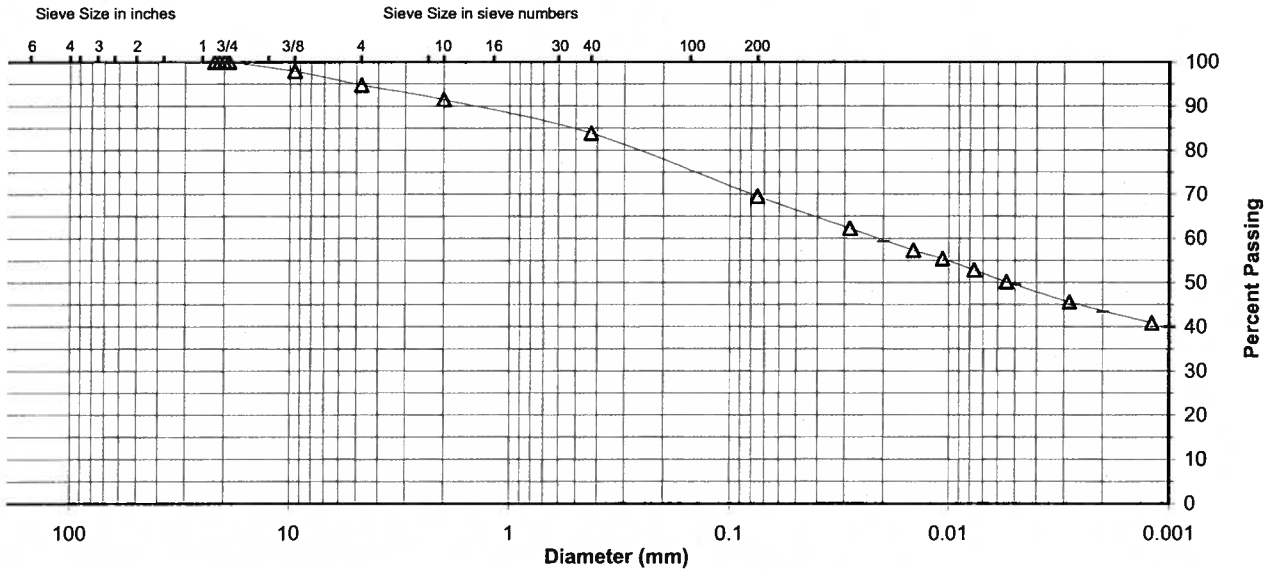
Specific Gravity 2.75

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	83.8
No. 200	69.6
0.02 mm	59.4
0.005 mm	49.5
0.002 mm	43.4
0.001 mm	40.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	5.2	3.3	7.7	14.2	20.1	49.5	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	8.5		7.7		14.2	26.2		43.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-38, 42.0'-43.5', 43.5'-45.0' Lab ID 435
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.8
No. 200	0.075	26.6
	0.02	13.7
	0.005	9.8
	0.002	6.8
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.2
Medium Sand	0.2	---
Fine Sand	73.2	73.2
Silt	16.8	19.8
Clay	9.8	6.8

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-38, 42.0'-43.5', 43.5'-45.0'

Project Number 175569042
 Lab ID 435

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: N/A
 Particle Hardness: N/A

Tested By: BWT
 Test Date: 06-09-2009
 Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

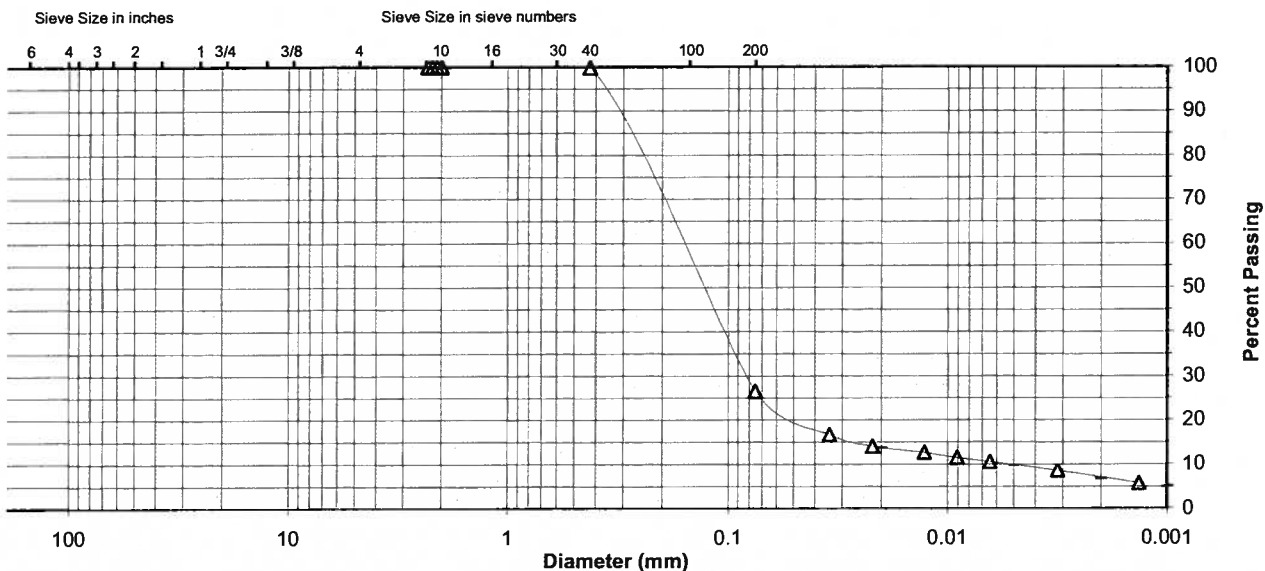
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.8
No. 200	26.6
0.02 mm	13.7
0.005 mm	9.8
0.002 mm	6.8
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.2	73.2	16.8	9.8
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.2		73.2	19.8	6.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name	Kingston Ash Pond	Project Number	175569042
Source	STN-41, 15.1'-15.6'	Lab ID	563
County	Kingston, Tennessee	Date Received	5-27-09
Sample Type	UD	Date Reported	6-30-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 20.4

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit:	<u>34</u>
Plastic Limit:	<u>18</u>
Plasticity Index:	<u>16</u>
Activity Index:	<u>0.53</u>

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.3
No. 4	4.75	93.9
No. 10	2	88.5
No. 40	0.425	80.9
No. 200	0.075	57.5
	0.02	44.2
	0.005	36.1
	0.002	30.4
estimated	0.001	27.0

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft ³):	<u>N/A</u>
Maximum Dry Density (kg/m ³):	<u>N/A</u>
Optimum Moisture Content (%):	<u>N/A</u>
Over Size Correction %:	<u>N/A</u>

California Bearing Ratio

Test Not Performed

Bearing Ratio (%):	<u>N/A</u>
Compacted Dry Density (lb/ft ³):	<u>N/A</u>
Compacted Moisture Content (%):	<u>N/A</u>

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size:	<u>No. 10</u>
Specific Gravity at 20° Celsius:	<u>2.74</u>

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	6.1	11.5
Coarse Sand	5.4	7.6
Medium Sand	7.6	---
Fine Sand	23.4	23.4
Silt	21.4	27.1
Clay	36.1	30.4

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-6 (6)

Comments: _____



Project Name Kingston Ash Pond
Source STN-41, 15.1'-15.6'

Project Number 175569042
Lab ID 563

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-15-2009
Date Received 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.3
No. 4	93.9
No. 10	88.5

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

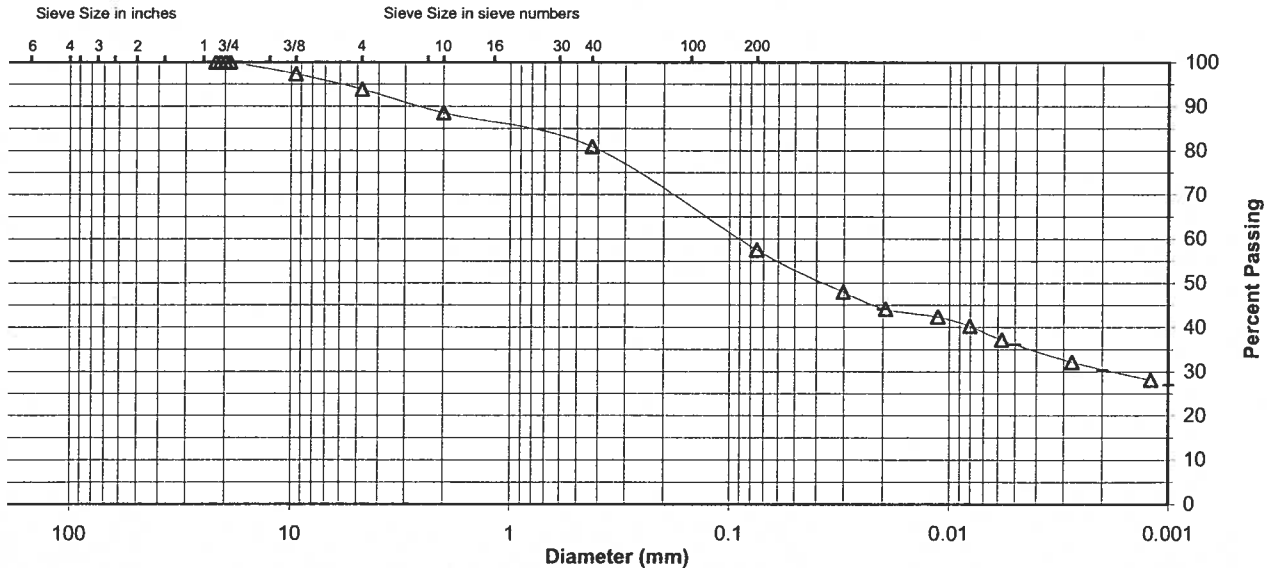
Specific Gravity 2.74

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	80.9
No. 200	57.5
0.02 mm	44.2
0.005 mm	36.1
0.002 mm	30.4
0.001 mm	27.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	6.1	5.4	7.6	23.4	21.4	36.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	11.5		7.6		23.4	27.1	30.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-41, 26.0'-27.5', 27.5'-29.0' Lab ID 1261
 County Roane (TN) Date Received 4-27-09
 Sample Type SPT Comp Date Reported 5-18-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	23.4
	0.02	13.4
	0.005	9.2
	0.002	7.4
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	76.3	76.3
Silt	14.2	16.0
Clay	9.2	7.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils
ASTM D 422

Project Name Kingston Ash Pond
Source STN-41, 26.0'-27.5', 27.5'-29.0'

Project Number 171468117
Lab ID 1261

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 05-08-2009
Date Received: 04-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

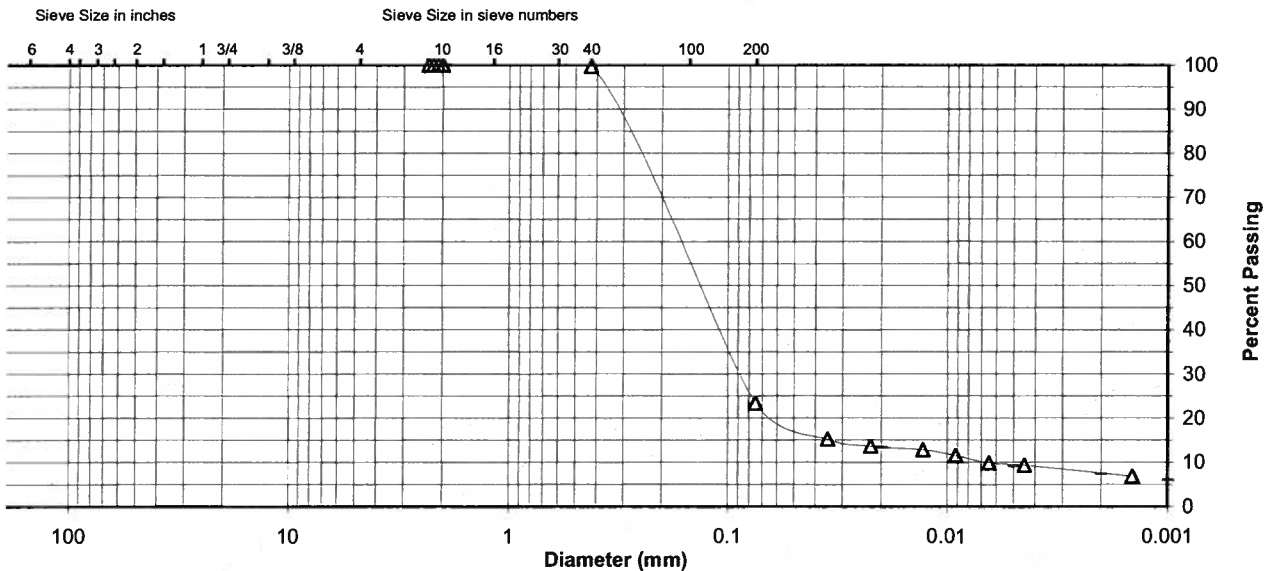
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	23.4
0.02 mm	13.4
0.005 mm	9.2
0.002 mm	7.4
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.3	76.3	14.2	9.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.3		76.3	16.0	7.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-42, 27.5'-29.0', 29.0'-30.5' Lab ID 1055
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-12-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 18
 Plastic Limit: 17
 Plasticity Index: 1
 Activity Index: 0.07

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	40.3
	0.02	23.2
	0.005	17.0
	0.002	14.4
estimated	0.001	14.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	59.6	59.6
Silt	23.3	25.9
Clay	17.0	14.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-42, 27.5'-29.0', 29.0'-30.5'

Project Number 171468117
Lab ID 1055

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: RHB
Test Date: 05-06-2009
Date Received: 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

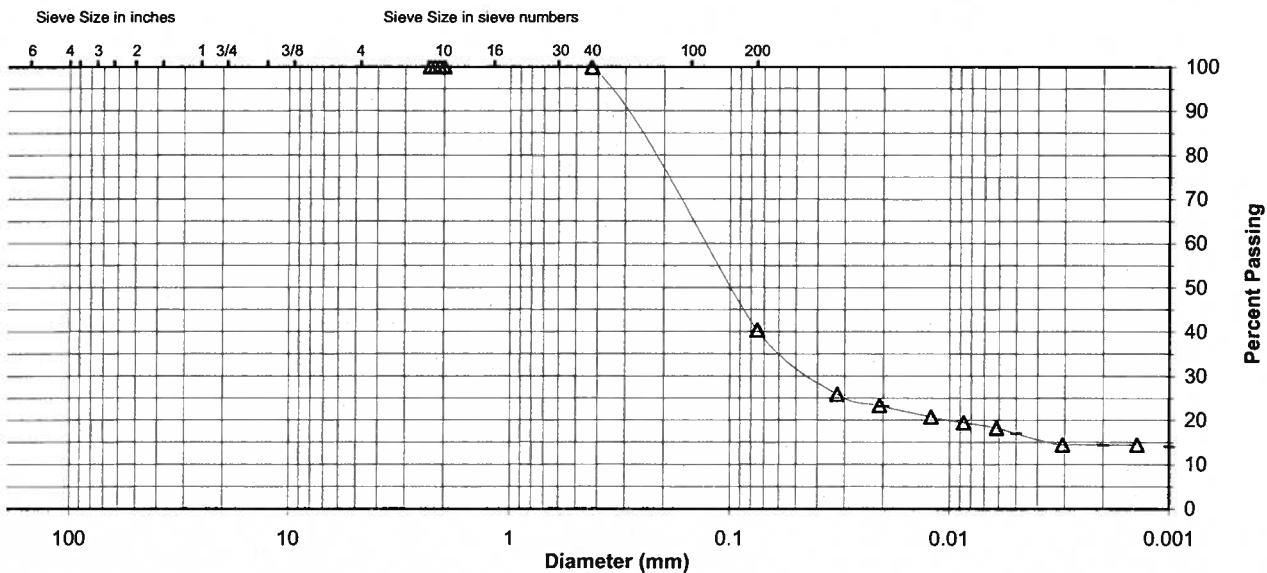
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	40.3
0.02 mm	23.2
0.005 mm	17.0
0.002 mm	14.4
0.001 mm	14.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.1	59.6	23.3	17.0	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.1		59.6	25.9		14.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-42, 41.0'-42.5', 42.5'-44.0' Lab ID 1065
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	100.0
No. 40	0.425	98.5
No. 200	0.075	16.9
	0.02	7.6
	0.005	5.5
	0.002	4.3
estimated	0.001	4.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.5
Medium Sand	1.5	---
Fine Sand	81.6	81.6
Silt	11.4	12.6
Clay	5.5	4.3

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-42, 41.0'-42.5', 42.5'-44.0'

Project Number 171468117
 Lab ID 1065

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: Angular
 Particle Hardness: Hard and Durable
 Tested By: RHB
 Test Date: 05-05-2009
 Date Received 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	100.0

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

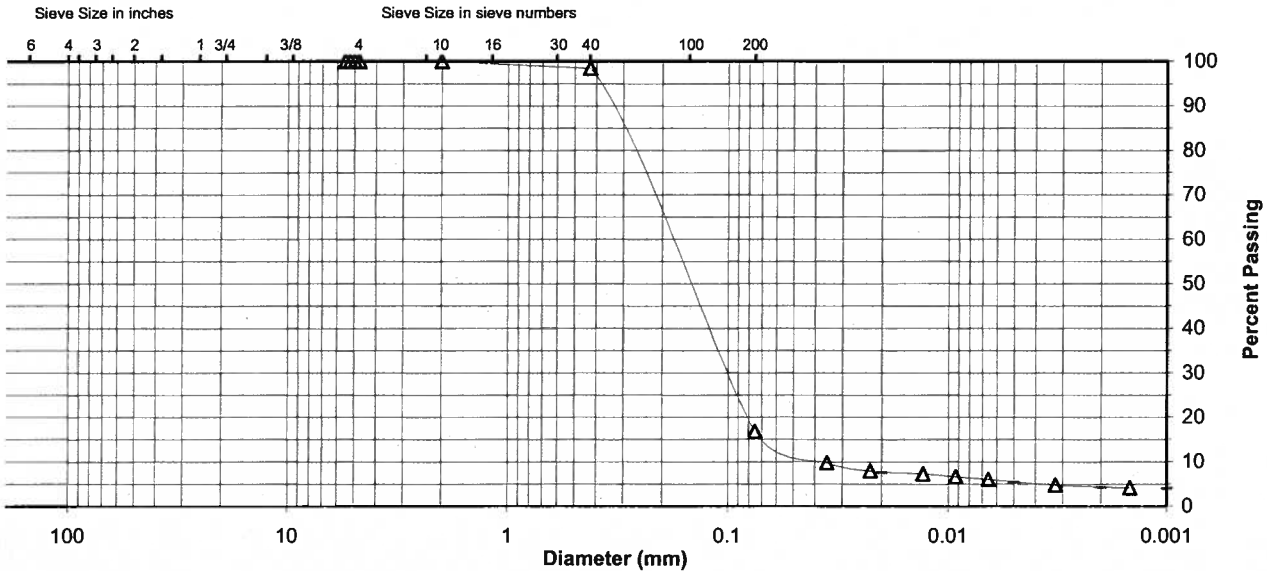
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.5
No. 200	16.9
0.02 mm	7.6
0.005 mm	5.5
0.002 mm	4.3
0.001 mm	4.0

Particle Size Distribution

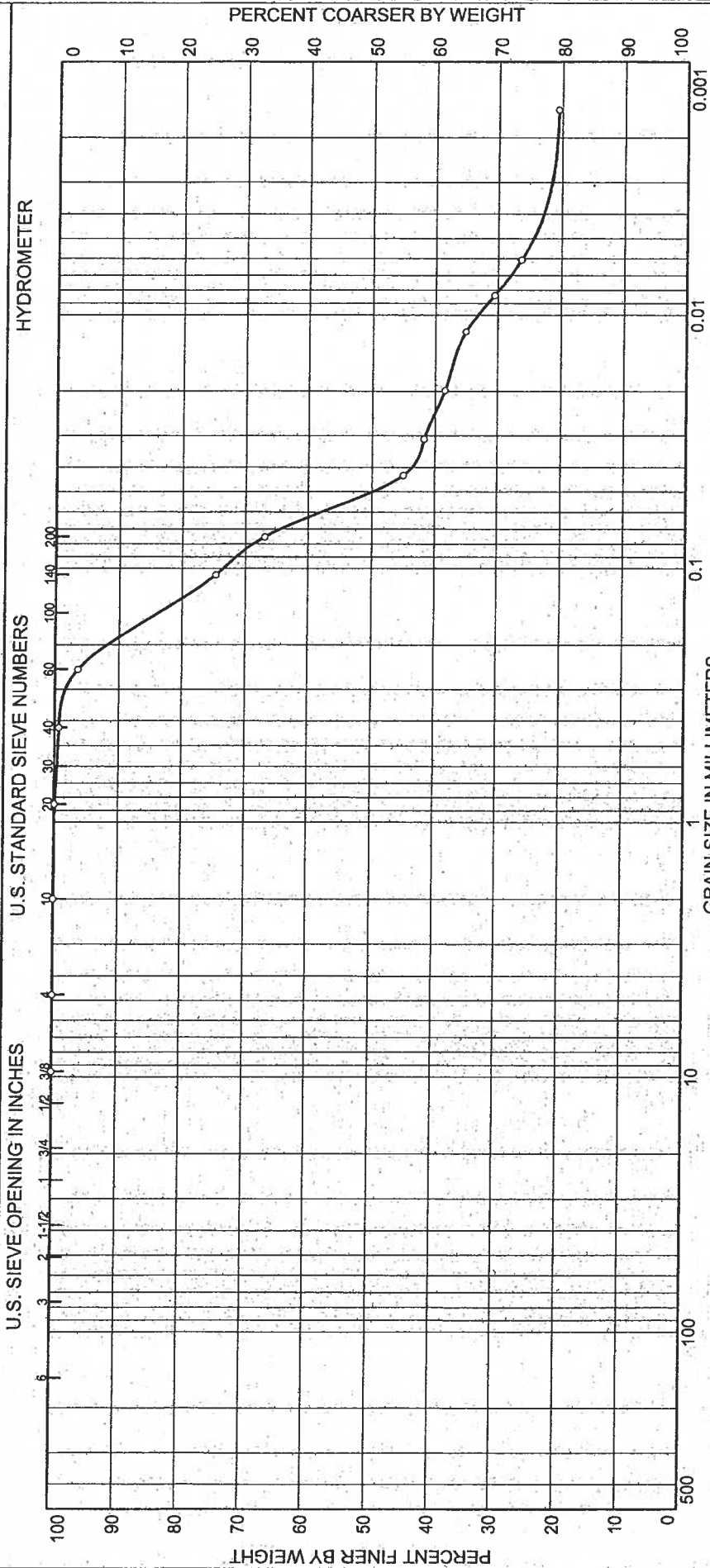
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.5	81.6	11.4	5.5
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		1.5	81.6	12.6		4.3



Comments _____

Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140



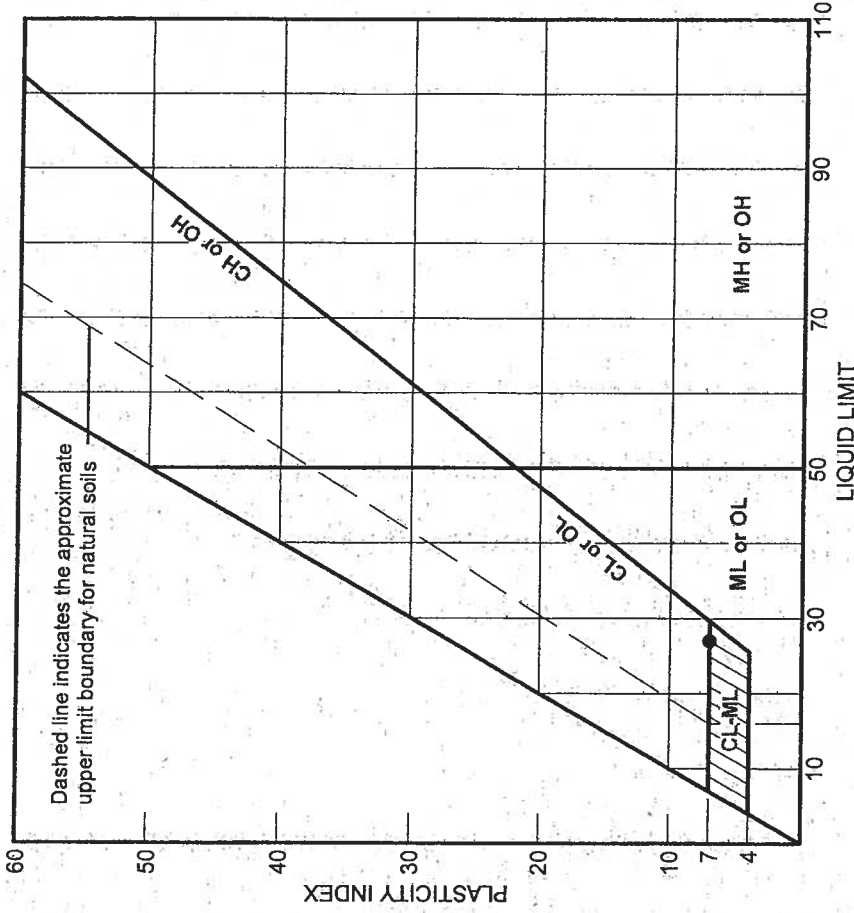
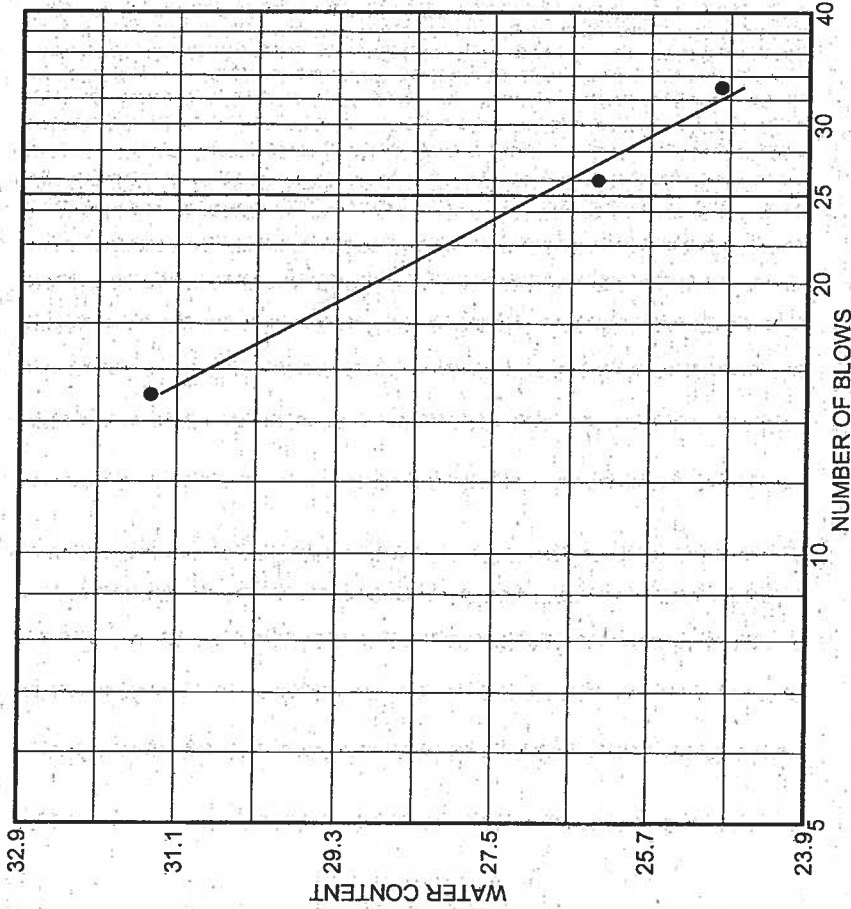
	% COBBLES	% GRAVEL	% SAND
0	0.0	33.1	33.1
0	0.0	42.5	24.4

SOURCE	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION
STN-48	29.1-29.6 ft	May 09	CL-ML	Gray Brown Silty clay
STN-43				

Client STANTEC	○
Project Kingston Ash Pond	
Project No. GTX-1464	Lab no.

GeoTesting Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
	STN-48	29.1-29.6 ft	May 09	CL-ML	Gray Brown Sandy silty clay		27	7
	STN-43							

Client STANTEC

Project Kingston Ash Pond

Project No. GTX-1464

Lab no.

GeoTesting Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-43, 40.0'-41.5', 41.5'-43.0' Lab ID 682
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.5
No. 200	0.075	19.7
	0.02	12.2
	0.005	7.9
	0.002	6.0
estimated	0.001	4.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.5
Medium Sand	0.5	--
Fine Sand	79.8	79.8
Silt	11.8	13.7
Clay	7.9	6.0

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.64

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-43, 40.0'-41.5', 41.5'-43.0'

Project Number 171468117
 Lab ID 682

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: N/A
 Particle Hardness: N/A
 Tested By: BWT
 Test Date: 04-17-2009
 Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

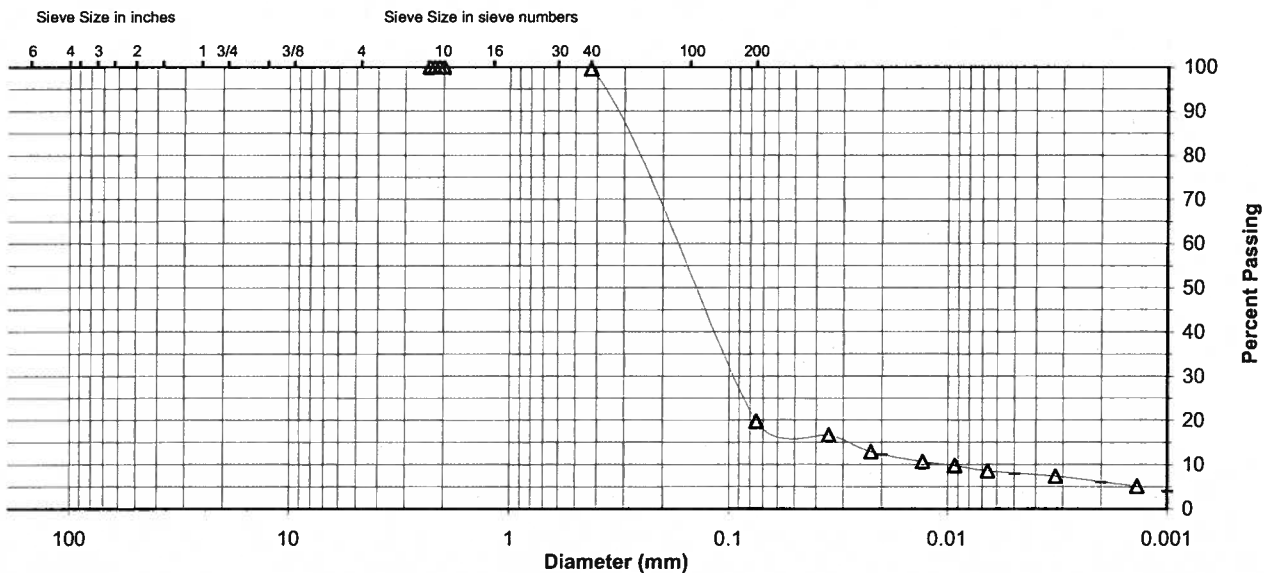
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	19.7
0.02 mm	12.2
0.005 mm	7.9
0.002 mm	6.0
0.001 mm	4.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.5	79.8	11.8	7.9
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.5	79.8	13.7		6.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-45, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0' Lab ID 448
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 40
 Plastic Limit: 20
 Plasticity Index: 20
 Activity Index: 0.54

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	96.4
No. 4	4.75	94.3
No. 10	2	91.8
No. 40	0.425	85.2
No. 200	0.075	70.5
	0.02	55.4
	0.005	43.7
	0.002	37.1
estimated	0.001	33.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.7	8.2
Coarse Sand	2.5	6.6
Medium Sand	6.6	---
Fine Sand	14.7	14.7
Silt	26.8	33.4
Clay	43.7	37.1

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.64

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-6 (12)

Comments: _____



Project Name Kingston Ash Pond
Source STN-45, 7.5'-9.0', 9.0'-10.5', 10.5'-12.0'

Project Number 175569042
Lab ID 448

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-10-2009
Date Received: 05-26-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	96.4
No. 4	94.3
No. 10	91.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

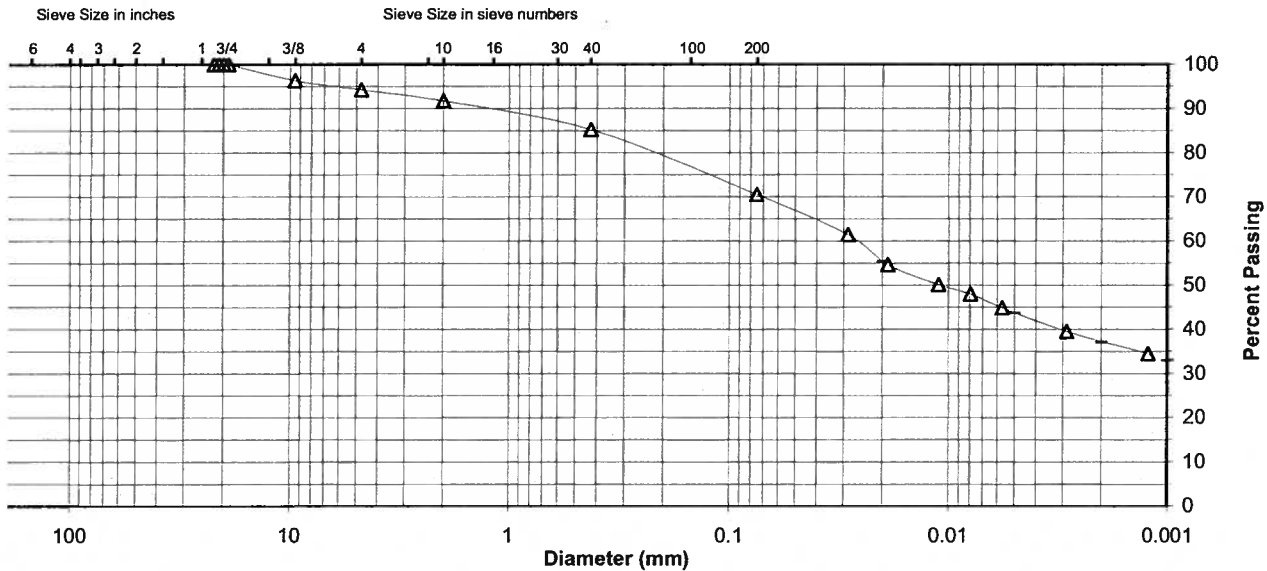
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.2
No. 200	70.5
0.02 mm	55.4
0.005 mm	43.7
0.002 mm	37.1
0.001 mm	33.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.7	2.5	6.6	14.7	26.8	43.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	8.2		6.6		14.7	33.4	37.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-45, 30.0'-31.5', 31.5'-33.0' Lab ID 464
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 30
 Plastic Limit: 18
 Plasticity Index: 12
 Activity Index: 0.48

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	100.0
No. 10	2	99.8
No. 40	0.425	99.3
No. 200	0.075	72.7
	0.02	44.6
	0.005	30.8
	0.002	24.8
estimated	0.001	22.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.2
Coarse Sand	0.2	0.5
Medium Sand	0.5	---
Fine Sand	26.6	26.6
Silt	41.9	47.9
Clay	30.8	24.8

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-6 (7)

Comments: _____



Project Name Kingston Ash Pond
Source STN-45, 30.0'-31.5', 31.5'-33.0'

Project Number 175569042
Lab ID 464

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-15-2009
Date Received: 05-26-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	100.0
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

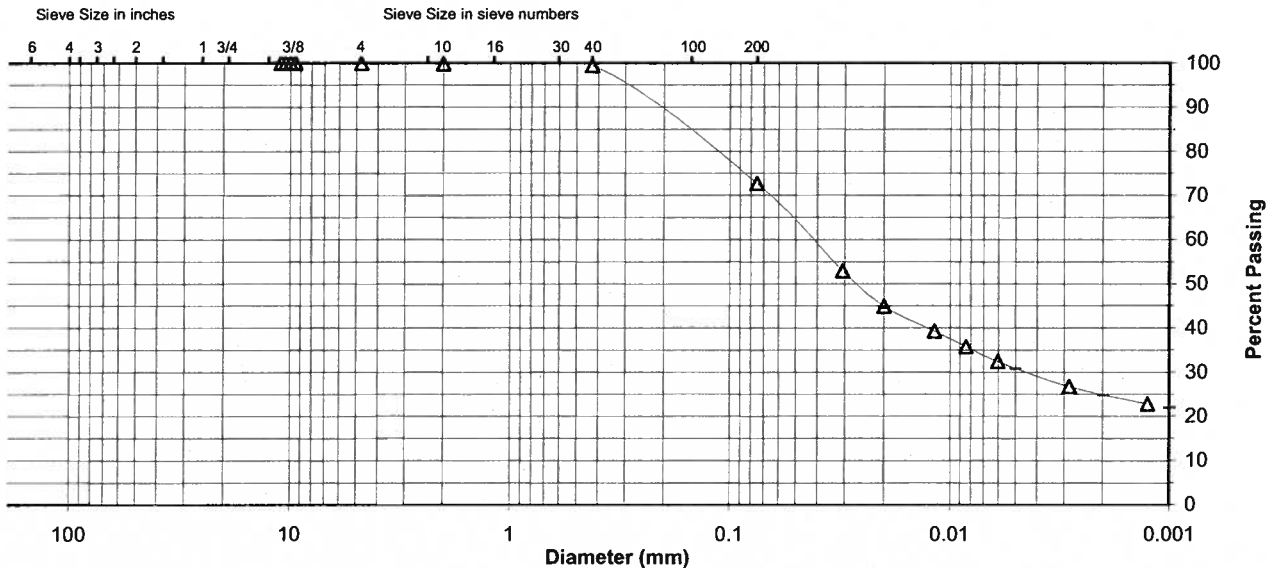
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	72.7
0.02 mm	44.6
0.005 mm	30.8
0.002 mm	24.8
0.001 mm	22.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.2	0.5	26.6	41.9	30.8
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.2		0.5	26.6	47.9		24.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-47 / SPT-11, 17.0'-18.5' & STN-47 / SPT-12, 18.5'-20.0' Lab ID 423
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	39.1
	0.02	16.5
	0.005	13.6
	0.002	11.6
estimated	0.001	10.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	60.8	60.8
Silt	25.5	27.5
Clay	13.6	11.6

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-47 / SPT-11, 17.0'-18.5' & STN-47 / SPT-12, 18.5'-20.0'

Project Number 171468117
 Lab ID 423

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: N/A
 Particle Hardness: N/A

Tested By: KWS
 Test Date: 04-15-2009
 Date Received 04-06-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

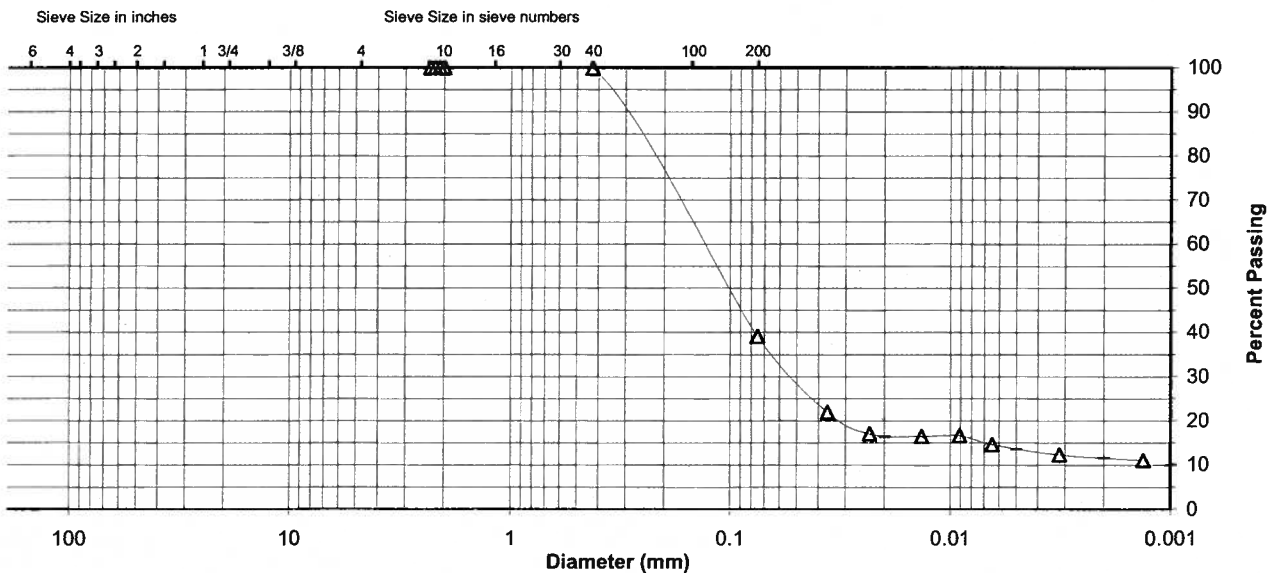
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	39.1
0.02 mm	16.5
0.005 mm	13.6
0.002 mm	11.6
0.001 mm	10.0

Particle Size Distribution

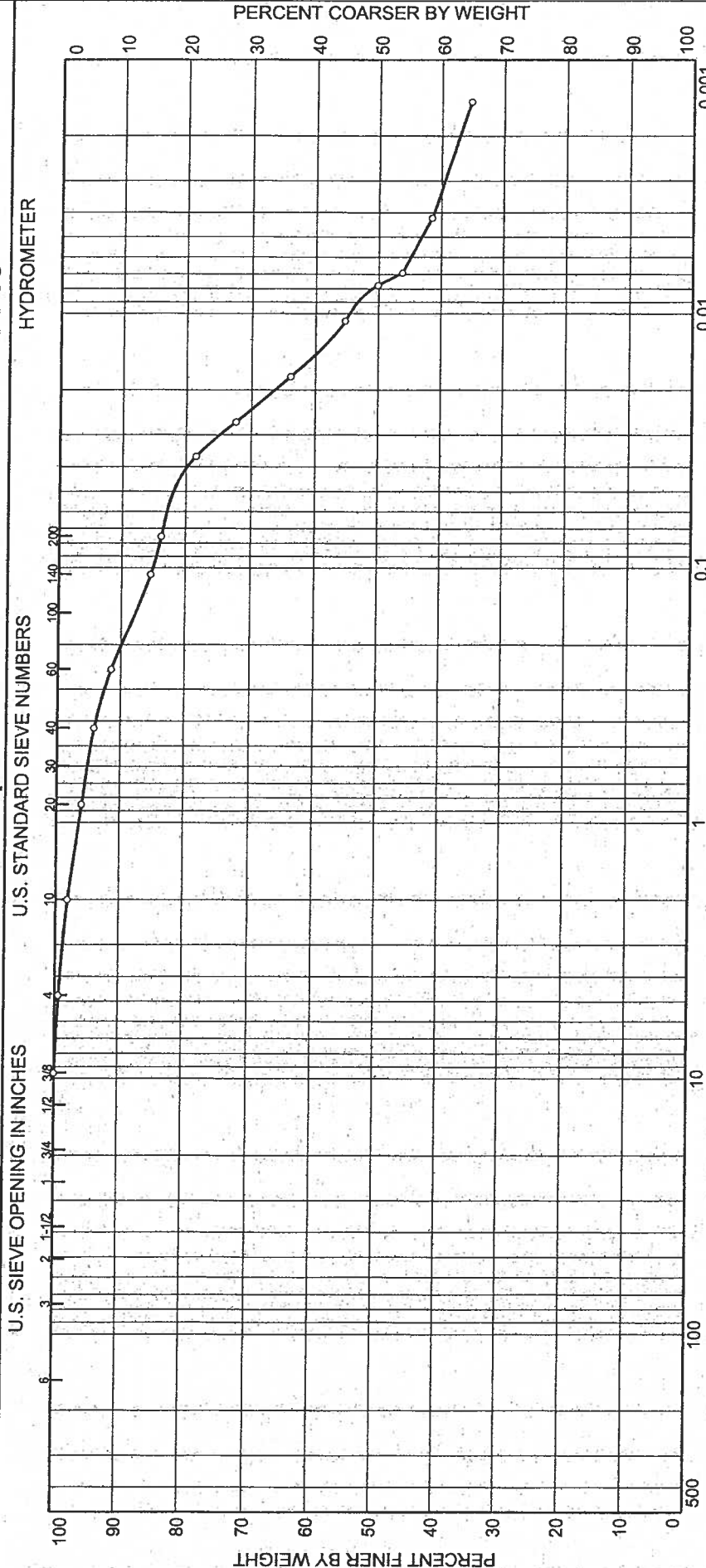
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.1	60.8	25.5	13.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.1		60.8	27.5	11.6



Comments _____

Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140



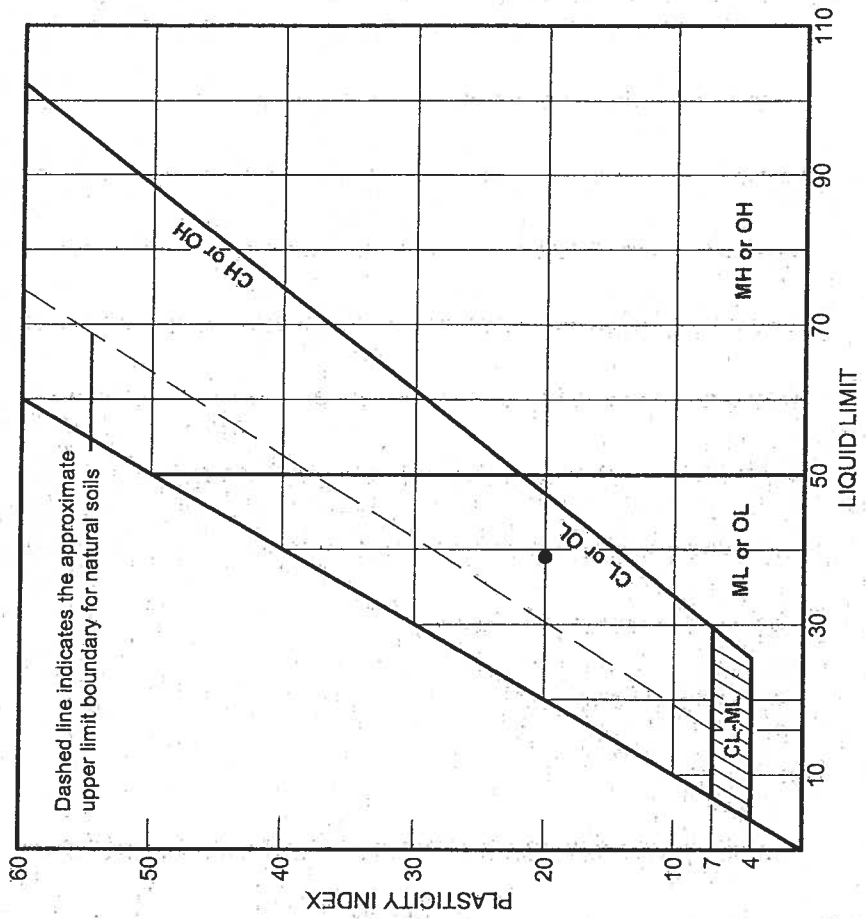
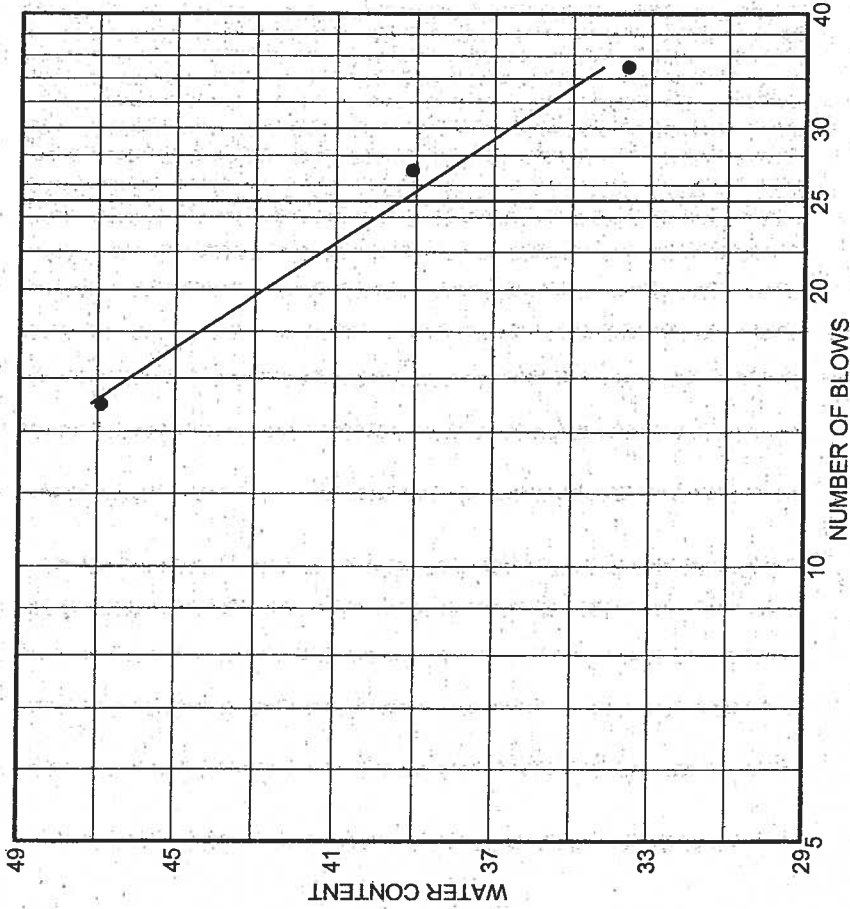
	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
	0.0	0.6	15.6	40.7	43.1

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
	STN-48	4.5-5 ft	May 09	CL	Gray Brown Lean clay with sand		39	19

Client STANTEC
 Project Kingston Ash Pond
 Project No. GTX-1464 Lab no. _____

GeoTesting
 Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	STN-48	4.5-5 ft	May 09	CL	Gray Brown Lean clay with sand		39	20

Client STANTEC

Project Kingston Ash Pond

Project No. GTX-1464

Lab no.

GeoTesting Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-48 / SPT-6, 9.5'-11.0' & STN-48 / SPT-7, 11.0'-12.5' Lab ID 447
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 69
 Plastic Limit: 32
 Plasticity Index: 37
 Activity Index: 0.63

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.0
No. 10	2	97.7
No. 40	0.425	94.2
No. 200	0.075	82.7
	0.02	71.6
	0.005	63.9
	0.002	58.6
estimated	0.001	55.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.0	2.3
Coarse Sand	1.3	3.5
Medium Sand	3.5	---
Fine Sand	11.5	11.5
Silt	18.8	24.1
Clay	63.9	58.6

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.74

Classification

Unified Group Symbol: CH
 Group Name: Fat clay with sand
 AASHTO Classification: A-7-5 (35)

Comments: _____



Project Name Kingston Ash Pond
Source STN-48 / SPT-6, 9.5'-11.0' & STN-48 / SPT-7, 11.0'-12.5'

Project Number 171468117
Lab ID 447

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Soft

Tested By: BWT
Test Date: 04-20-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.0
No. 10	97.7

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

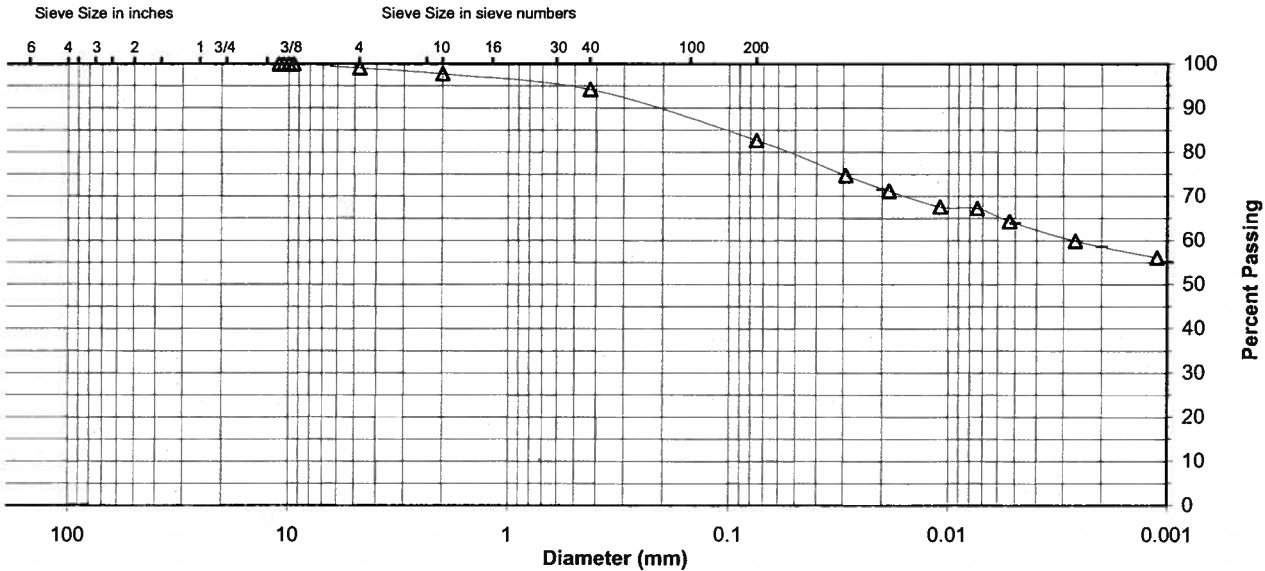
Specific Gravity 2.74

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.2
No. 200	82.7
0.02 mm	71.6
0.005 mm	63.9
0.002 mm	58.6
0.001 mm	55.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.0	1.3	3.5	11.5	18.8	63.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	2.3		3.5		11.5	24.1	58.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-48 / SPT-14, 24.5'-26.0' & STN-48 / SPT-15, 26.0'-27.5' Lab ID 457
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 26
 Plastic Limit: 14
 Plasticity Index: 12
 Activity Index: 0.48

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	50.1
	0.02	35.2
	0.005	27.7
	0.002	25.1
estimated	0.001	24.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	49.5	49.5
Silt	22.4	25.0
Clay	27.7	25.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-6 (3)

Comments: _____



Project Name Kingston Ash Pond
Source STN-48 / SPT-14, 24.5'-26.0' & STN-48 / SPT-15, 26.0'-27.5'

Project Number 171468117
Lab ID 457

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DRB
Test Date: 04-16-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

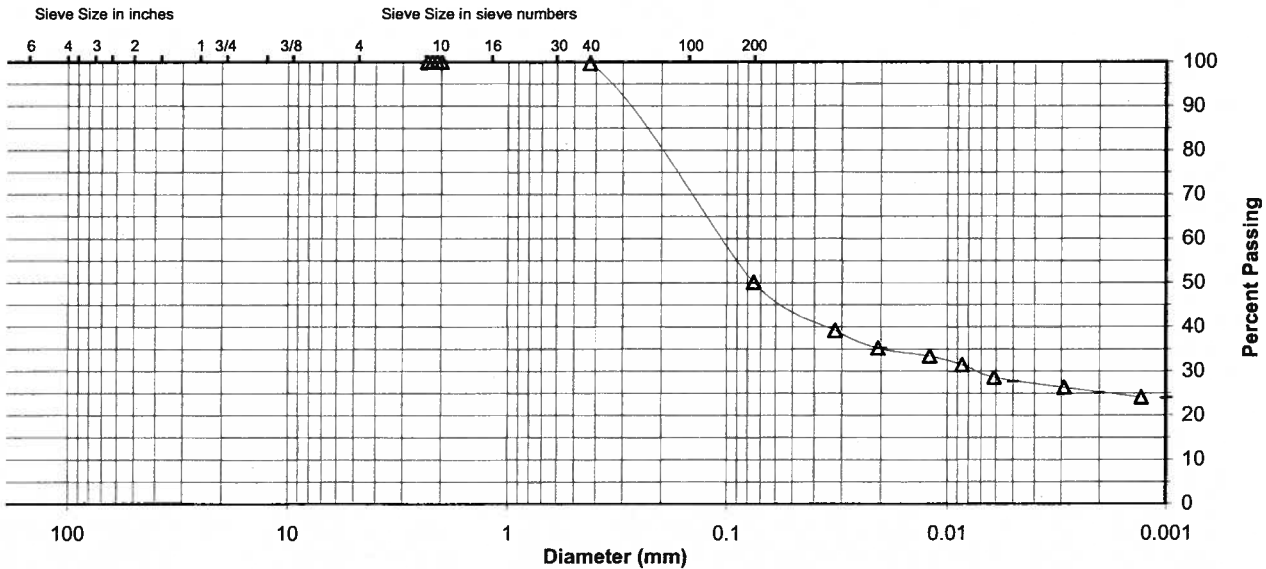
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	50.1
0.02 mm	35.2
0.005 mm	27.7
0.002 mm	25.1
0.001 mm	24.0

Particle Size Distribution

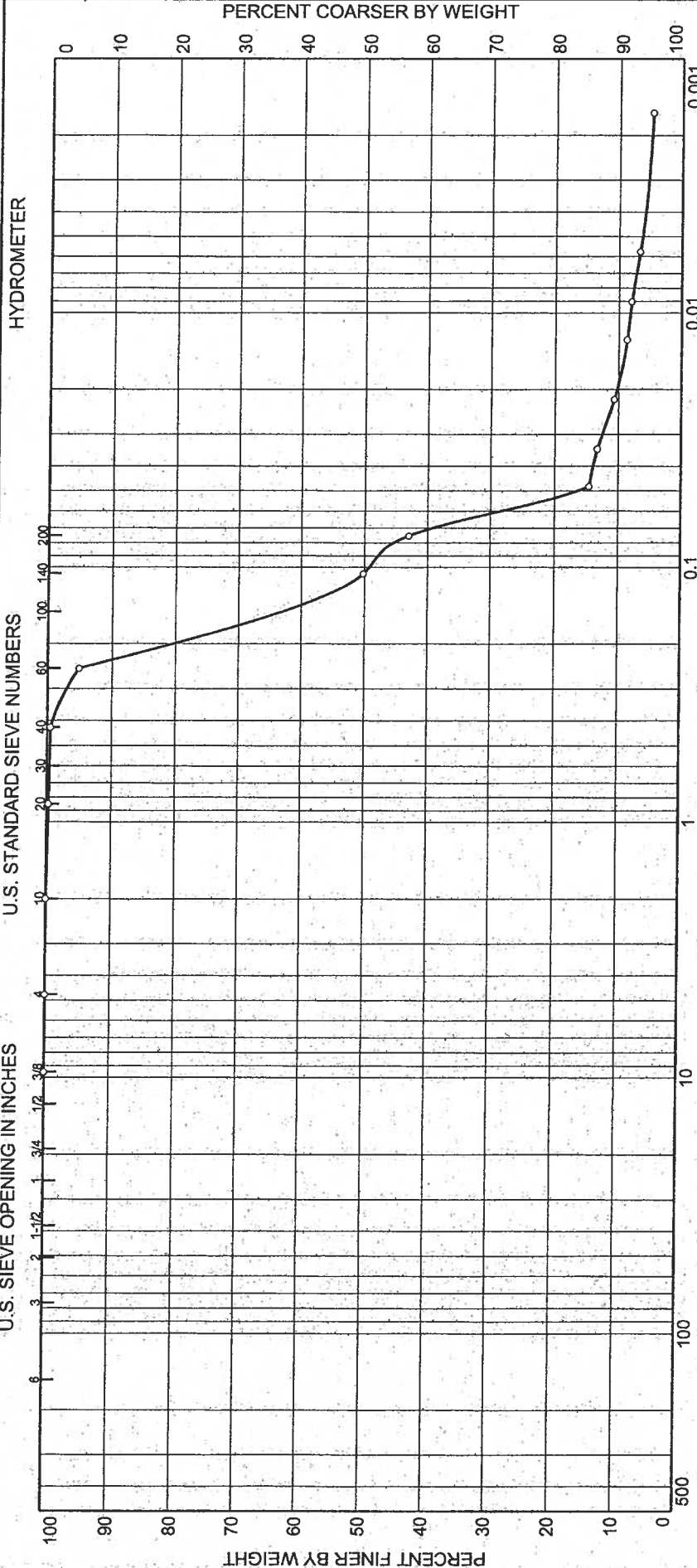
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	49.5	22.4	27.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.4		49.5	25.0	25.1



Comments _____

Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140



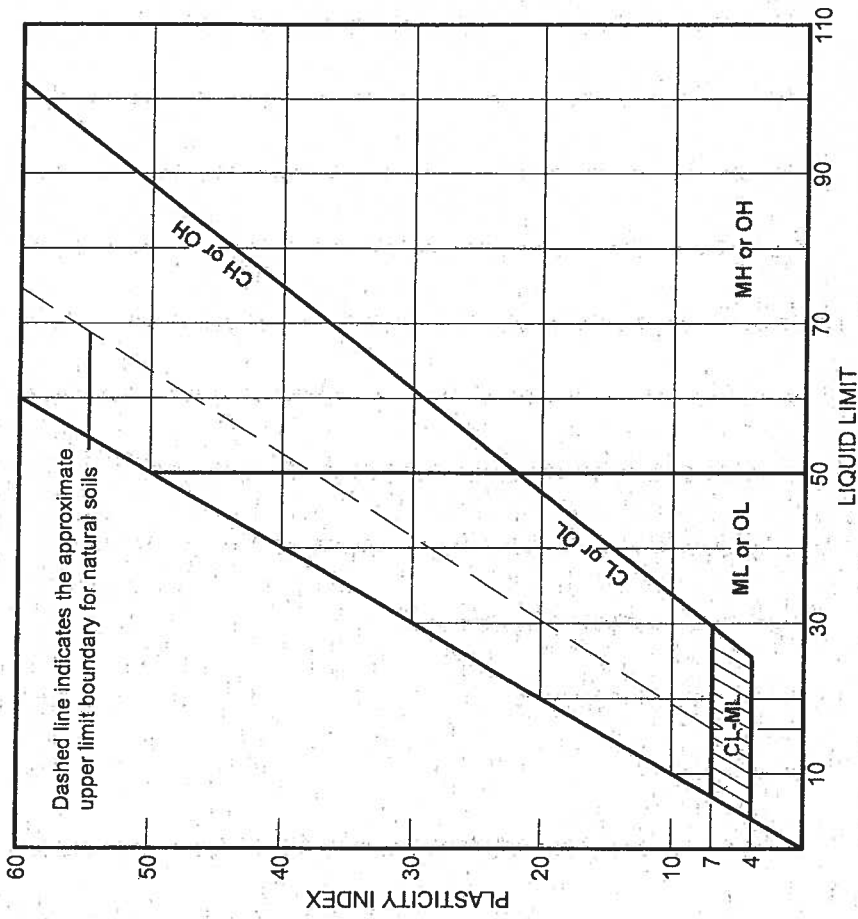
% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	57.0	36.7	6.3

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
	STN-48	33.5-34 ft	May 09	SM	Gray Silty sand			

Client STANTEC
 Project Kingston Ash Pond
 Project No. GTX-1464 Lab no.

GeoTesting Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	STN-48	33.5-34 ft	May 09	SM	Gray Silty sand		NV	NP

Client STANTEC

Project Kingston Ash Pond

Project No. GTX-1464 Lab no.

GeoTesting
Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-48 / SPT-24, 41.5'-43.0' & STN-48 / SPT-25, 43.0'-44.5' Lab ID 468
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 4-30-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	98.8
No. 200	0.075	37.0
	0.02	19.0
	0.005	15.7
	0.002	11.6
estimated	0.001	7.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.67

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	1.2
Medium Sand	1.2	---
Fine Sand	61.8	61.8
Silt	21.3	25.4
Clay	15.7	11.6

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-48 / SPT-24, 41.5'-43.0' & STN-48 / SPT-25, 43.0'-44.5'

Project Number 171468117
Lab ID 468

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-17-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

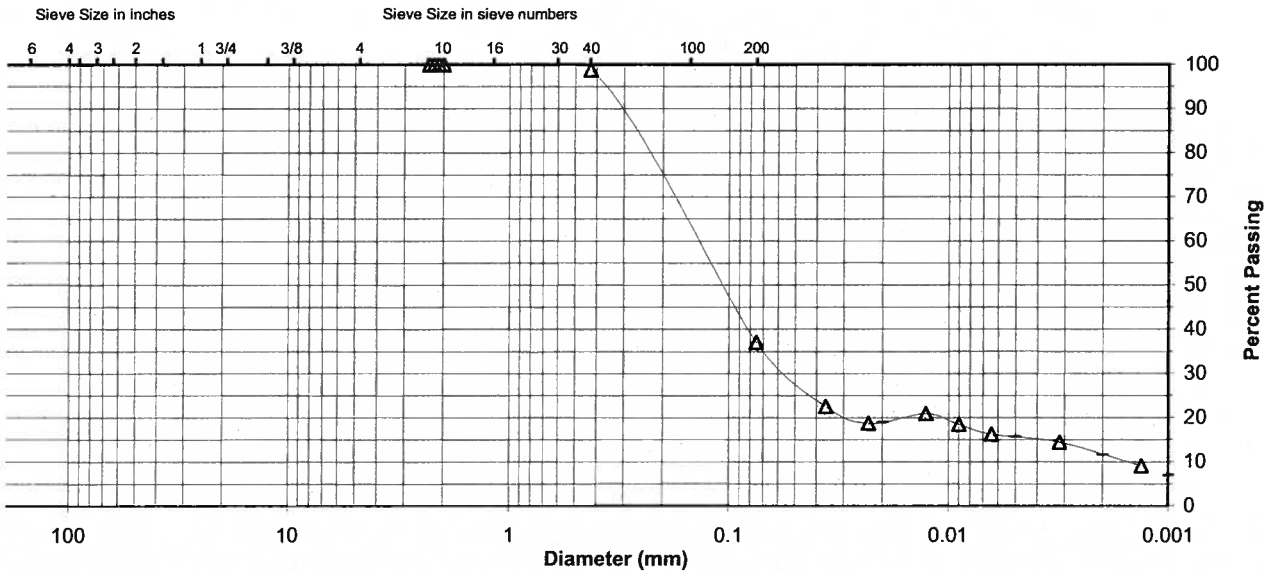
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.8
No. 200	37.0
0.02 mm	19.0
0.005 mm	15.7
0.002 mm	11.6
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	1.2	61.8	21.3	15.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		1.2		61.8	25.4	11.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-49, 30.0'-31.5', 31.5'-33.0' Lab ID 191
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 30
 Plastic Limit: 19
 Plasticity Index: 11
 Activity Index: 0.50

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.8
No. 40	0.425	97.3
No. 200	0.075	65.8
	0.02	40.0
	0.005	28.1
	0.002	22.0
estimated	0.001	19.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.2
Coarse Sand	0.2	2.5
Medium Sand	2.5	---
Fine Sand	31.5	31.5
Silt	37.7	43.8
Clay	28.1	22.0

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-6 (5)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-49, 30.0'-31.5', 31.5'-33.0'

Project Number 175569042
 Lab ID 191

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Rounded
 Particle Hardness: Hard and Durable

Tested By: CM
 Test Date: 05-28-2009
 Date Received 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.8

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

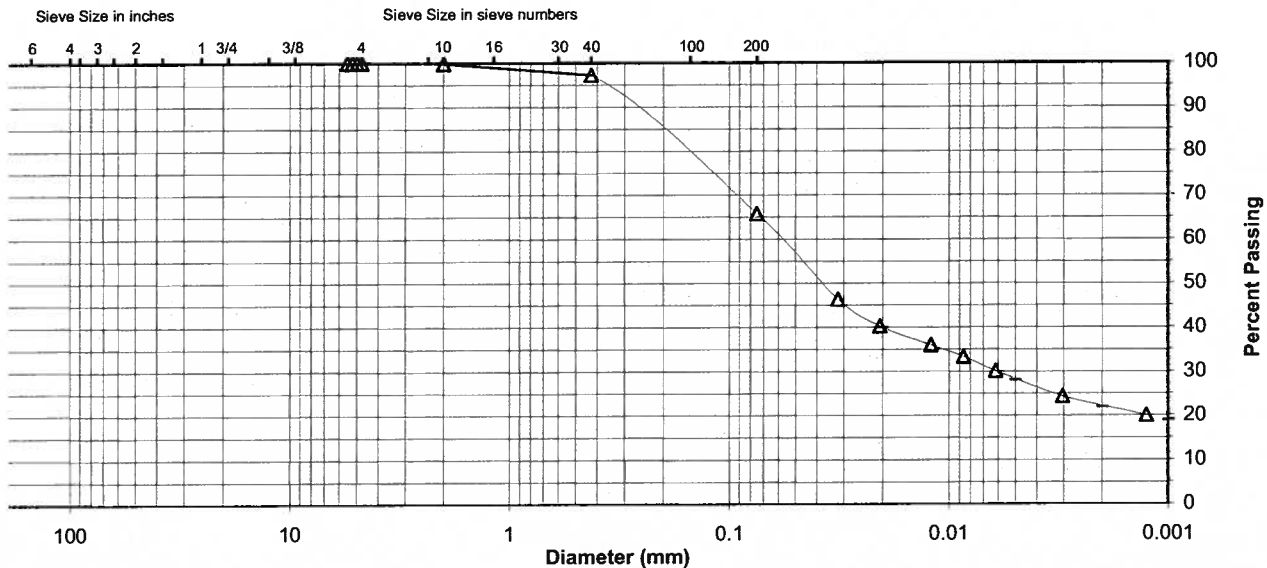
Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.3
No. 200	65.8
0.02 mm	40.0
0.005 mm	28.1
0.002 mm	22.0
0.001 mm	19.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.2	2.5	31.5	37.7	28.1
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.2		2.5		31.5	43.8	22.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-50, 20.5'-21.0' Lab ID 547
 County Kingston, Tennessee Date Received 5-27-09
 Sample Type UD Date Reported 6-30-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 24.7

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 26
 Plastic Limit: 17
 Plasticity Index: 9
 Activity Index: 0.50

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.3
No. 4	4.75	94.5
No. 10	2	90.0
No. 40	0.425	78.5
No. 200	0.075	59.2
	0.02	39.0
	0.005	23.7
	0.002	18.2
estimated	0.001	15.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.5	10.0
Coarse Sand	4.5	11.5
Medium Sand	11.5	---
Fine Sand	19.3	19.3
Silt	35.5	41.0
Clay	23.7	18.2

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.72

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-4 (3)

Comments: _____



Project Name Kingston Ash Pond
Source STN-50, 20.5'-21.0'

Project Number 175569042
Lab ID 547

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RM
Test Date: 06-23-2009
Date Received: 05-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.3
No. 4	94.5
No. 10	90.0

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

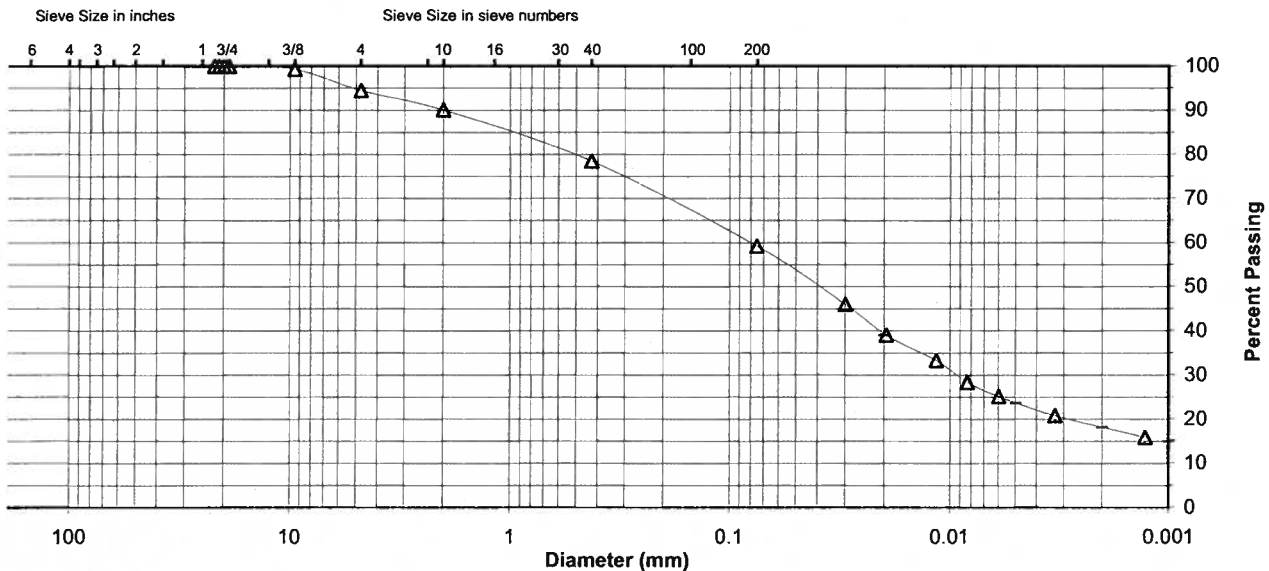
Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	78.5
No. 200	59.2
0.02 mm	39.0
0.005 mm	23.7
0.002 mm	18.2
0.001 mm	15.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.5	4.5	11.5	19.3	35.5	23.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	10.0		11.5		19.3	41.0	18.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-50, 28.0'-29.5', 29.5'-31.0' Lab ID 1089
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-14-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 17
 Plastic Limit: 15
 Plasticity Index: 2
 Activity Index: 0.25

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	98.8
No. 200	0.075	39.3
	0.02	18.7
	0.005	11.3
	0.002	7.7
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	1.1
Medium Sand	1.1	---
Fine Sand	59.5	59.5
Silt	28.0	31.6
Clay	11.3	7.7

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-50, 28.0'-29.5', 29.5'-31.0'

Project Number 171468117
Lab ID 1089

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 04-29-2009
Date Received: 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

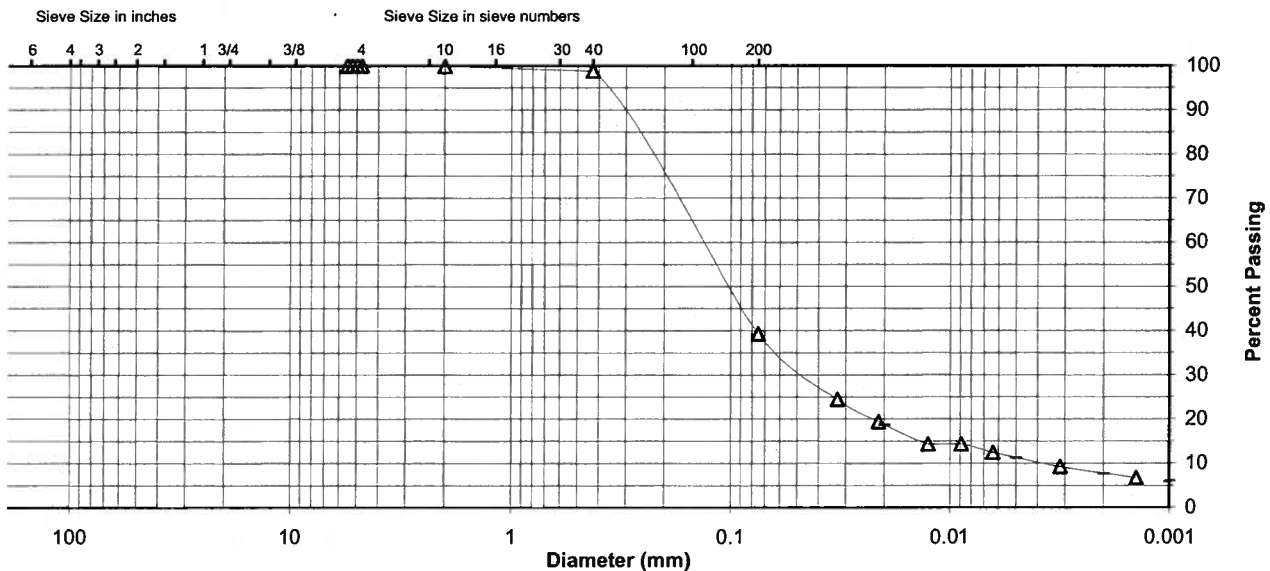
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.8
No. 200	39.3
0.02 mm	18.7
0.005 mm	11.3
0.002 mm	7.7
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.1	1.1	59.5	28.0	11.3	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.1		1.1		59.5	31.6		7.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-51, 3.0'-4.5', 4.5'-6.0' Lab ID 1098
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 56
 Plastic Limit: 21
 Plasticity Index: 35
 Activity Index: 0.90

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	94.0
No. 4	4.75	89.3
No. 10	2	85.4
No. 40	0.425	78.0
No. 200	0.075	62.3
	0.02	53.4
	0.005	45.5
	0.002	38.8
estimated	0.001	35.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	10.7	14.6
Coarse Sand	3.9	7.4
Medium Sand	7.4	---
Fine Sand	15.7	15.7
Silt	16.8	23.5
Clay	45.5	38.8

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.74

Classification
 Unified Group Symbol: CH
 Group Name: Sandy fat clay
 AASHTO Classification: A-7-6 (19)

Comments: _____



Project Name Kingston Ash Pond
Source STN-51, 3.0'-4.5', 4.5'-6.0'

Project Number 171468117
Lab ID 1098

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 05-05-2009
Date Received 04-23-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	94.0
No. 4	89.3
No. 10	85.4

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

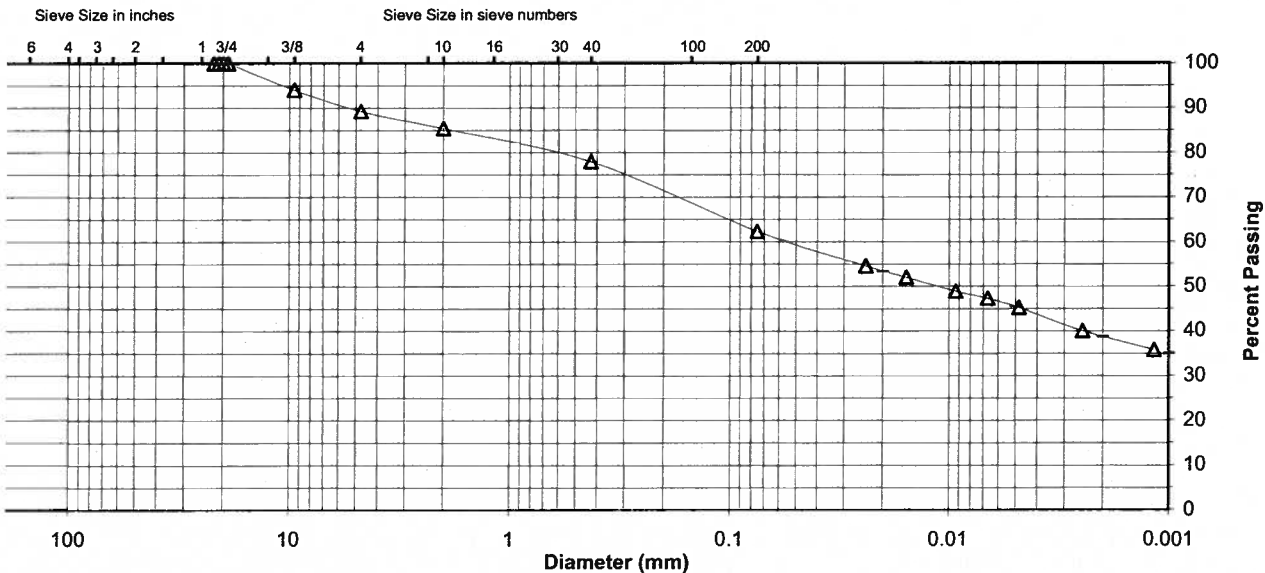
Specific Gravity 2.74

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	78.0
No. 200	62.3
0.02 mm	53.4
0.005 mm	45.5
0.002 mm	38.8
0.001 mm	35.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	10.7	3.9	7.4	15.7	16.8	45.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	14.6		7.4		15.7	23.5	38.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-51, 43.0'-44.5', 44.5'-46.0' Lab ID 1122
 County Roane (TN) Date Received 4-23-09
 Sample Type SPT Comp Date Reported 5-13-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.5
No. 10	2	99.0
No. 40	0.425	96.2
No. 200	0.075	10.5
	0.02	4.0
	0.005	3.2
	0.002	2.9
estimated	0.001	3.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.5	1.0
Coarse Sand	0.5	2.8
Medium Sand	2.8	---
Fine Sand	85.7	85.7
Silt	7.3	7.6
Clay	3.2	2.9

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: SP-SM
 Group Name: Poorly graded sand with silt
 AASHTO Classification: A-3 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-51, 43.0'-44.5', 44.5'-46.0'

Project Number 171468117
Lab ID 1122

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: RHB
Test Date: 05-05-2009
Date Received 04-23-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.5
No. 10	99.0

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

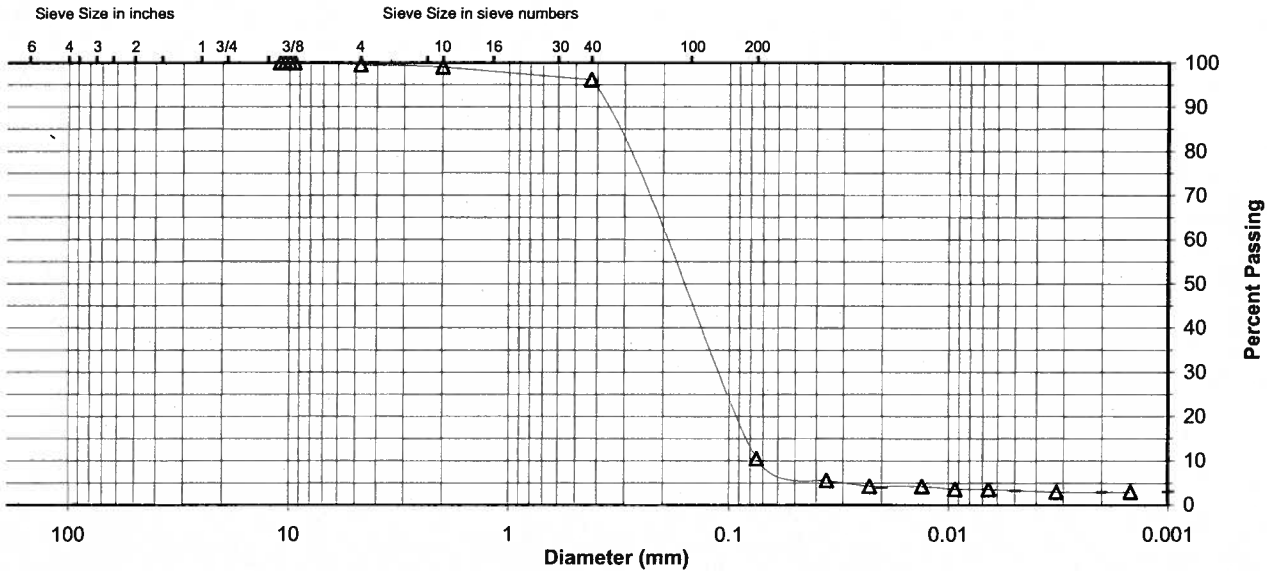
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	96.2
No. 200	10.5
0.02 mm	4.0
0.005 mm	3.2
0.002 mm	2.9
0.001 mm	3.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.5	0.5	2.8	85.7	7.3	3.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	1.0		2.8		85.7	7.6	2.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-52, 4.5'-6.0', 6.0'-7.5' Lab ID 1275
 County Roane (TN) Date Received 4-27-09
 Sample Type SPT Comp Date Reported 5-18-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 40
 Plastic Limit: 26
 Plasticity Index: 14
 Activity Index: 2.80

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	82.0
3/8"	9.5	74.4
No. 4	4.75	66.6
No. 10	2	58.8
No. 40	0.425	42.4
No. 200	0.075	29.1
	0.02	21.4
	0.005	10.4
	0.002	5.1
estimated	0.001	1.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	33.4	41.2
Coarse Sand	7.8	16.4
Medium Sand	16.4	---
Fine Sand	13.3	13.3
Silt	18.7	24.0
Clay	10.4	5.1

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.85

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-2-6 (1)

Comments: _____



Project Name Kingston Ash Pond
Source STN-52, 4.5'-6.0', 6.0'-7.5'

Project Number 171468117
Lab ID 1275

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 05-08-2009
Date Received 04-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	82.0
3/8"	74.4
No. 4	66.6
No. 10	58.8

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

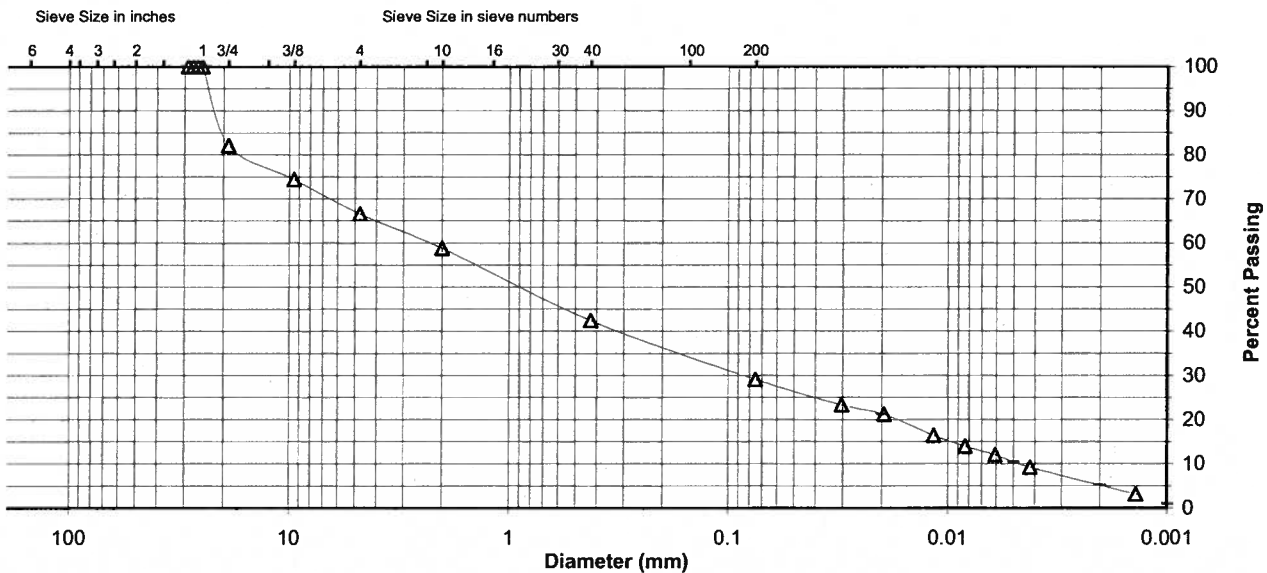
Specific Gravity 2.85

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	42.4
No. 200	29.1
0.02 mm	21.4
0.005 mm	10.4
0.002 mm	5.1
0.001 mm	1.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	18.0	15.4	7.8	16.4	13.3	18.7	10.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	41.2		16.4		13.3	24.0		5.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-52, 16.5'-18.0', 18.0'-19.5' Lab ID 1284
 County Roane (TN) Date Received 4-27-09
 Sample Type SPT Comp Date Reported 5-18-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.5
No. 10	2	99.4
No. 40	0.425	98.4
No. 200	0.075	20.3
	0.02	11.3
	0.005	8.0
	0.002	6.0
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.5	0.6
Coarse Sand	0.1	1.0
Medium Sand	1.0	---
Fine Sand	78.1	78.1
Silt	12.3	14.3
Clay	8.0	6.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.68

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-52, 16.5'-18.0', 18.0'-19.5'

Project Number 171468117
 Lab ID 1284

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-11-2009
 Date Received 04-27-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.5
No. 10	99.4

Maximum Particle size: 3/8" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

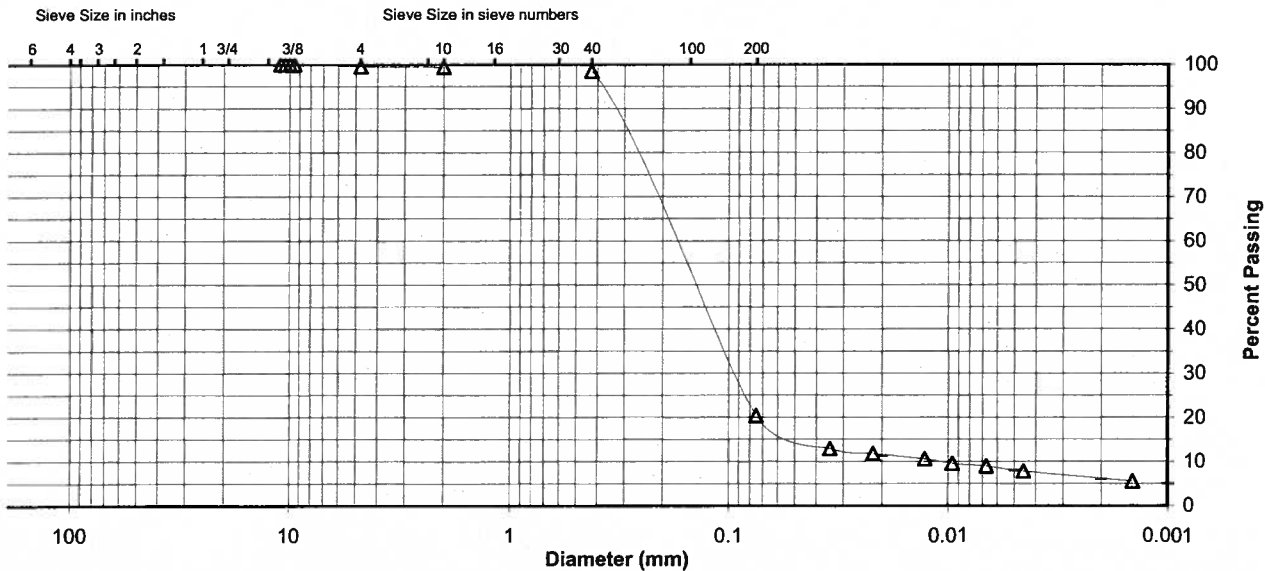
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.4
No. 200	20.3
0.02 mm	11.3
0.005 mm	8.0
0.002 mm	6.0
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.5	0.1	1.0	78.1	12.3	8.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	0.6		1.0		78.1	14.3	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-53, 41.0'-42.5', 42.5'-44.0', 44.0'-45.5' Lab ID 1326
 County Roane (TN) Date Received 4-27-09
 Sample Type SPT Comp Date Reported 5-18-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	98.0
No. 200	0.075	34.7
	0.02	21.2
	0.005	12.3
	0.002	8.9
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	1.9
Medium Sand	1.9	---
Fine Sand	63.3	63.3
Silt	22.4	25.8
Clay	12.3	8.9

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-53, 41.0'-42.5', 42.5'-44.0', 44.0'-45.5'

Project Number 171468117
 Lab ID 1326

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-08-2009
 Date Received 04-27-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

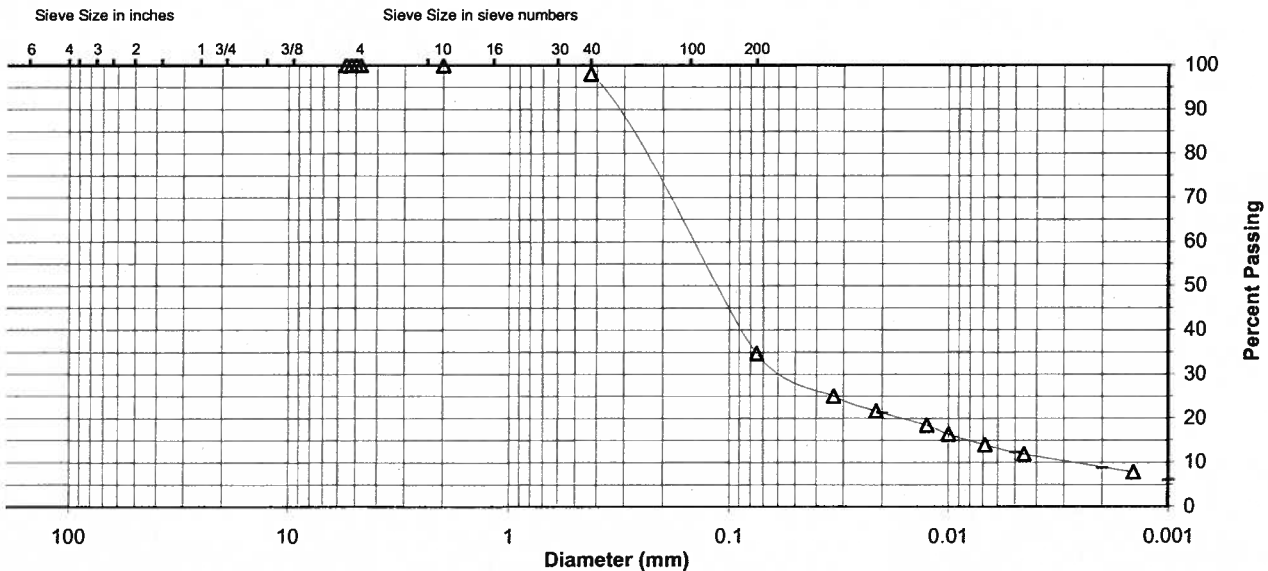
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.0
No. 200	34.7
0.02 mm	21.2
0.005 mm	12.3
0.002 mm	8.9
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	1.9	63.3	22.4	12.3
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.1		1.9	63.3	25.8		8.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-54, 53.0'-54.5', 54.5'-56.0' Lab ID 1779
 County Roane (TN) Date Received 5-8-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.9
No. 40	0.425	99.3
No. 200	0.075	31.7
	0.02	15.5
	0.005	10.5
	0.002	8.3
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.1	0.1
Coarse Sand	0.0	0.6
Medium Sand	0.6	---
Fine Sand	67.6	67.6
Silt	21.2	23.4
Clay	10.5	8.3

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.64

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-54, 53.0'-54.5', 54.5'-56.0'

Project Number 171468117
 Lab ID 1779

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 05-22-2009
 Date Received 05-08-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.9
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

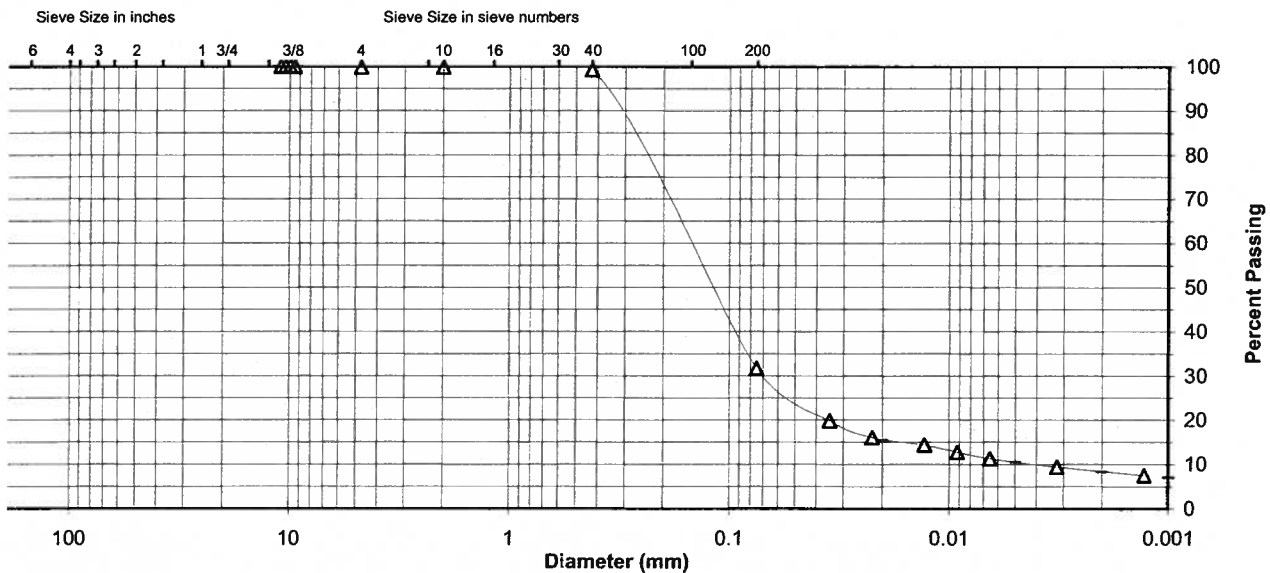
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	31.7
0.02 mm	15.5
0.005 mm	10.5
0.002 mm	8.3
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.1	0.0	0.6	67.6	21.2	10.5	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.1		0.6		67.6	23.4		8.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-55 / ST-1, 42.6'-43.1' Lab ID 187B
 County Roane (TN) Date Received 3-24-09
 Sample Type ST Date Reported 5-20-09

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
 Moisture Content (%): 20.7

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 27
 Plastic Limit: 18
 Plasticity Index: 9
 Activity Index: 0.50

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	92.7
No. 200	0.075	65.3
	0.02	42.1
	0.005	25.4
	0.002	18.5
estimated	0.001	14.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	7.3
Medium Sand	7.3	---
Fine Sand	27.4	27.4
Silt	39.9	46.8
Clay	25.4	18.5

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL
 Group Name: Sandy lean clay
 AASHTO Classification: A-4 (4)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-55 / ST-1, 42.6'-43.1'

 Project Number 171468117
 Lab ID 187B
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: N/A
 Particle Hardness: N/A

 Tested By: CM
 Test Date: 04-23-2009
 Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

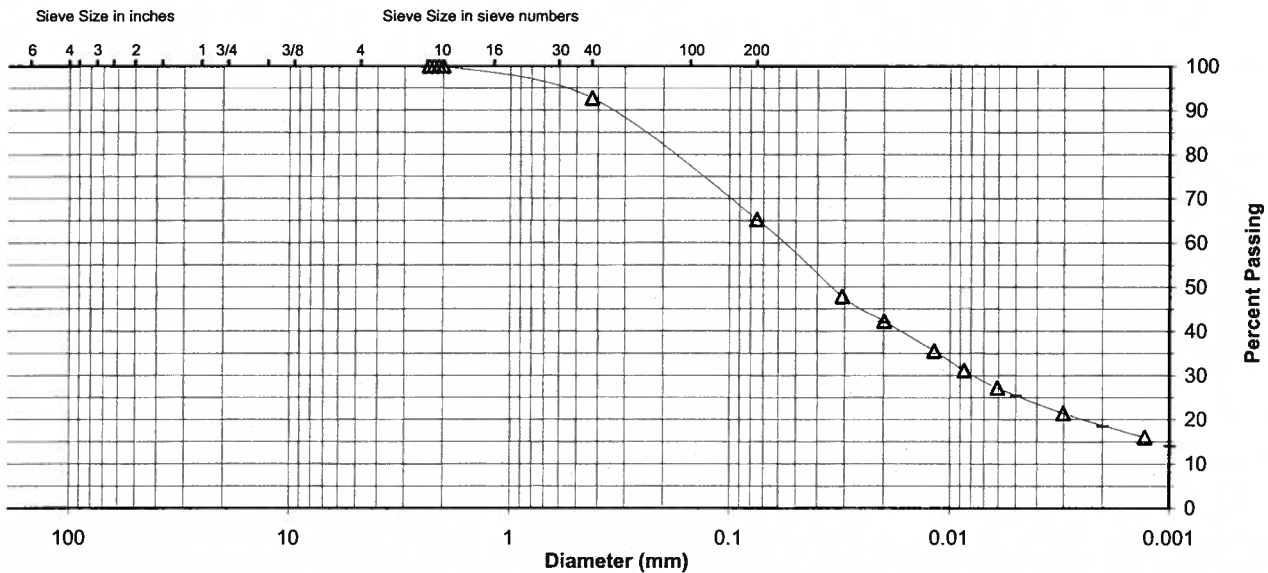
 Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	92.7
No. 200	65.3
0.02 mm	42.1
0.005 mm	25.4
0.002 mm	18.5
0.001 mm	14.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	7.3	27.4	39.9	25.4
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		7.3	27.4	46.8		18.5



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-55 / SPT-30, 47.5'-49.0' & STN-55 / SPT-31, 49.0'-50.5' Lab ID 172
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 22
 Plastic Limit: 15
 Plasticity Index: 7
 Activity Index: 0.50

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.6
No. 200	0.075	61.3
	0.02	33.7
	0.005	18.8
	0.002	13.9
estimated	0.001	12.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.3
Medium Sand	0.3	—
Fine Sand	38.3	38.3
Silt	42.5	47.4
Clay	18.8	13.9

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay
 AASHTO Classification: A-4 (1)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-55 / SPT-30, 47.5'-49.0' & STN-55 / SPT-31, 49.0'-50.5'

Project Number 171468117
 Lab ID 172

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Soft

Tested By: DG
 Test Date: 04-10-2019
 Date Received 03-24-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

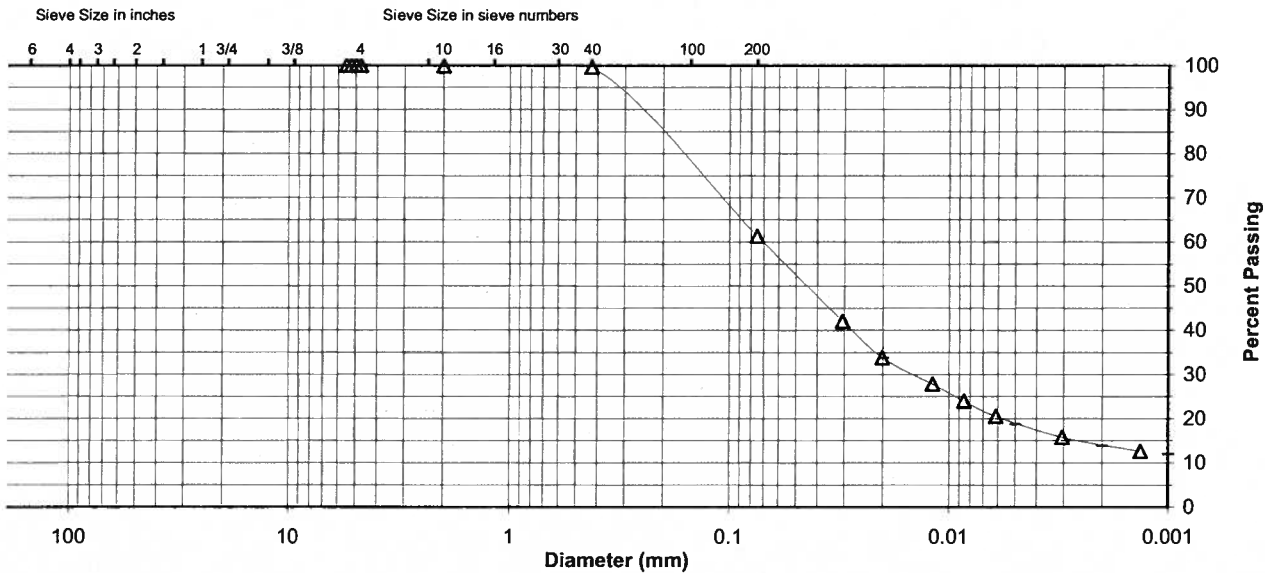
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	61.3
0.02 mm	33.7
0.005 mm	18.8
0.002 mm	13.9
0.001 mm	12.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	0.3	38.3	42.5	18.8
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.1		0.3	38.3	47.4		13.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-55 / SPT-37, 58.0'-59.5' & STN-55 / SPT-38, 59.5'-60.2' Lab ID 180
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	---
3/4"	19	85.7
3/8"	9.5	76.6
No. 4	4.75	72.2
No. 10	2	67.3
No. 40	0.425	63.4
No. 200	0.075	15.4
	0.02	5.0
	0.005	3.4
	0.002	2.1
estimated	0.001	1.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	27.8	32.7
Coarse Sand	4.9	3.9
Medium Sand	3.9	---
Fine Sand	48.0	48.0
Silt	12.0	13.3
Clay	3.4	2.1

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.62

Classification

Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-55 / SPT-37, 58.0'-59.5' & STN-55 / SPT-38, 59.5'-60.2'

Project Number 171468117
 Lab ID 180

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: DG
 Test Date: 04-10-2009
 Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	---
3/4"	85.7
3/8"	76.6
No. 4	72.2
No. 10	67.3

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

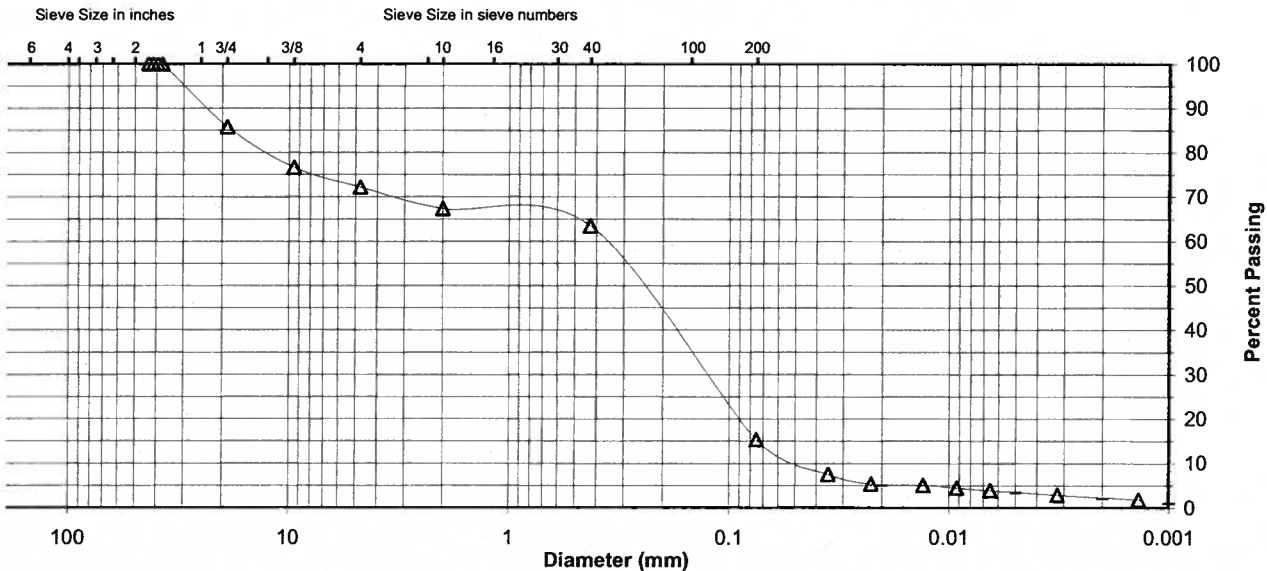
Specific Gravity 2.62

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	63.4
No. 200	15.4
0.02 mm	5.0
0.005 mm	3.4
0.002 mm	2.1
0.001 mm	1.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	14.3	13.5	4.9	3.9	48.0	12.0	3.4
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	32.7		3.9	48.0	13.3		2.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name	Kingston Ash Pond	Project Number	171468117
Source	STN-56 / SPT-28, 40.5'-42.0' & STN-56 / SPT-29, 42.0'-43.5'	Lab ID	80
County	Roane (TN)	Date Received	3-24-09
Sample Type	SPT Comp	Date Reported	4-22-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit:	22
Plastic Limit:	17
Plasticity Index:	5
Activity Index:	0.36

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.1
No. 200	0.075	61.3
	0.02	34.8
	0.005	20.4
	0.002	14.1
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM	AASHTO
	(%)	(%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.9
Medium Sand	0.9	---
Fine Sand	37.8	37.8
Silt	40.9	47.2
Clay	20.4	14.1

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft ³):	N/A
Maximum Dry Density (kg/m ³):	N/A
Optimum Moisture Content (%):	N/A
Over Size Correction %:	N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%):	N/A
Compacted Dry Density (lb/ft ³):	N/A
Compacted Moisture Content (%):	N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size:	No. 10
Specific Gravity at 20° Celsius:	2.65

Classification

Unified Group Symbol: CL-ML
 Group Name: Sandy silty clay

AASHTO Classification: A-4 (1)

Comments: _____



Project Name Kingston Ash Pond
Source STN-56 / SPT-28, 40.5'-42.0' & STN-56 / SPT-29, 42.0'-43.5'

Project Number 171468117
Lab ID 80

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-09-2009
Date Received: 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

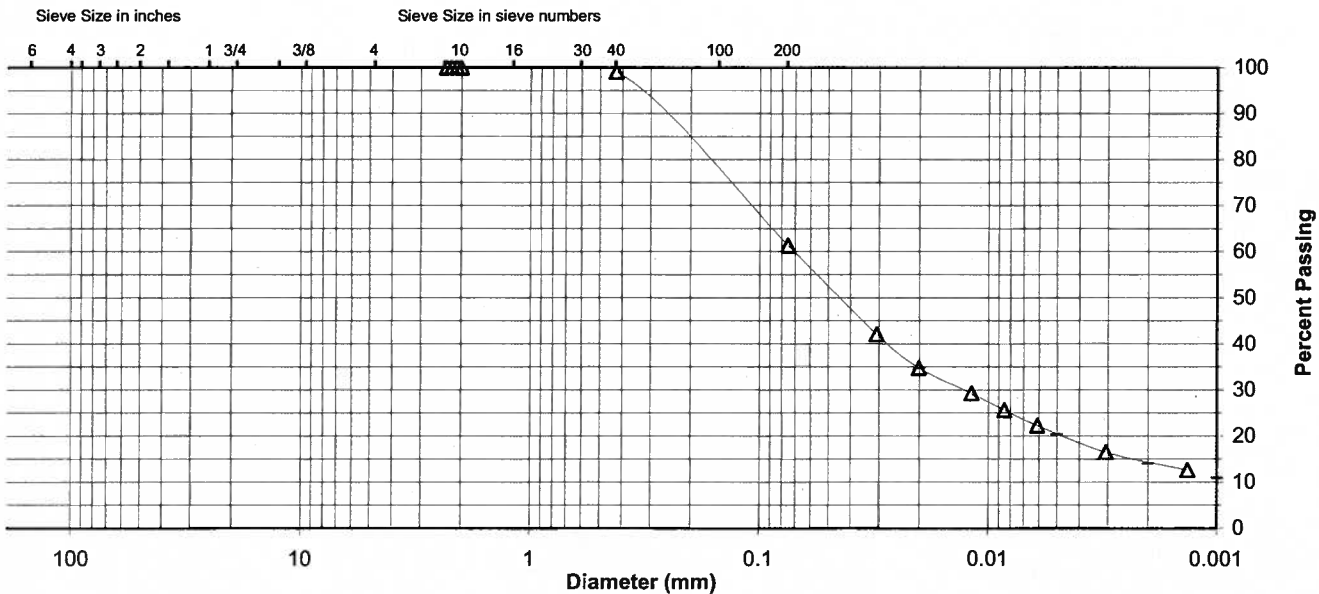
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.1
No. 200	61.3
0.02 mm	34.8
0.005 mm	20.4
0.002 mm	14.1
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.9	37.8	40.9	20.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.9		37.8	47.2		14.1



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-56 / SPT-30, 43.5'-45.0' & STN-56 / SPT-31, 45.0'-46.5' Lab ID 83
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 20
 Plastic Limit: 19
 Plasticity Index: 1
 Activity Index: 0.09

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.5
No. 200	0.075	45.5
	0.02	23.9
	0.005	14.6
	0.002	11.1
estimated	0.001	8.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.5
Medium Sand	0.5	---
Fine Sand	54.0	54.0
Silt	30.9	34.4
Clay	14.6	11.1

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-56 / SPT-30, 43.5'-45.0' & STN-56 / SPT-31, 45.0'-46.5'

Project Number 171468117
 Lab ID 83

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: N/A
 Particle Hardness: N/A
 Tested By: BWT
 Test Date: 04-09-2009
 Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

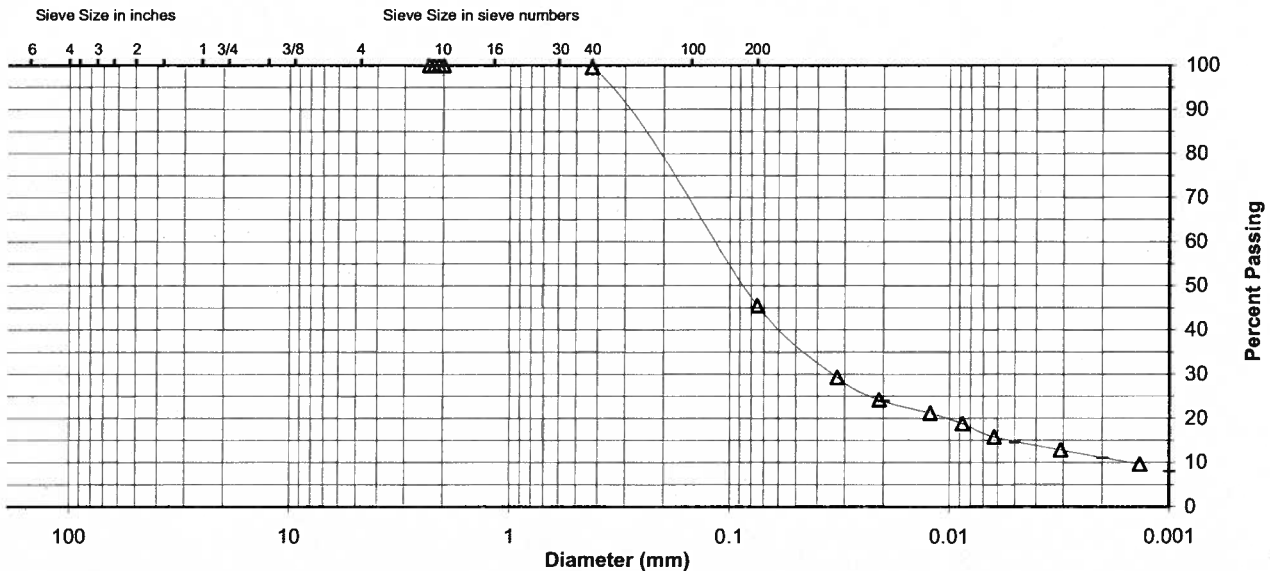
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	45.5
0.02 mm	23.9
0.005 mm	14.6
0.002 mm	11.1
0.001 mm	8.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.5	54.0	30.9	14.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	0.0		0.5		54.0	11.1	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-56 / SPT-37, 54.0'-55.5' & STN-56 / SPT-38, 55.5'-57.0' Lab ID 91
 County Roane (TN) Date Received 3-24-09
 Sample Type SPT Comp Date Reported 4-22-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	23.8
	0.02	10.2
	0.005	5.1
	0.002	3.2
estimated	0.001	2.0

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	75.8	75.8
Silt	18.7	20.6
Clay	5.1	3.2

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.61

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-56 / SPT-37, 54.0'-55.5' & STN-56 / SPT-38, 55.5'-57.0'

Project Number 171468117
 Lab ID 91

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: N/A
 Particle Hardness: N/A
 Tested By: BWT
 Test Date: 04-09-2009
 Date Received 03-24-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

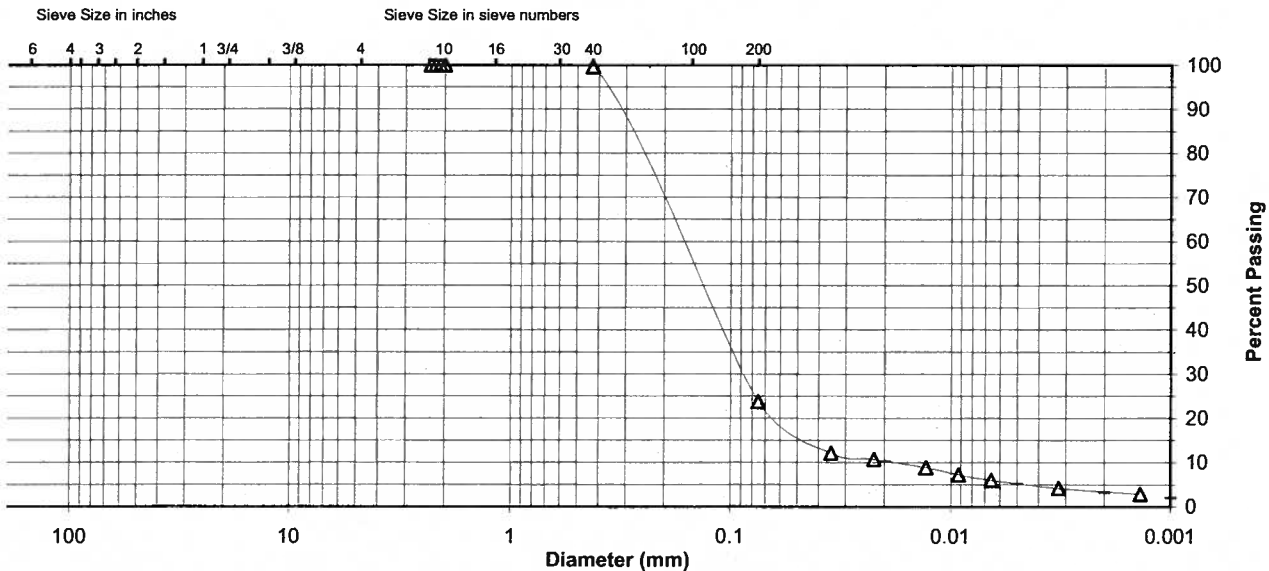
Specific Gravity 2.61

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	23.8
0.02 mm	10.2
0.005 mm	5.1
0.002 mm	3.2
0.001 mm	2.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	75.8	18.7	5.1
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.4	75.8	20.6		3.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-59, 18.5'-20.0', 20.0'-21.5' Lab ID 578
 County Kingston, Tennessee Date Received 6-3-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.4
No. 200	0.075	40.3
	0.02	23.9
	0.005	18.6
	0.002	15.9
estimated	0.001	15.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.6
Medium Sand	0.6	---
Fine Sand	59.1	59.1
Silt	21.7	24.4
Clay	18.6	15.9

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-59, 18.5'-20.0', 20.0'-21.5'

Project Number 175569042
 Lab ID 578

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: N/A
 Particle Hardness: N/A
 Tested By: CSM
 Test Date: 06-16-2009
 Date Received 06-03-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

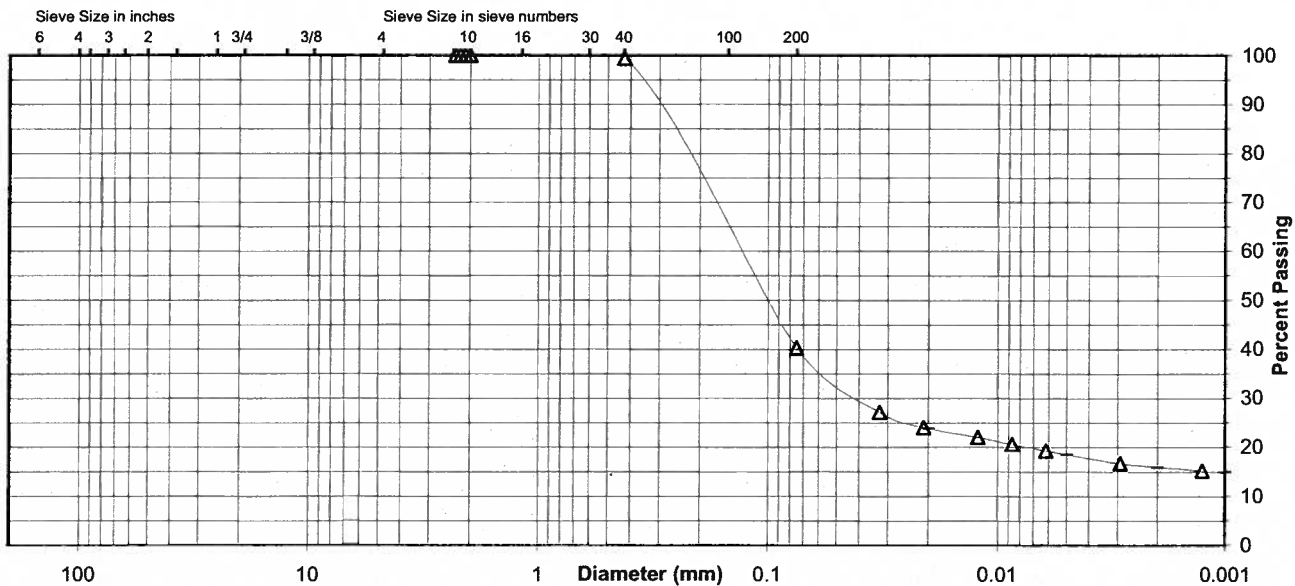
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.4
No. 200	40.3
0.02 mm	23.9
0.005 mm	18.6
0.002 mm	15.9
0.001 mm	15.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.6	59.1	21.7	18.6	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.6		59.1	24.4		15.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-59, 30.5'-32.0', 32.0'-33.5' Lab ID 587
 County Kingston, Tennessee Date Received 6-3-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	100.0
No. 200	0.075	30.5
	0.02	16.2
	0.005	11.2
	0.002	8.4
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.0
Medium Sand	0.0	---
Fine Sand	69.5	69.5
Silt	19.3	22.1
Clay	11.2	8.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-59, 30.5'-32.0', 32.0'-33.5'

 Project Number 175569042
 Lab ID 587
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: N/A
 Particle Hardness: N/A

 Tested By: CSM
 Test Date: 06-16-2009
 Date Received 06-03-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

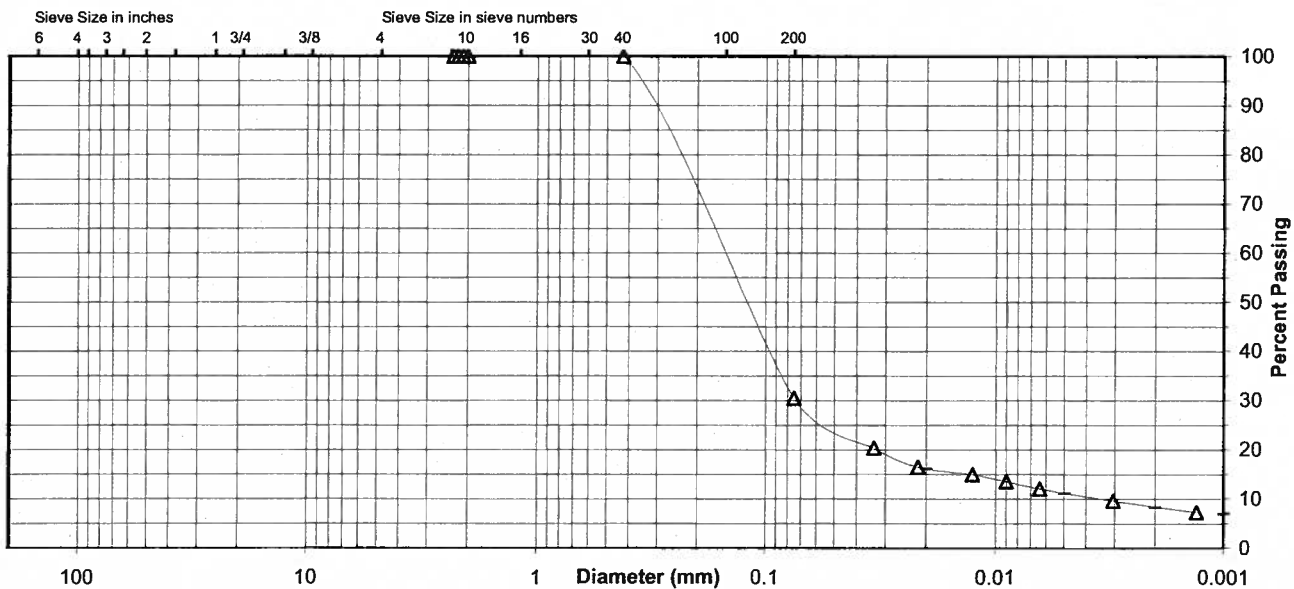
 Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	100.0
No. 200	30.5
0.02 mm	16.2
0.005 mm	11.2
0.002 mm	8.4
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.0	69.5	19.3	11.2	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.0		69.5	22.1		8.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-60, 14.0'-15.5', 15.5'-17.0' Lab ID 610
 County Kingston, Tennessee Date Received 6-3-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 31
 Plastic Limit: 18
 Plasticity Index: 13
 Activity Index: 0.52

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.7
No. 200	0.075	68.1
	0.02	44.8
	0.005	30.0
	0.002	25.3
estimated	0.001	22.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.2
Medium Sand	0.2	---
Fine Sand	31.6	31.6
Silt	38.1	42.8
Clay	30.0	25.3

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-6 (7)

Comments: _____



Project Name Kingston Ash Pond
Source STN-60, 14.0'-15.5', 15.5'-17.0'

Project Number 175569042
Lab ID 610

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 06-15-2009
Date Received 06-03-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

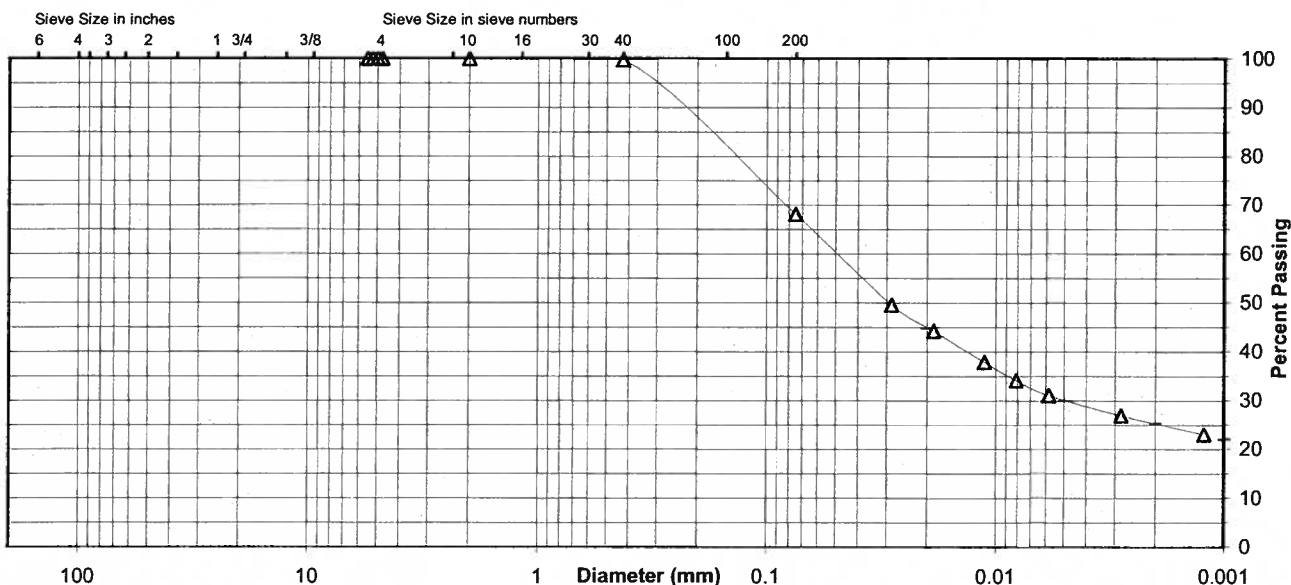
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	68.1
0.02 mm	44.8
0.005 mm	30.0
0.002 mm	25.3
0.001 mm	22.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.1	0.2	31.6	38.1	30.0	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.1		0.2		31.6	42.8		25.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-60, 28.0'-29.5', 29.5'-31.0' Lab ID 619
 County Kingston, Tennessee Date Received 6-3-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 21
 Plastic Limit: 18
 Plasticity Index: 3
 Activity Index: 0.20

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.8
No. 200	0.075	48.4
	0.02	26.8
	0.005	18.4
	0.002	15.3
estimated	0.001	13.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.2
Medium Sand	0.2	---
Fine Sand	51.4	51.4
Silt	30.0	33.1
Clay	18.4	15.3

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-60, 28.0'-29.5', 29.5'-31.0'

Project Number 175569042
Lab ID 619

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 06-15-2009
Date Received: 06-03-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

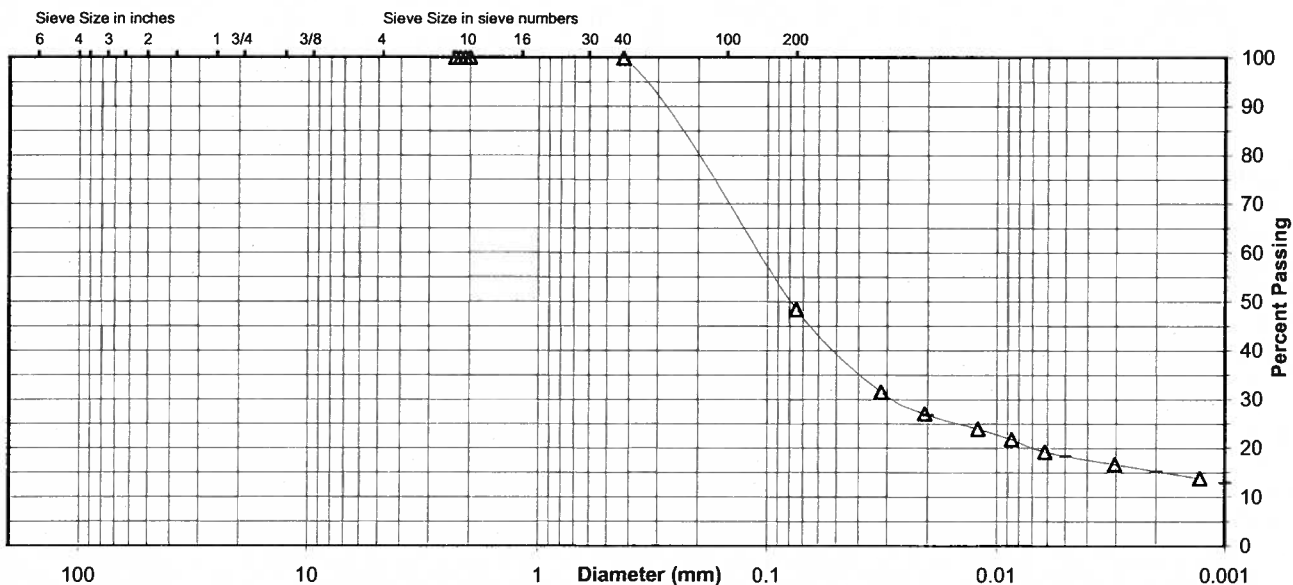
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.8
No. 200	48.4
0.02 mm	26.8
0.005 mm	18.4
0.002 mm	15.3
0.001 mm	13.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.2	51.4	30.0	18.4
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.2		51.4	33.1	15.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-62, 6.0'-7.5', 7.5'-9.0' Lab ID 771
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	89.9
No. 4	4.75	76.4
No. 10	2	56.5
No. 40	0.425	34.3
No. 200	0.075	14.6
	0.02	3.4
	0.005	1.4
	0.002	0.9
estimated	0.001	0.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	23.6	43.5
Coarse Sand	19.9	22.2
Medium Sand	22.2	---
Fine Sand	19.7	19.7
Silt	13.2	13.7
Clay	1.4	0.9

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.79

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-1-b (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-62, 6.0'-7.5', 7.5'-9.0'

 Project Number 171468117
 Lab ID 771
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: Angular
 Particle Hardness: Hard and Durable

 Tested By: CM
 Test Date: 04-23-2009
 Date Received 04-14-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	89.9
No. 4	76.4
No. 10	56.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

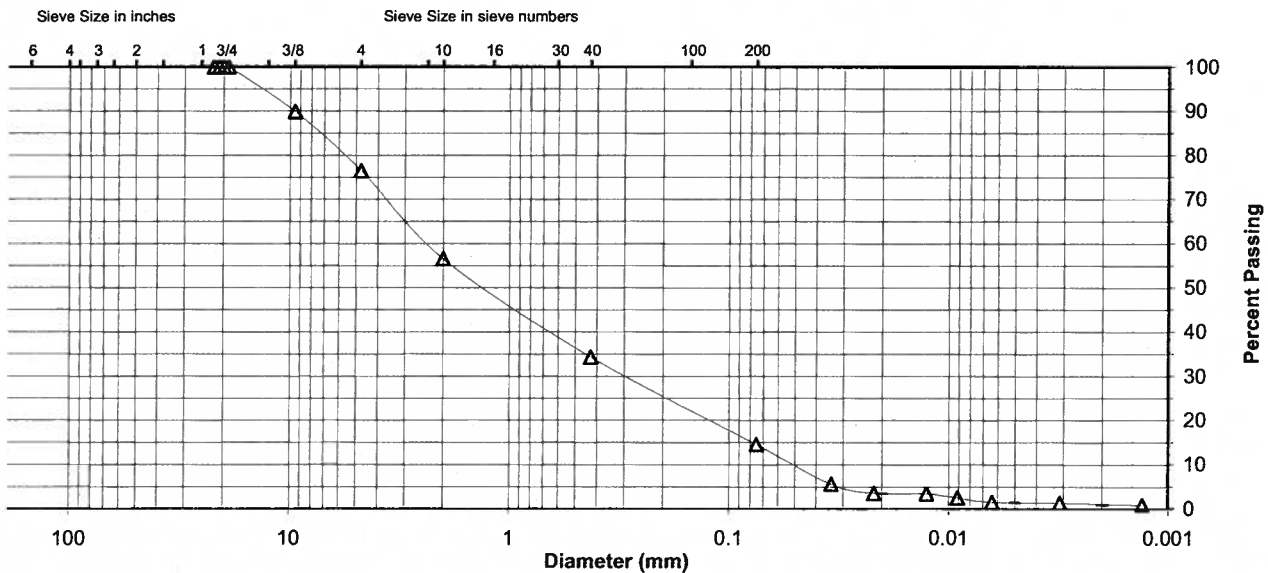
 Specific Gravity 2.79

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	34.3
No. 200	14.6
0.02 mm	3.4
0.005 mm	1.4
0.002 mm	0.9
0.001 mm	0.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	23.6	19.9	22.2	19.7	13.2	1.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	43.5		22.2		19.7	13.7		0.9



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-62, 21.0'-22.5', 22.5'-24.0' Lab ID 782
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	43.1
	0.02	23.0
	0.005	14.8
	0.002	12.2
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	56.6	56.6
Silt	28.3	30.9
Clay	14.8	12.2

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-62, 21.0'-22.5', 22.5'-24.0'

Project Number 171468117
Lab ID 782

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-27-2009
Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

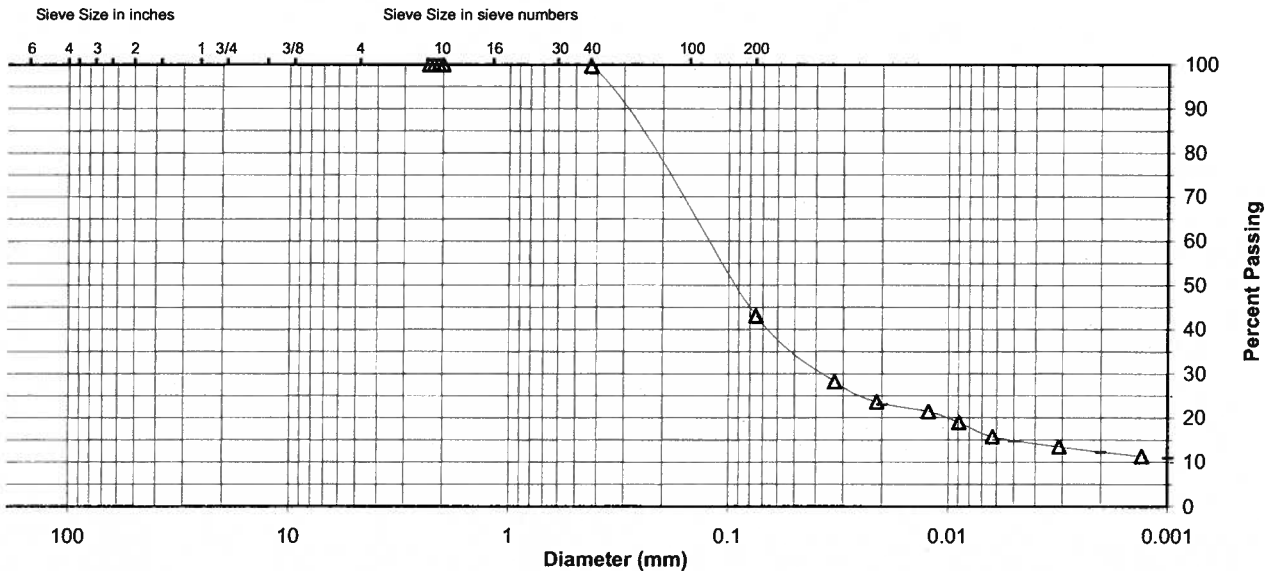
Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.7
No. 200	43.1
0.02 mm	23.0
0.005 mm	14.8
0.002 mm	12.2
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.3	56.6	28.3	14.8
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.3	56.6	30.9		12.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-62, 39.5'-41.0', 41.0'-42.5' Lab ID 794
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.5
No. 200	0.075	25.9
	0.02	13.2
	0.005	9.6
	0.002	7.6
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.4
Medium Sand	0.4	---
Fine Sand	73.6	73.6
Silt	16.3	18.3
Clay	9.6	7.6

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-62, 39.5'-41.0', 41.0'-42.5'

Project Number 171468117
Lab ID 794

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2009
Date Received: 04-14-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

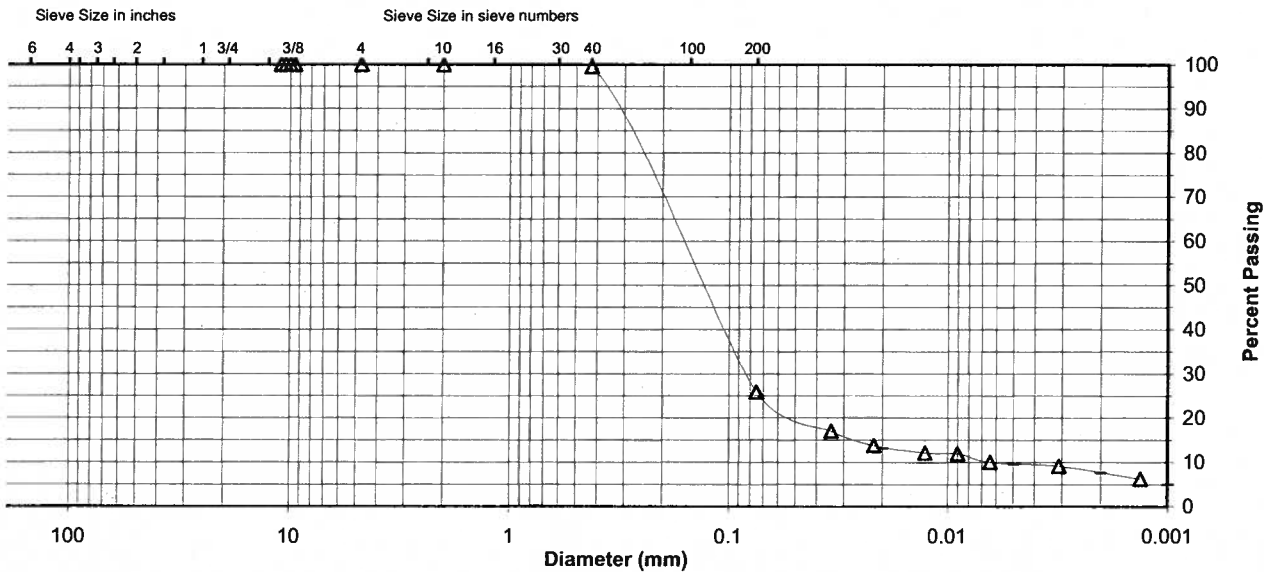
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	25.9
0.02 mm	13.2
0.005 mm	9.6
0.002 mm	7.6
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	0.4	73.6	16.3	9.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.1		0.4		73.6	18.3	7.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-63 / SPT-10, 17.5'-19.0' & STN-63 / SPT-11, 19.0'-20.5' Lab ID 582
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	98.7
No. 200	0.075	22.5
	0.02	12.6
	0.005	8.2
	0.002	6.2
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	1.2
Medium Sand	1.2	---
Fine Sand	76.2	76.2
Silt	14.3	16.3
Clay	8.2	6.2

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.64

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-63 / SPT-10, 17.5'-19.0' & STN-63 / SPT-11, 19.0'-20.5'

Project Number 171468117
Lab ID 582

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-17-2009
Date Received: 04-06-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Maximum Particle size: No. 4 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

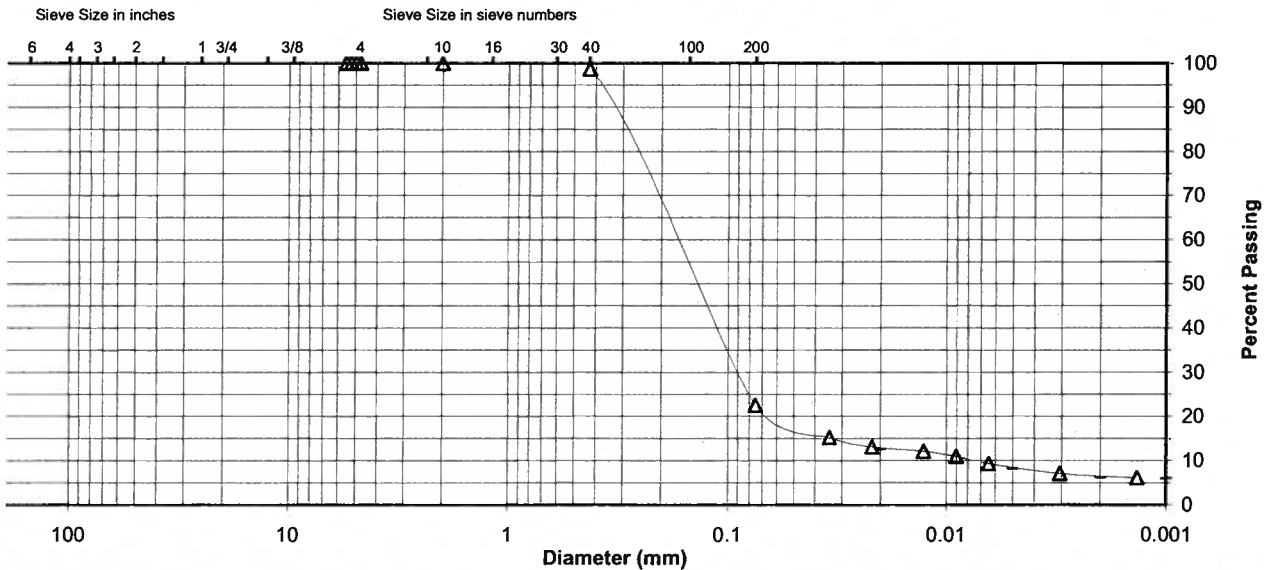
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.7
No. 200	22.5
0.02 mm	12.6
0.005 mm	8.2
0.002 mm	6.2
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	1.2	76.2	14.3	8.2
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.1		1.2	76.2	16.3		6.2



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-63 /SPT-17, 28.0'-29.5' & STN-63 /SPT-18A, 29.5'-30.5' Lab ID 590
 County Roane (TN) Date Received 4-6-09
 Sample Type SPT Comp Date Reported 5-1-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	44.8
	0.02	24.0
	0.005	17.6
	0.002	14.3
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	54.8	54.8
Silt	27.2	30.5
Clay	17.6	14.3

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-63 /SPT-17, 28.0'-29.5' & STN-63 /SPT-18A, 29.5'-30.5'

Project Number 171468117
Lab ID 590

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: BWT
Test Date: 04-17-2009
Date Received: 04-06-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

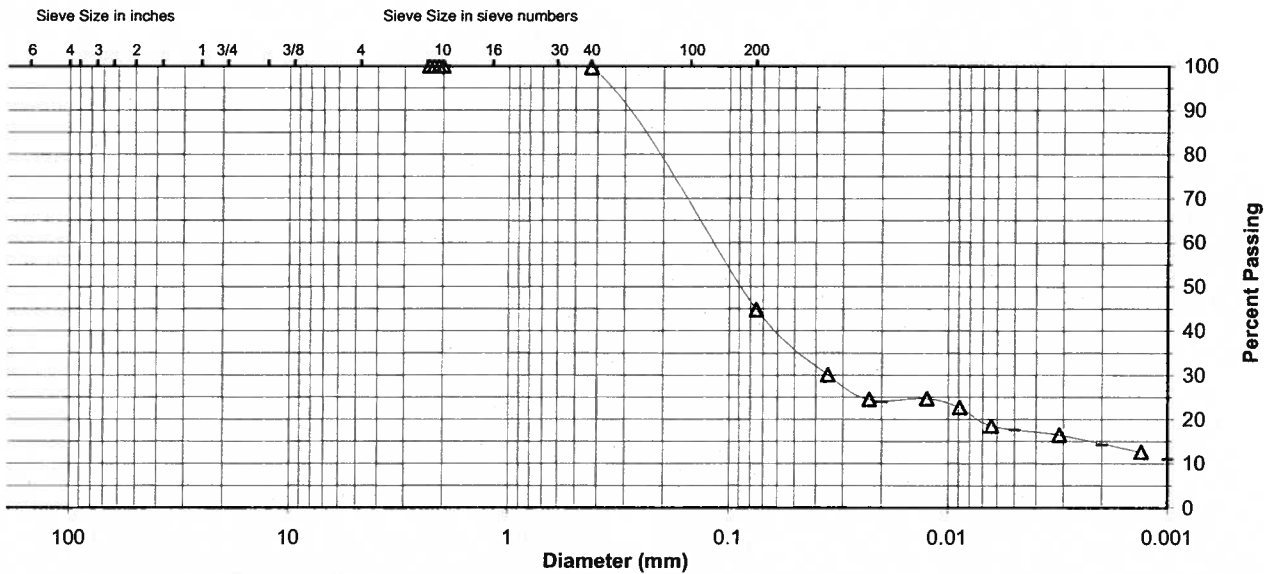
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	44.8
0.02 mm	24.0
0.005 mm	17.6
0.002 mm	14.3
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	54.8	27.2	17.6
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.4		54.8	30.5	14.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-64, 3.0'-4.5', 4.5'-6.0' Lab ID 623
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.5
No. 4	4.75	86.6
No. 10	2	70.9
No. 40	0.425	52.2
No. 200	0.075	27.8
	0.02	14.4
	0.005	11.4
	0.002	9.0
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	13.4	29.1
Coarse Sand	15.7	18.7
Medium Sand	18.7	---
Fine Sand	24.4	24.4
Silt	16.4	18.8
Clay	11.4	9.0

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-64, 3.0'-4.5', 4.5'-6.0'

Project Number 171468117
Lab ID 623

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: DRB
Test Date: 04-16-2009
Date Received: 04-14-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.5
No. 4	86.6
No. 10	70.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

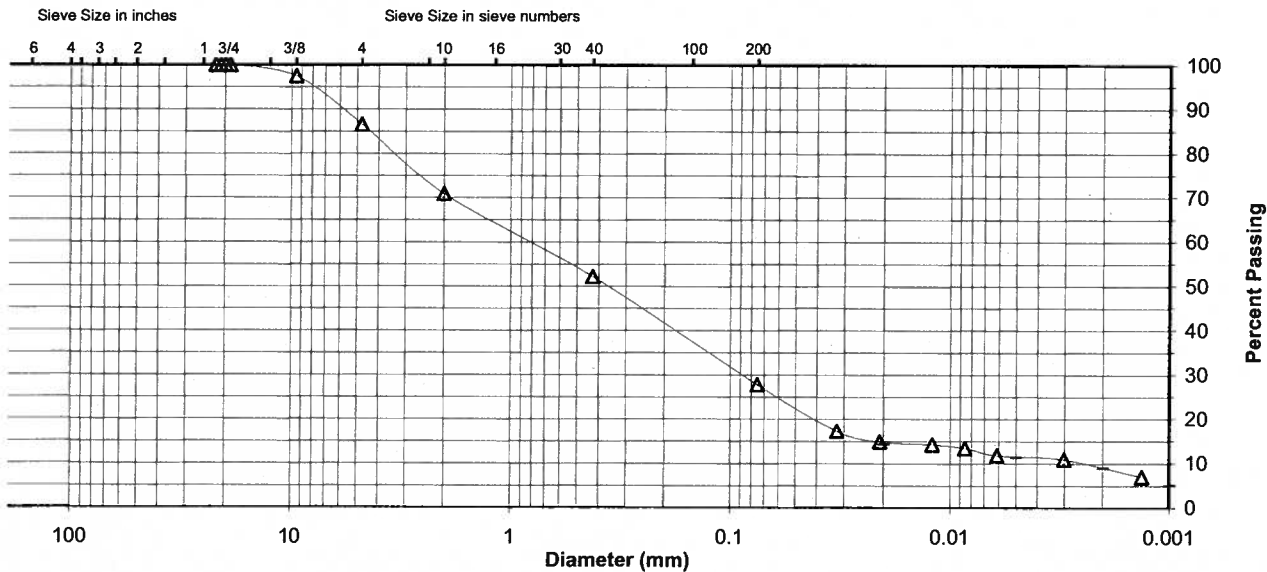
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	52.2
No. 200	27.8
0.02 mm	14.4
0.005 mm	11.4
0.002 mm	9.0
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	13.4	15.7	18.7	24.4	16.4	11.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	29.1		18.7		24.4	18.8		9.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-64, 9.0'-10.5', 10.5'-12.0' Lab ID 628
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 28
 Plastic Limit: 15
 Plasticity Index: 13
 Activity Index: 0.57

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.4
No. 4	4.75	99.0
No. 10	2	98.3
No. 40	0.425	96.8
No. 200	0.075	64.4
	0.02	39.3
	0.005	28.1
	0.002	23.3
estimated	0.001	20.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.0	1.7
Coarse Sand	0.7	1.5
Medium Sand	1.5	---
Fine Sand	32.4	32.4
Silt	36.3	41.1
Clay	28.1	23.3

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL

Group Name: Sandy lean clay

AASHTO Classification: A-6 (6)

Comments: _____



Particle-Size Analysis of Soils
ASTM D 422

Project Name Kingston Ash Pond
Source STN-64, 9.0'-10.5', 10.5'-12.0'

Project Number 171468117
Lab ID 628

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: DRB
Test Date: 04-16-2009
Date Received: 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.4
No. 4	99.0
No. 10	98.3

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

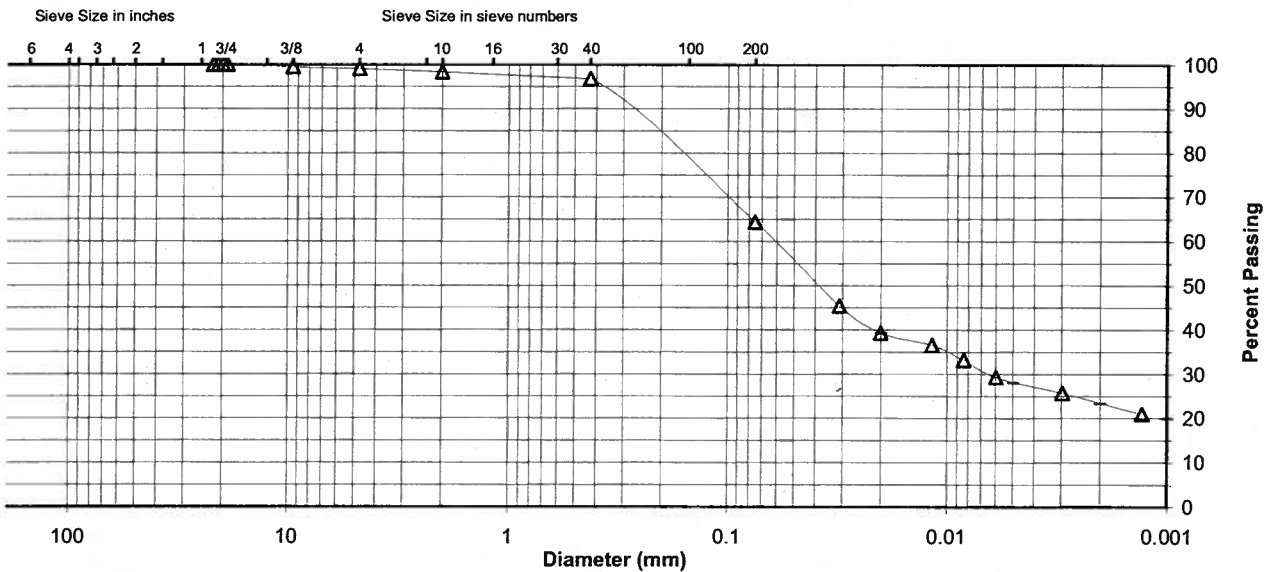
Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	96.8
No. 200	64.4
0.02 mm	39.3
0.005 mm	28.1
0.002 mm	23.3
0.001 mm	20.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	1.0	0.7	1.5	32.4	36.3	28.1	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	1.7		1.5		32.4	41.1		23.3



Comments _____

Reviewed By _____

Client: Stantec Consulting Services
 Project: Kingston Ash Pond
 Location: Roane, TN

Project No: GTX-9015

Boring ID: STN-64

Sample Type: tube

Tested By: jbr

Sample ID: S #608B

Test Date: 05/17/09

Checked By: jdt

Depth: 20.6-21.1 ft

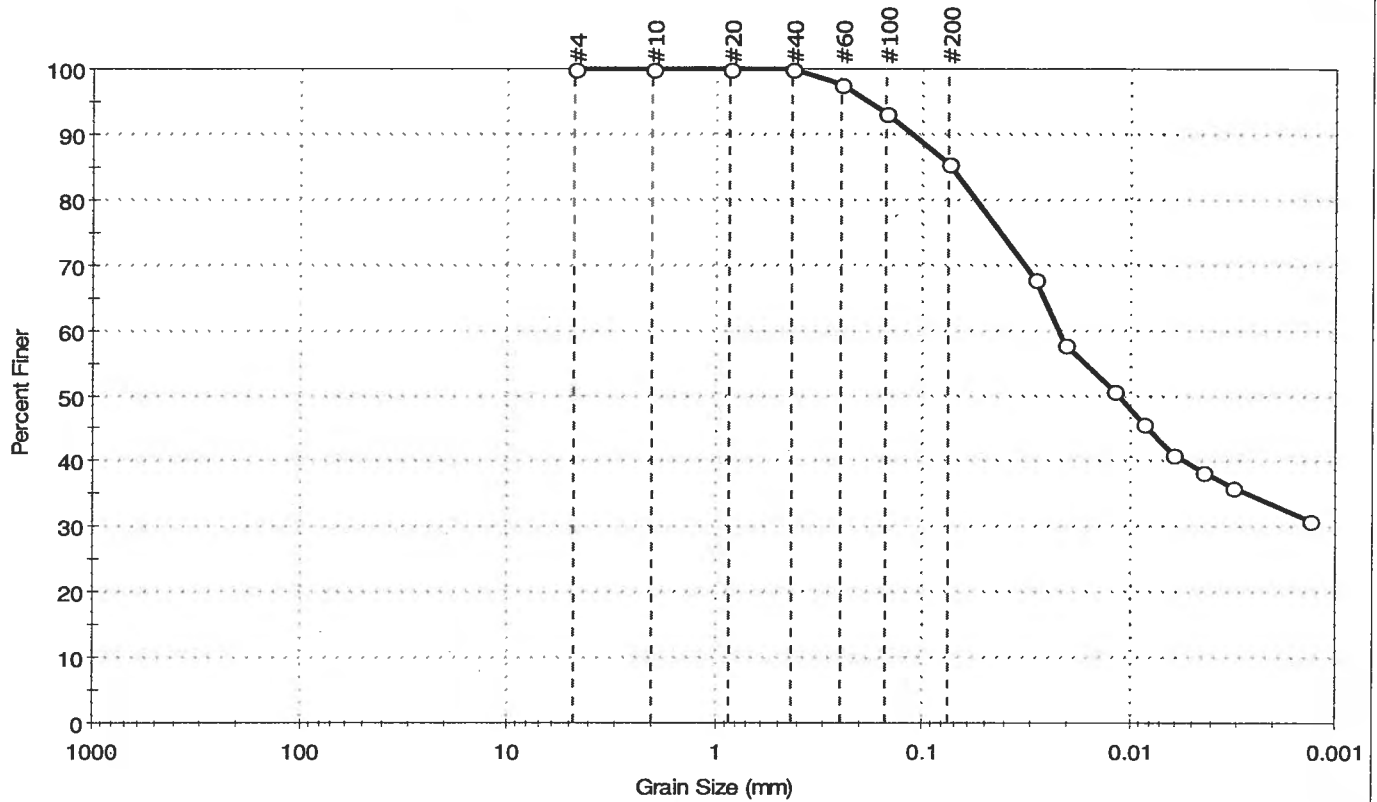
Test Id: 152224

Test Comment: ---

Sample Description: Moist, reddish yellow clay

Sample Comment: ---

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	14.6	85.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	98		
#100	0.15	93		
#200	0.075	85		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0291	68		
---	0.0206	58		
---	0.0121	51		
---	0.0087	46		
---	0.0062	41		
---	0.0044	38		
---	0.0031	36		
---	0.0013	31		

Coefficients

D ₈₅ = 0.0733 mm	D ₃₀ = N/A
D ₆₀ = 0.0221 mm	D ₁₅ = N/A
D ₅₀ = 0.0116 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

ASTM lean clay (CL)

AASHTO Clayey Soils (A-6 (16))

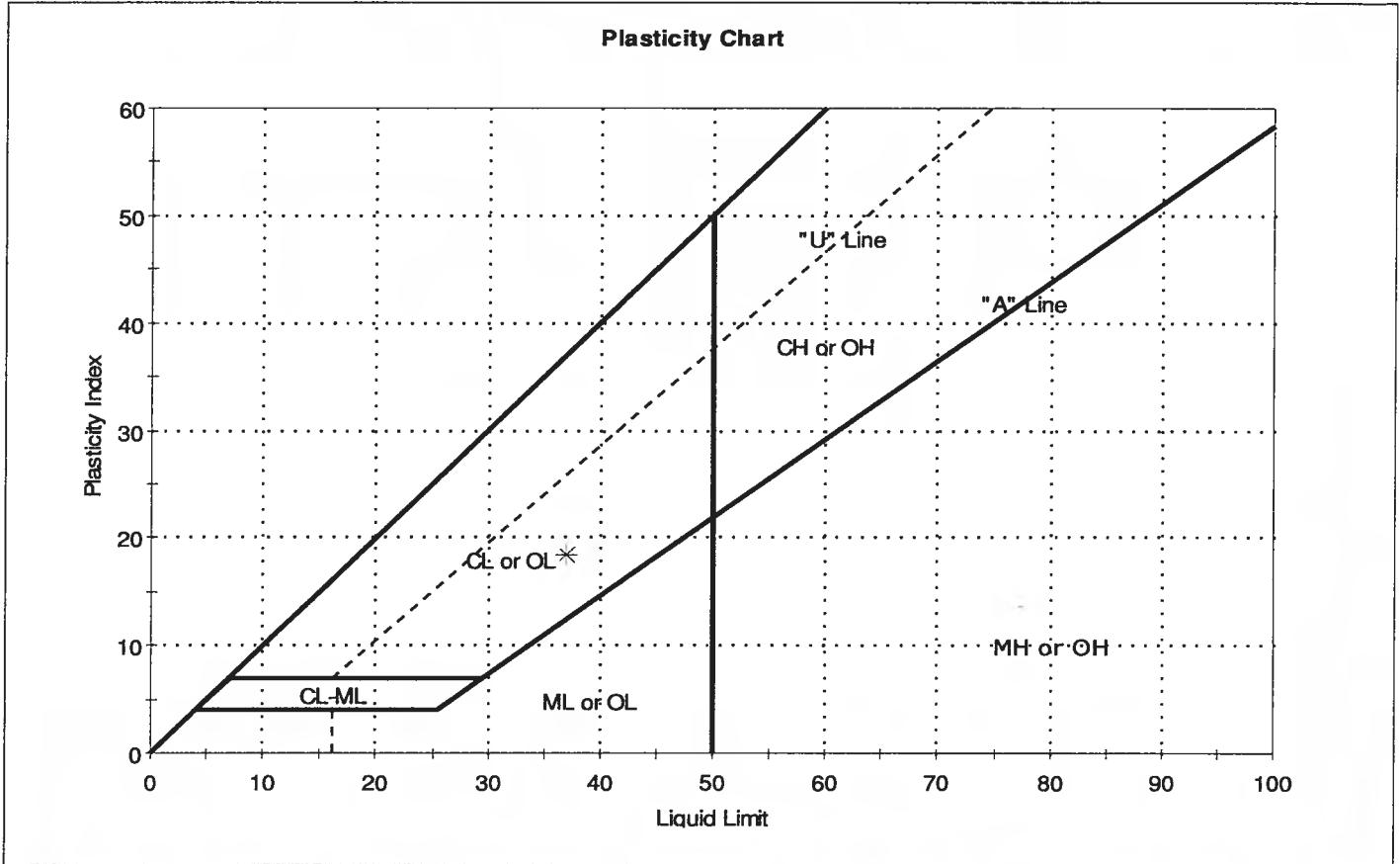
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client: Stantec Consulting Services	Project No: GTX-9015
Project: Kingston Ash Pond	Tested By: cam
Location: Roane, TN	Checked By: jdt
Boring ID: STN-64	Sample Type: tube
Sample ID: S #608B	Test Date: 05/14/09
Depth: 20.6-21.1 ft	Test Id: 152221
Test Comment: ---	
Sample Description: Moist, reddish yellow clay	
Sample Comment: ---	

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S #608B	STN-64	20.6-21.1 ft	27	37	19	18	0	lean clay (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-64, 39.0'-40.5', 40.5'-42.0' Lab ID 646
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	97.3
No. 200	0.075	35.1
	0.02	17.0
	0.005	9.7
	0.002	7.5
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	2.7
Medium Sand	2.7	---
Fine Sand	62.2	62.2
Silt	25.4	27.6
Clay	9.7	7.5

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.65

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-64, 39.0'-40.5', 40.5'-42.0'

Project Number 171468117
Lab ID 646

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: DRB
Test Date: 04-16-2009
Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

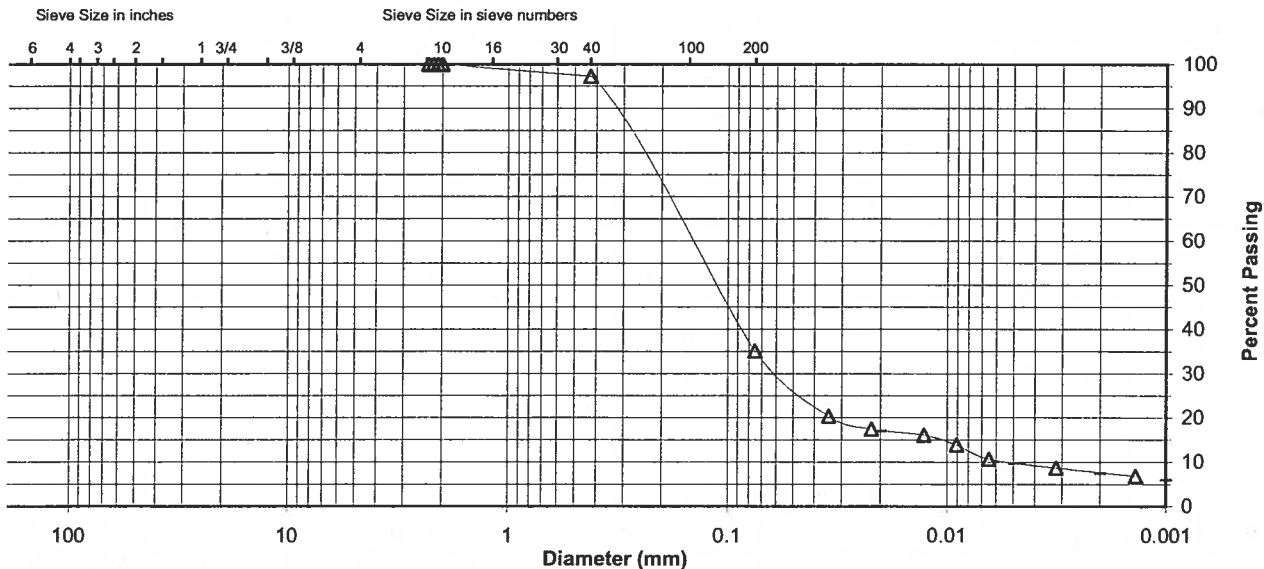
Specific Gravity 2.65

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.3
No. 200	35.1
0.02 mm	17.0
0.005 mm	9.7
0.002 mm	7.5
0.001 mm	6.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	2.7	62.2	25.4	9.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		2.7		62.2	27.6	7.5



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-65, 4.5'-6.0', 6.0'-7.5' Lab ID 695
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	92.1
No. 4	4.75	79.9
No. 10	2	63.5
No. 40	0.425	43.5
No. 200	0.075	21.7
	0.02	10.2
	0.005	5.0
	0.002	3.2
estimated	0.001	2.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	20.1	36.5
Coarse Sand	16.4	20.0
Medium Sand	20.0	---
Fine Sand	21.8	21.8
Silt	16.7	18.5
Clay	5.0	3.2

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.67

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand with gravel
 AASHTO Classification: A-1-b (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-65, 4.5'-6.0', 6.0'-7.5'

Project Number 171468117
 Lab ID 695

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: Angular
 Particle Hardness: Hard and Durable
 Tested By: BWT
 Test Date: 04-20-2009
 Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	92.1
No. 4	79.9
No. 10	63.5

Maximum Particle size: 3/4" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

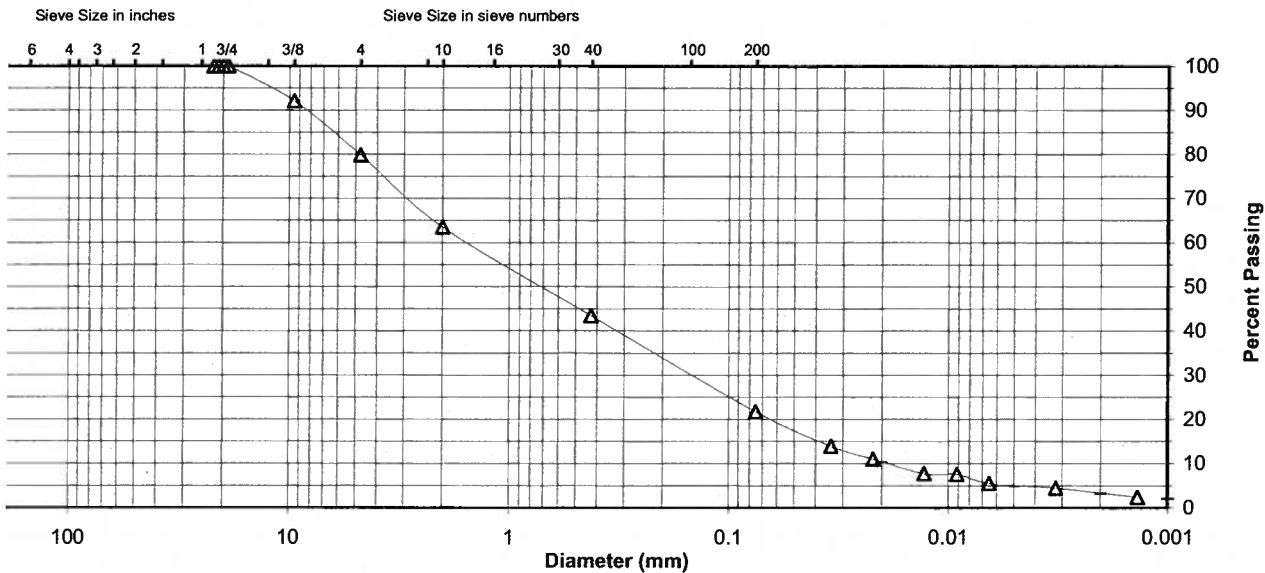
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	43.5
No. 200	21.7
0.02 mm	10.2
0.005 mm	5.0
0.002 mm	3.2
0.001 mm	2.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	20.1	16.4	20.0	21.8	16.7	5.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	36.5		20.0		21.8	3.2	



Comments _____

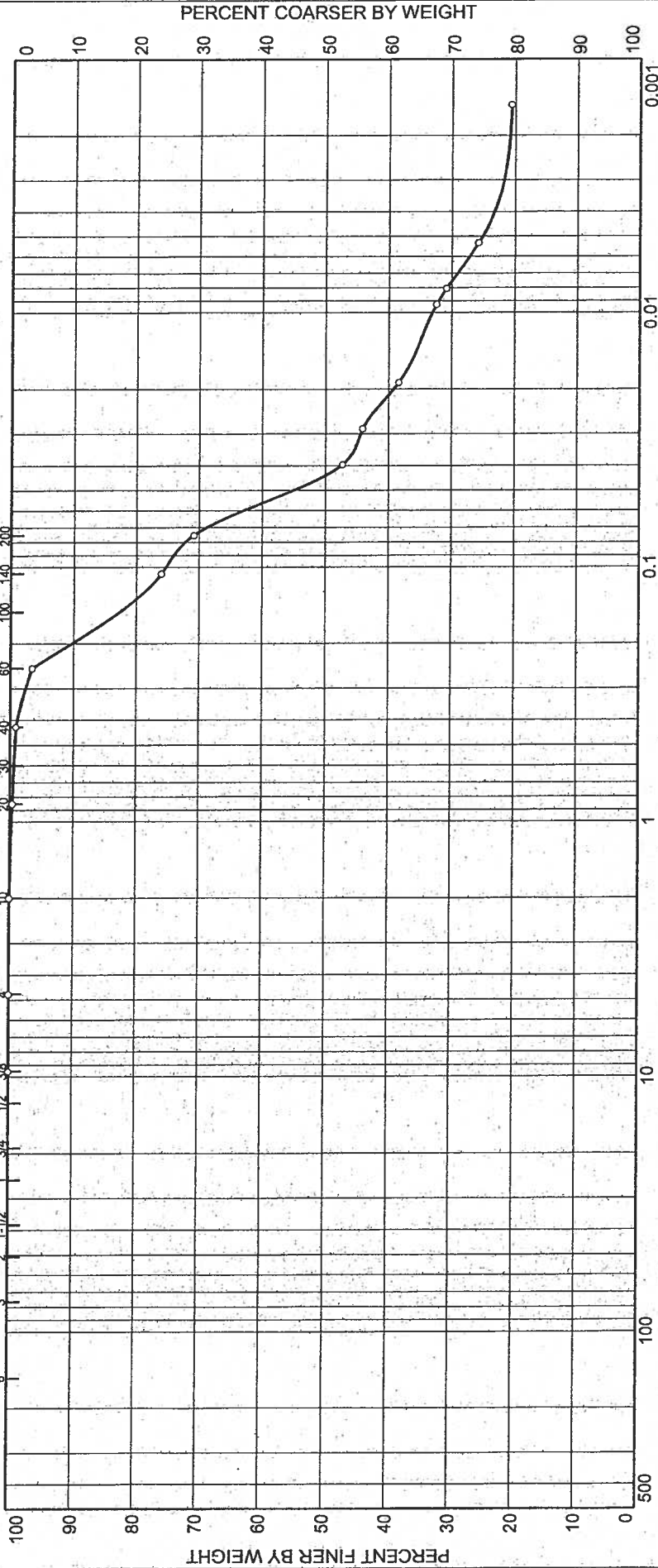
Reviewed By _____

Particle Size Distribution Report ASTM D422/ASTM D1140

U.S. SIEVE OPENING IN INCHES

U.S. STANDARD SIEVE NUMBERS

HYDROMETER



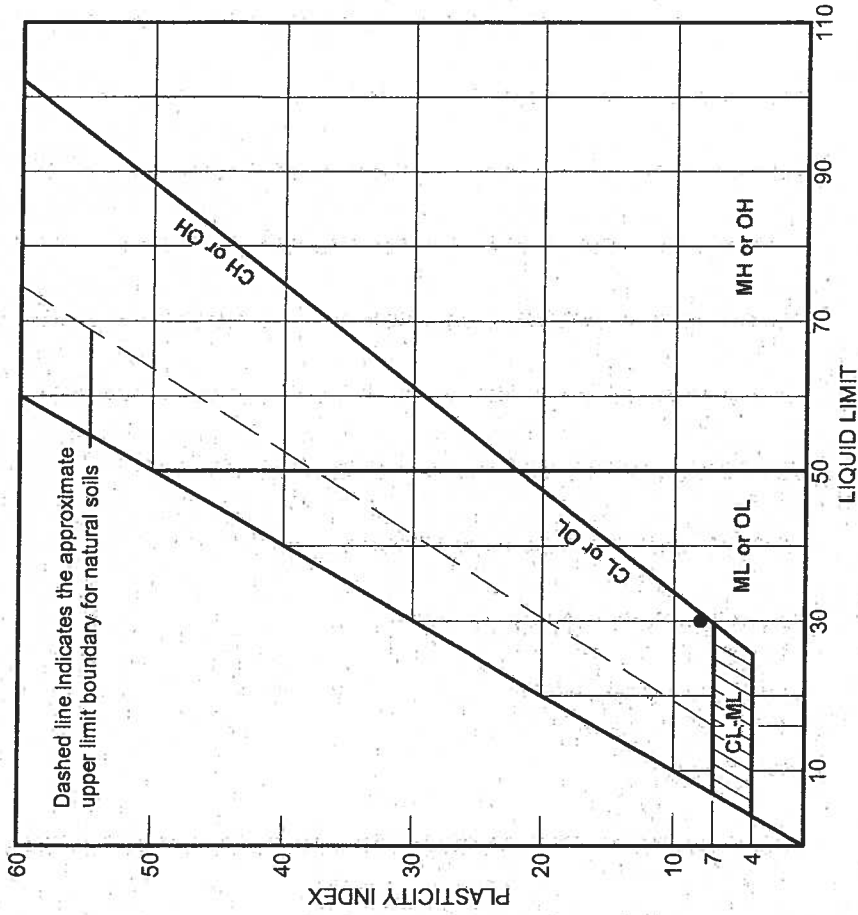
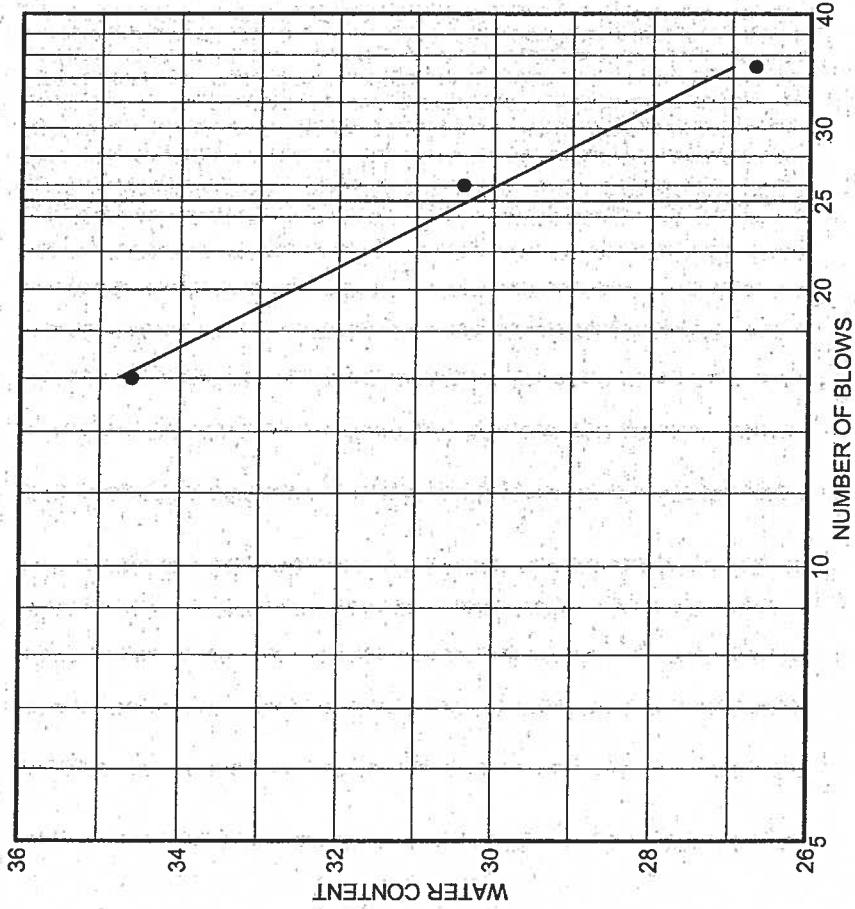
% COBBLES	0.0	% SAND	29.2
% SILT	45.7	% CLAY	25.1

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION
	STN-65	13.5-14 ft	May 09	CL	Gray Brown Lean clay with sand

Client STANTEC	
Project Kingston Ash Pond	
Project No. GTX-1464	Lab no.

GeoTesting Express Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	STN-65	13.5-14 ft	May 09	CL	Gray Brown Lean clay with sand		30	8

Client STANTEC
 Project Kingston Ash Pond
 Project No. GTX-1464 Lab no.

GeoTesting Express Inc.



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-65, 40.5'-42.0', 42.0'-43.5' Lab ID 718
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 30
 Plastic Limit: 19
 Plasticity Index: 11
 Activity Index: 0.48

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.8
No. 200	0.075	83.3
	0.02	57.0
	0.005	32.9
	0.002	22.7
estimated	0.001	19.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.1
Medium Sand	0.1	---
Fine Sand	16.5	16.5
Silt	50.4	60.6
Clay	32.9	22.7

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL
 Group Name: Lean clay with sand
 AASHTO Classification: A-6 (8)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-65, 40.5'-42.0', 42.0'-43.5'

Project Number 171468117
 Lab ID 718

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 04-17-2009
 Date Received 04-14-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

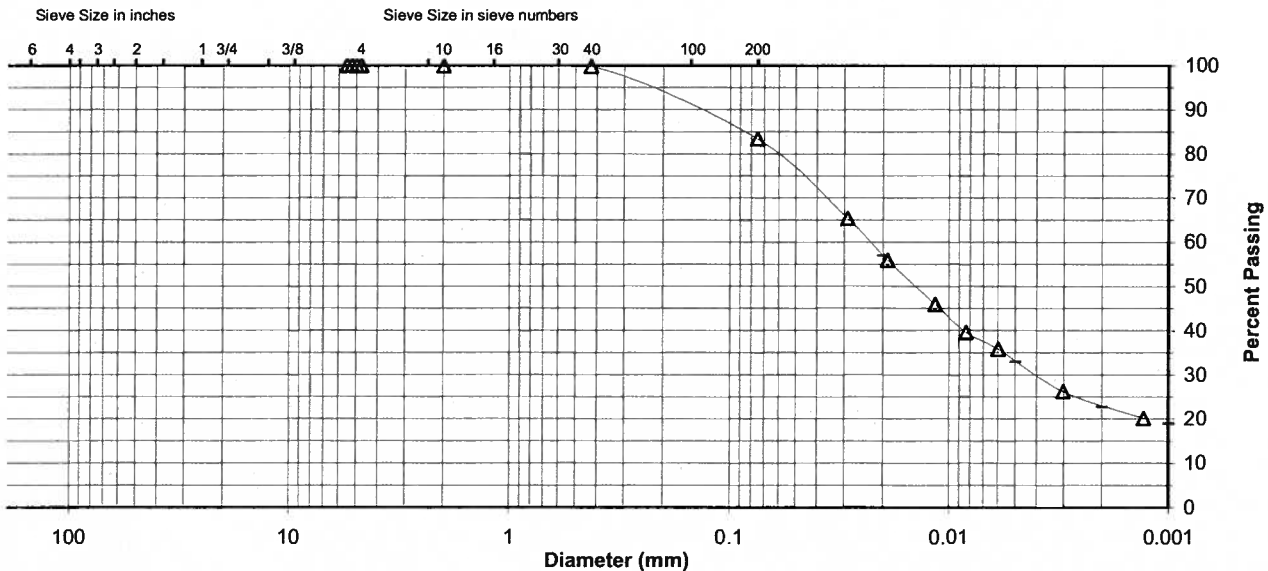
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.8
No. 200	83.3
0.02 mm	57.0
0.005 mm	32.9
0.002 mm	22.7
0.001 mm	19.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	0.1	16.5	50.4	32.9
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.1		0.1	16.5	60.6		22.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-65, 45.0'-46.5', 46.5'-48.0' Lab ID 722
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.5
No. 4	4.75	95.2
No. 10	2	92.6
No. 40	0.425	77.3
No. 200	0.075	31.8
	0.02	21.8
	0.005	13.2
	0.002	7.7
estimated	0.001	5.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	4.8	7.4
Coarse Sand	2.6	15.3
Medium Sand	15.3	---
Fine Sand	45.5	45.5
Silt	18.6	24.1
Clay	13.2	7.7

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.53

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-65, 45.0'-46.5', 46.5'-48.0'

Project Number 171468117
 Lab ID 722

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 04-20-2009
 Date Received 04-14-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.5
No. 4	95.2
No. 10	92.6

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

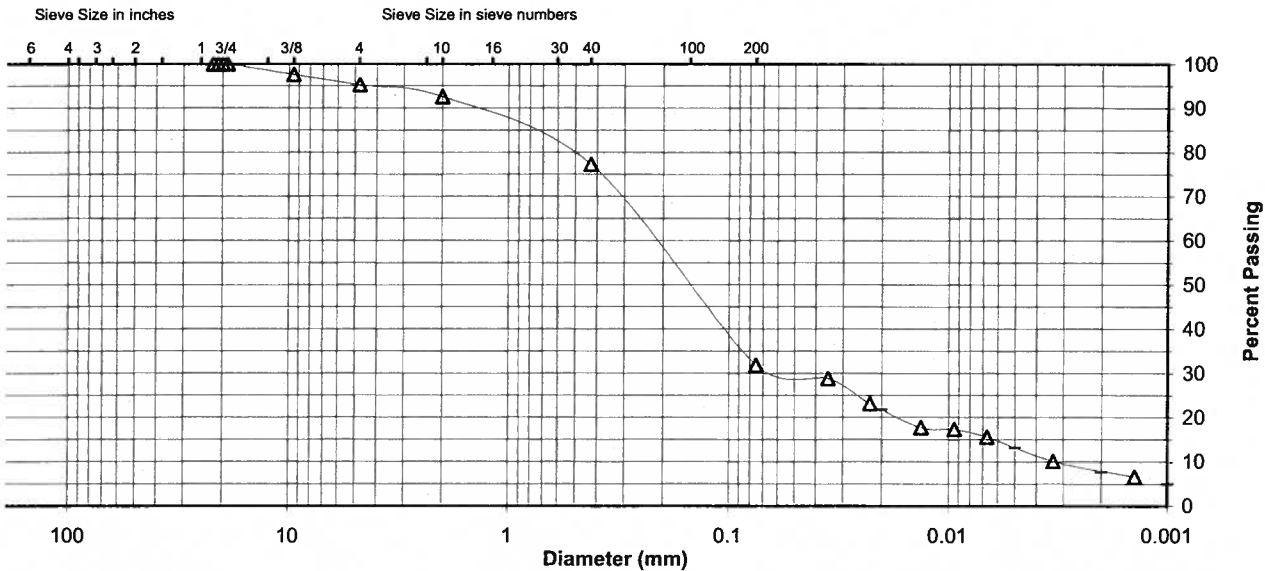
Specific Gravity 2.53

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	77.3
No. 200	31.8
0.02 mm	21.8
0.005 mm	13.2
0.002 mm	7.7
0.001 mm	5.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	4.8	2.6	15.3	45.5	18.6	13.2	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	7.4		15.3		45.5	24.1		7.7



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-66, 15.5'-17.0', 17.0'-18.5', 18.5'-20.0' Lab ID 735
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 26
 Plastic Limit: 18
 Plasticity Index: 8
 Activity Index: 2.00

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	96.4
3/8"	9.5	76.6
No. 4	4.75	61.2
No. 10	2	45.1
No. 40	0.425	24.4
No. 200	0.075	13.4
	0.02	9.7
	0.005	6.4
	0.002	4.3
estimated	0.001	4.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	38.8	54.9
Coarse Sand	16.1	20.7
Medium Sand	20.7	---
Fine Sand	11.0	11.0
Silt	7.0	9.1
Clay	6.4	4.3

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.77

Classification

Unified Group Symbol: SC
 Group Name: Clayey sand with gravel

AASHTO Classification: A-2-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-66, 15.5'-17.0', 17.0'-18.5', 18.5'-20.0'

Project Number 171468117
 Lab ID 735

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421
 Particle Shape: Angular
 Particle Hardness: Hard and Durable
 Tested By: BWT
 Test Date: 04-20-2009
 Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	96.4
3/8"	76.6
No. 4	61.2
No. 10	45.1

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

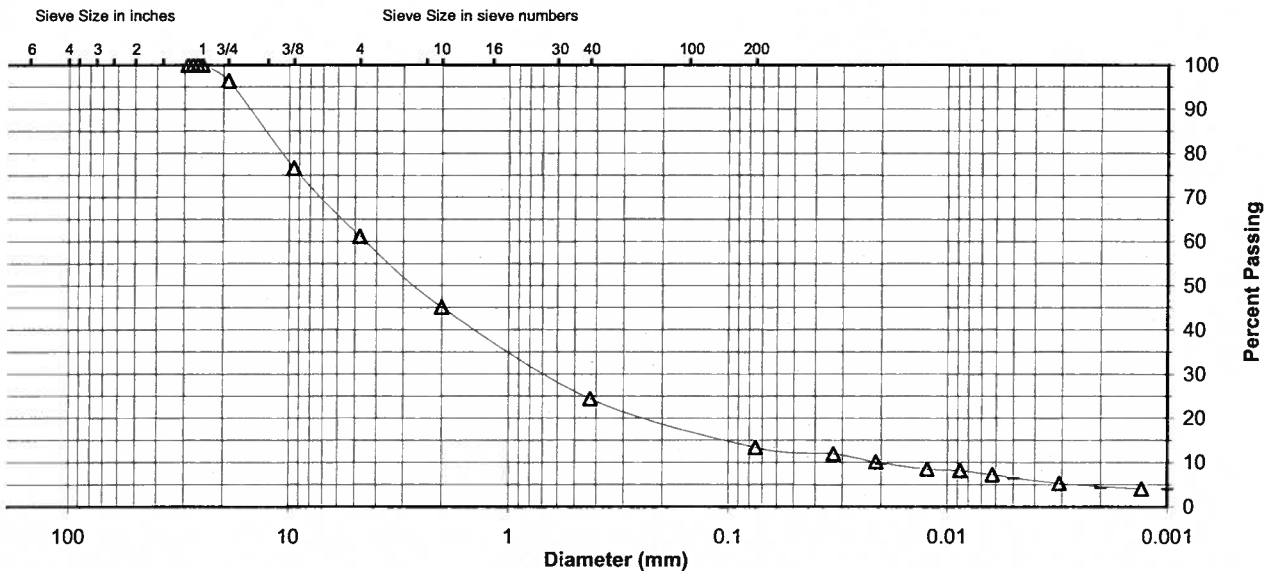
Specific Gravity 2.77

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	24.4
No. 200	13.4
0.02 mm	9.7
0.005 mm	6.4
0.002 mm	4.3
0.001 mm	4.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	3.6	35.2	16.1	20.7	11.0	7.0	6.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	54.9		20.7		11.0	9.1		4.3



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-66, 27.5'-29.0', 29.0'-30.5' Lab ID 744
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 21
 Plastic Limit: 19
 Plasticity Index: 2
 Activity Index: 0.15

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.6
No. 200	0.075	48.0
	0.02	24.3
	0.005	16.8
	0.002	12.8
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.4
Medium Sand	0.4	---
Fine Sand	51.6	51.6
Silt	31.2	35.2
Clay	16.8	12.8

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____

Project Name Kingston Ash Pond
 Source STN-66, 27.5'-29.0', 29.0'-30.5'

 Project Number 171468117
 Lab ID 744
Sieve analysis for the Portion Coarser than the No. 10 Sieve

 Test Method: ASTM D 422
 Prepared using: ASTM D 421

 Particle Shape: N/A
 Particle Hardness: N/A

 Tested By: BWT
 Test Date: 04-17-2009
 Date Received 04-14-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

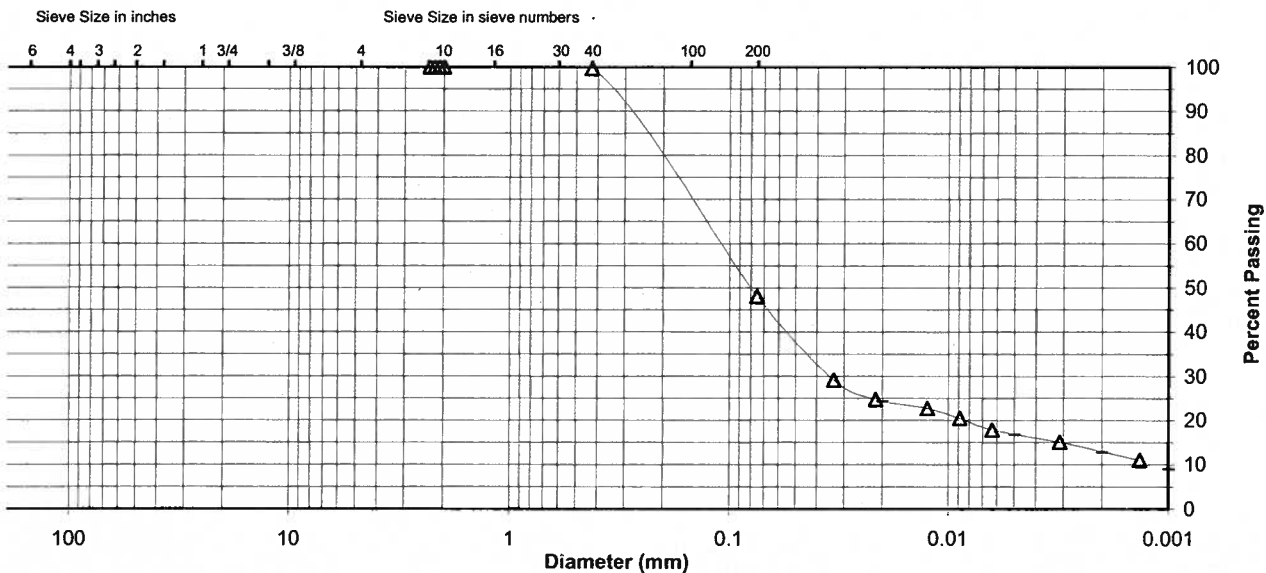
 Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.6
No. 200	48.0
0.02 mm	24.3
0.005 mm	16.8
0.002 mm	12.8
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.4	51.6	31.2	16.8
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.4		51.6	35.2	12.8



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-66, 39.0'-40.0', 40.0'-41.5' Lab ID 752
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.7
No. 200	0.075	54.9
	0.02	33.8
	0.005	18.7
	0.002	13.2
estimated	0.001	12.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM	AASHTO
	(%)	(%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.3
Medium Sand	0.3	---
Fine Sand	44.8	44.8
Silt	36.2	41.7
Clay	18.7	13.2

Moisture-Density Relationship
 Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.66

Classification
 Unified Group Symbol: ML
 Group Name: Sandy silt
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
Source STN-66, 39.0'-40.0', 40.0'-41.5'

Project Number 171468117
Lab ID 752

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421
Particle Shape: N/A
Particle Hardness: N/A
Tested By: BWT
Test Date: 04-21-2009
Date Received: 04-14-2009

Table with 2 columns: Sieve Size, % Passing. Rows include 3", 2", 1 1/2", 1", 3/4", 3/8", No. 4, No. 10.

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

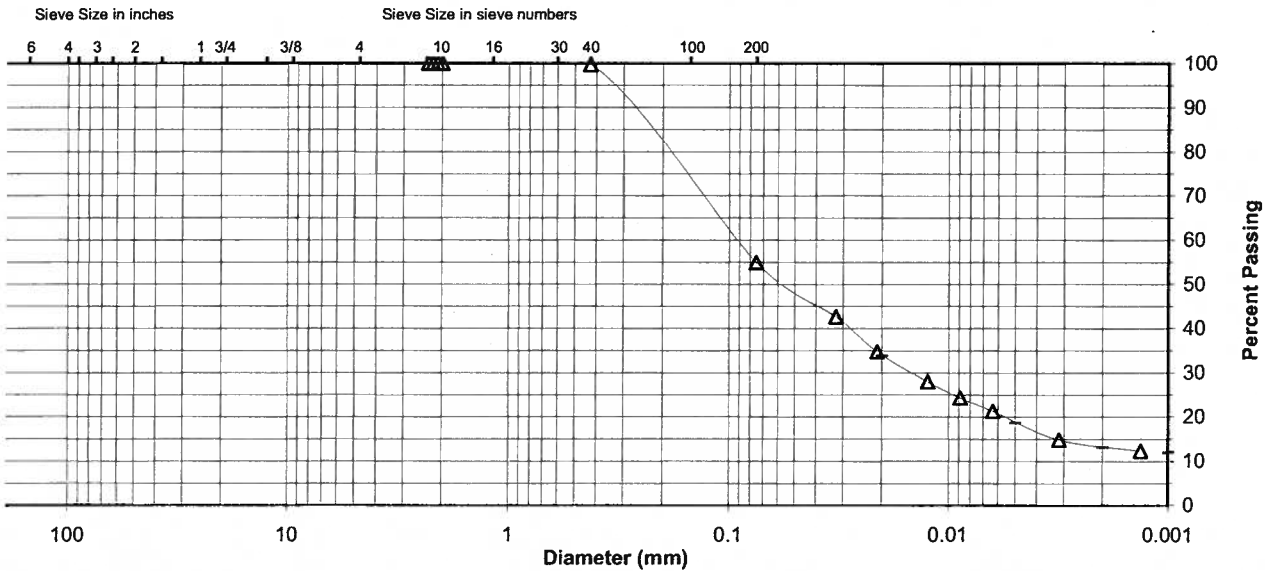
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

Table with 2 columns: Sieve Size, % Passing. Rows include No. 40, No. 200, 0.02 mm, 0.005 mm, 0.002 mm, 0.001 mm.

Particle Size Distribution

Table with 2 rows (ASTM, AASHTO) and 7 columns (Coarse Gravel, Fine Gravel, C. Sand, Medium Sand, Fine Sand, Silt, Clay).



Comments

Reviewed By



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 171468117
 Source STN-66, 50.5'-52.0', 52.0'-53.5' Lab ID 761
 County Roane (TN) Date Received 4-14-09
 Sample Type SPT Comp Date Reported 5-11-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.9
No. 4	4.75	99.9
No. 10	2	99.8
No. 40	0.425	98.4
No. 200	0.075	43.5
	0.02	29.6
	0.005	17.2
	0.002	10.6
estimated	0.001	7.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.1	0.2
Coarse Sand	0.1	1.4
Medium Sand	1.4	---
Fine Sand	54.9	54.9
Silt	26.3	32.9
Clay	17.2	10.6

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No.10
 Specific Gravity at 20° Celsius: 2.57

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-4 (0)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-66, 50.5'-52.0', 52.0'-53.5'

Project Number 171468117
 Lab ID 761

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: BWT
 Test Date: 04-21-2009
 Date Received 04-14-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.9
No. 4	99.9
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

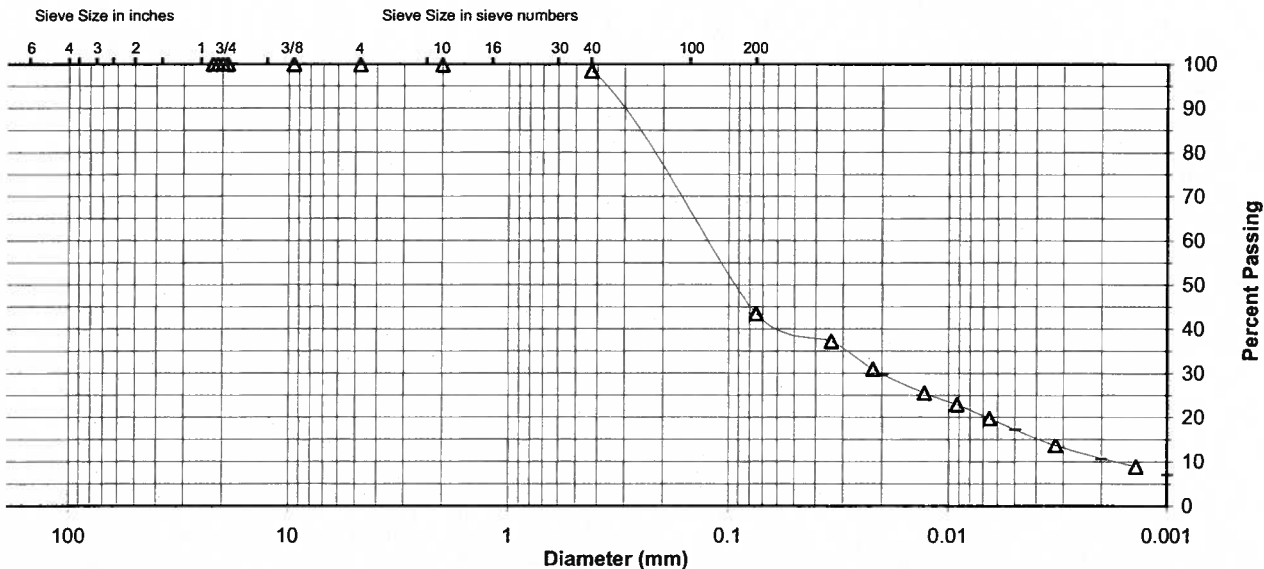
Specific Gravity 2.57

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.4
No. 200	43.5
0.02 mm	29.6
0.005 mm	17.2
0.002 mm	10.6
0.001 mm	7.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.1	0.1	1.4	54.9	26.3	17.2	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.2		1.4		54.9	32.9		10.6



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-69, 3.0'-4.5', 4.5'-6.0' Lab ID 478
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 44
 Plastic Limit: 26
 Plasticity Index: 18
 Activity Index: 1.38

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	95.4
3/4"	19	91.1
3/8"	9.5	78.3
No. 4	4.75	70.8
No. 10	2	53.8
No. 40	0.425	41.6
No. 200	0.075	31.8
	0.02	24.7
	0.005	17.2
	0.002	13.4
estimated	0.001	11.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	29.2	46.2
Coarse Sand	17.0	12.2
Medium Sand	12.2	---
Fine Sand	9.8	9.8
Silt	14.6	18.4
Clay	17.2	13.4

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.79

Classification

Unified Group Symbol: SC
 Group Name: Clayey sand with gravel
 AASHTO Classification: A-2-7 (1)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-69, 3.0'-4.5', 4.5'-6.0'

Project Number 175569042
 Lab ID 478

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: CP
 Test Date: 06-16-2009
 Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	95.4
3/4"	91.1
3/8"	78.3
No. 4	70.8
No. 10	53.8

Maximum Particle size: 1 1/2" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

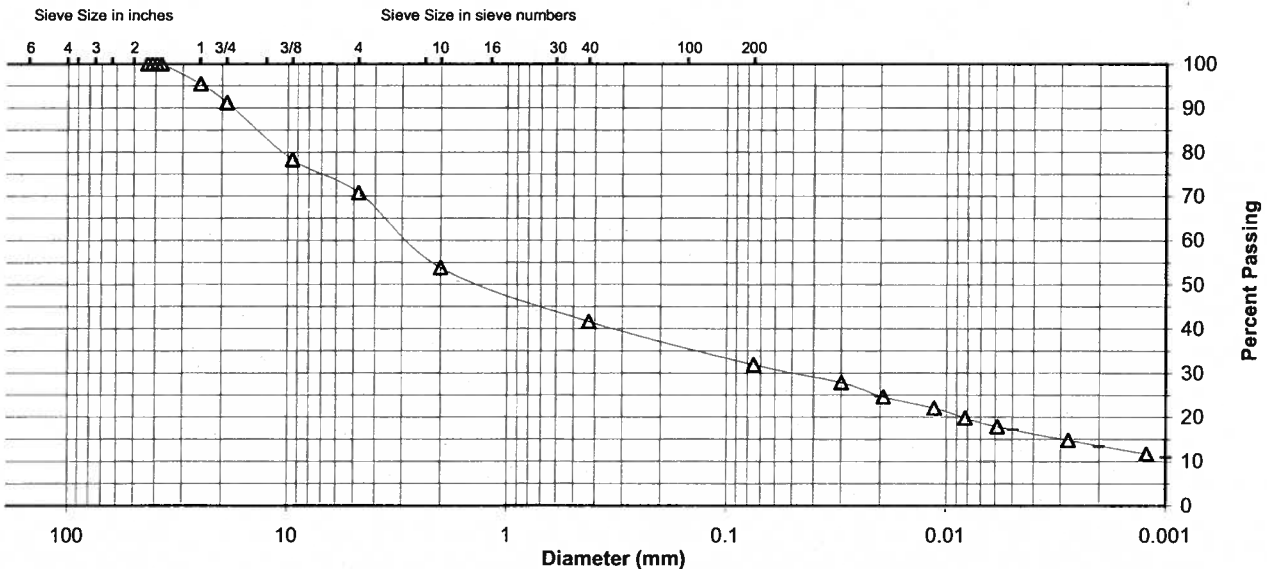
Specific Gravity 2.79

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	41.6
No. 200	31.8
0.02 mm	24.7
0.005 mm	17.2
0.002 mm	13.4
0.001 mm	11.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	8.9	20.3	17.0	12.2	9.8	14.6	17.2
AASHTO	Gravel		Coarse Sand		Fine Sand	Clay	
	46.2		12.2		9.8	13.4	



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-69, 15.0'-16.5', 16.5'-18.0' Lab ID 487
 County Kingston, Tennessee Date Received 5-26-09
 Sample Type SPT Comp Date Reported 6-24-09

Test Results

Natural Moisture Content
 Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits
 Test Method: ASTM D 4318 Method A
 Prepared: Dry

Liquid Limit: 29
 Plastic Limit: 16
 Plasticity Index: 13
 Activity Index: 0.46

Particle Size Analysis
 Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	98.0
3/8"	9.5	96.5
No. 4	4.75	95.9
No. 10	2	95.5
No. 40	0.425	94.9
No. 200	0.075	65.6
	0.02	42.6
	0.005	32.5
	0.002	28.4
estimated	0.001	25.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	4.1	4.5
Coarse Sand	0.4	0.6
Medium Sand	0.6	---
Fine Sand	29.3	29.3
Silt	33.1	37.2
Clay	32.5	28.4

Moisture-Density Relationship
 Test Not Performed

Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio
 Test Not Performed

Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity
 Test Method: ASTM D 854
 Prepared: Dry

Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.68

Classification
 Unified Group Symbol: CL
 Group Name: Sandy lean clay

AASHTO Classification: A-6 (6)

Comments: _____



Particle-Size Analysis of Soils

ASTM D 422

Project Name Kingston Ash Pond
 Source STN-69, 15.0'-16.5', 16.5'-18.0'

Project Number 175569042
 Lab ID 487

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
 Prepared using: ASTM D 421

Particle Shape: Angular
 Particle Hardness: Hard and Durable

Tested By: CSM
 Test Date: 06-16-2009
 Date Received 05-26-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	98.0
3/8"	96.5
No. 4	95.9
No. 10	95.5

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

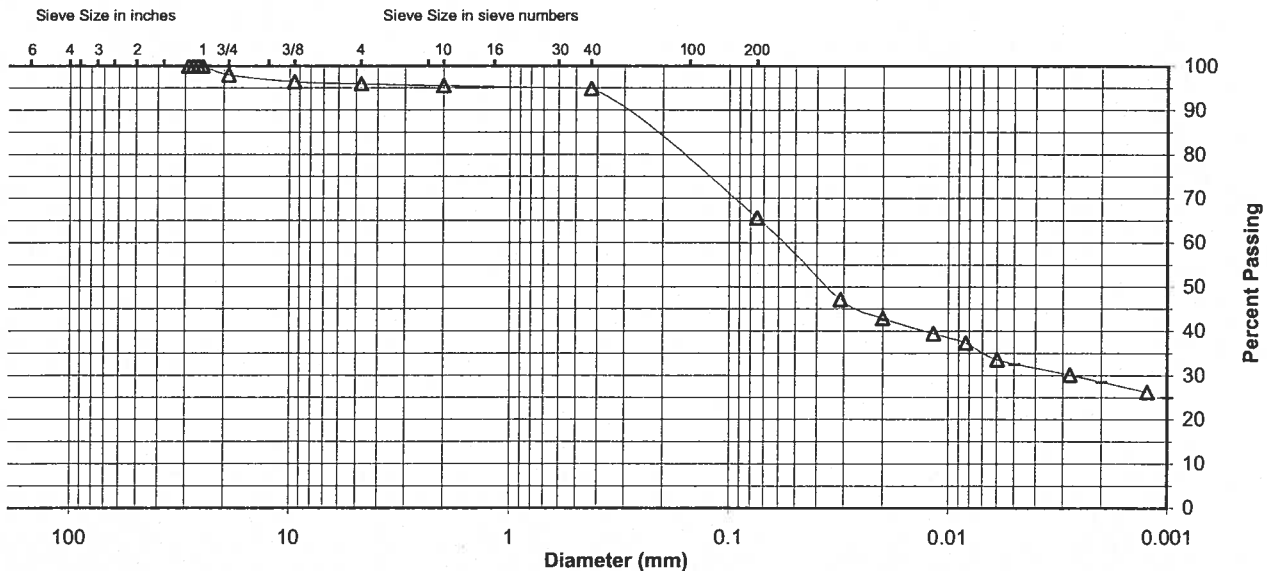
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.9
No. 200	65.6
0.02 mm	42.6
0.005 mm	32.5
0.002 mm	28.4
0.001 mm	25.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	2.0	2.1	0.4	0.6	29.3	33.1	32.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	4.5		0.6		29.3	37.2	28.4



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-71, 4.5'-6.0', 6.0'-7.5' Lab ID 207
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: 36
 Plastic Limit: 20
 Plasticity Index: 16
 Activity Index: 1.14

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	98.3
3/8"	9.5	90.1
No. 4	4.75	80.2
No. 10	2	60.1
No. 40	0.425	46.8
No. 200	0.075	33.4
	0.02	24.1
	0.005	17.2
	0.002	14.0
estimated	0.001	12.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	19.8	39.9
Coarse Sand	20.1	13.3
Medium Sand	13.3	---
Fine Sand	13.4	13.4
Silt	16.2	19.4
Clay	17.2	14.0

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.75

Classification

Unified Group Symbol: SC
 Group Name: Clayey sand with gravel
 AASHTO Classification: A-2-6 (1)

Comments: _____



Project Name Kingston Ash Pond
Source STN-71, 4.5'-6.0', 6.0'-7.5'

Project Number 175569042
Lab ID 207

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CM
Test Date: 05-28-2009
Date Received 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	98.3
3/8"	90.1
No. 4	80.2
No. 10	60.1

Maximum Particle size: 1" Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

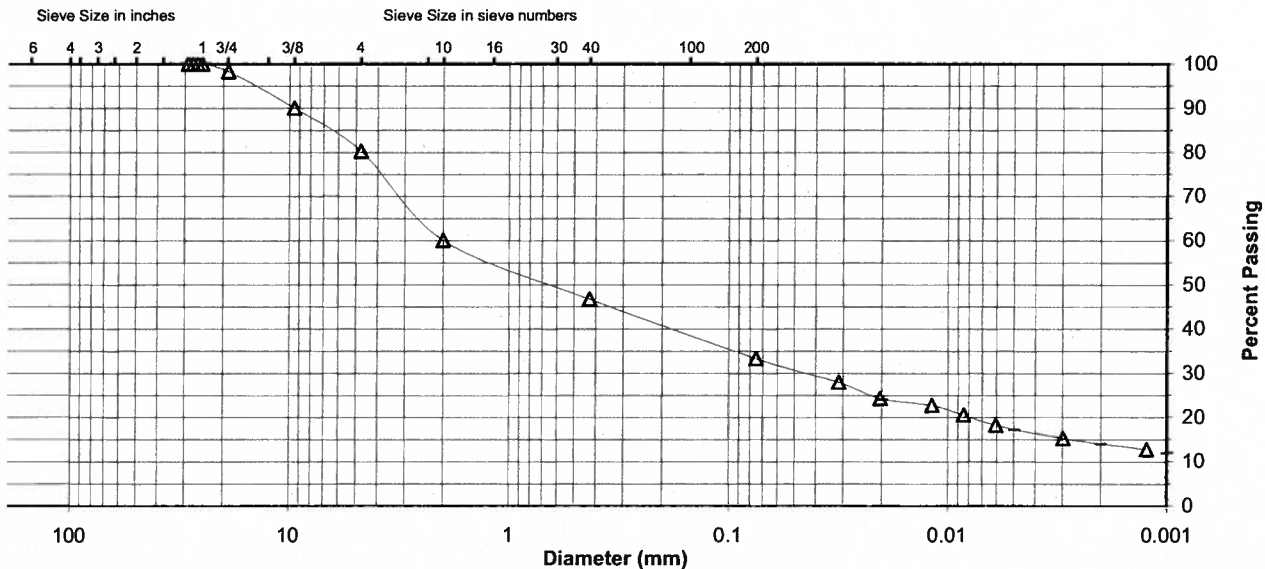
Specific Gravity 2.75

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	46.8
No. 200	33.4
0.02 mm	24.1
0.005 mm	17.2
0.002 mm	14.0
0.001 mm	12.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	1.7	18.1	20.1	13.3	13.4	16.2	17.2
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	39.9		13.3	13.4	19.4		14.0



Comments _____

Reviewed By _____



Summary of Soil Tests

Project Name Kingston Ash Pond Project Number 175569042
 Source STN-71, 22.5'-24.0', 24.0'-25.5' Lab ID 220
 County Kingston, Tennessee Date Received 5-22-09
 Sample Type SPT Comp Date Reported 6-5-09

Test Results

Natural Moisture Content

Test Not Performed
 Moisture Content (%): N/A

Atterberg Limits

Test Method: ASTM D 4318 Method A
 Prepared: Dry
 Liquid Limit: ---
 Plastic Limit: Non Plastic
 Plasticity Index: ---
 Activity Index: N/A

Particle Size Analysis

Preparation Method: ASTM D 421
 Gradation Method: ASTM D 422
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.1
No. 200	0.075	26.2
	0.02	15.0
	0.005	10.0
	0.002	8.0
estimated	0.001	6.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.9
Medium Sand	0.9	---
Fine Sand	72.9	72.9
Silt	16.2	18.2
Clay	10.0	8.0

Moisture-Density Relationship

Test Not Performed
 Maximum Dry Density (lb/ft³): N/A
 Maximum Dry Density (kg/m³): N/A
 Optimum Moisture Content (%): N/A
 Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
 Bearing Ratio (%): N/A
 Compacted Dry Density (lb/ft³): N/A
 Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
 Prepared: Dry
 Particle Size: No. 10
 Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: SM
 Group Name: Silty sand
 AASHTO Classification: A-2-4 (0)

Comments: _____



Project Name Kingston Ash Pond
Source STN-71, 22.5'-24.0', 24.0'-25.5'

Project Number 175569042
Lab ID 220

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: N/A
Particle Hardness: N/A

Tested By: CM
Test Date: 05-28-2009
Date Received: 05-22-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

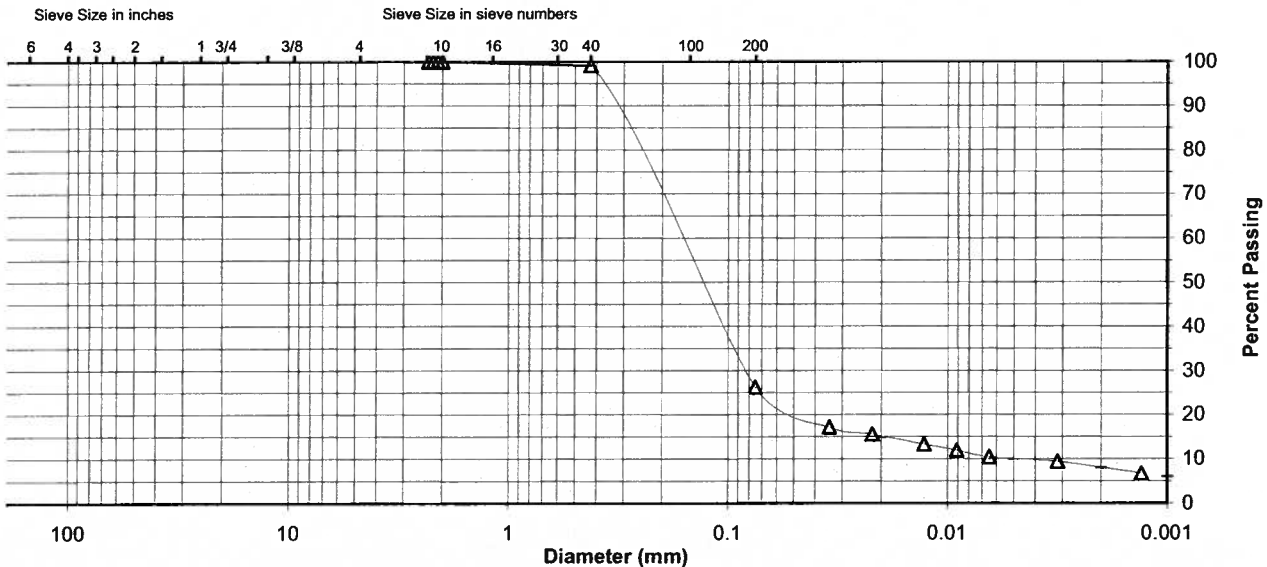
Specific Gravity 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.1
No. 200	26.2
0.02 mm	15.0
0.005 mm	10.0
0.002 mm	8.0
0.001 mm	6.0

Particle Size Distribution

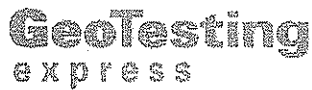
ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	0.9	72.9	16.2	10.0
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.0		0.9		72.9	18.2	8.0



Comments _____

Reviewed By _____

Direct Simple Shear Test Results



a subsidiary of Geocomp Corporation

**Consolidated Undrained Direct Simple Shear Test of Cohesive Soil
by ASTM D 6528**

Client: GeoTesting of Georgia GTX#: 9015
 Project Name: Kingston Ash Pond Test Date: 05/15/09
 Project Location: TN

Boring ID: ST-15D
 Sample ID: ST-5
 Depth, ft: 34-34.5 ft

Visual Description: Moist, yellowish brown clay with sand

Test Equipment: Top and bottom box (circular) = 2.62 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 5.39 in², soil height = 1 inch

Test Condition: inundated

Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

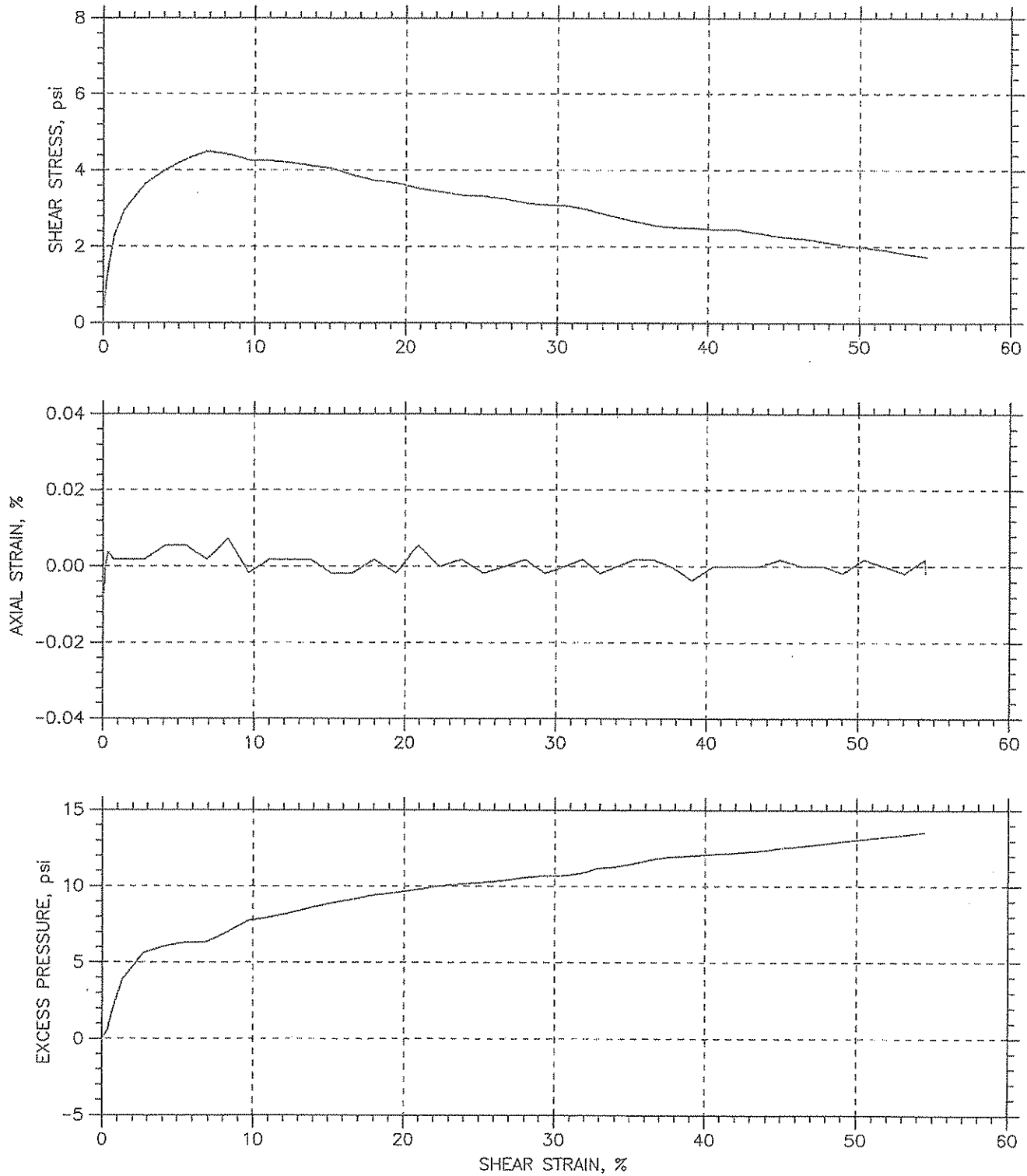
Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-4	DSS-5			
Initial Moisture Content, %	23.3	21.1			
Initial Dry Density, pcf	101	107			
Nominal Rate of Shear Strain, %/min	0.0008	0.0008			
Vertical Consolidation Stress, psi	15.0	15.0			
Final Moisture Content, %	24.7	21.5			
Measured Peak Shear Stress, psi	4.498	6.176			
Shear Strain at Peak Shear Stress, %	6.87	11.17			
Membrane Correction, psi	0.18	0.28			
Corrected Peak Shear Stress, psi	4.318	5.896			
S / σ'_{vc}	0.29	0.39			

Comments: Tested By: njh

Checked By: jdt

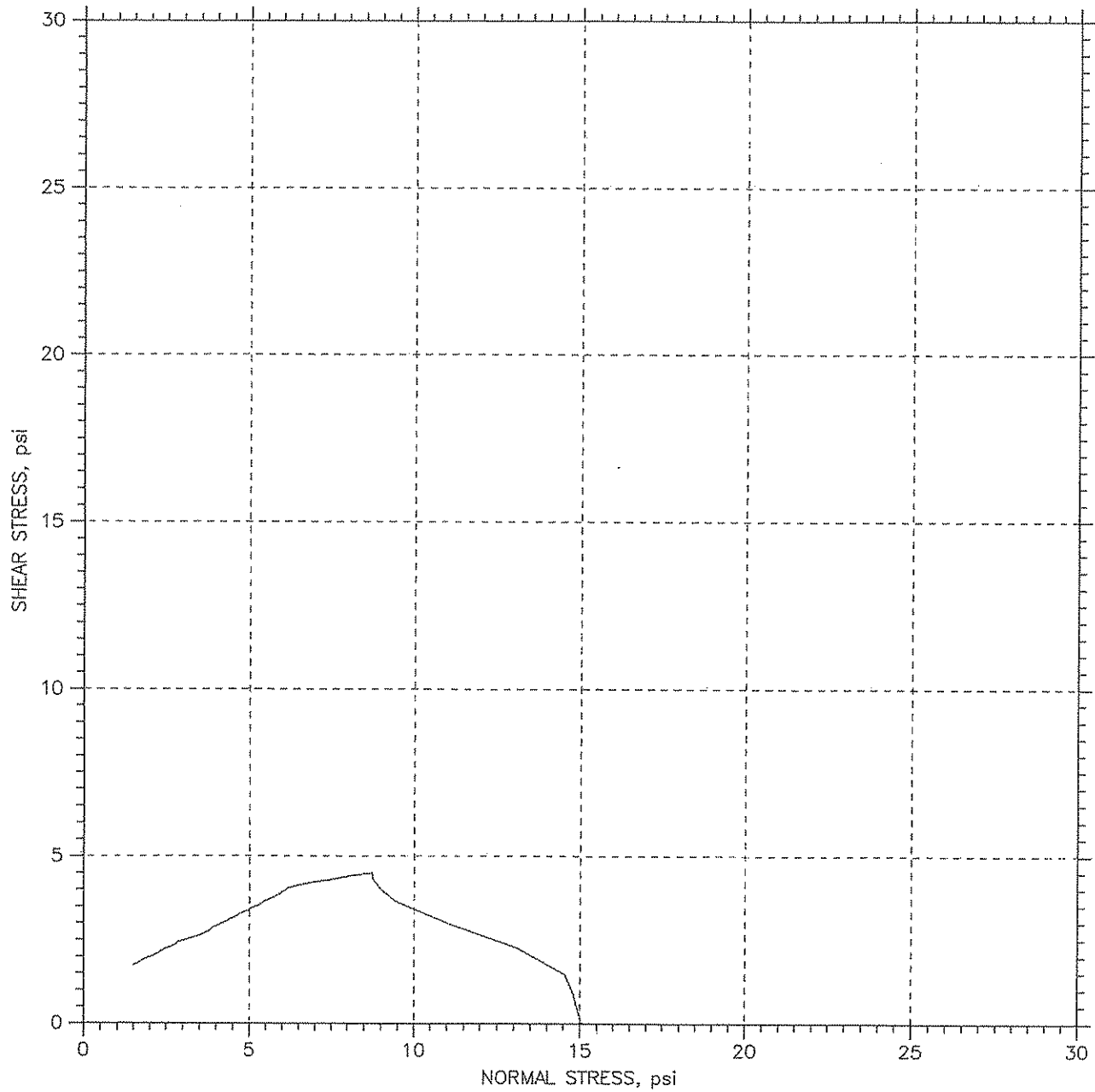
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DIRECT SIMPLE SHEAR TEST



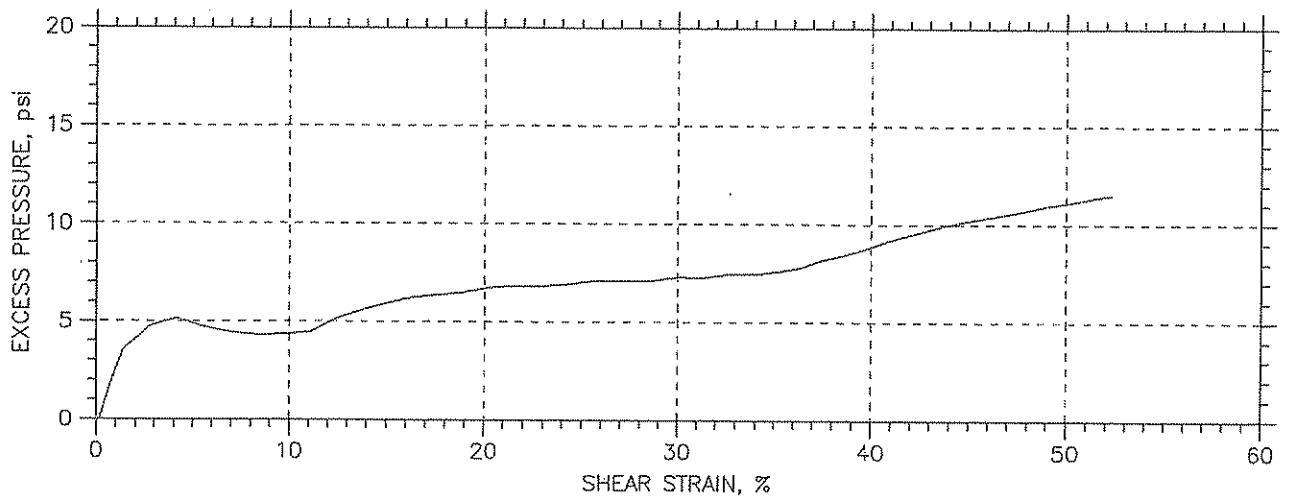
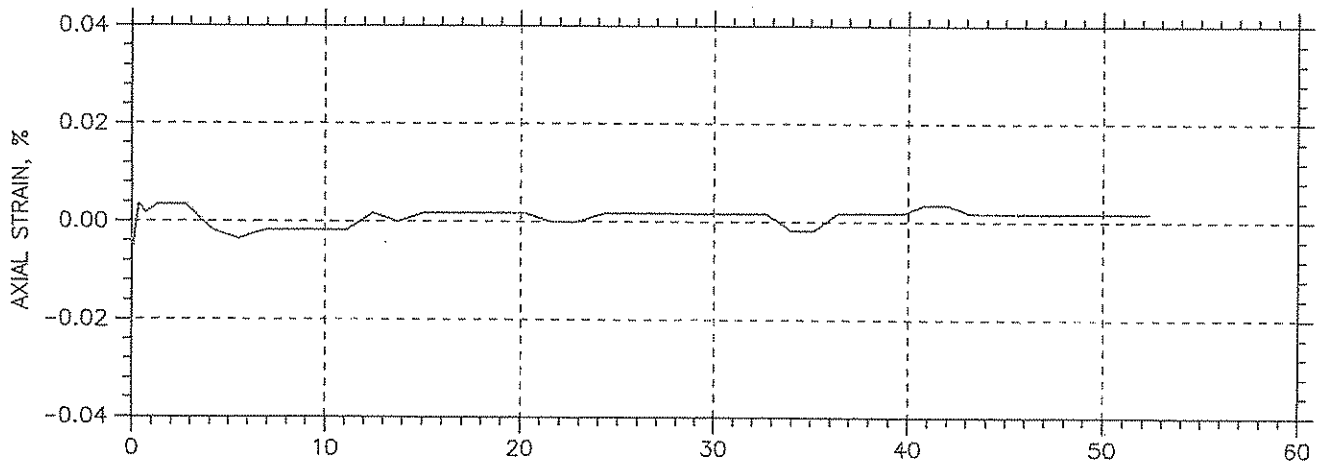
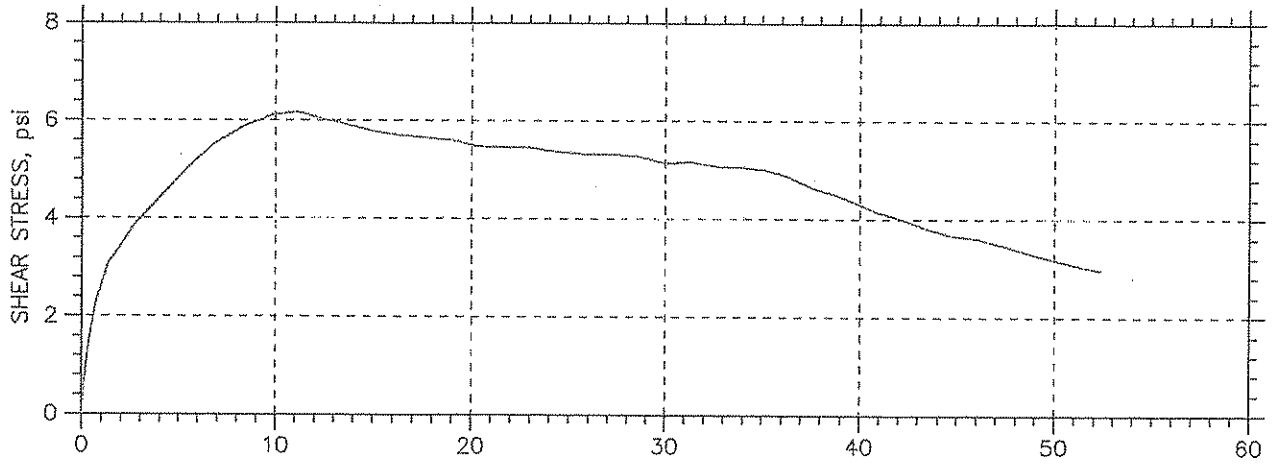
Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ST-15 D	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/15/09	Depth: 34-34.5
Test No.: DSS-4	Sample Type: core	Elevation: ---
Description: Moist, yellowish brown clay with sand		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-4n.dat		

DIRECT SIMPLE SHEAR TEST



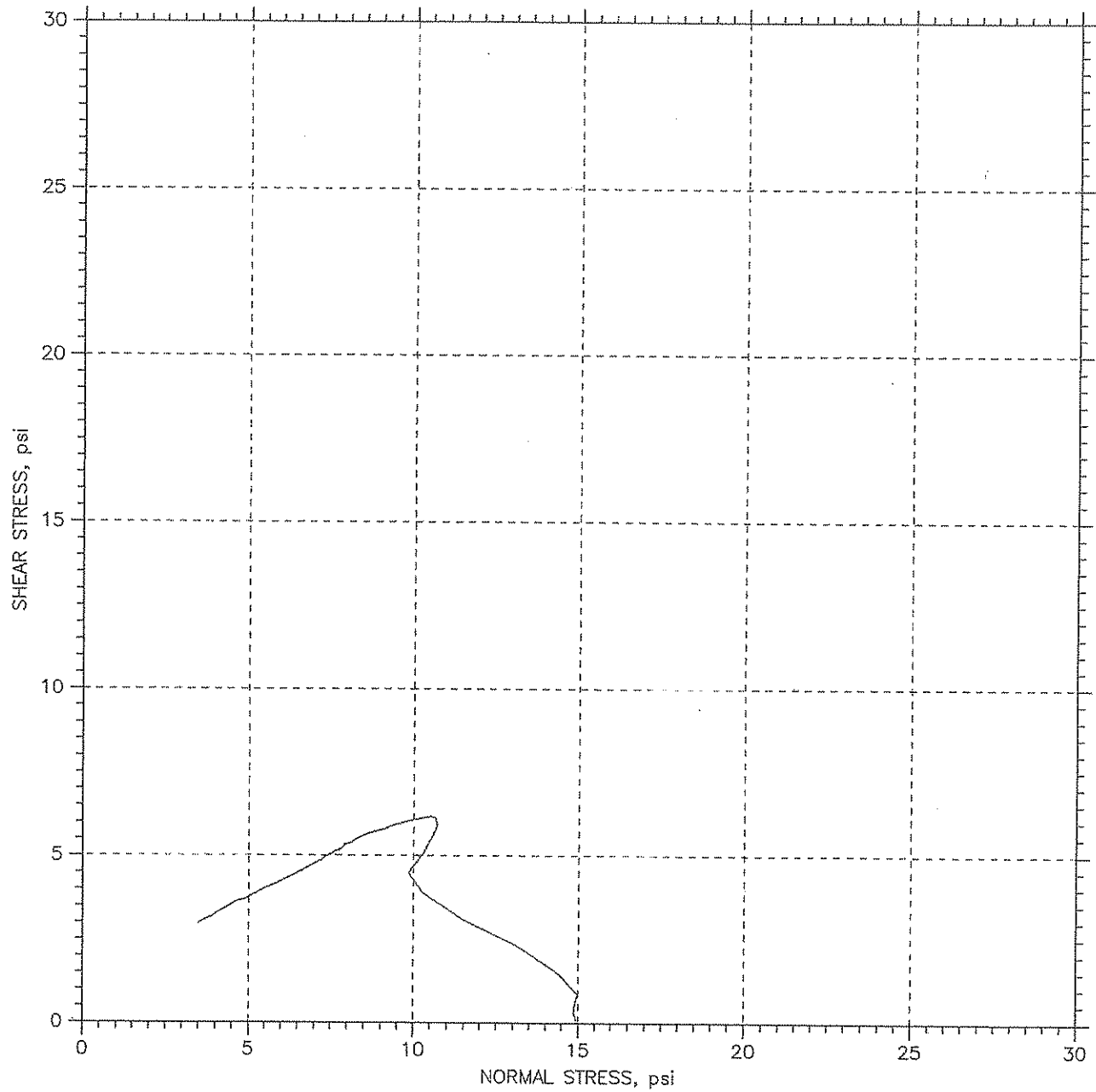
Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ST-15 D	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/15/09	Depth: 34-34.5
Test No.: DSS-4	Sample Type: core	Elevation: ---
Description: Moist, yellowish brown clay with sand		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-4n.dat		

DIRECT SIMPLE SHEAR TEST



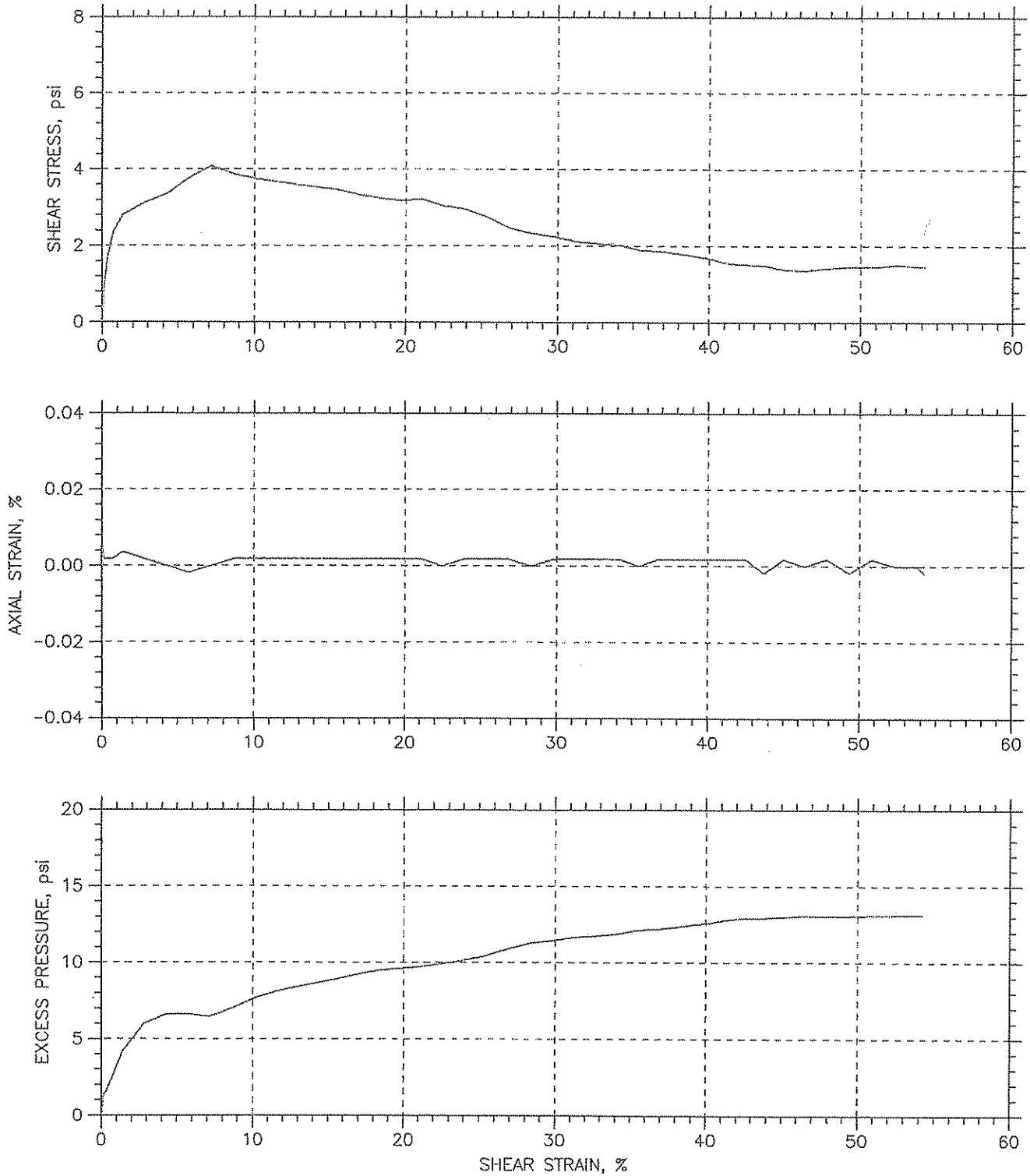
Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ST-15 D	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/17/09	Depth: 34.5-35 ft
Test No.: DSS-5	Sample Type: tube	Elevation: ---
Description: Moist, yellowish brown clay with sand		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-5n.dot		

DIRECT SIMPLE SHEAR TEST



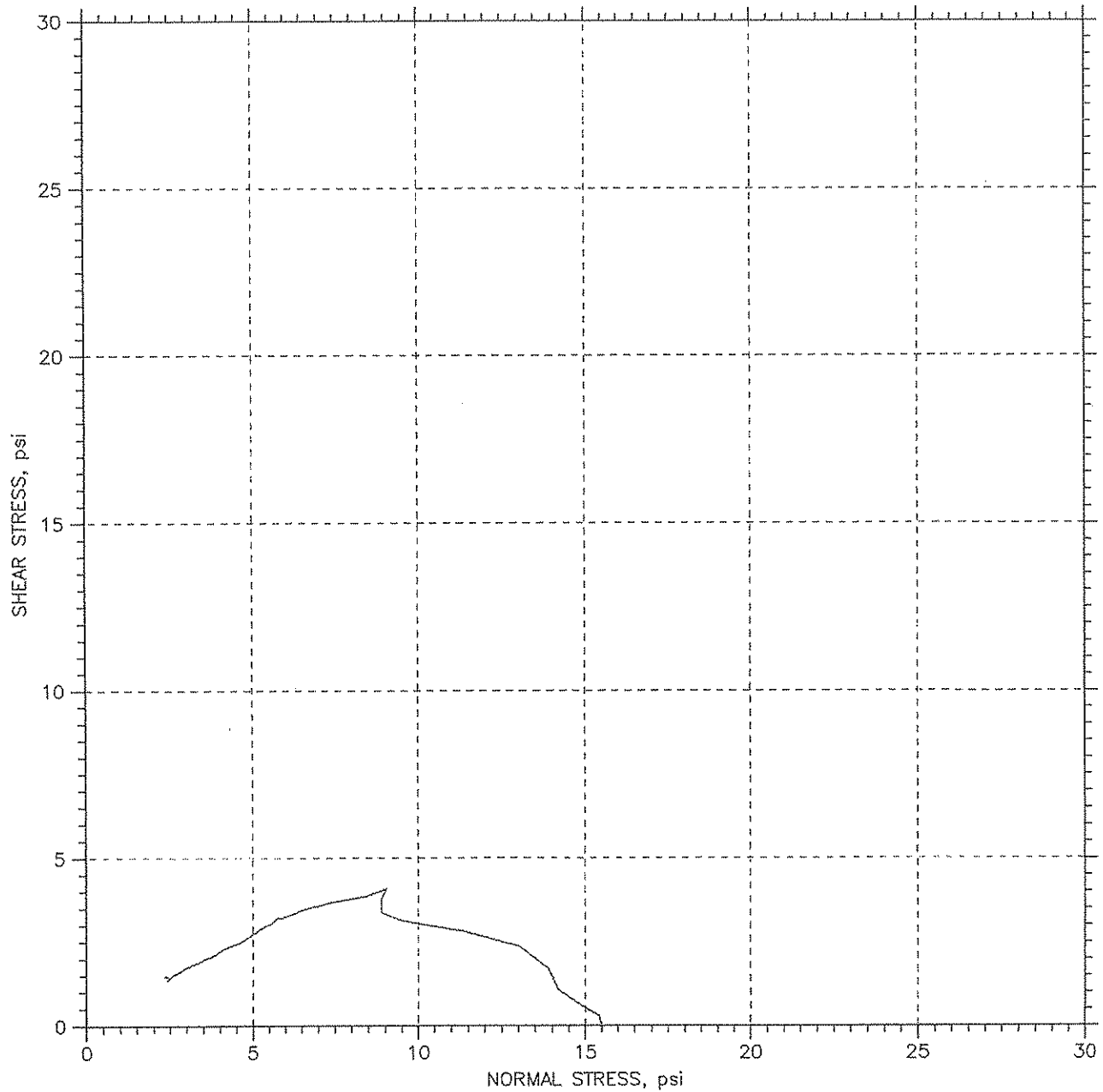
Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ST-15 D	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/17/09	Depth: 34.5-35 ft
Test No.: DSS-5	Sample Type: tube	Elevation: ---
Description: Moist, yellowish brown clay with sand		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-5n.dat		

DIRECT SIMPLE SHEAR TEST



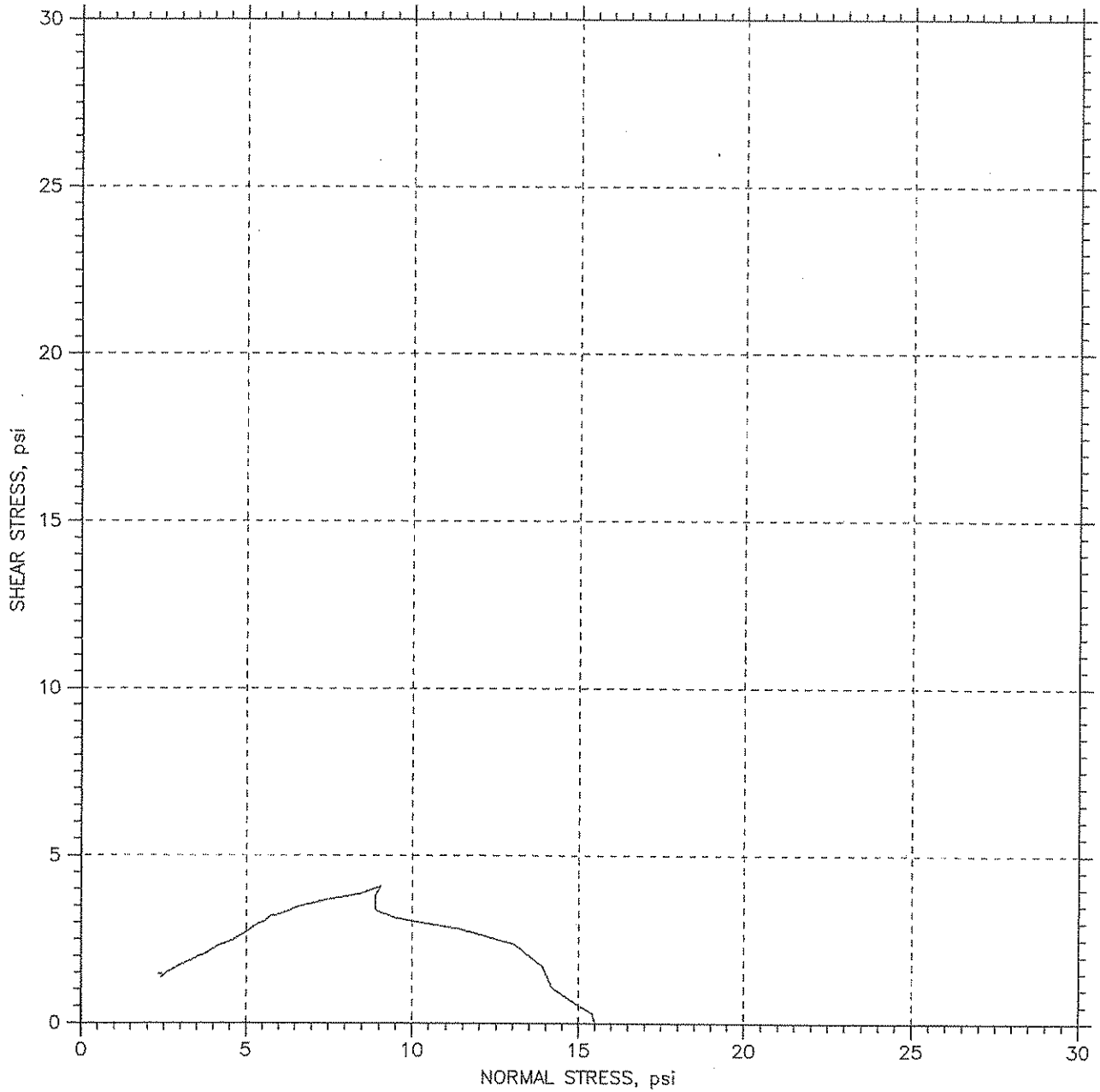
Project: Kingston Ash Pond	Location: Roone, TN	Project No.: GTX-9015
Boring No.: STN -27 B	Tested By: md	Checked By: jdt
Sample No.: ST-4	Test Date: 05/12/09	Depth: 33.2-33.8
Test No.: DSS-1	Sample Type: core	Elevation: ---
Description: Moist, olive gray sandy clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-1n.dat		

DIRECT SIMPLE SHEAR TEST



Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: STN -27 B	Tested By: md	Checked By: jdt
Sample No.: ST-4	Test Date: 05/12/09	Depth: 33.2-33.8
Test No.: DSS-1	Sample Type: core	Elevation: ---
Description: Moist, olive gray sandy clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-1n.dat		

DIRECT SIMPLE SHEAR TEST



Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: STN -27 B	Tested By: md	Checked By: jdt
Sample No.: ST-4	Test Date: 05/12/09	Depth: 33.2-33.8
Test No.: DSS-1	Sample Type: core	Elevation: ---
Description: Moist, olive gray sandy clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-1n.dat		

**Consolidated Undrained Direct Simple Shear Test of Cohesive Soil
by ASTM D 6528**

Client: GeoTesting of Georgia
Project Name: Kingston Ash Pond
Project Location: TN

GTX#: 9015
Test Date: 05/13/09

Boring ID: STN-27B
Sample ID: ST-5
Depth, ft: 35.2-35.8 ft

Visual Description: Moist, yellowish brown sandy silty clay

Test Equipment: Top and bottom box (circular) = 2.62 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 5.39 in², soil height = 1 inch

Test Condition: inundated

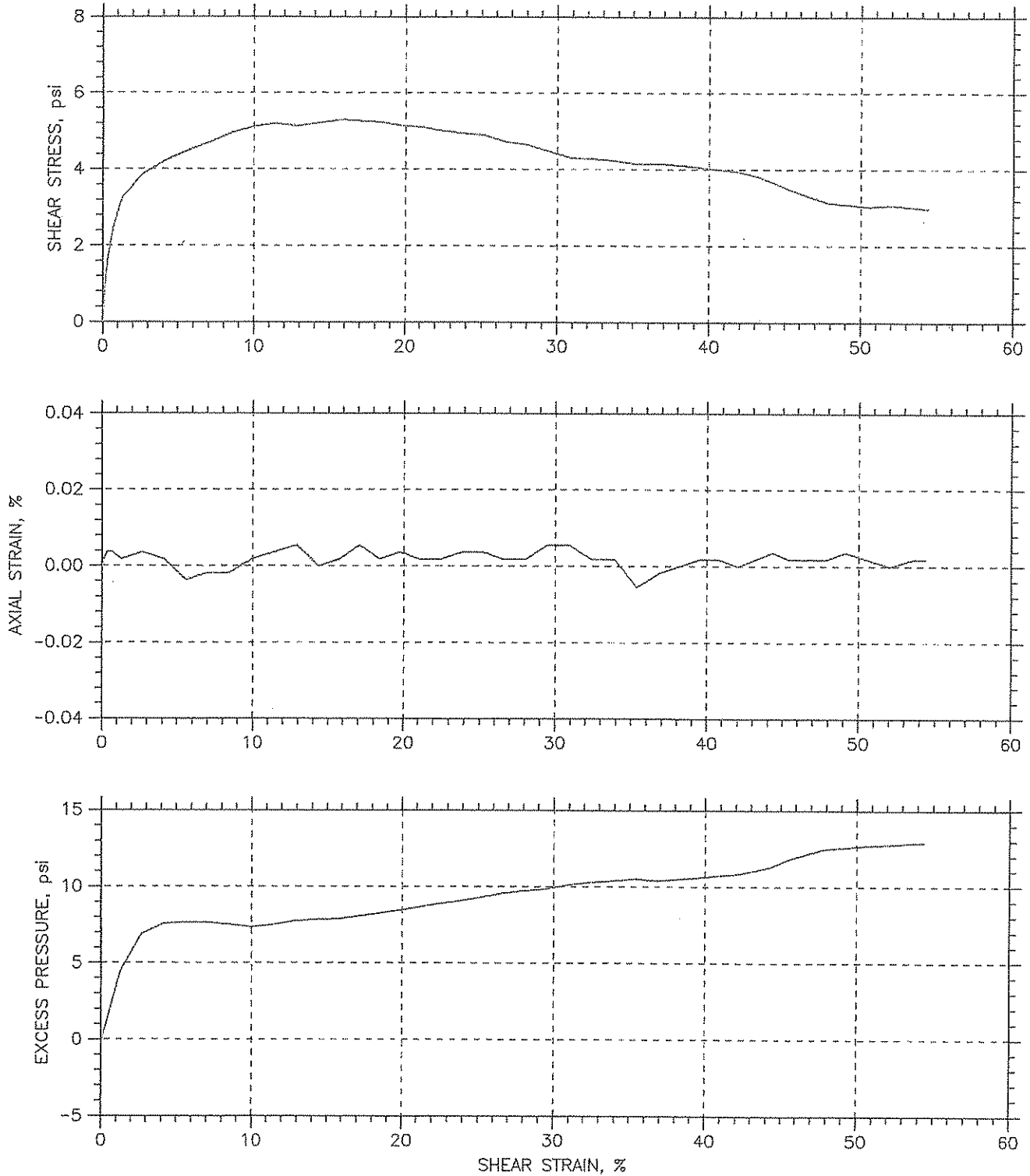
Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-2	DSS-3			
Initial Moisture Content, %	22.3	23.0			
Initial Dry Density, pcf	102	104			
Nominal Rate of Shear Strain, %/min	0.0008	0.0008			
Vertical Consolidation Stress, psi	15.5	15.5			
Final Moisture Content, %	24.2	23.1			
Measured Peak Shear Stress, psi	5.296	5.273			
Shear Strain at Peak Shear Stress, %	15.78	13.80			
Membrane Correction, psi	0.29	0.28			
Corrected Peak Shear Stress, psi	5.006	4.993			
S / σ'_{vc}	0.32	0.32			

Comments: Tested By: njh Checked By: jdt

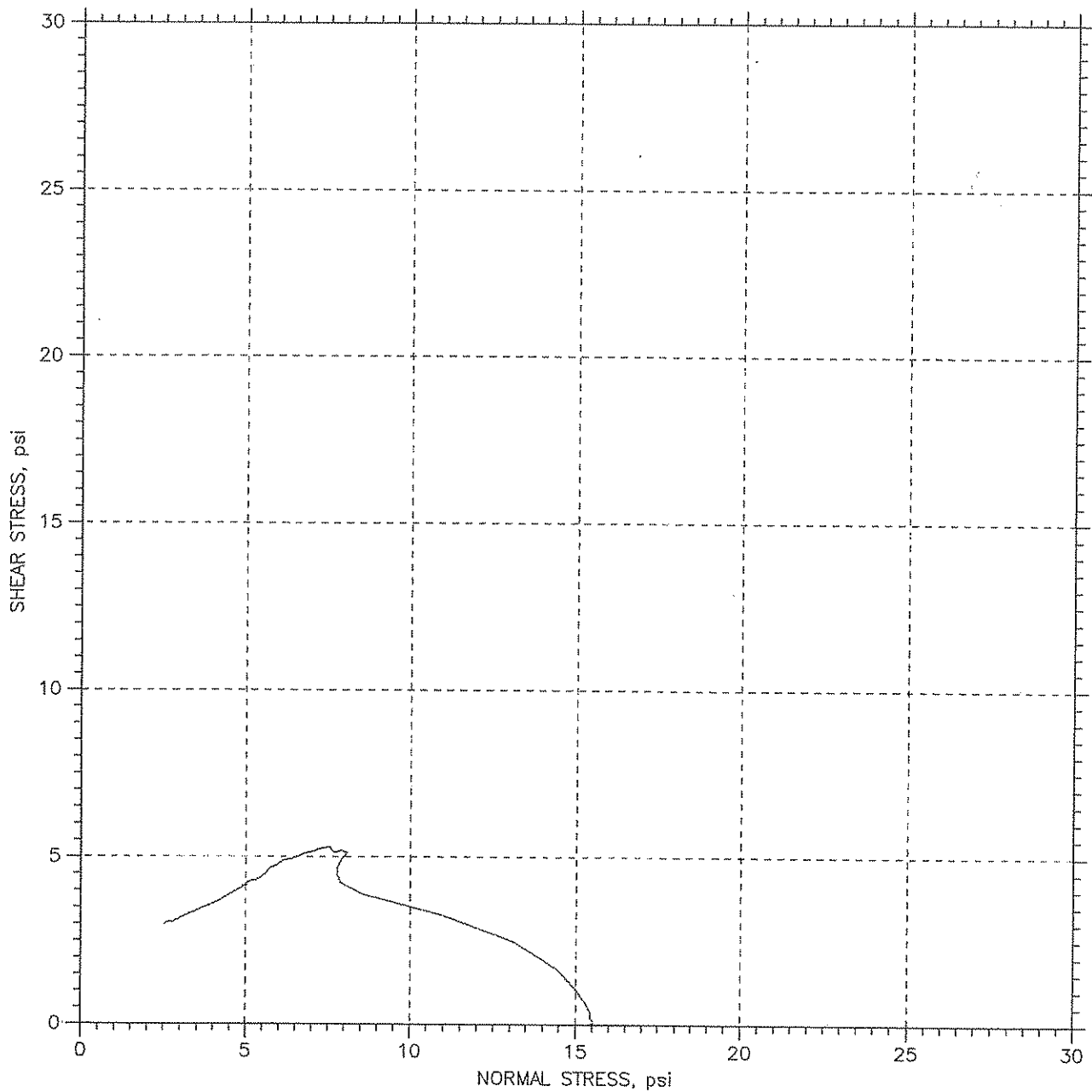
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DIRECT SIMPLE SHEAR TEST



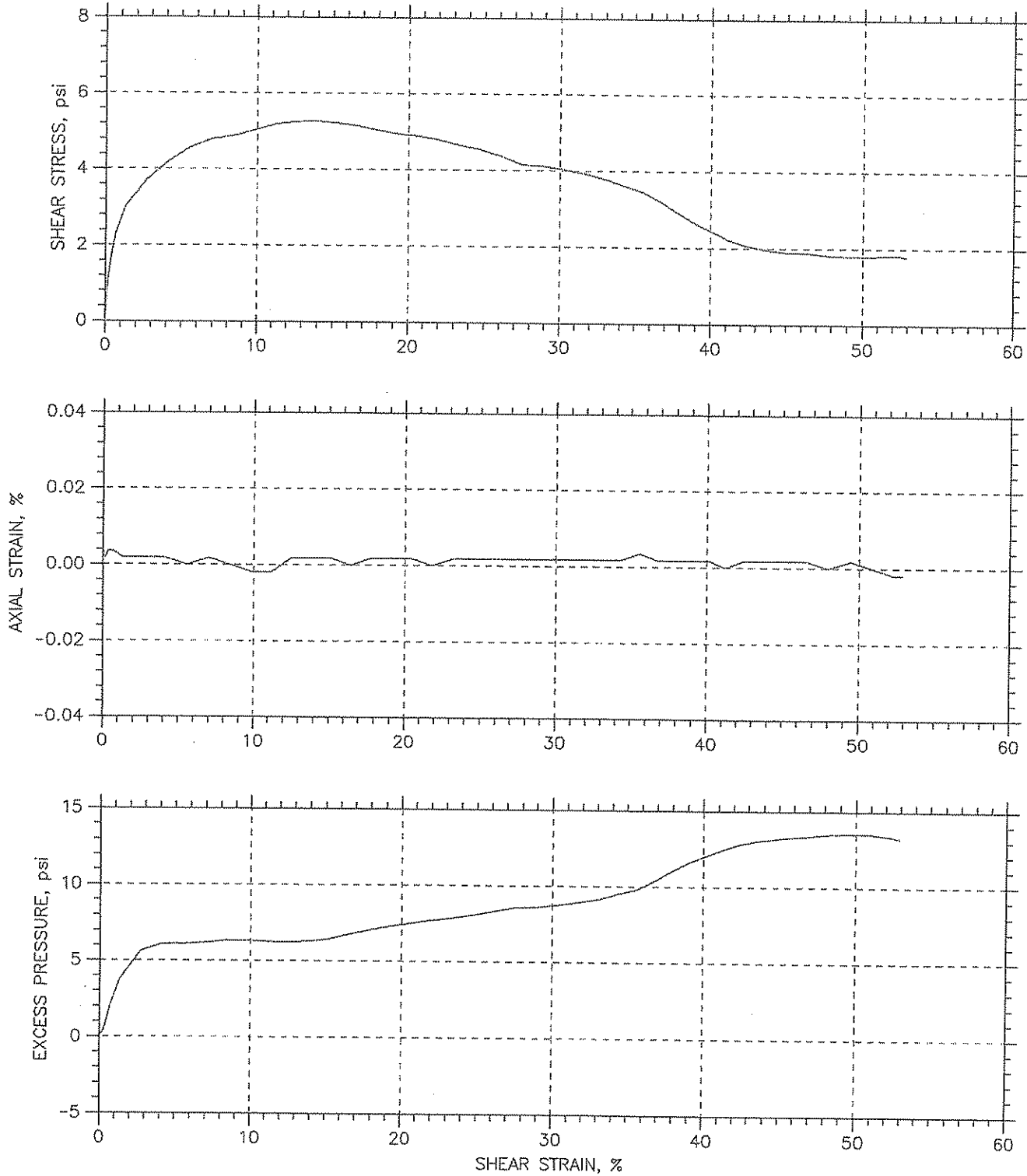
Project: Kingston Ash Pond	Location: Roane TN	Project No.: GTX-9015
Boring No.: STN-27 B	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/13/09	Depth: 35.2-35.8
Test No.: DSS-2	Sample Type: Core	Elevation: ---
Description: Moist, yellowish brown sandy silty clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-2n.dat		

DIRECT SIMPLE SHEAR TEST



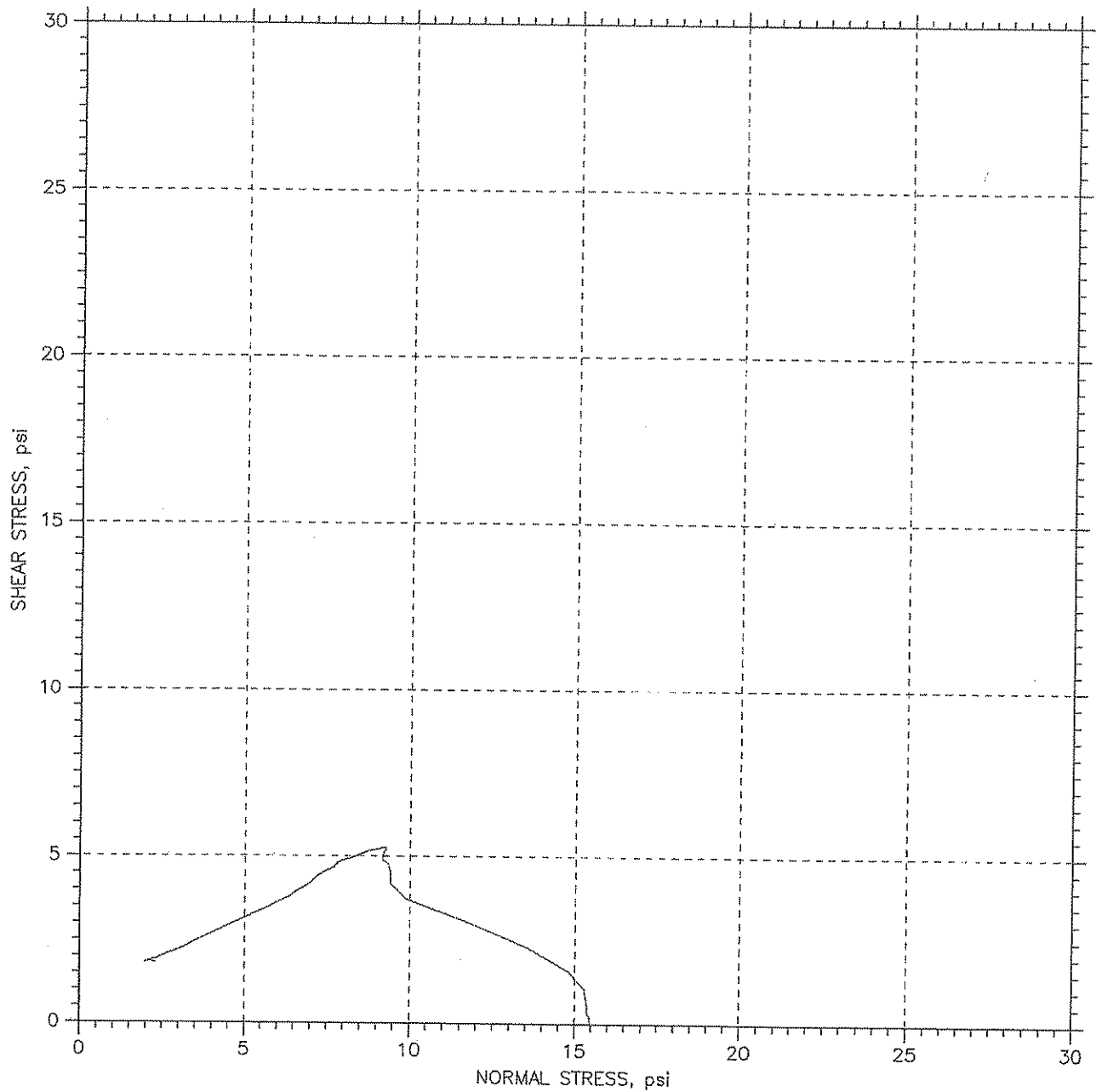
Project: Kingston Ash Pond	Location: Roane TN	Project No.: GTX-9015
Boring No.: STN-27 B	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/13/09	Depth: 35.2-35.8
Test No.: DSS-2	Sample Type: Core	Elevation: ---
Description: Moist, yellowish brown sandy silty clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-2n.dat		

DIRECT SIMPLE SHEAR TEST



Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: STN-27 B	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/14/09	Depth: 35.2-35.8
Test No.: DSS-3	Sample Type: core	Elevation: ---
Description: Moist, yellowish brown sandy silty clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-3n.dat		

DIRECT SIMPLE SHEAR TEST



Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: STN-27 B	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 05/14/09	Depth: 35.2-35.8
Test No.: DSS-3	Sample Type: core	Elevation: ---
Description: Moist, yellowish brown sandy silty clay		
Remarks: System J - 1.0 membrane		
File: \\Geocompdb1\projects\Gtx9015\dss\9015-DSS-3n.dat		

One-Dimensional Consolidation Test Results

Reconstructed by C. Barnett 7/9/09



One-Dimensional Consolidation of Soils

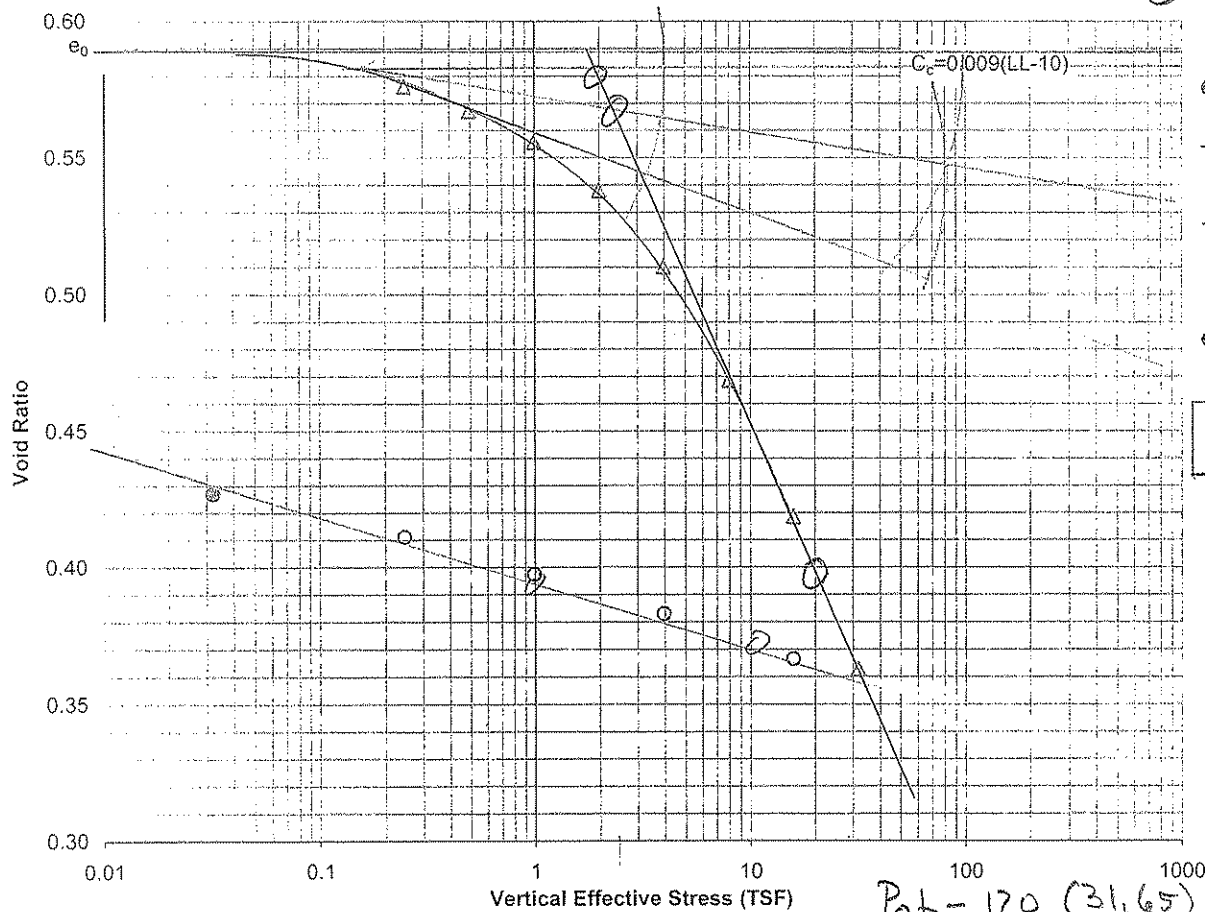
ASTM D 2435

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-2, 31.4'-31.9' Sample ID 536
 Cv computation Method: Square Root of Time Initial Void Ratio 0.589
 Swell Pressure (tsf) - 0 Preconsolidation Pressure (tsf) 2.5

$C_c = 0.182$

$C_r = 0.025$

Void Ratio at d_{100} vs. Stress



$$C_c = \frac{0.580 - 0.398}{\log\left(\frac{20/12}{10/1}\right)}$$

$$C_c = 0.182$$

$$C_r = \frac{0.395 - 0.370}{\log\left(\frac{10/1}{1}\right)}$$

$$C_r = 0.025$$

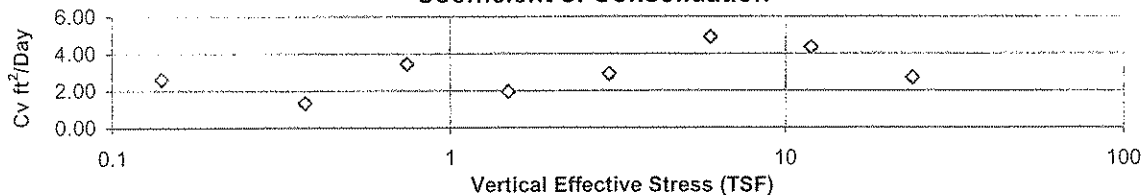
▲ Initial Load ○ Unload @ d_{max} — Empirical Data Line
 ▼ Recompression ● Final Unload @ d_{max}

$P_c = 2.5 \text{ tsf}$

$P_{cb} = 120 \text{ (31.65)}$

$P_{cb} = 3,798 \text{ psf}$

Coefficient of Consolidation



◇ Load ◇ ReLoad

Reconstructed by C. Barnett
7/9/08



One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-9, 11.7'-12.2' Sample ID 559
 Cv computation Method: Square Root of Time Initial Void Ratio 0.844
 Swell Pressure (tsf) - 0.279 Preconsolidation Pressure (tsf) 6.0

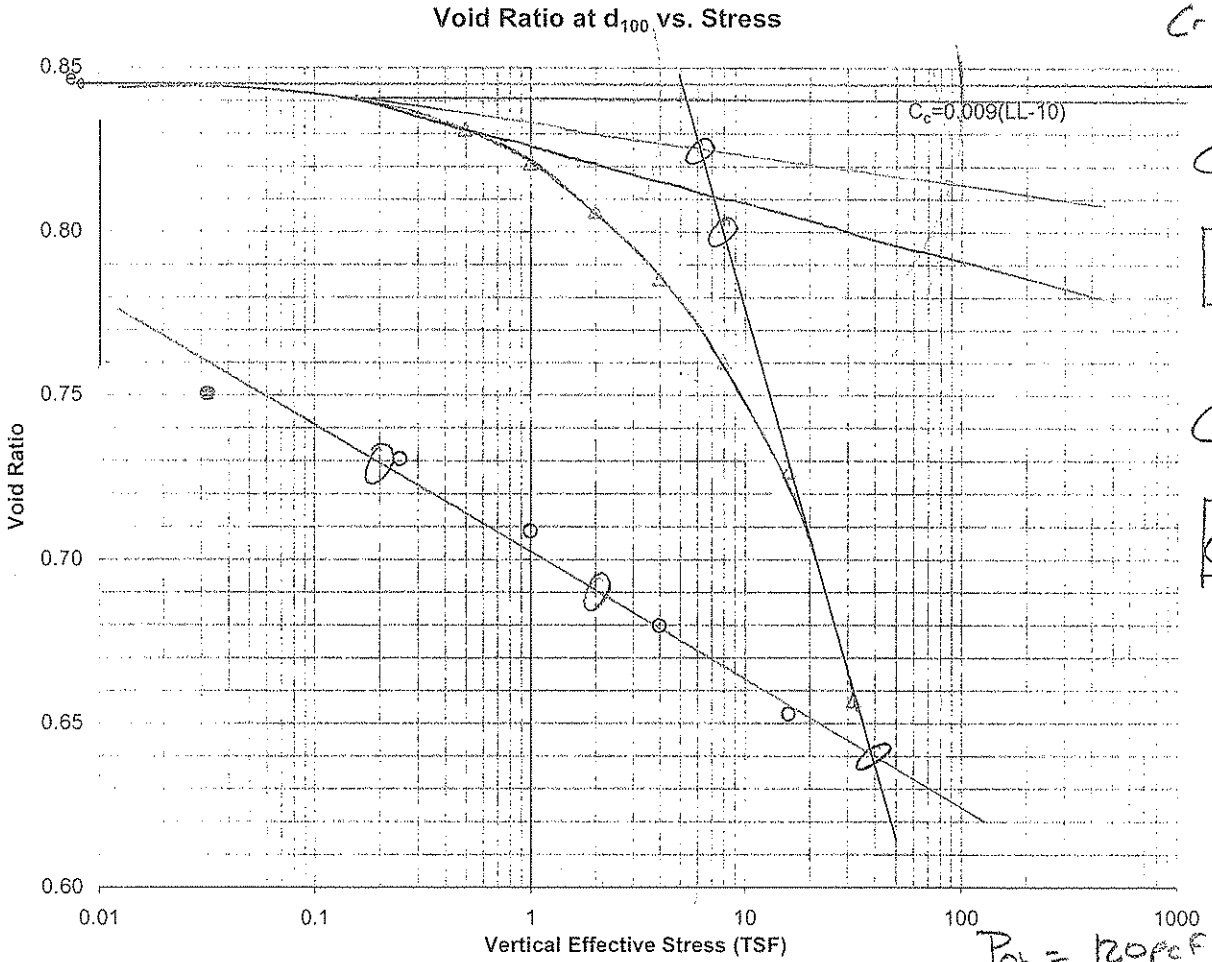
$C_c = 0.216$
 $C_r = 0.04$

$$C_c = \frac{0.800 - 0.649}{\log\left(\frac{10}{8}\right)}$$

$$C_c = 0.216$$

$$C_r = \frac{0.730 - 0.690}{\log\left(\frac{2}{0.2}\right)}$$

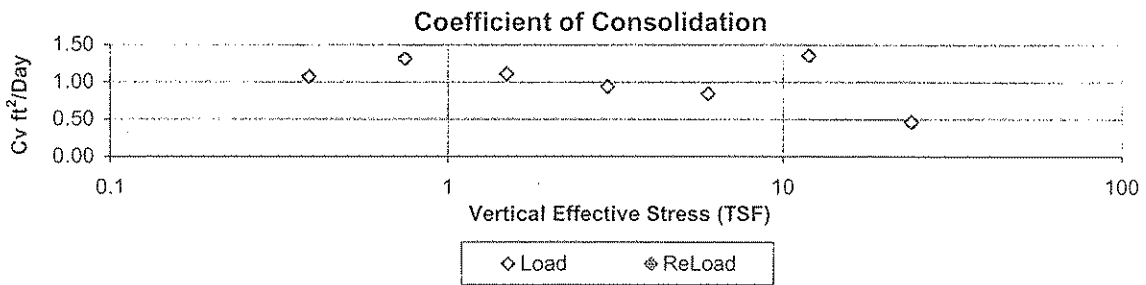
$$C_r = 0.04$$



$P_{ob} = 120 \text{ psf } (11.95 \text{ ft})$
 $P_{ob} = 1434 \text{ psf}$

$P_c = 6 \text{ tsf}$

▲ Initial Load ○ Unload @ d_{max} — Empirical Data Line
 ▲ Recompression ● Final Unload @ d_{max}



Reconstructed by C. Barnett 7/9/09



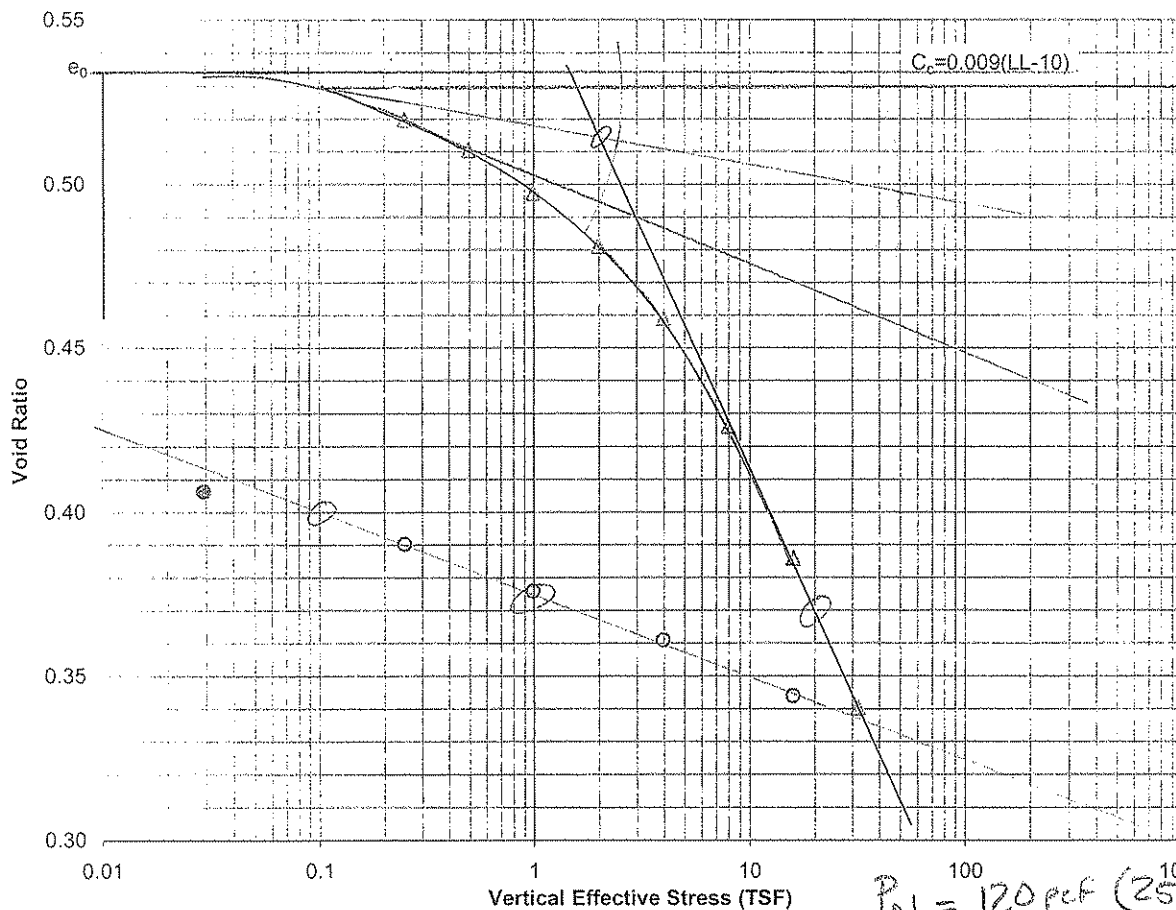
One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-14, 24.8'-25.3' Sample ID 514
 Cv computation Method: Square Root of Time Initial Void Ratio 0.534
 Swell Pressure (tsf) - 0 Preconsolidation Pressure (tsf) 2.0

$C_c = 0.145$
 $C_r = 0.025$

Void Ratio at d_{100} vs. Stress



$C_c = \frac{0.515 - 0.376}{\log(20/2)}$

$C_c = 0.145$

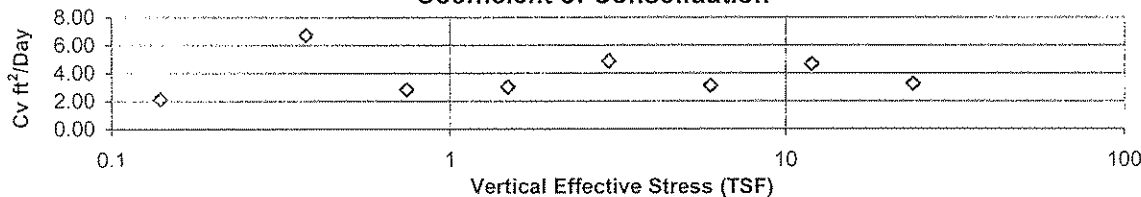
$C_r = \frac{0.400 - 0.376}{\log(1/0.1)}$

$C_r = 0.025$

$P_{ob} = 120 \text{ psf (25.05 ft)}$
 $P_{ob} = 3,006 \text{ psf}$

▲ Initial Load ○ Unload @ d_{max} — Empirical Data Line
 ▲ Recompression ● Final Unload @ d_{max}

Coefficient of Consolidation



◇ Load ◇ ReLoad

KDG

Reconstructed by C Bennett 7/9/09



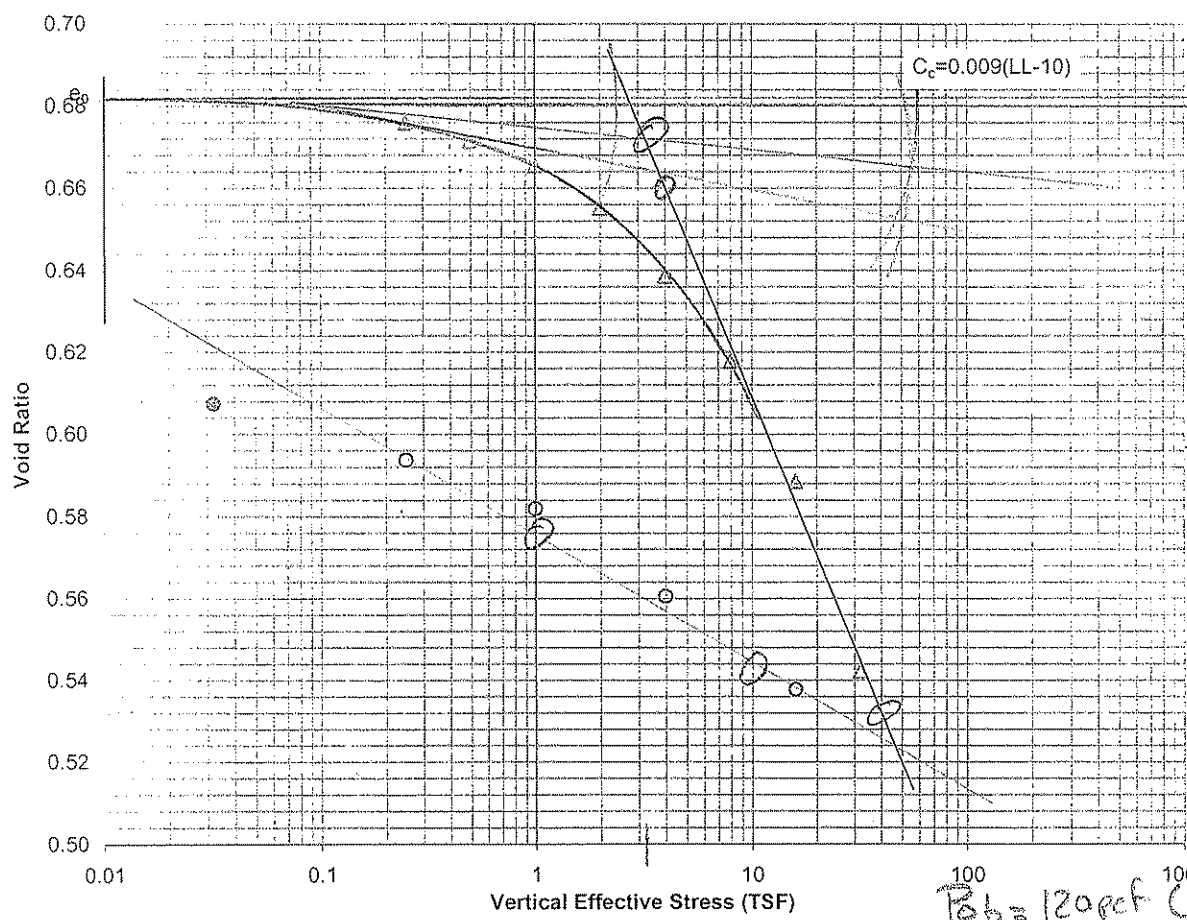
One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-19, 14.1'-14.6' Sample ID 516
 Cv computation Method: Square Root of Time Initial Void Ratio 0.681
 Swell Pressure (tsf) - 0 Preconsolidation Pressure (tsf) 3.1

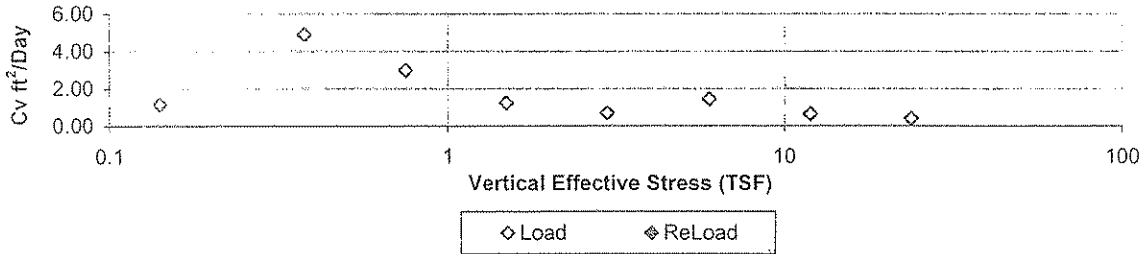
$C_c = 0.125$
 $C_r = 0.032$
 $C_c = \frac{0.660 - 0.537}{\log(4/1)}$
 $C_c = 0.125$
 $C_r = \frac{0.576 - 0.544}{\log(10/1)}$
 $C_r = 0.032$

Void Ratio at d_{100} vs. Stress

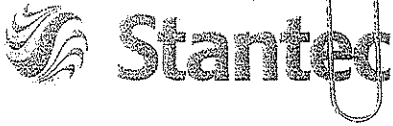


△ Initial Load ○ Unload @ d_{max} — Empirical Data Line
 ▲ Recompression ● Final Unload @ d_{max}

Coefficient of Consolidation



Reconstructed by C. Bennett 6/22/11



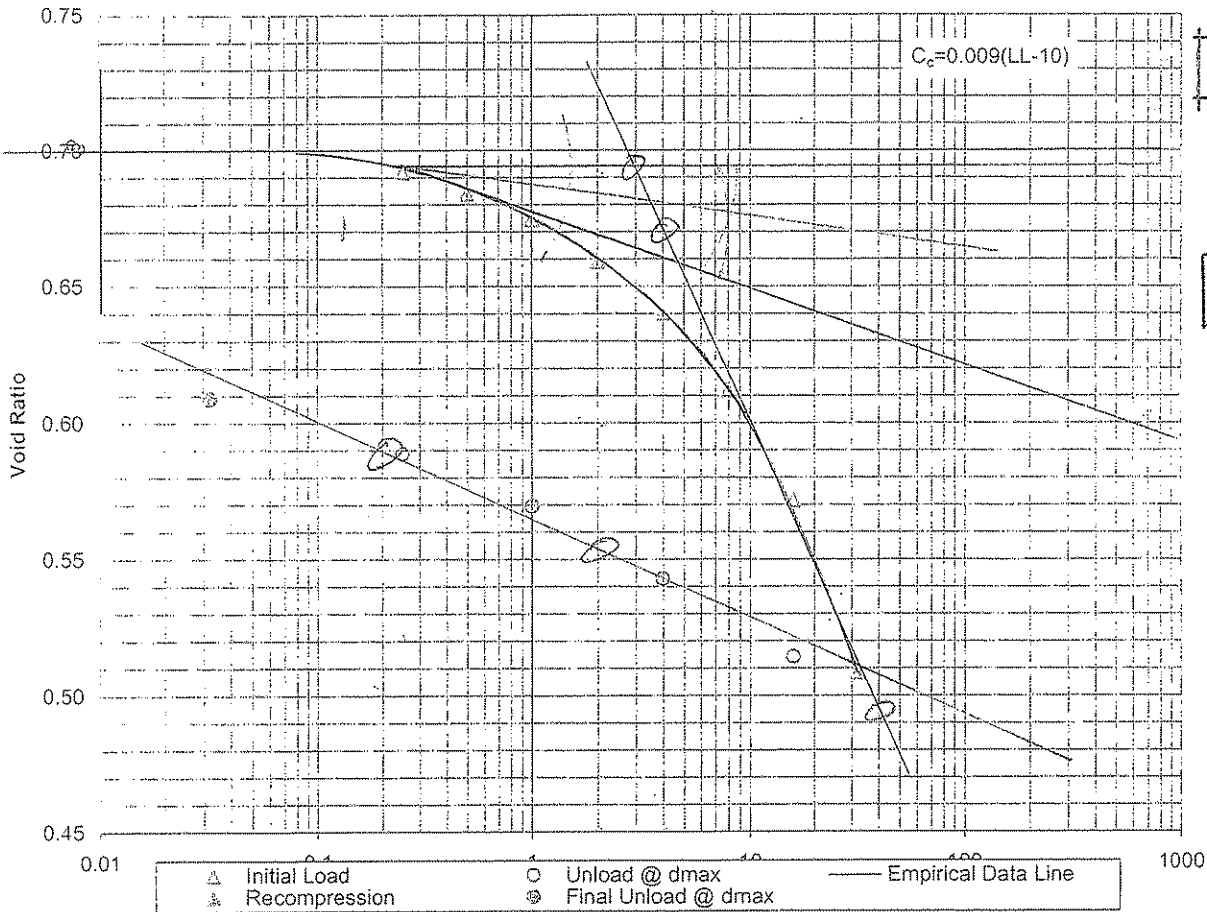
One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-32, 14.0'-14.5' Sample ID 359
 Cv computation Method: Square Root of Time Initial Void Ratio 0.700
 Swell Pressure (tsf) - 0.24 Preconsolidation Pressure (tsf) 3.0

$$C_c = \frac{0.670 - 0.495}{\log(4^3/4)}$$

Void Ratio at d_{100} vs. Stress



$$C_c = 0.175$$

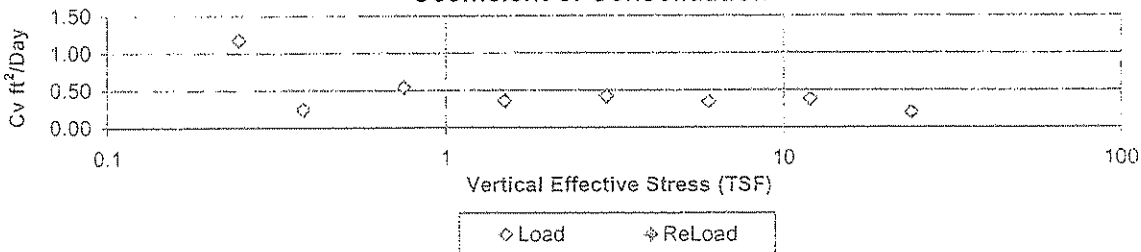
$$C_r = \frac{0.590 - 0.55}{\log(2^2/0.2)}$$

$$C_r = 0.085$$

$$P_c = 3 \text{ tsf}$$

$$P_{ob} = (14.3)(120) = 1716 \text{ psf}$$

Coefficient of Consolidation



Reconstructed by C. Barnett 7/9/09



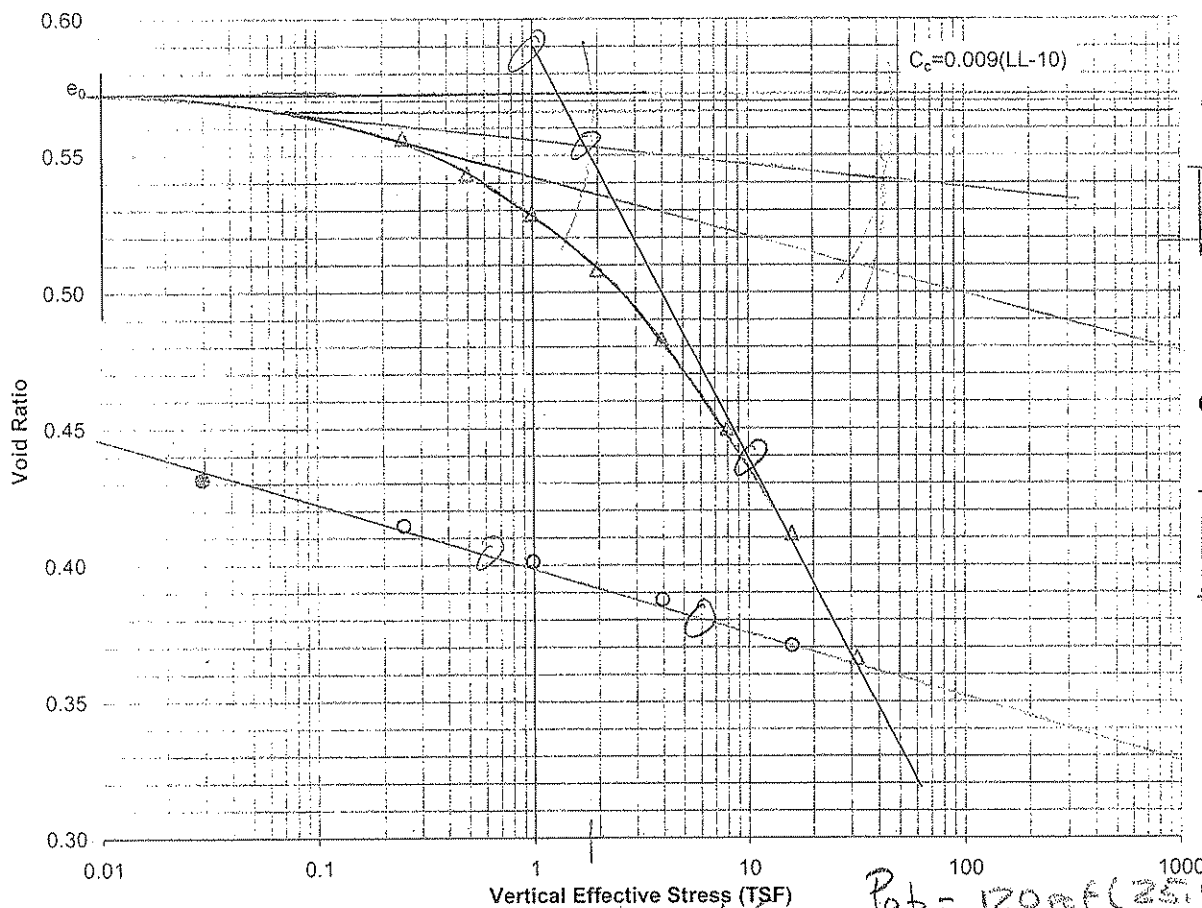
One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-52, 25.2'-25.7' Sample ID 552
 Cv computation Method: Square Root of Time Initial Void Ratio 0.573
 Swell Pressure (tsf) - 3.35E-02 Preconsolidation Pressure (tsf) 1.9 tsf

$C_c = 0.150$
 $C_r = 0.025$

Void Ratio at d_{100} vs. Stress



$C_c = \frac{0.570 - 0.440}{\log(10/1)}$

$C_c = 0.150$

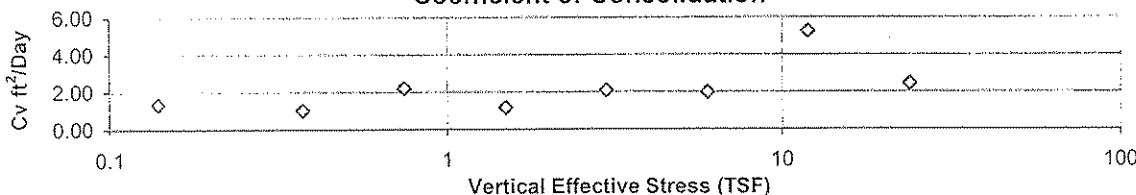
$C_r = \frac{0.405 - 0.38}{\log(6/0.6)}$

$C_r = 0.025$

$P_{ob} = 120 \text{ psf } (25.45)$
 $P_{ob} = 3,054 \text{ psf}$

△ Initial Load ○ Unload @ d_{max} — Empirical Data Line
▲ Recompression ⊙ Final Unload @ d_{max}

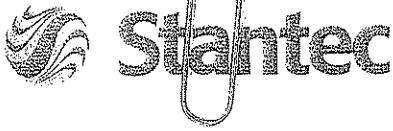
Coefficient of Consolidation



◇ Load ◇ ReLoad

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Reconstructed by S. Remate 6/22/09



One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond

Project No. 171468117

Source STN-63, 15.2'-15.7'

Sample ID 362

Cv computation Method: Square Root of Time

Initial Void Ratio 0.785

Swell Pressure (tsf) - 0.58

Preconsolidation Pressure (tsf) 0.8

Le to ...

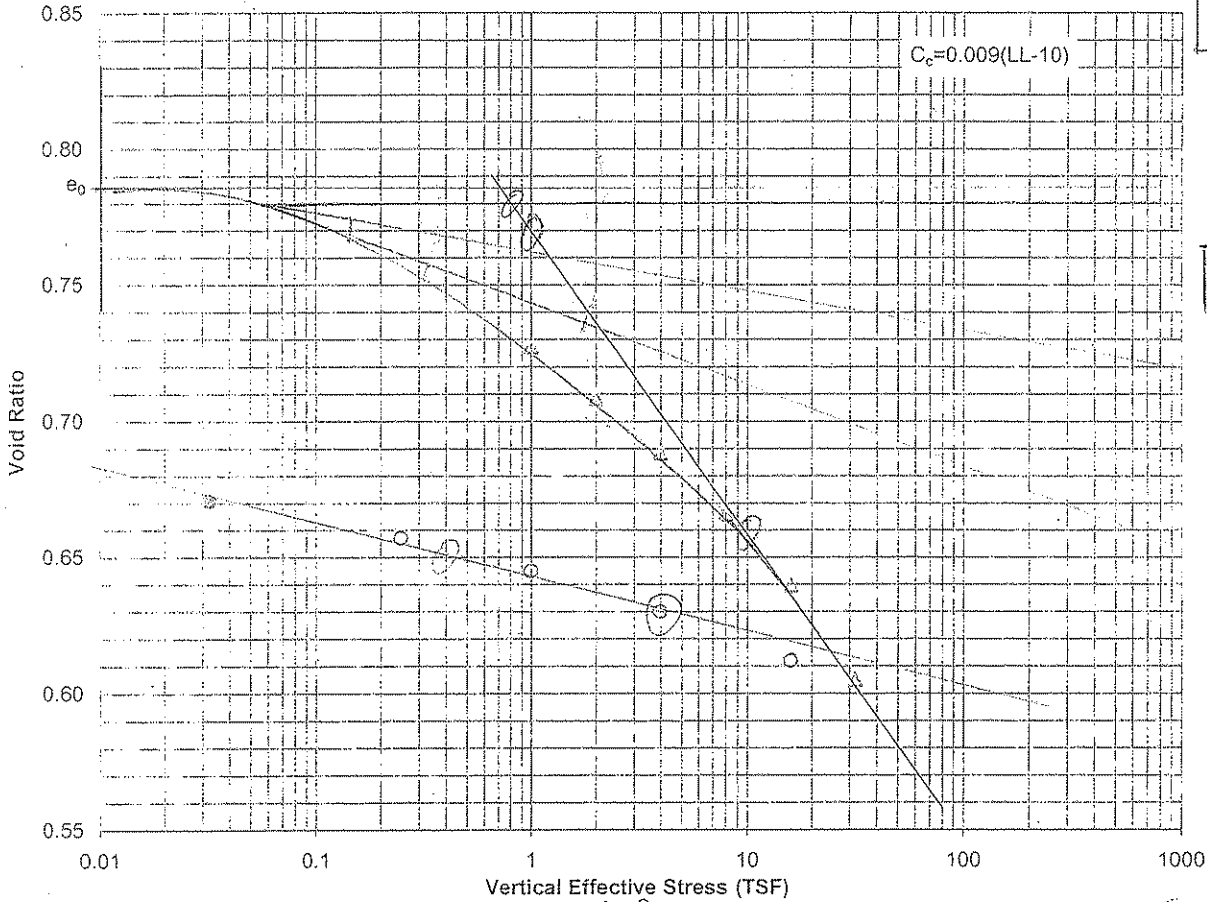
$$C_c = \frac{0.770 - 0.660}{\log\left(\frac{10}{1}\right)}$$

$$C_c = 0.110$$

$$C_c = \frac{0.650 - 0.530}{\log\left(\frac{4}{0.14}\right)}$$

$$C_c = 0.020$$

Void Ratio at d_{100} vs. Stress

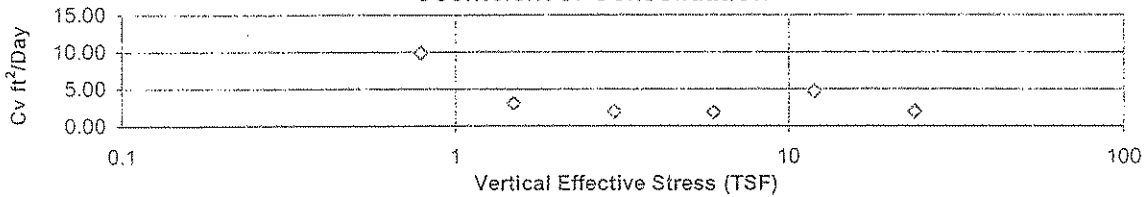


$$P_c = 0.8 \text{ tsf}$$

$$P_{0.6} = (15.5)(120) = 1860 \text{ psf}$$

- ▲ Initial Load
- Unload @ dmax
- Empirical Data Line
- ▲ Recompression
- Final Unload @ dmax

Coefficient of Consolidation



- ◇ Load
- ◆ ReLoad

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Reconstituted by G. Barnett 6/21



One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-64, 21.2'-21.7' Sample ID 608
 Cv computation Method: Log of Time Initial Void Ratio 0.752
 Swell Pressure (tsf) - 0.16 Preconsolidation Pressure (tsf) 0.6

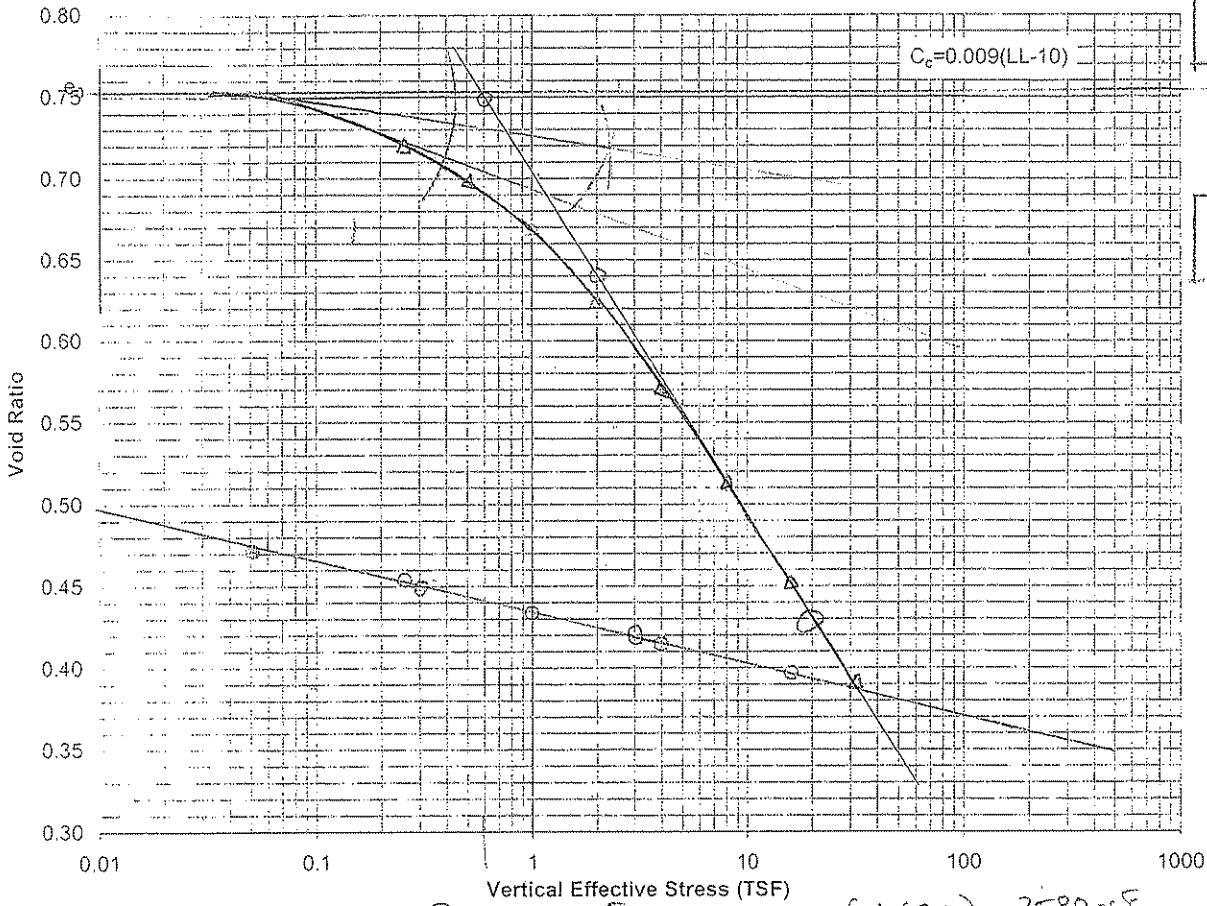
$$C_c = \frac{0.750 - 0.430}{\log(20/6)}$$

$$C_c = 0.320$$

$$C_r = \frac{0.450 - 0.420}{\log(3/1.2)}$$

$$C_r = 0.030$$

Void Ratio at d_{100} vs. Stress

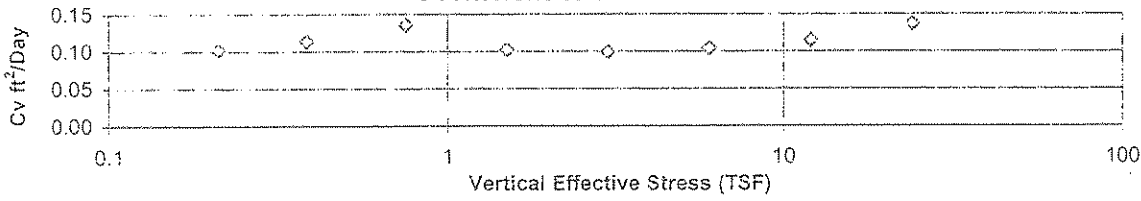


$P_c = 0.6$ tsf

$$P_{ob} = (120)(21.5) = 2580 \text{ psf}$$

Initial Load
 Recompression
 Unload @ d_{max}
 Final Unload @ d_{max}
 Empirical Data Line

Coefficient of Consolidation



Load
 ReLoad

Reconstructed by C. Bennett 6/22/09



One-Dimensional Consolidation of Soils

ASTM D 2435

Project Name Kingston Ash Pond
 Source STN-65, 33.8'-34.3'
 Cv computation Method: Square Root of Time
 Swell Pressure (tsf) - 0.0

Project No. 171468117
 Sample ID 614
 Initial Void Ratio 0.815
 Preconsolidation Pressure (tsf) 1.7

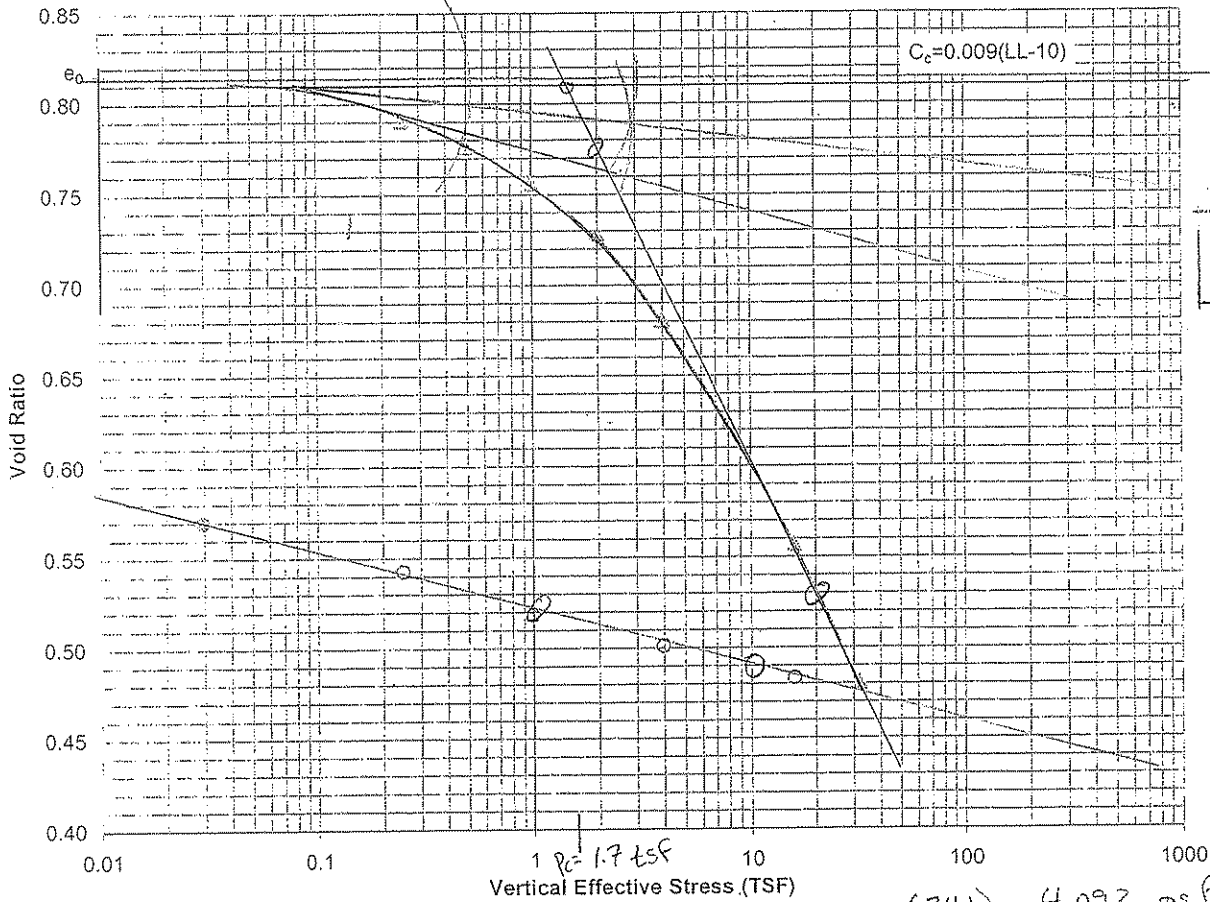
$$Cc = \frac{0.755 - 0.530}{\log\left(\frac{10}{1.7}\right)}$$

$$Cc = 0.225$$

$$Cr = \frac{0.523 - 0.490}{\log\left(\frac{10}{1}\right)}$$

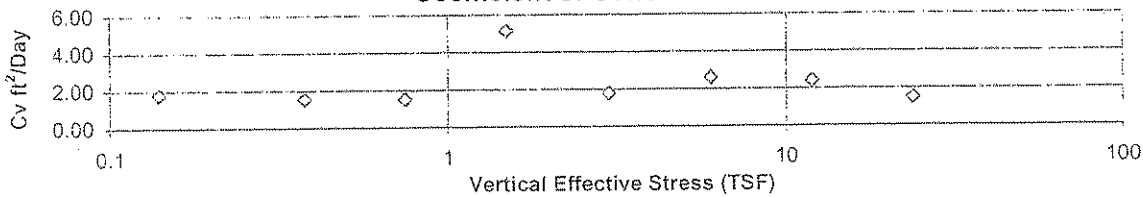
$$Cr = 0.032$$

Void Ratio at d_{100} vs. Stress



△ Initial Load ○ Unload @ d_{max} — Empirical Data Line
 ▲ Recompression ⊗ Final Unload @ d_{max}

Coefficient of Consolidation



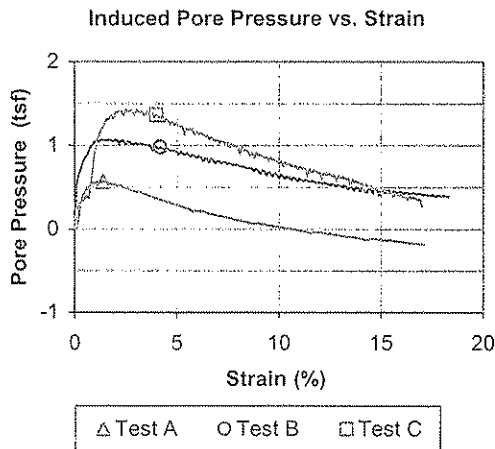
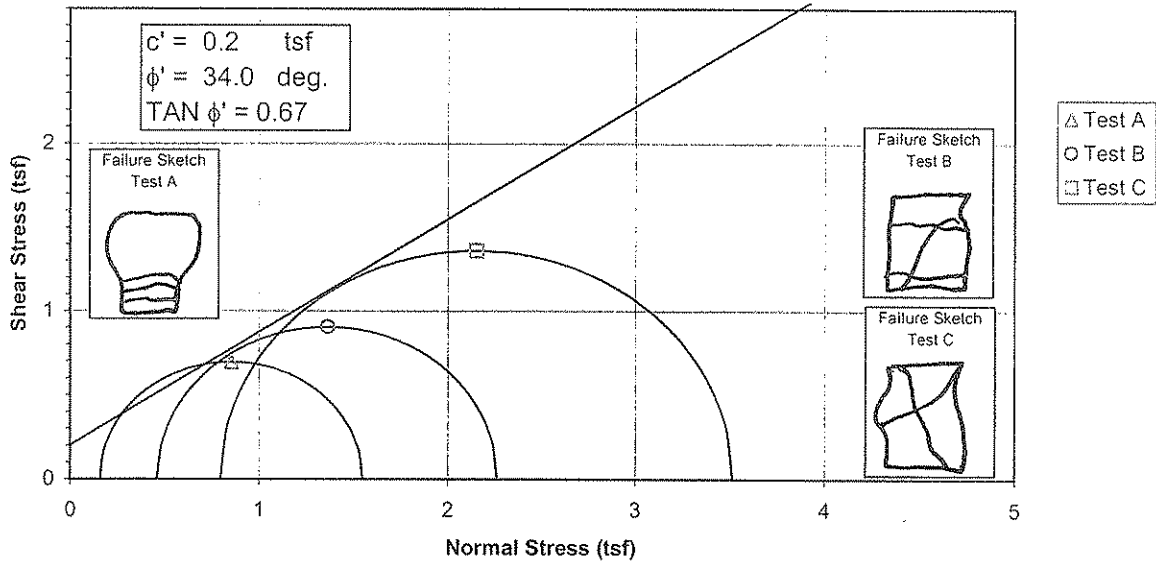
◇ Load ⊗ ReLoad

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Consolidated Undrained
Triaxial Test Results

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

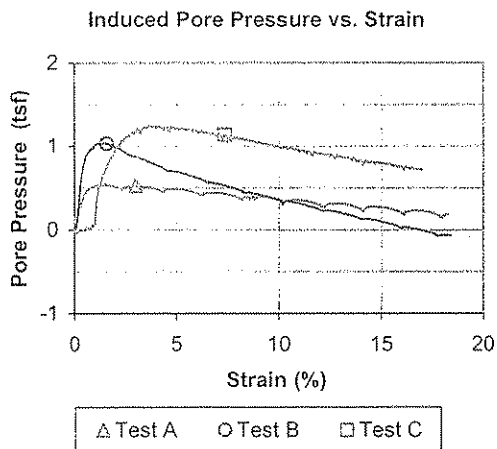
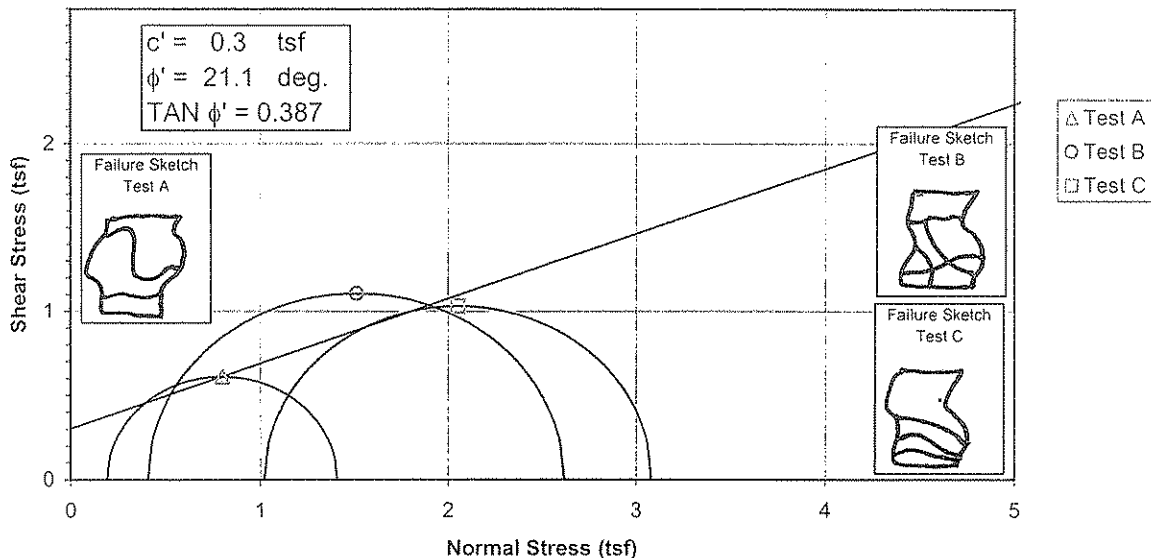


Specimen No.		A	B	C
Initial Data	Water content %	W_o 17.5	17.9	19.4
	Dry Density PCF	γ_{d_o} 112.9	111.0	108.2
	Saturation %	S_o 97.4	94.6	95.3
	Void Ratio	e_o 0.482	0.508	0.546
After Shear	Water content %	W_f 18.0	15.6	17.7
	Dry Density PCF	γ_{d_f} 112.9	118.0	113.4
	Saturation %	S_f 100.0	100.0	100.0
	Void Ratio	e_f 0.482	0.417	0.475
	Final Back Pressure TSF	u_c 5.76	5.04	4.32
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.16	0.46	0.80
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 1.39	1.81	2.72
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	t_f 6.0	129.1	145.1
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	D_o 2.884	2.884	2.884
Controlled - Strain Test	Initial Height, in.	H_o 5.999	6.006	6.065

Description of Specimens		Sandy Lean Clay (CL), brown, moist, firm, coal fragments			
Type of Specimen		Undisturbed		Type of test R	
LL 23	PL 15	PI 8	Gs 2.68	Project Kingston Ash Pond	
Remarks:					
Boring No.		STN-2		Sample No. 528	
Depth Elev.		9.0'-9.5', 14.0'-14.5', 14.6'-15.1'			
Laboratory		Stantec		Date 7-1-09	
TRIAXIAL COMPRESSION TEST REPORT					

Failure Criterion: Maximum Effective Principal Stress Ratio

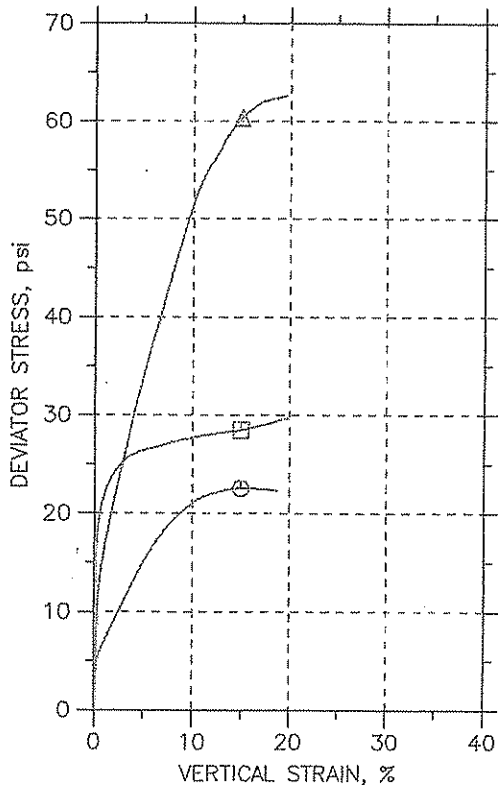
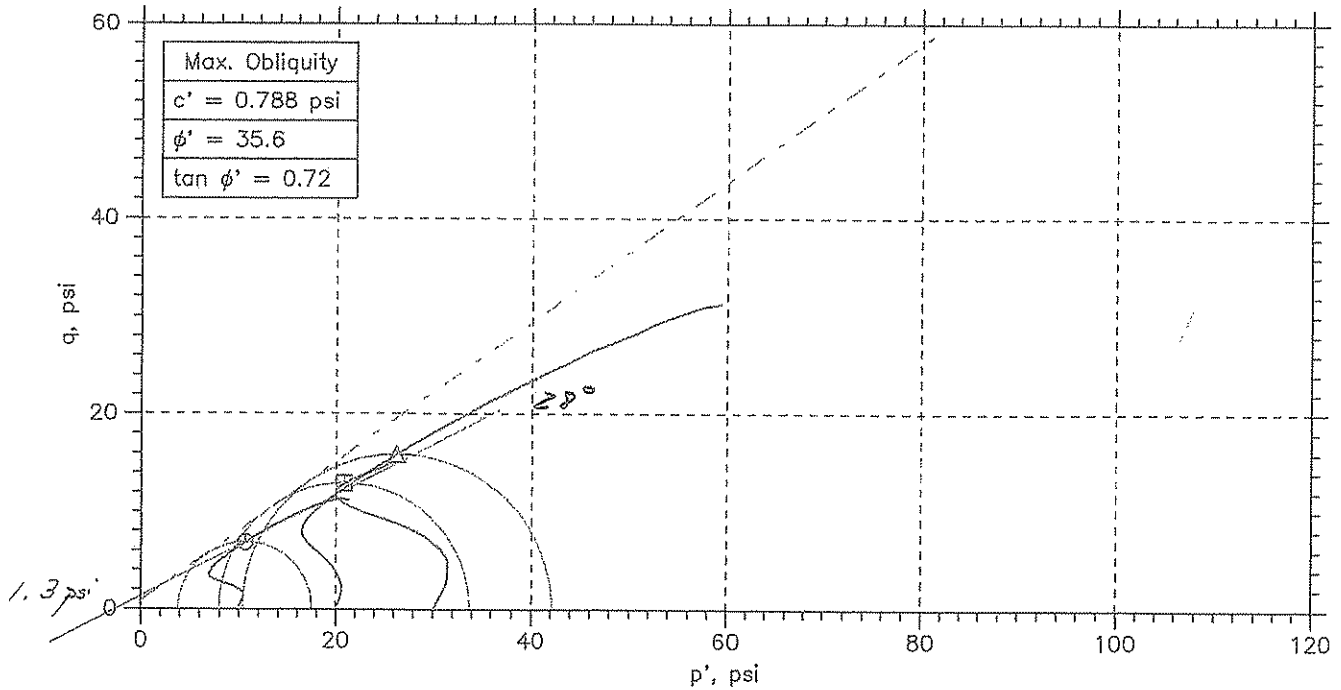
Effective Strength Envelope



Specimen No.		A	B	C
Initial Data	Water content %	W_o 24.8	25.4	27.4
	Dry Density PCF	γ_{d_o} 97.5	97.4	96.5
	Saturation %	S_o 90.1	92.1	97.2
	Void Ratio	e_o 0.755	0.757	0.772
After Shear	Water content %	W_f 25.8	26.2	25.7
	Dry Density PCF	γ_{d_f} 100.2	99.6	100.3
	Saturation %	S_f 100.0	100.0	100.0
	Void Ratio	e_f 0.706	0.718	0.705
	Final Back Pressure TSF	u_c 5.76	5.04	4.32
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.19	0.41	1.02
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 1.22	2.21	2.06
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	t_f 14.2	8.1	244.6
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	D_o 2.875	2.864	2.856
	Initial Height, in.	H_o 6.054	6.137	5.985

Controlled - Strain Test						Type of Specimen Undisturbed		Type of test R	
Description of Specimens Fat Clay with Sand (CH), red brown, moist, firm						Project Kingston Ash Pond			
LL	55	PL	19	PI	37	Gs	2.74	Boring No. STN-3, STN-5 Sample No. 538	
Remarks:						Depth Elev. 10.5'-11.0', 11.3' - 11.8', 12.5'-13.0'			
						Laboratory Stantec		Date 6-30-09	
TRIAXIAL COMPRESSION TEST REPORT									

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Symbol	⊙	△	□	
Sample No.	ST-4	ST-4	ST-3	
Test No.	CU-4-1	CU-4-2	CU-4-3	
Depth	31.0-31.6	31.6-32.2	31.6-32.8	
Initial	Diameter, in	2.88	2.87	2.87
	Height, in	6.1	5.95	6.01
	Water Content, %	22.1	16.6	18.8
	Dry Density, pcf	101.2	114.6	111.7
	Saturation, %	91.1	95.2	100.0
	Void Ratio	0.647	0.471	0.509
Before Shear	Water Content, %	20.6	17.3	18.5
	Dry Density, pcf	107.5	114.9	112.5
	Saturation*, %	100.0	100.0	100.0
	Void Ratio	0.551	0.467	0.499
Back Press., psi	27.99	121.	27.99	
Ver. Eff. Cons. Stress, psi	10.	20.	30.01	
Shear Strength, psi	11.29	30.17	14.25	
Strain at Failure, %	15	15	15	
Strain Rate, %/min	0.032	0.032	0.032	
B-Value	1.25	0.95	0.97	
Measured Specific Gravity	2.67	---	---	
Liquid Limit	22	---	---	
Plastic Limit	16	---	---	

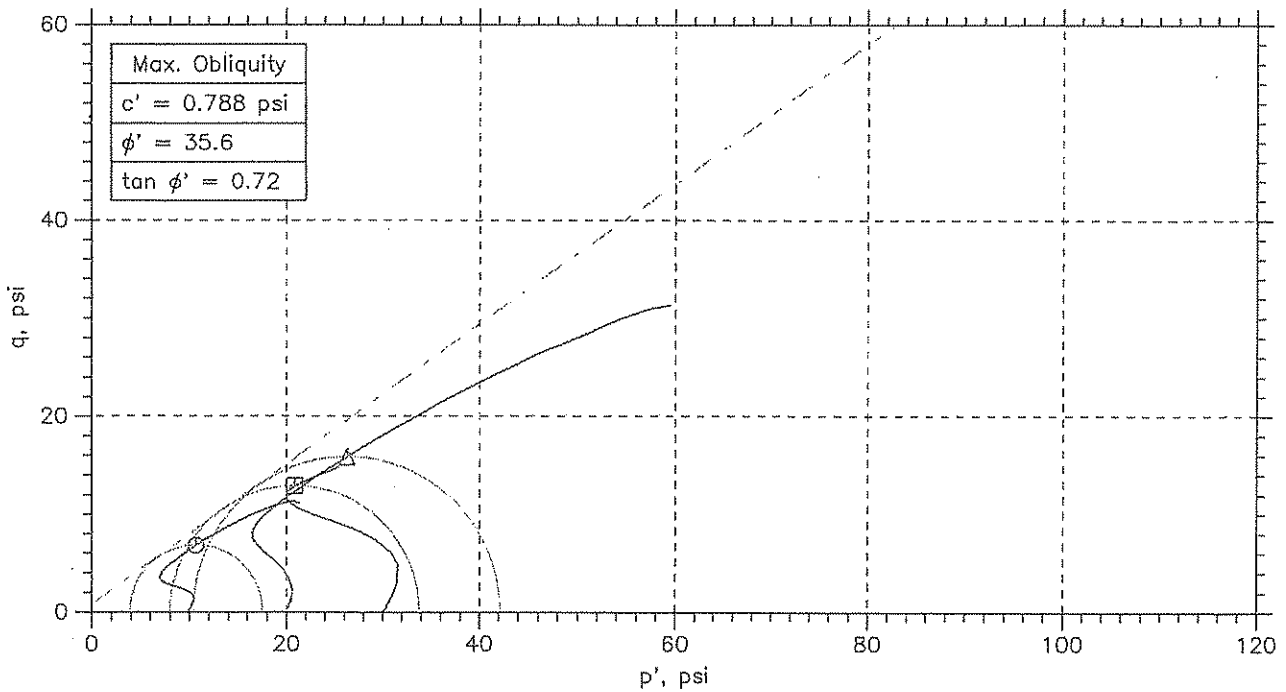
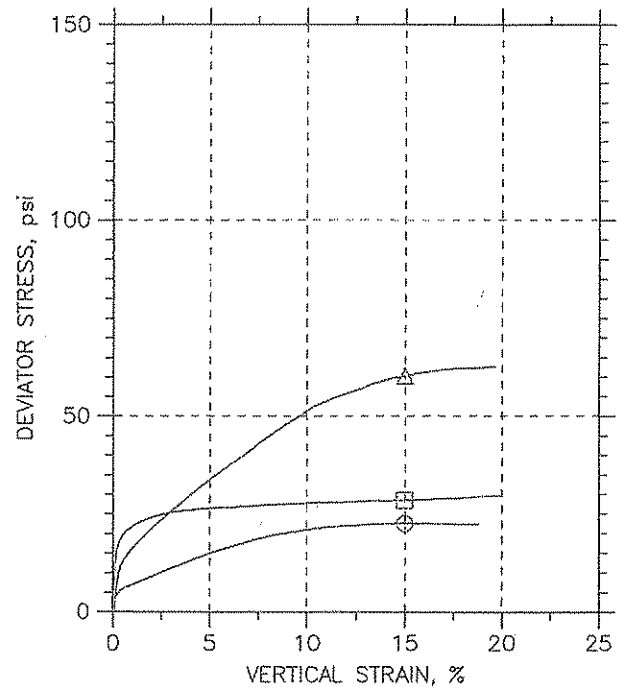
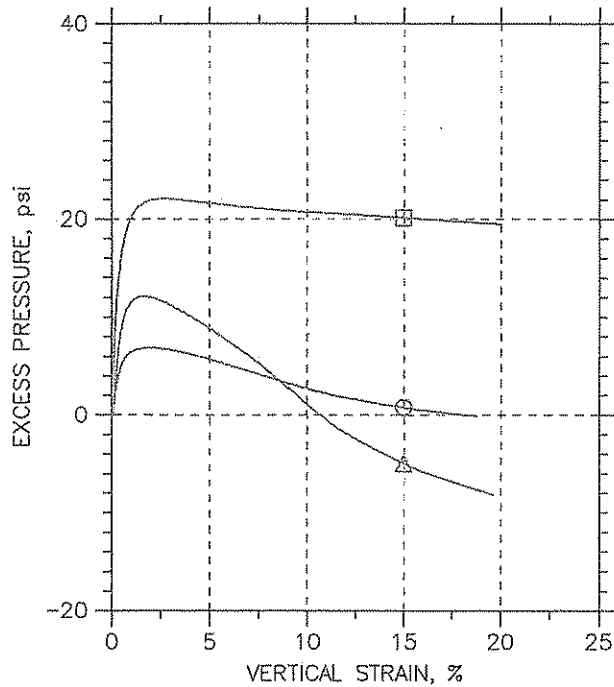


Project: Kingston Ash Pond	
Location: Roane, TN	
Project No.: GTX-9015	
Boring No.: STN-3 D	
Sample Type: core	
Description: CU-4-1 STN-3D Moist, olive brown sandy silty clay; CU-4-2 STN-3D Moist, green, yellow	
Remarks: and brown sandy silt; CU-4-3 STN-37D Moist, brown and yellow sandy silt	

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

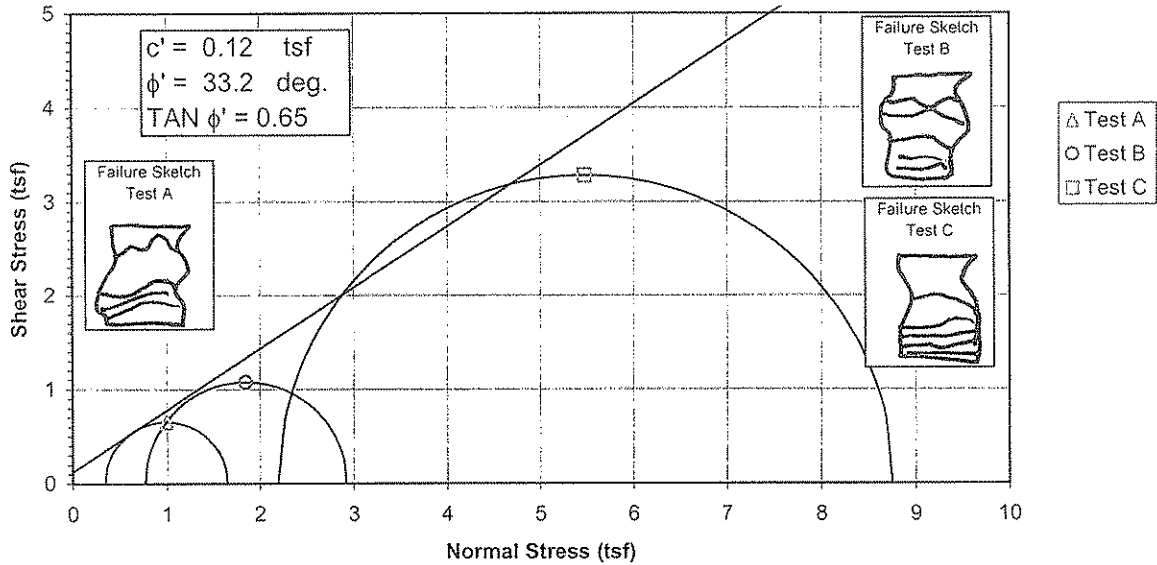


Symbol	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	ST-4	CU-4-1	31.0-31.6	md	05/12/09	jdt		9015-CU-4-1n.dat
△	ST-4	CU-4-2	31.6-32.2	md	05/12/09	jdt		9015-CU-4-2n.dat
□	ST-3	CU-4-3	31.6-32.8	md	05/12/09	jdt		9015-CU-4-3n.dat

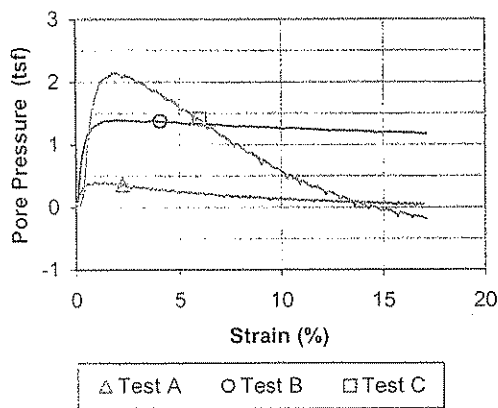
GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingston Ash Pond		Location: Roane, TN		Project No.: GTX-9015	
	Boring No.: STN-3 D		Sample Type: core			
	Description: CU-4-1 STN-3D Moist, olive brown sandy silty clay; CU-4-2 STN-3D Moist, green, yellow					
	Remarks: and brown sandy silt; CU-4-3 STN-37D Moist, brown and yellow sandy silt					

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



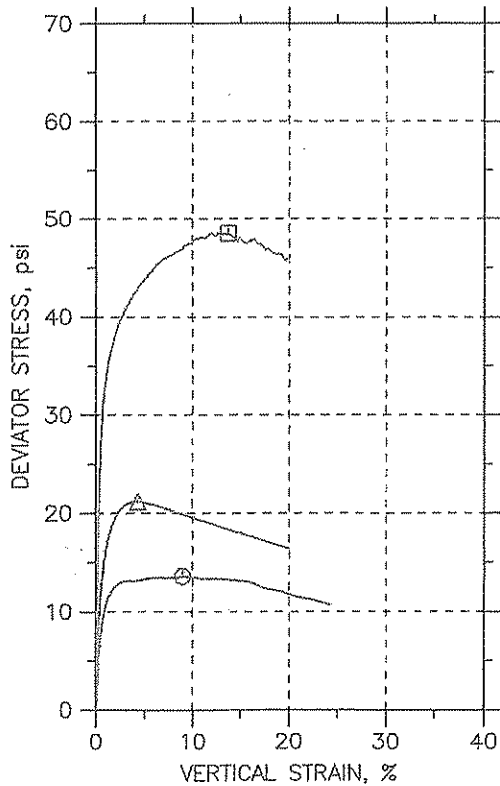
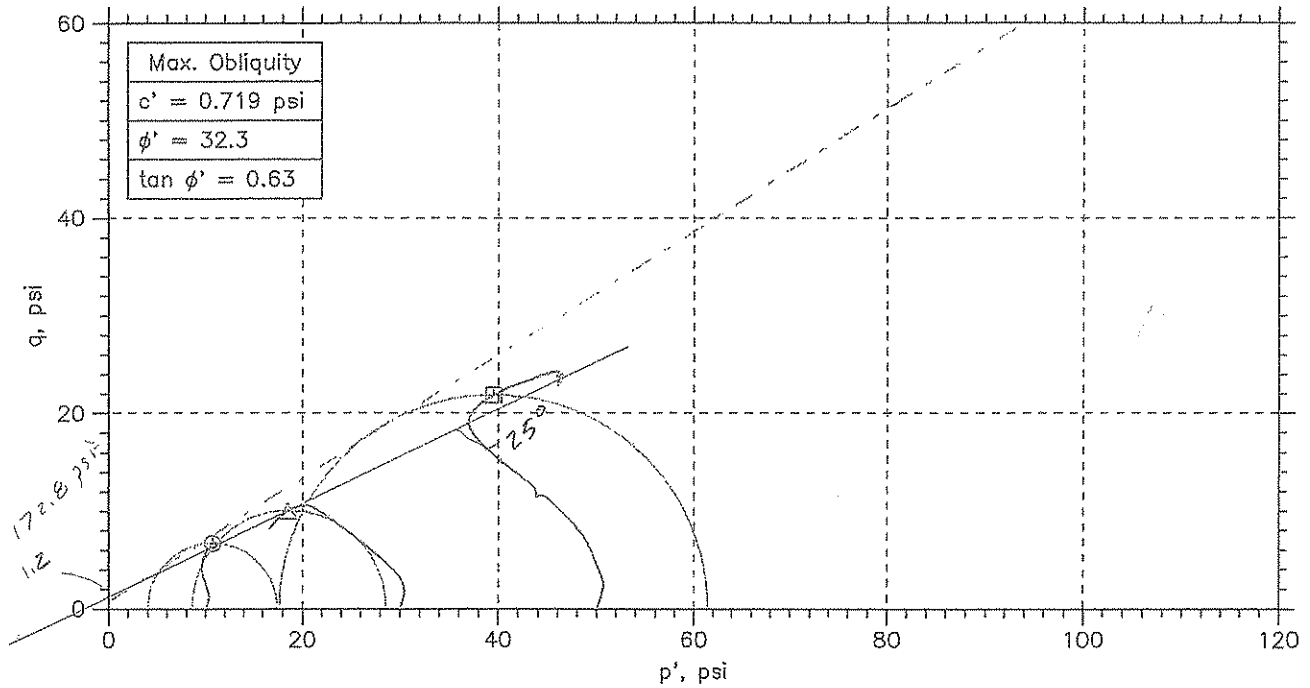
Induced Pore Pressure vs. Strain



Specimen No.		A	B	C
Initial Data	Water content %	W_o 22.2	20.5	20.0
	Dry Density PCF	γ_{d_o} 106.2	107.0	109.7
	Saturation %	S_o 105.6	99.3	104.3
	Void Ratio	e_o 0.558	0.547	0.508
After Shear	Water content %	W_f 19.9	19.4	16.0
	Dry Density PCF	γ_{d_f} 108.2	109.3	116.1
	Saturation %	S_f 100.0	100.0	100.0
	Void Ratio	e_f 0.529	0.513	0.425
	Final Back Pressure TSF	u_c 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.35	0.78	2.20
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 1.29	2.14	6.57
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	t_f 72.6	19.8	88.2
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	D_o 2.870	2.880	2.859
	Initial Height, in.	H_o 6.065	5.997	5.961

Controlled - Strain Test				Initial Diameter, in.				D_o 2.870		2.880		2.859	
Description of Specimens				Sandy Silty Clay (CL-ML), brown, moist, soft to firm									
				Type of Specimen				Undisturbed					
				Type of test				R					
LL	PL	PI	Gs	2.65		Project				Kingston Ash Pond			
Remarks:													
				Boring No.		STN-14, STN-61		Sample No.		512			
				Depth Elev.		STN-14, 23.6'-24.1', 24.2'-24.7', STN-61, 23.0'-23.5'							
				Laboratory				Stantec					
				Date				6-25-09					
TRIAXIAL COMPRESSION TEST REPORT													

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



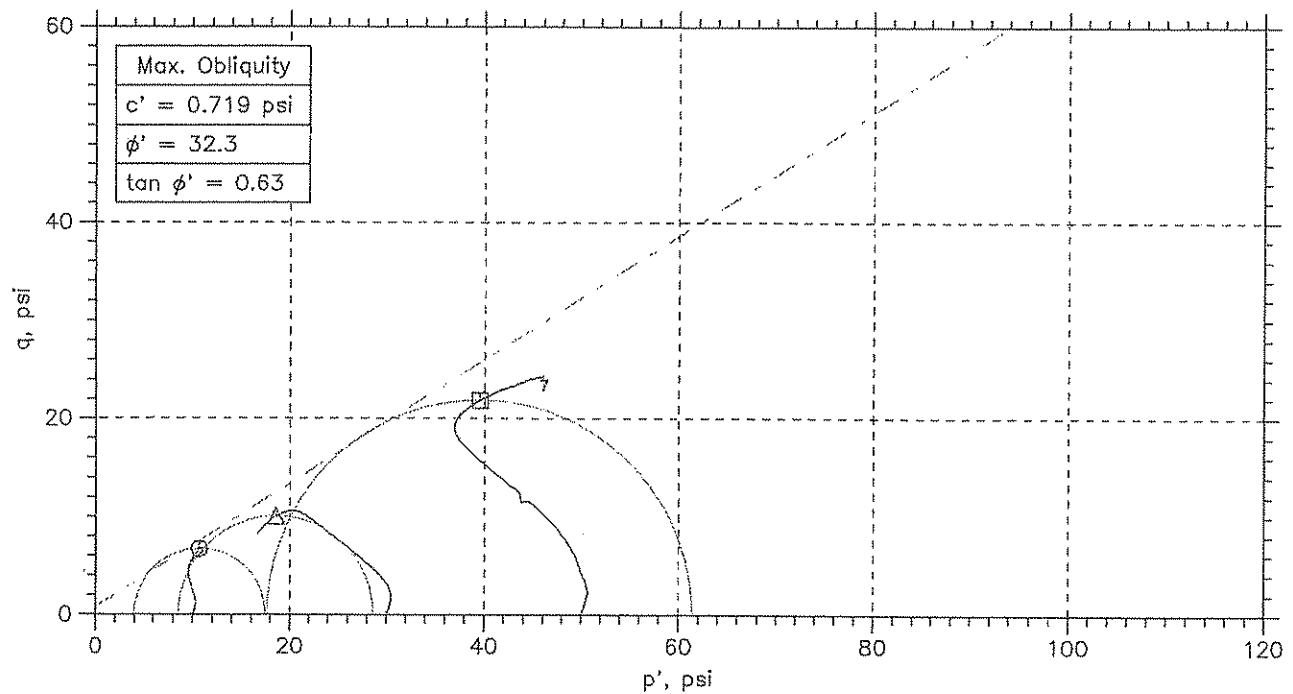
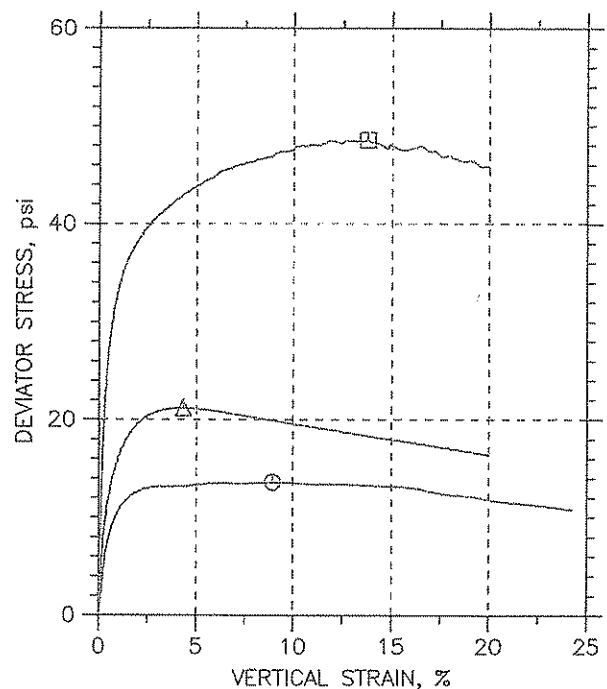
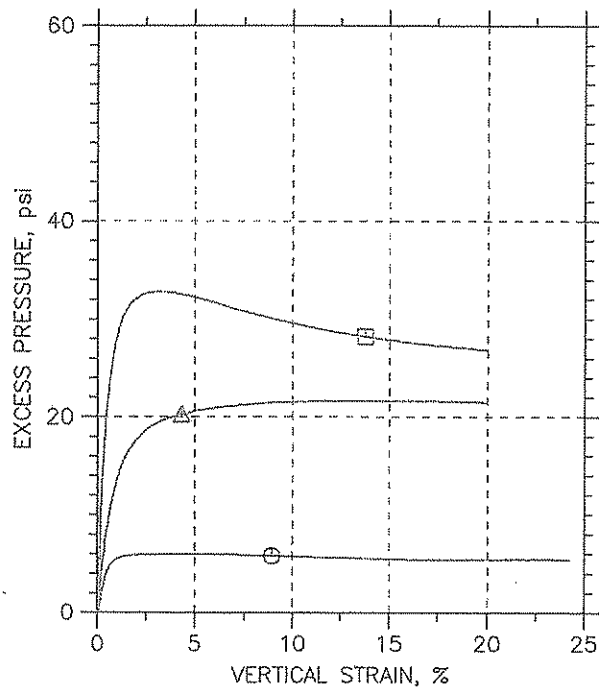
Symbol	⊙	△	□	
Sample No.	ST-1	ST-1	ST-2	
Test No.	CU-5-1	CU-5-2	CU-5-3	
Depth	38.3-38.9	38.9-39.5	46.3-46.9	
Initial	Diameter, in	2.87	2.88	2.87
	Height, in	5.95	5.89	5.91
	Water Content, %	32.8	27.7	22.8
	Dry Density, pcf	89.33	90.97	102.5
	Saturation, %	103.1	88.8	95.4
Before Shear	Void Ratio	0.838	0.832	0.644
	Water Content, %	27.3	28.8	22.4
	Dry Density, pcf	95.58	94.21	105.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.718	0.769	0.604
	Back Press., psi	28.	109.	82.02
	Ver. Eff. Cons. Stress, psi	9.996	30.	50.
	Shear Strength, psi	6.805	10.6	24.28
	Strain at Failure, %	8.95	4.33	13.8
	Strain Rate, %/min	0.016	0.016	0.016
	B-Value	0.95	0.95	0.95
	Measured Specific Gravity	2.63	2.67	---
	Liquid Limit	38	38	---
	Plastic Limit	23	23	---

 <small>a subsidiary of Geocomp Corporation</small>	Project: Kingston Ash Pond	
	Location: Roane, TN	
	Project No.: GTX-9015	
	Boring No.: ST-28	
	Sample Type: core	
	Description: CU-5-1 ST-28 Moist, dark olive gray clay with sand; CU-5-2 ST-28 Moist, dark olive gray clay and sand; CU-5-3 ST-28 Moist, yellow and gray silt with clay and sand	

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

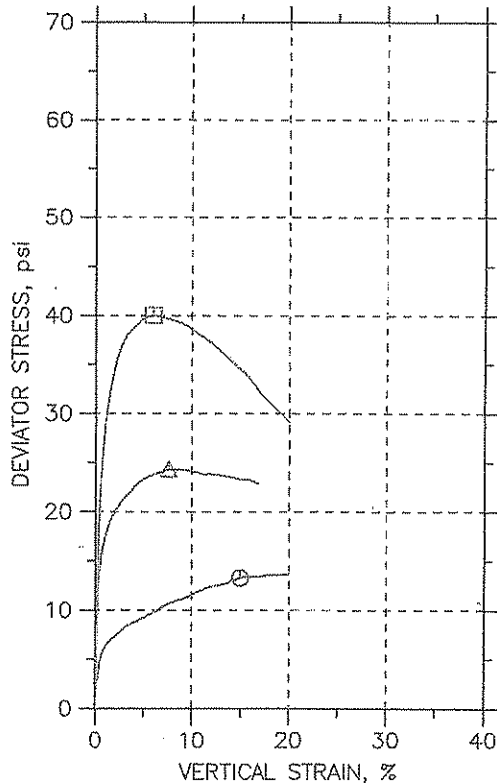
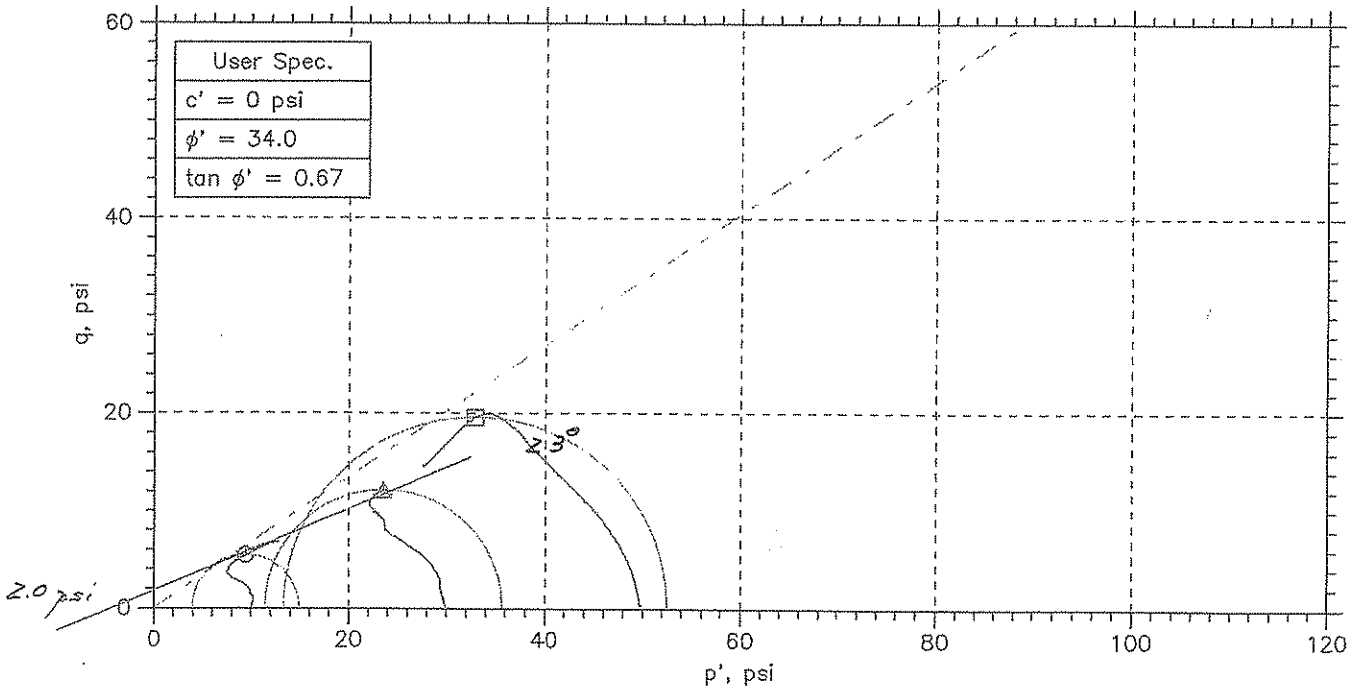
CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



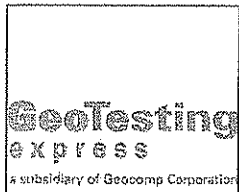
Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	ST-1	CU-5-1	md	05/14/09	jdt		9015-CU-5-1n.dat
△	ST-1	CU-5-2	md	05/14/09	jdt		9015-CU-5-2an.dat
□	ST-2	CU-5-3	md	05/14/09	jdt		9015-CU-5-3n.dat

Geotesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingston Ash Pond		Location: Roane, TN		Project No.: GTX-9015	
	Boring No.: ST-28		Sample Type: core			
	Description: CU-5-1 ST-28 Moist, dark olive gray clay with sand; CU-5-2 ST-28 Moist, dark olive					
	Remarks: gray clay and sand; CU-5-3 ST-28 Moist, yellow and gray silt with clay and sand					

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Symbol	○	△	□	
Sample No.	ST-7	ST-7	ST-7	
Test No.	CU-6-1	CU-6-2	CU-6-3	
Depth	60.2-60.8	60.8-61.4	61.4-62.0	
Initial	Diameter, in	2.88	2.88	2.87
	Height, in	5.95	5.99	6
	Water Content, %	21.5	31.4	43.8
	Dry Density, pcf	103.7	87.45	74.79
	Saturation, %	100.0	96.2	98.0
Before Shear	Void Ratio	0.554	0.842	1.15
	Water Content, %	22.3	26.3	36.5
	Dry Density, pcf	102.3	95.9	83.
	Saturation*, %	100.0	100.0	100.0
Void Ratio	0.575	0.68	0.941	
Back Press., psi	28.	72.98	55.01	
Ver. Eff. Cons. Stress, psi	10.	30.01	49.98	
Shear Strength, psi	6.668	12.2	20.01	
Strain at Failure, %	15	7.6	6.03	
Strain Rate, %/min	0.016	0.016	0.016	
B-Value	0.95	0.95	0.96	
Measured Specific Gravity	2.58	2.58	2.58	
Liquid Limit	36	36	36	
Plastic Limit	19	19	19	

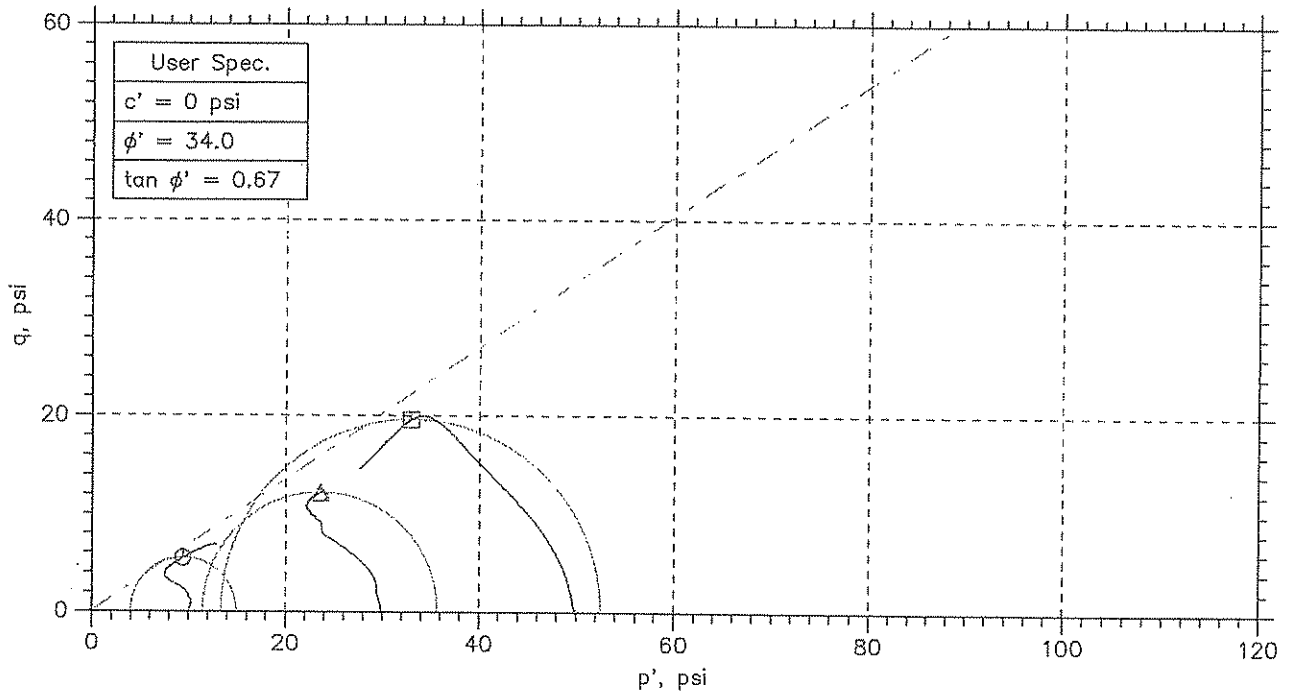
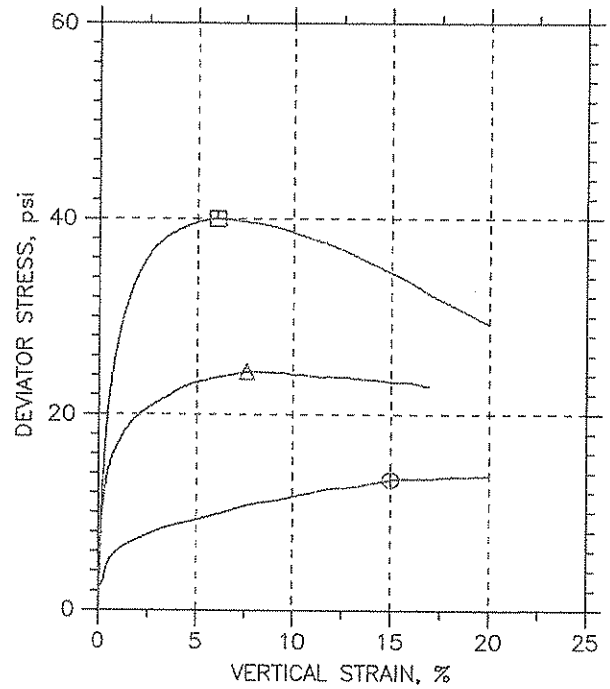
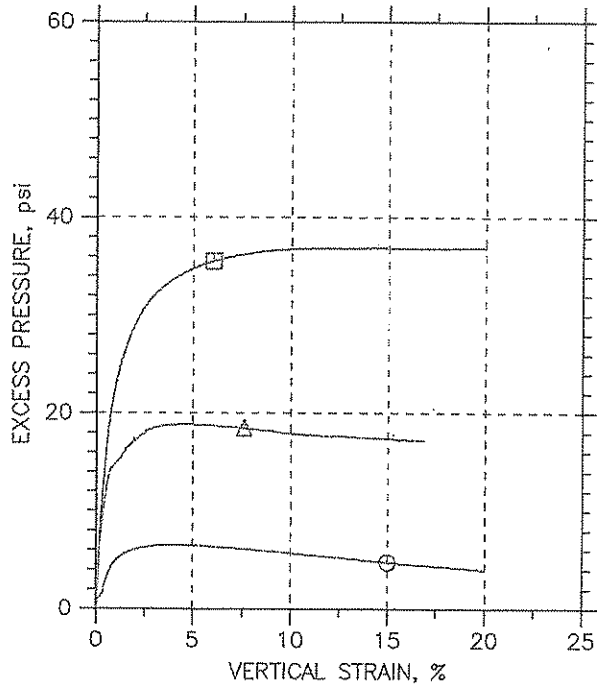


Project: Kingston Ash Pond	
Location: Roane, TN	
Project No.: GTX-9015	
Boring No.: ST-29	
Sample Type: core	
Description: CU-6-1, 6-2 and 6-3 all: Moist, dark olive gray clay	
Remarks:	

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

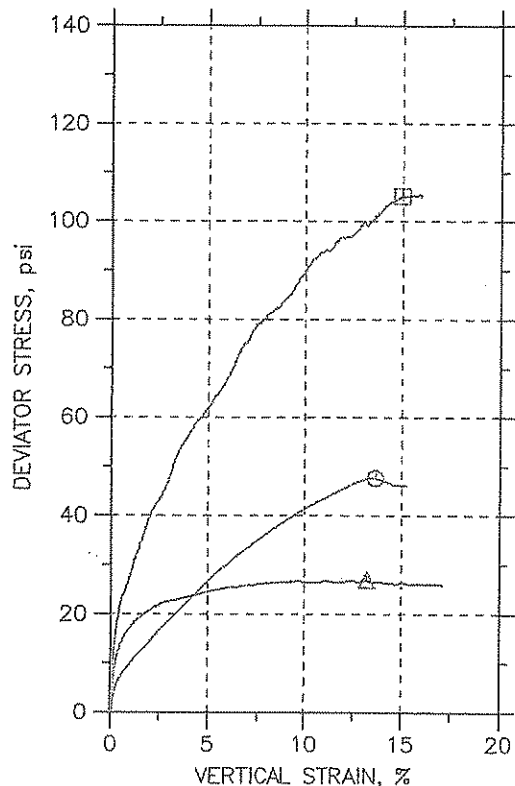
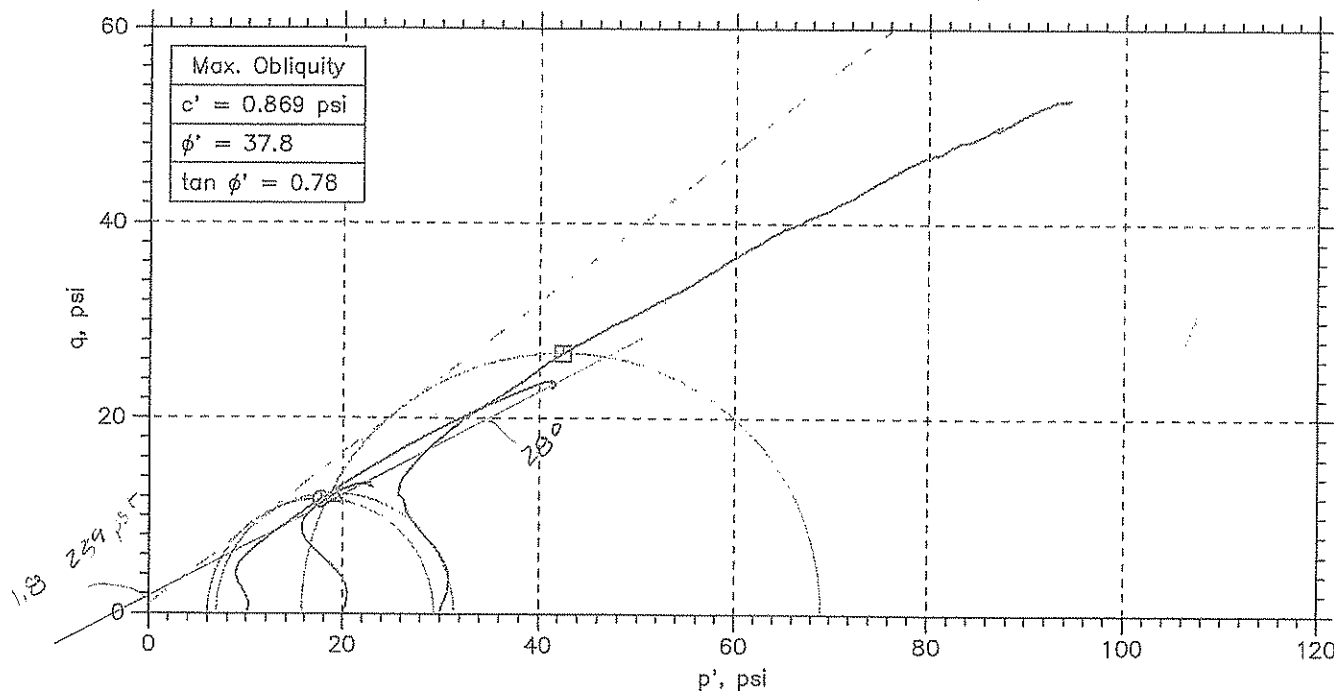


	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	ST-7	CU-6-1	60.2-60.8	md	05/14/09	jdt		9015-CU-6-1n.dat
△	ST-7	CU-6-2	60.8-61.4	md	05/14/09	jdt		9015-CU-6-2n.dat
□	ST-7	CU-6-3	61.4-62.0	md	05/14/09	jdt		9015-CU-6-3n.dat

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Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ST-29	Sample Type: core	
Description: CU-6-1, 6-2 and 6-3 all: Moist, dark olive gray clay		
Remarks:		

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Symbol	⊙	△	□	
Sample No.	335 A	608 B	348	
Test No.	CU-2-1	CU-2-2	CU-2-3	
Depth	20-20.5	20.6-21.1	30.3-30.8	
Initial	Diameter, in	2.81	2.85	2.81
	Height, in	5.71	5.76	5.75
	Water Content, %	28.7	26.2	22.2
	Dry Density, pcf	94.97	98.63	104.
	Saturation, %	100.0	99.9	98.7
	Void Ratio	0.775	0.709	0.597
Before Shear	Water Content, %	24.7	24.3	19.2
	Dry Density, pcf	101.1	101.8	110.
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.667	0.656	0.51
Back Press., psi	51.99	82.	54.99	
Ver. Eff. Cons. Stress, psi	10.01	20.	30.01	
Shear Strength, psi	23.83	13.49	52.61	
Strain at Failure, %	13.7	13.2	15	
Strain Rate, %/min.	0.032	0.032	0.032	
B-Value	0.95	0.96	0.95	
Measured Specific Gravity	---	2.7	2.66	
Liquid Limit	---	37	22	
Plastic Limit	---	19	16	

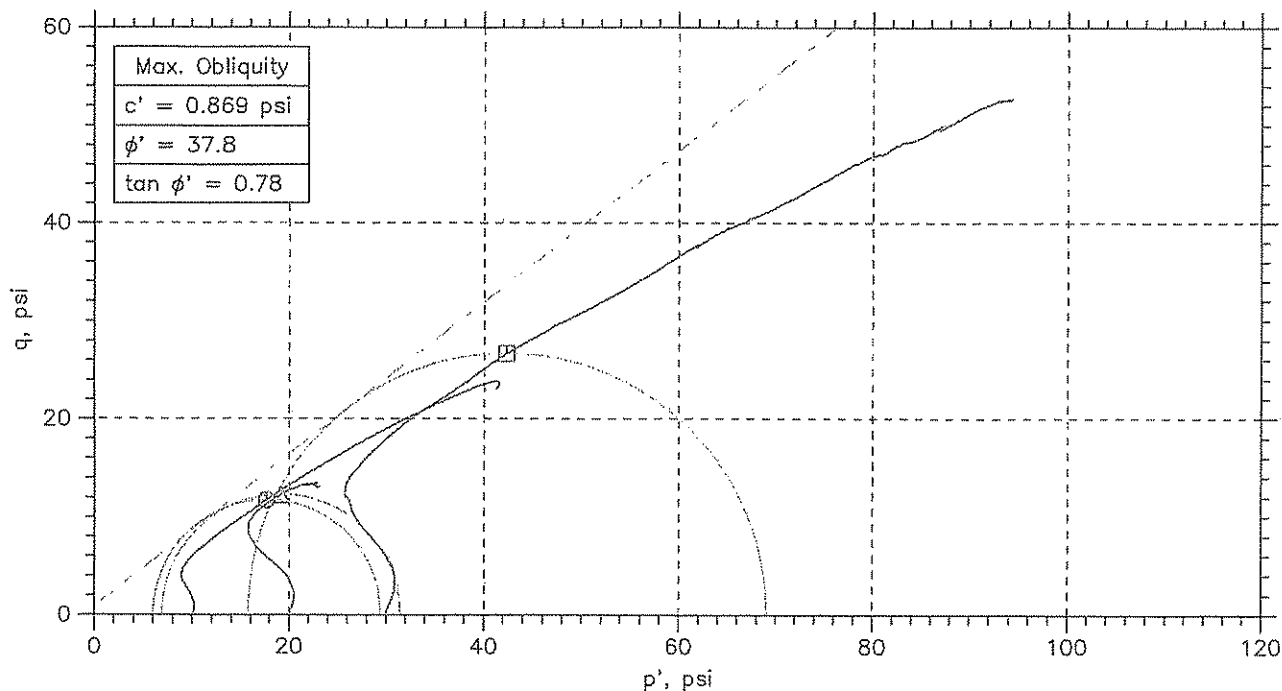
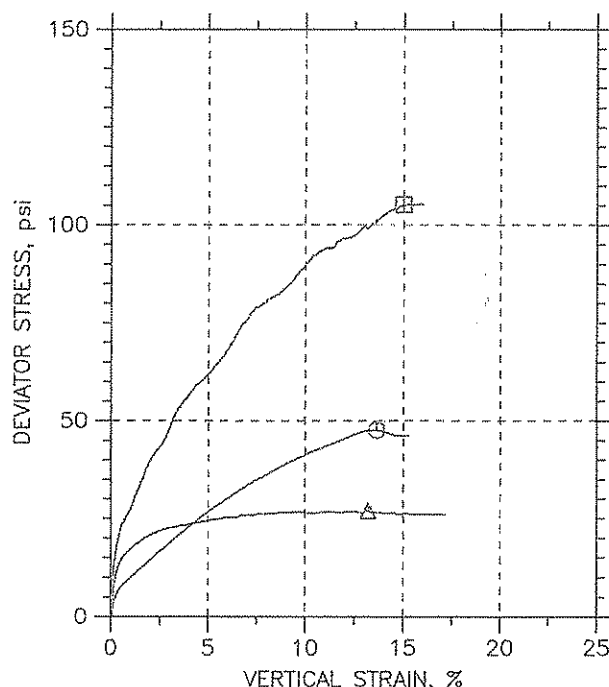
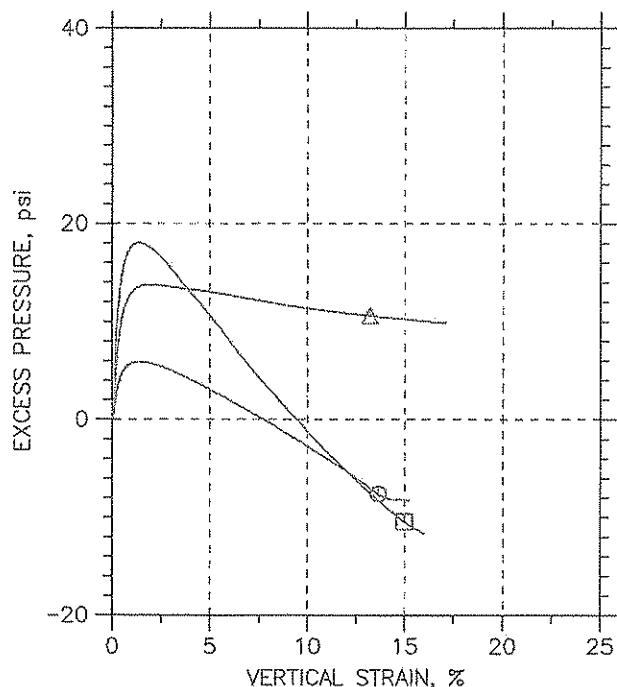


Project: Kingston Ash Pond	
Location: Roane, TN	
Project No.: GTX-9015	
Boring No.: ---	
Sample Type: core	
Description: CU-2-1 STN-26 Moist, dark brown sandy silt; CU-2-2 STN-64 Moist, reddish yellow clay	
Remarks: CU-2-3 STN-27 Moist, olive brown sandy silty clay	

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations.

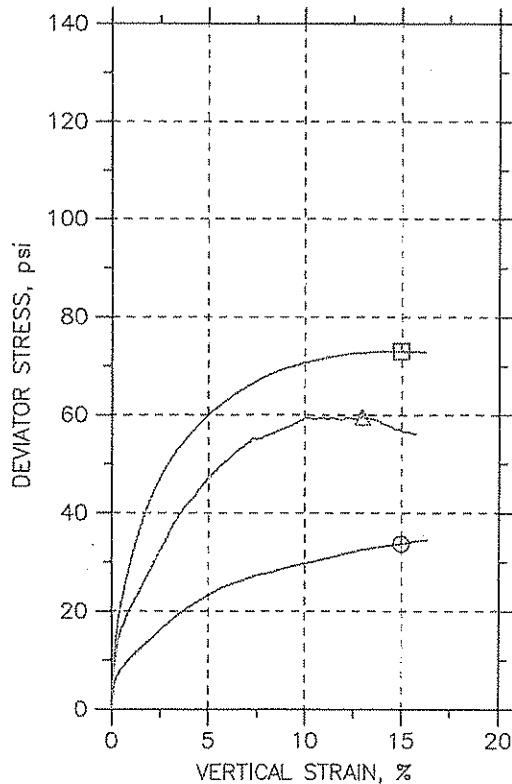
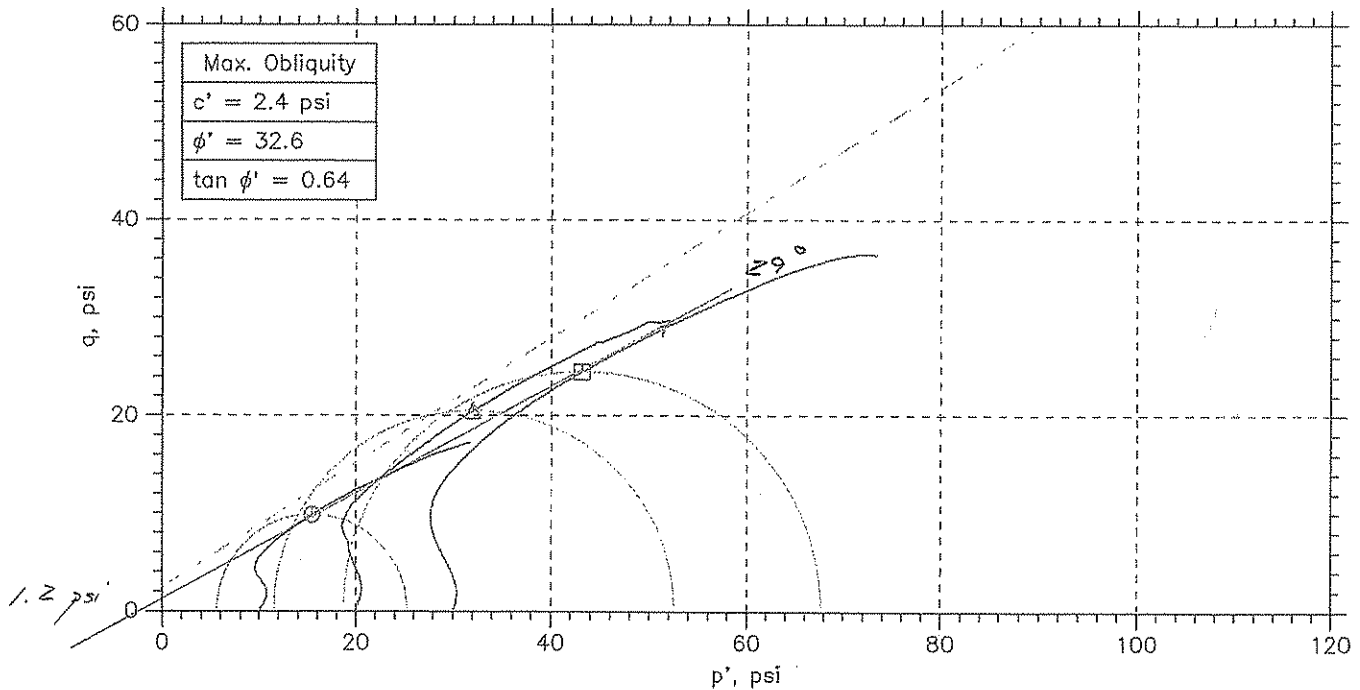
CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Symbol	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	335 A	CU-2-1	20-20.5	md	05/11/09	jdt		9015-CU-2-1n.dat
△	608 B	CU-2-2	20.6-21.1	md	05/11/09	jdt		9015-CU-2-2n.dat
□	348	CU-2-3	30.3-30.8	md	05/11/09	jdt		9015-CU-2-3n.dat

<p style="font-size: small; margin-top: 5px;">a subsidiary of Geocomp Corporation</p>	Project: Kingston Ash Pond		Location: Roane, TN		Project No.: GTX-9015	
	Boring No.: ---		Sample Type: core			
	Description: CU-2-1 STN-26 Moist, dark brown sandy silt; CU-2-2 STN-64 Moist, reddish yellow clay					
	Remarks: CU-2-3 STN-27 Moist, olive brown sandy silty clay					

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



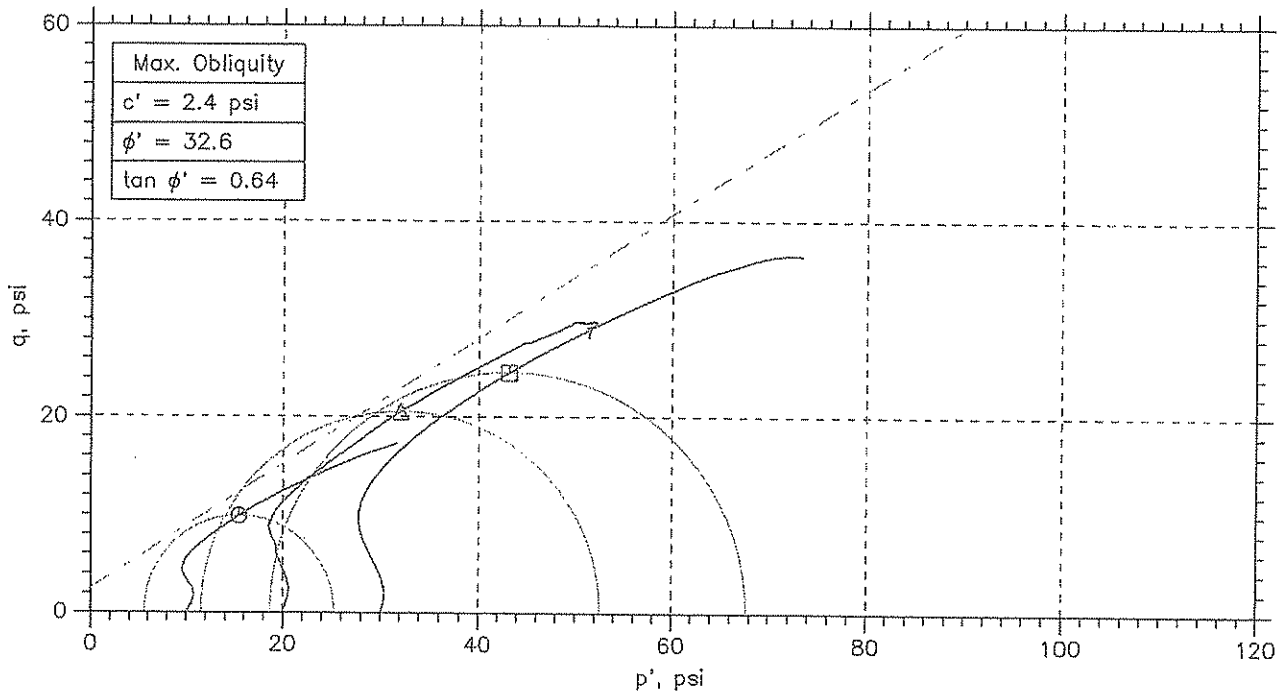
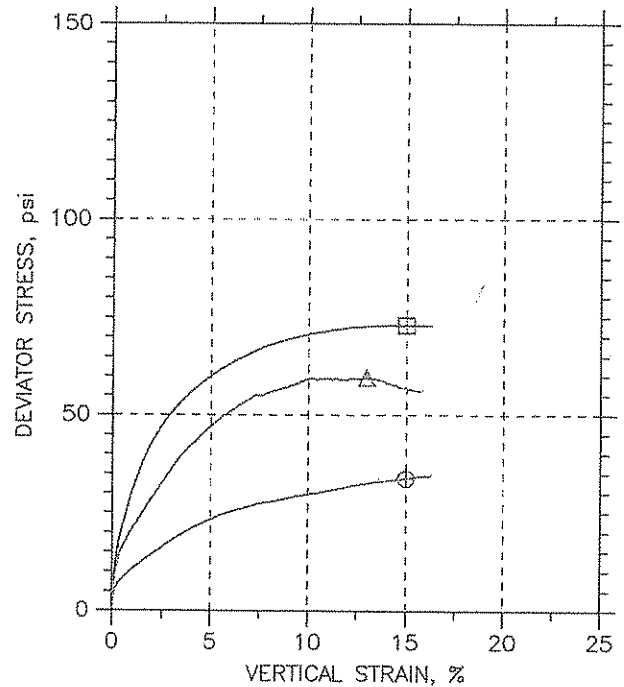
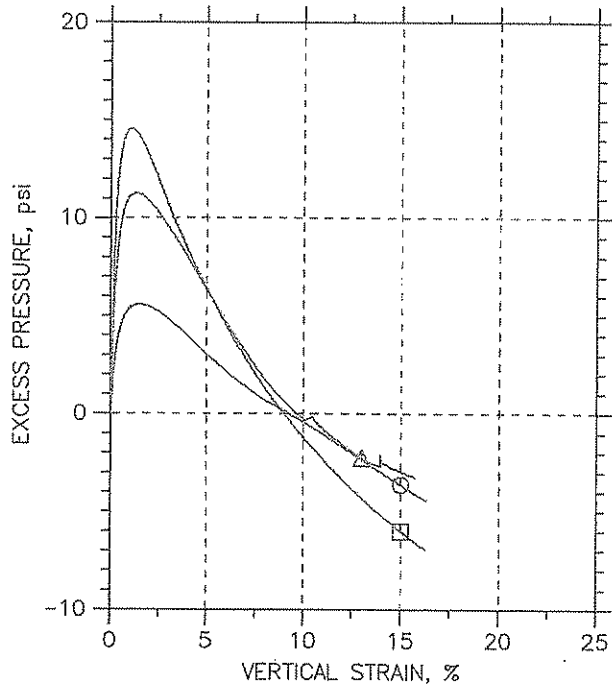
Symbol	⊙	△	□	
Sample No.	340 B	616 A	360 C	
Test No.	CU-1-1	CU-1-2	CU-1-3	
Depth	33.6-34.1	33.6-34.1	50.0-50.5	
Initial	Diameter, in	2.87	2.83	2.87
	Height, in	5.8	5.7	5.78
	Water Content, %	22.9	19.2	20.1
	Dry Density, pcf	104.2	109.	107.8
	Saturation, %	100.0	95.0	96.4
	Void Ratio	0.618	0.547	0.563
Before Shear	Water Content, %	23.2	18.5	19.2
	Dry Density, pcf	103.7	112.4	111.
	Saturation*, %	100.0	100.0	100.0
	Void Ratio	0.625	0.5	0.519
	Back Press., psi	27.99	73.	85.01
Ver. Eff. Cons. Stress, psi	10.	19.99	29.98	
Shear Strength, psi	16.88	29.77	36.54	
Strain at Failure, %	15	13	15	
Strain Rate, %/min	0.032	0.032	0.032	
B-Value	0.99	0.95	0.96	
Estimated Specific Gravity	2.7	2.7	2.7	
Liquid Limit	---	---	---	
Plastic Limit	---	---	---	

 <small>a subsidiary of Geosima Corporation</small>	Project: Kingston Ash Pond	
	Location: Roane, TN	
	Project No.: GTX-9015	
	Boring No.: ---	
	Sample Type: core	
	Description: CU-1-1 STN-31 Moist, yellowish brown sandy silt; CU-1-2 STN-66 Moist, yellowish brown	
Remarks: sandy silt; CU-1-3 STN-32 Moist, brown and gray silty clay with sand		

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations.

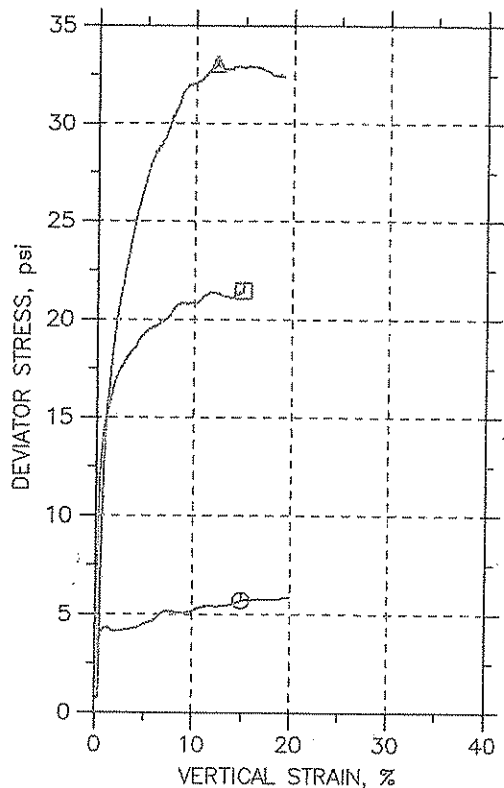
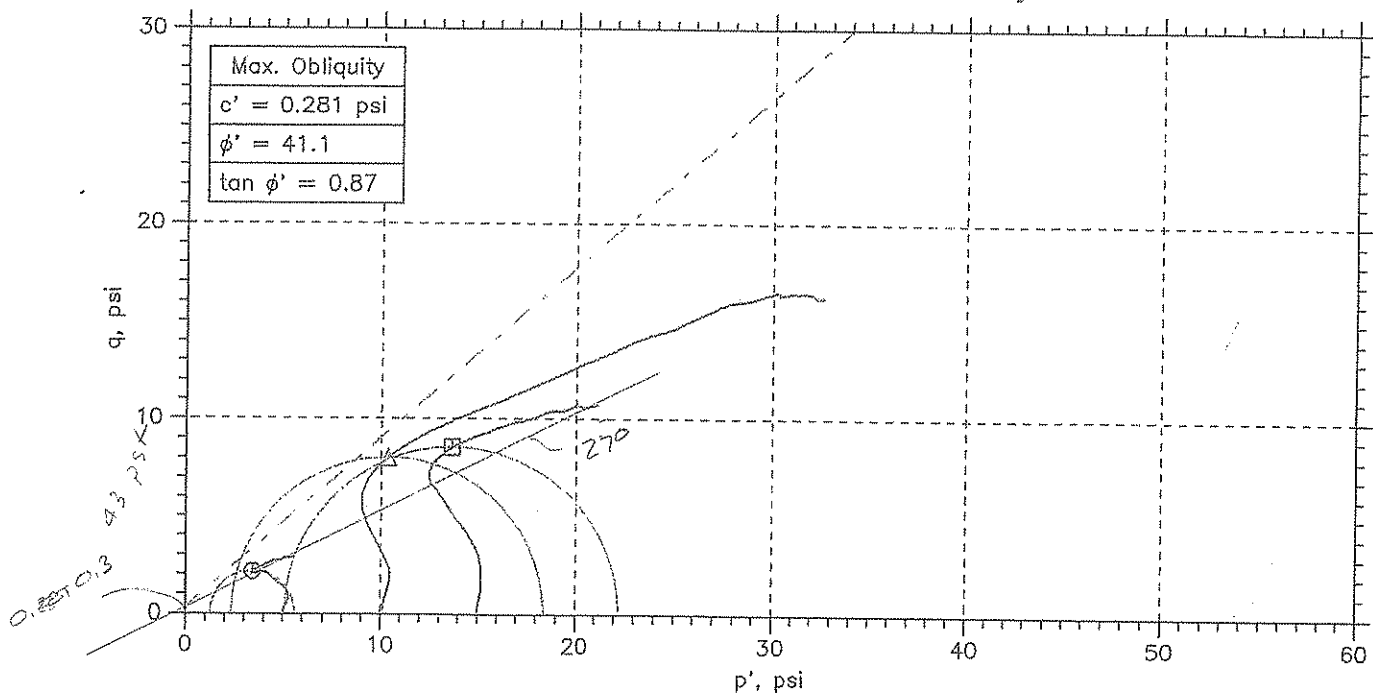
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	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	340 B	CU-1-1	33.6-34.1	md	05/11/09	jdt		9015-CU-1-1n.dat
△	616 A	CU-1-2	33.6-34.1	md	05/11/09	jdt		9015-CU-1-2n.dat
□	360 C	CU-1-3	50.0-50.5	md	05/11/09	jdt		9015-CU-1-3n.dat

GeoTesting express <small>a subsidiary of Geocomp Corporation</small>	Project: Kingston Ash Pond		Location: Roane, TN		Project No.: GTX-9015	
	Boring No.: ---		Sample Type: core			
	Description: CU-1-1 STN-31 Moist, yellowish brown sandy silt; CU-1-2 STN-66 Moist, yellowish brown					
	Remarks: sandy silt; CU-1-3 STN-32 Moist, brown and gray silty clay with sand					

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Symbol	⊙	△	□	
Sample No.	342 A	342 B	343 A	
Test No.	CU-3-1	CU-3-2	CU-3-3	
Depth	13.5-14.0	14.3-14.8	20.0-20.3	
Initial	Diameter, in	2.86	2.87	2.86
	Height, in	5.95	5.79	5.8
	Water Content, %	25.3	19.8	21.8
	Dry Density, pcf	97.83	108.1	105.5
	Saturation, %	94.5	98.1	98.2
Before Shear	Void Ratio	0.723	0.536	0.598
	Water Content, %	25.5	27.9	24.2
	Dry Density, pcf	99.88	95.26	101.9
	Saturation*, %	100.0	100.0	100.0
	Void Ratio	0.688	0.743	0.654
Back Press., psi	133.	100.	132.8	
Ver. Eff. Cons. Stress, psi	5.008	9.994	15.	
Shear Strength, psi	2.863	16.53	10.74	
Strain at Failure, %	15	12.2	15	
Strain Rate, %/min:	0.016	0.016	0.016	
B-Value	0.93	0.95	0.95	
Measured Specific Gravity	---	2.66	---	
Liquid Limit	---	52	---	
Plastic Limit	---	20	---	

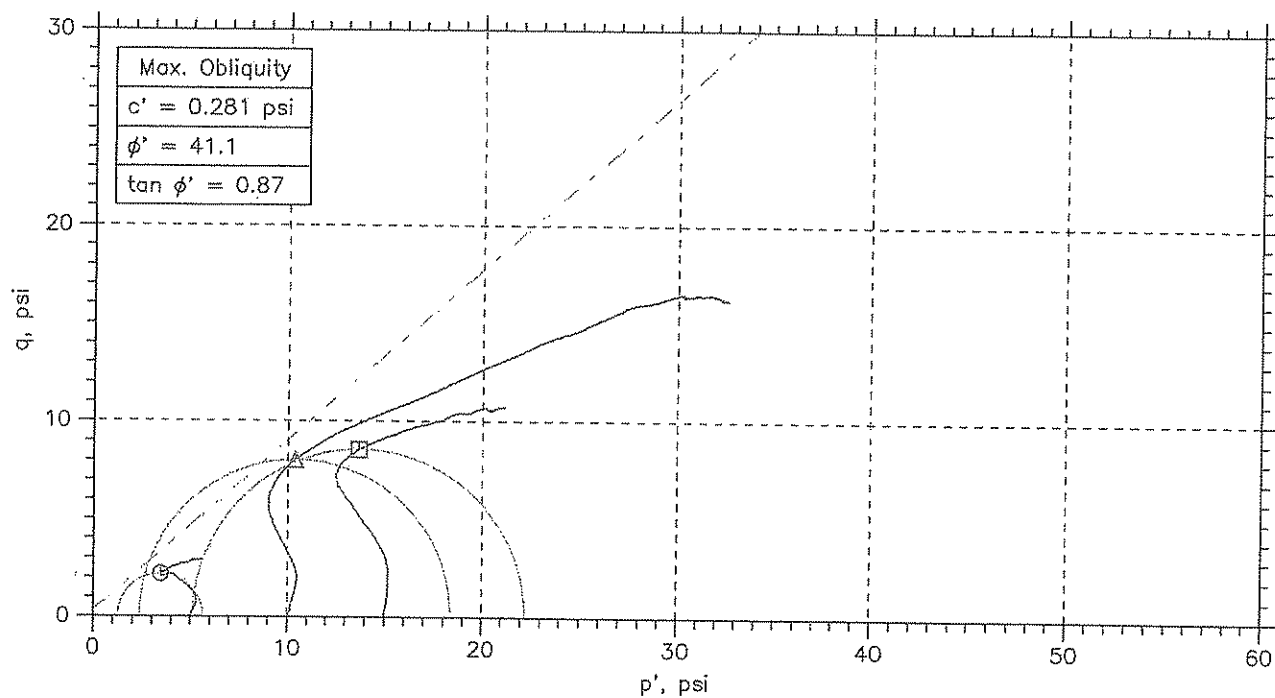
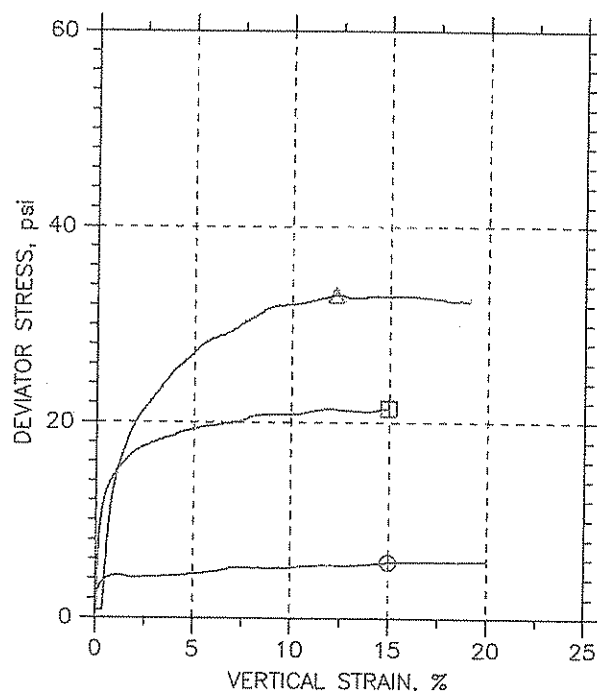
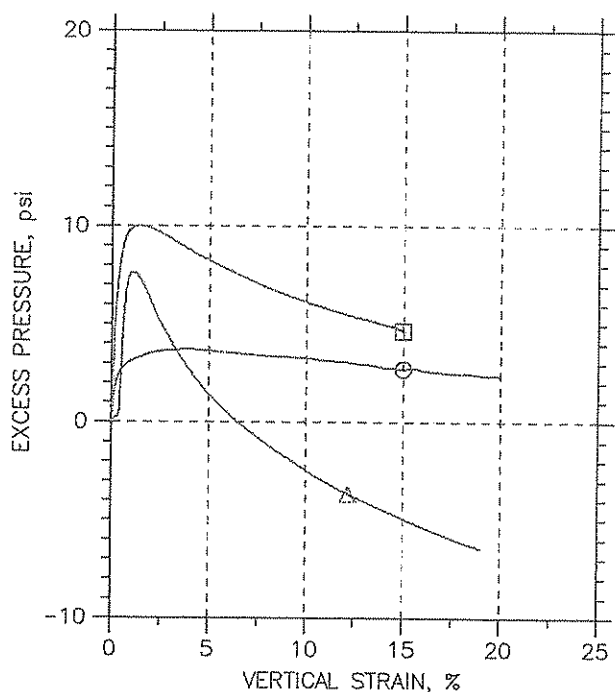
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Project: Kingston Ash Pond	
Location: Roane, TN	
Project No.: GTX-9015	
Boring No.: ---	
Sample Type: core	
Description: CU-3-1 STN-37 Moist, yellowish brown clay with sand and gravel; CU-3-2 STN-37 Moist,	
Remarks: reddish brown clay with sand; CU-3-3 STN-37 Moist, reddish brown clay	

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



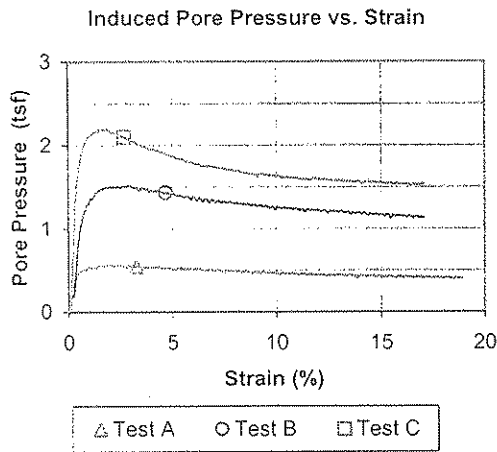
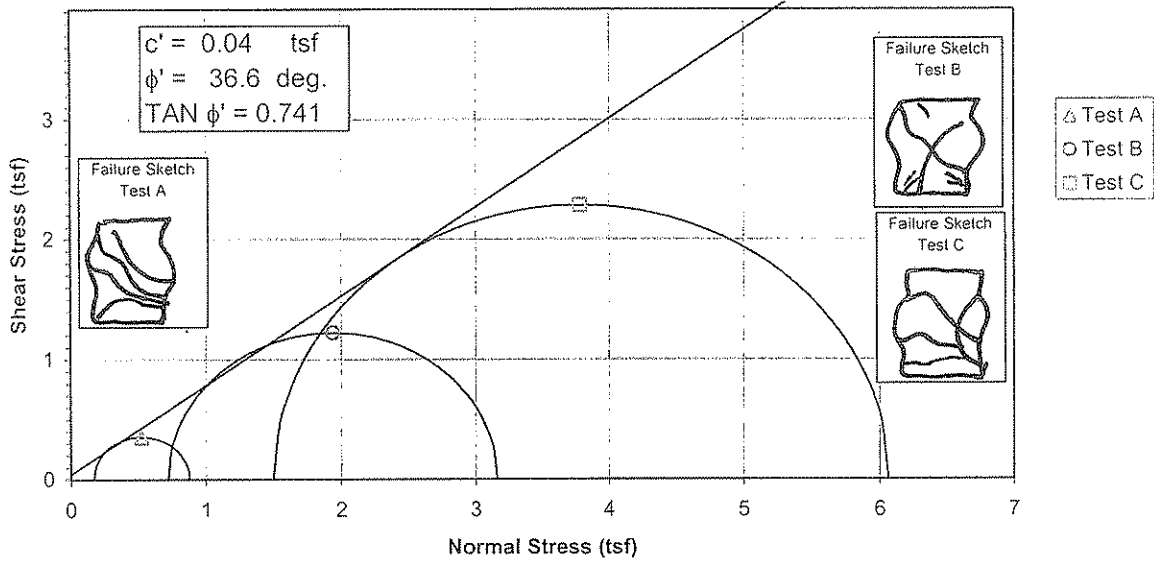
Symbol	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
○	342 A	CU-3-1	13.5-14.0	md	05/12/09	jdt		9015-CU-3-1n.dat
△	342 B	CU-3-2	14.3-14.8	md	05/12/09	jdt		9015-CU-3-2n.dat
□	343 A	CU-3-3	20.0-20.3	md	05/11/09	jdt		9015-CU-3-3n.dat

GeoTesting
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Project: Kingston Ash Pond	Location: Roane, TN	Project No.: GTX-9015
Boring No.: ---	Sample Type: core	
Description: CU-3-1 STN-37 Moist, yellowish brown clay with sand and gravel; CU-3-2 STN-37 Moist, reddish brown clay with sand; CU-3-3 STN-37 Moist, reddish brown clay		

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Specimen No.			A	B	C
Initial Data	Water content %	W_o	25.4	23.7	23.1
	Dry Density PCF	γ_{d_o}	101.1	102.8	102.2
	Saturation %	S_o	105.4	102.3	98.3
	Void Ratio	e_o	0.642	0.616	0.625
After Shear	Water content %	W_f	19.8	19.5	22.0
	Dry Density PCF	γ_{d_f}	108.7	109.3	104.8
	Saturation %	S_f	100.0	100.0	100.0
	Void Ratio	e_f	0.528	0.519	0.585
	Final Back Pressure TSF	u_c	5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$	0.17	0.72	1.50
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$	0.71	2.44	4.57
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	t_f	95.2	338.5	21.1
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$	n/a	n/a	n/a
	Initial Diameter, in.	D_o	2.901	2.901	2.891
	Initial Height, in.	H_o	5.834	5.980	6.067

Controlled - Strain Test			
Description of Specimens		Sandy Lean Clay (CL), brown, moist, soft	
		Type of Specimen	Undisturbed
		Type of test R	
LL 26	PL 17	PI 9	Gs 2.66
Project		Kingston Ash Pond	
Remarks:			
Boring No.		STN-50, STN-51	Sample No. 546
Depth Elev.		20.0'-20.5', 20.5'-21.0', 23.5'-24.0'	
Laboratory		Stantec	Date 6-30-09
TRIAXIAL COMPRESSION TEST REPORT			

Permeability Test Results



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-2, 21.1'-21.6' Test ID 532
 Visual Classification Lean Clay with Sand (CL), brown, moist, firm Prepared By CM
 Undisturbed XX Specific Gravity 2.7 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

Permeant: De-aired tap water

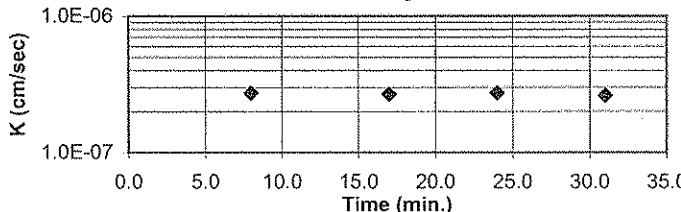
Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4481	2.4151	2.4151	Chamber <u>75</u>
Diameter (in.)	2.8010		2.7894	Influent <u>70</u>
Moisture Content (%)	21.5		20.2	Effluent <u>65</u>
Dry Unit Weight (pcf)	106.4		108.8	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.584		0.550	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	99.2		99.0	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimmings MC (%)	21.5			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-10-09	12:49	72.0	22.06	3.39	0	---	---	---	---
6-10-09	12:57	72.0	21.69	3.79	4.80E+02	2.9E-09	2.9E-07	2.7E-09	2.7E-07
6-10-09	13:06	72.0	21.26	4.21	5.40E+02	2.8E-09	2.8E-07	2.7E-09	2.7E-07
6-10-09	13:13	72.0	20.92	4.54	4.20E+02	2.9E-09	2.9E-07	2.7E-09	2.7E-07
6-10-09	13:20	72.0	20.61	4.87	4.20E+02	2.8E-09	2.8E-07	2.6E-09	2.6E-07

Corrected Permeability vs. Time



A gradient of approximately 56.4 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 2.69E-09 cm/s 2.69E-07
 Average Hydraulic Conductivity @ 20°C (last run) m/s 2.69E-09 cm/s 2.69E-07

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-4, 26.0'-26.5' Test ID 540
 Visual Classification Sandy Lean Clay (CL), brown, moist, firm Prepared By CM
 Undisturbed XX Specific Gravity 2.69 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

Permeant: De-aired tap water

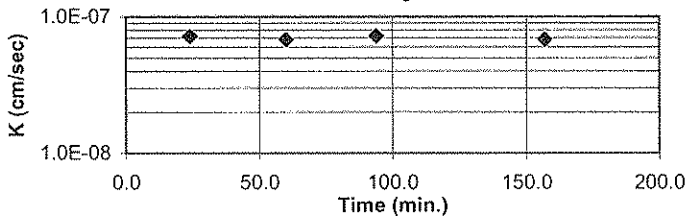
Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4336	2.3625	2.3629	Chamber <u>75</u>
Diameter (in.)	2.8013		2.8004	Influent <u>70</u>
Moisture Content (%)	18.4		16.6	Effluent <u>65</u>
Dry Unit Weight (pcf)	112.6		116.1	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.491		0.447	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	101.1		100.1	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimming MC (%)	19.7			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-11-09	7:44	72.0	22.26	3.20	0	---	---	---	---
6-11-09	8:08	72.0	21.95	3.52	1.44E+03	7.6E-10	7.6E-08	7.2E-10	7.2E-08
6-11-09	8:44	72.0	21.52	3.98	2.16E+03	7.2E-10	7.2E-08	6.8E-10	6.8E-08
6-11-09	9:18	72.0	21.09	4.44	2.04E+03	7.7E-10	7.7E-08	7.3E-10	7.3E-08
6-11-09	10:21	72.0	20.32	5.21	3.78E+03	7.2E-10	7.2E-08	6.8E-10	6.8E-08

Corrected Permeability vs. Time



A gradient of approximately 56.7 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 7.02E-10 cm/s 7.02E-08
 Average Hydraulic Conductivity @ 20°C (last run) m/s 7.02E-10 cm/s 7.02E-08

Reviewed by: _____



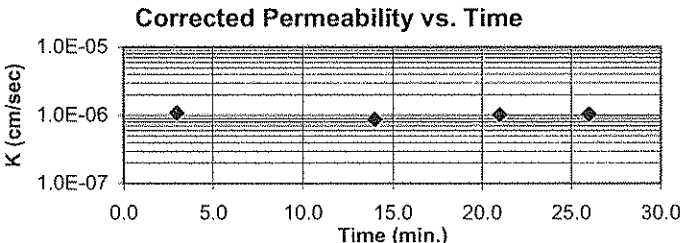
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-5, 39.1'-39.6' Test ID 544
 Visual Classification Sandy Lean Clay (CL), light brown, wet, soft Prepared By CM
 Undisturbed XX Specific Gravity 2.67 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4178	2.3717	2.3719	Chamber <u>75</u>
Diameter (in.)	2.7913		2.8035	Influent <u>70</u>
Moisture Content (%)	23.0		20.5	Effluent <u>65</u>
Dry Unit Weight (pcf)	107.4		108.5	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.552		0.536	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	111.1		102.0	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimming MC (%)	21.9			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-10-09	12:52	72.0	13.82	11.73	0	---	---	---	---
6-10-09	12:55	72.0	13.65	11.86	1.80E+02	1.2E-08	1.2E-06	1.1E-08	1.1E-06
6-10-09	13:06	72.0	13.23	12.32	6.60E+02	9.2E-09	9.2E-07	8.8E-09	8.8E-07
6-10-09	13:13	72.0	12.93	12.67	4.20E+02	1.1E-08	1.1E-06	1.0E-08	1.0E-06
6-10-09	13:18	72.0	12.65	12.86	3.00E+02	1.1E-08	1.1E-06	1.0E-08	1.0E-06



A gradient of approximately 57.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 1.01E-08 cm/s 1.01E-06
 Average Hydraulic Conductivity @ 20°C (last run) m/s 1.01E-08 cm/s 1.01E-06

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

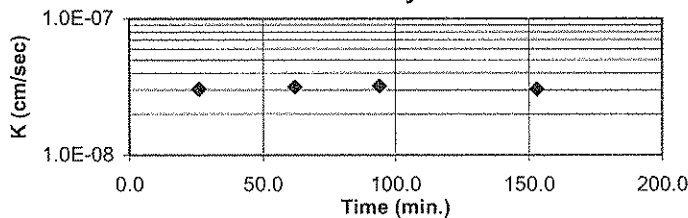
Project Name Kingston Ash Pond Project No. 175569042
 Source STN-8, 9.0'-9.5' Test ID 554
 Visual Classification Lean Clay (CL), brown, moist, firm Prepared By CM
 Undisturbed XX Specific Gravity 2.69 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4595	2.4449	2.4449	Chamber <u>75</u>
Diameter (in.)	2.8013		2.7987	Influent <u>70</u>
Moisture Content (%)	22.9		22.9	Effluent <u>65</u>
Dry Unit Weight (pcf)	103.2		104.0	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.627		0.614	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	98.3		100.3	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimmings MC (%)	21.3			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-11-09	7:43	72.0	22.05	3.47	0	---	---	---	---
6-11-09	8:09	72.0	21.91	3.61	1.56E+03	3.2E-10	3.2E-08	3.1E-10	3.1E-08
6-11-09	8:45	72.0	21.71	3.81	2.16E+03	3.3E-10	3.3E-08	3.2E-10	3.2E-08
6-11-09	9:17	72.0	21.55	4.01	1.92E+03	3.4E-10	3.4E-08	3.2E-10	3.2E-08
6-11-09	10:16	72.0	21.22	4.31	3.54E+03	3.2E-10	3.2E-08	3.1E-10	3.1E-08

Corrected Permeability vs. Time



A gradient of approximately 56.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 3.12E-10 cm/s 3.12E-08
 Average Hydraulic Conductivity @ 20°C (last run) m/s 3.12E-10 cm/s 3.12E-08

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 175569042
 Source STN-8, 16.1'-16.6' Test ID 556
 Visual Classification Sandy Lean Clay (CL), brown, moist, firm Prepared By CM
 Undisturbed XX Specific Gravity 2.69 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

Permeant: De-aired tap water

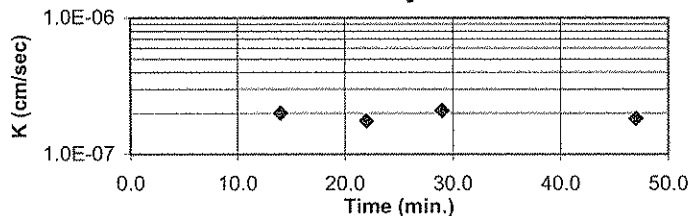
Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4430	2.3759	2.3759	Chamber	75
Diameter (in.)	2.8023		2.8074	Influent	70
Moisture Content (%)	18.8		17.2	Effluent	65
Dry Unit Weight (pcf)	111.3		114.1	Applied Head Difference (psi)	5
Void Ratio	0.508		0.472	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	99.3		98.1	Maximum Effective Consolidation Stress (psi)	10
Trimmings MC (%)	21.0			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-10-09	12:53	72.0	22.26	3.16	0	---	---	---	---
6-10-09	13:07	72.0	21.79	3.71	8.40E+02	2.1E-09	2.1E-07	2.0E-09	2.0E-07
6-10-09	13:15	72.0	21.54	3.97	4.80E+02	1.9E-09	1.9E-07	1.8E-09	1.8E-07
6-10-09	13:22	72.0	21.30	4.26	4.20E+02	2.2E-09	2.2E-07	2.1E-09	2.1E-07
6-10-09	13:40	72.0	20.74	4.88	1.08E+03	1.9E-09	1.9E-07	1.8E-09	1.8E-07

Corrected Permeability vs. Time



A gradient of approximately 56.5 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 1.92E-09 cm/s 1.92E-07
 Average Hydraulic Conductivity @ 20°C (last run) m/s 1.92E-09 cm/s 1.92E-07

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

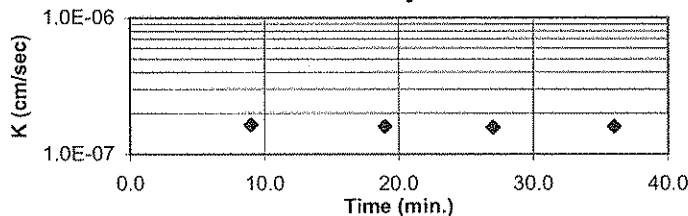
Project Name Kingston Ash Pond Project No. 175569042
 Source STN-15, 12.0'-12.5' Test ID 511
 Visual Classification Gravelly Fat Clay (CH), red brown, moist, firm Prepared By CM
 Undisturbed XX Specific Gravity 2.71 ASTM D854-A Date 6-5-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4819	2.4387	2.4387	Chamber <u>75</u>
Diameter (in.)	2.8047		2.7942	Influent <u>70</u>
Moisture Content (%)	27.7		29.6	Effluent <u>65</u>
Dry Unit Weight (pcf)	90.8		93.1	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.864		0.817	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	87.0		98.3	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimmings MC (%)	32.2			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
6-10-09	12:46	72.0	22.34	3.26	0	---	---	---	---
6-10-09	12:55	72.0	22.10	3.54	5.40E+02	1.7E-09	1.7E-07	1.6E-09	1.6E-07
6-10-09	13:05	72.0	21.83	3.83	6.00E+02	1.7E-09	1.7E-07	1.6E-09	1.6E-07
6-10-09	13:13	72.0	21.61	4.05	4.80E+02	1.7E-09	1.7E-07	1.6E-09	1.6E-07
6-10-09	13:22	72.0	21.38	4.32	5.40E+02	1.7E-09	1.7E-07	1.6E-09	1.6E-07

Corrected Permeability vs. Time



A gradient of approximately 55.6 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 1.60E-09 cm/s 1.60E-07
 Average Hydraulic Conductivity @ 20°C (last run) m/s 1.60E-09 cm/s 1.60E-07

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-26 / ST-2, 20.0'-20.5' Test ID 335A
 Visual Classification Gravelly Lean Clay (CL), brown, wet, soft Prepared By KDG
 Undisturbed XX Specific Gravity 2.72 ASTM D854-A Date 5-11-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

Permeant: De-aired tap water

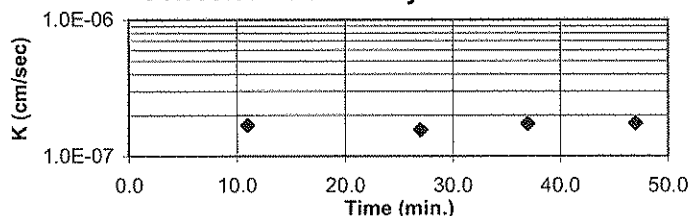
Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4529	2.3547	2.3547	Chamber <u>75</u>
Diameter (in.)	2.8060		2.7790	Influent <u>70</u>
Moisture Content (%)	24.0		22.1	Effluent <u>65</u>
Dry Unit Weight (pcf)	99.4		105.5	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.709		0.609	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	92.0		98.9	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimmings MC (%)	23.5			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-14-09	12:49	70.0	22.12	3.06	0	---	---	---	---
5-14-09	13:00	70.0	21.82	3.41	6.60E+02	1.7E-09	1.7E-07	1.7E-09	1.7E-07
5-14-09	13:16	70.0	21.38	3.84	9.60E+02	1.6E-09	1.6E-07	1.6E-09	1.6E-07
5-14-09	13:26	70.0	21.08	4.14	6.00E+02	1.8E-09	1.8E-07	1.7E-09	1.7E-07
5-14-09	13:36	70.0	20.78	4.44	6.00E+02	1.8E-09	1.8E-07	1.7E-09	1.7E-07

Corrected Permeability vs. Time



A gradient of approximately 56.3 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) _____
 Average Hydraulic Conductivity @ 20°C (last run) _____

m/s 1.67E-09
 m/s 1.67E-09

cm/s 1.67E-07
 cm/s 1.67E-07

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

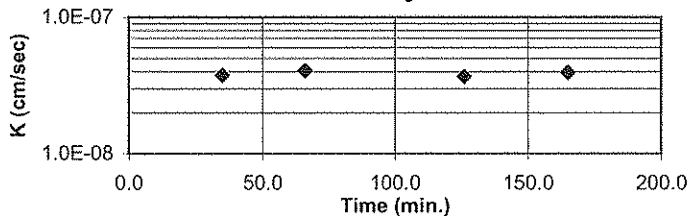
Project Name Kingston Ash Pond Project No. 171468117
 Source STN-27, 19.0'-19.5' Test ID 347
 Visual Classification Fat Clay with Gravel, red brown, moist, firm Prepared By RC
 Undisturbed XX Specific Gravity 2.73 ASTM D854-A Date 5-12-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4305	2.4040	2.4099	Chamber <u>75</u>
Diameter (in.)	2.7933		2.7741	Influent <u>70</u>
Moisture Content (%)	29.5		29.9	Effluent <u>65</u>
Dry Unit Weight (pcf)	91.7		93.7	Applied Head Difference (psi) <u>5</u>
Void Ratio	0.859		0.818	Back Pressure Saturated to (psi) <u>65</u>
Degree of Saturation (%)	93.7		99.8	Maximum Effective Consolidation Stress (psi) <u>10</u>
Trimmings MC (%)	31.5			Minimum Effective Consolidation Stress (psi) <u>5</u>

Date	Clock (24H:M)	Temp. F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-15-09	7:47	70.0	22.04	3.35	0	---	---	---	---
5-15-09	8:22	70.0	21.81	3.57	2.10E+03	3.9E-10	3.9E-08	3.8E-10	3.8E-08
5-15-09	8:53	70.0	21.60	3.79	1.86E+03	4.2E-10	4.2E-08	4.1E-10	4.1E-08
5-15-09	9:53	70.0	21.23	4.17	3.60E+03	3.8E-10	3.8E-08	3.7E-10	3.7E-08
5-15-09	10:32	70.0	20.98	4.44	2.34E+03	4.0E-10	4.0E-08	3.9E-10	3.9E-08

Corrected Permeability vs. Time



A gradient of approximately 56.8 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 3.86E-10 cm/s 3.86E-08
 Average Hydraulic Conductivity @ 20°C (last run) m/s 3.86E-10 cm/s 3.86E-08

Reviewed by: _____



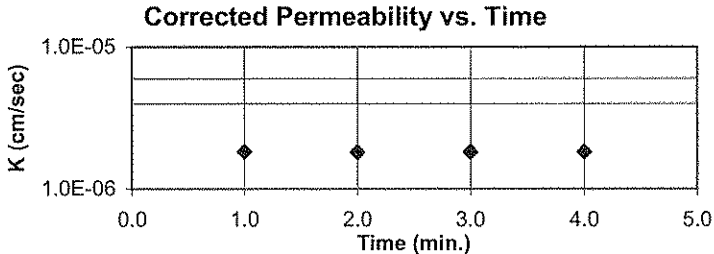
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-27, 44.1'-44.6' Test ID 349A
 Visual Classification Sandy Lean Clay (CL), light brown, moist, firm Prepared By RC
 Undisturbed XX Specific Gravity 2.7 ASTM D854-A Date 5-12-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4495	2.4416	2.4416	Chamber	75
Diameter (in.)	2.7817		2.7532	Influent	70
Moisture Content (%)	20.4		19.1	Effluent	65
Dry Unit Weight (pcf)	107.8		110.4	Applied Head Difference (psi)	5
Void Ratio	0.563		0.527	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	97.9		97.9	Maximum Effective Consolidation Stress (psi)	10
Trimmings MC (%)	20.5			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-14-09	11:03	70.0	22.03	3.61	0	---	---	---	---
5-14-09	11:04	70.0	21.72	3.91	6.00E+01	1.9E-08	1.9E-06	1.8E-08	1.8E-06
5-14-09	11:05	70.0	21.42	4.21	6.00E+01	1.9E-08	1.9E-06	1.8E-08	1.8E-06
5-14-09	11:06	70.0	21.12	4.51	6.00E+01	1.9E-08	1.9E-06	1.8E-08	1.8E-06
5-14-09	11:07	70.0	20.82	4.81	6.00E+01	1.9E-08	1.9E-06	1.8E-08	1.8E-06



A gradient of approximately 56.3 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 1.82E-08 cm/s 1.82E-06
 Average Hydraulic Conductivity @ 20°C (last run) m/s 1.82E-08 cm/s 1.82E-06

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

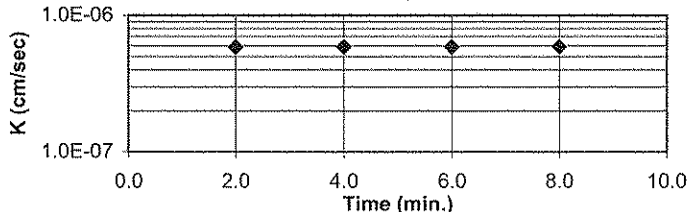
Project Name Kingston Ash Pond Project No. 171468117
 Source STN-31 / ST-4, 38.8'-39.3' Test ID 341B
 Visual Classification Lean Clay (CL), brown, moist, firm Prepared By RC
 Undisturbed XX Specific Gravity 2.71 ASTM D854-A Date 5-11-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)
Height (in.)	2.4510	2.4217	2.4216	Chamber 75
Diameter (in.)	2.7990		2.7788	Influent 70
Moisture Content (%)	24.1		23.9	Effluent 65
Dry Unit Weight (pcf)	100.1		102.8	Applied Head Difference (psi) 5
Void Ratio	0.690		0.646	Back Pressure Saturated to (psi) 65
Degree of Saturation (%)	94.5		100.3	Maximum Effective Consolidation Stress (psi) 10
Trimmings MC (%)	24.3			Minimum Effective Consolidation Stress (psi) 5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-14-09	10:41	70.0	21.90	3.73	0	---	---	---	---
5-14-09	10:43	70.0	21.70	3.93	1.20E+02	6.0E-09	6.0E-07	5.8E-09	5.8E-07
5-14-09	10:45	70.0	21.50	4.13	1.20E+02	6.0E-09	6.0E-07	5.9E-09	5.9E-07
5-14-09	10:47	70.0	21.30	4.33	1.20E+02	6.0E-09	6.0E-07	5.9E-09	5.9E-07
5-14-09	10:49	70.0	21.11	4.54	1.20E+02	6.1E-09	6.1E-07	5.9E-09	5.9E-07

Corrected Permeability vs. Time



A gradient of approximately 56.3 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 5.88E-09 cm/s 5.88E-07
 Average Hydraulic Conductivity @ 20°C (last run) m/s 5.88E-09 cm/s 5.88E-07

Reviewed by: _____



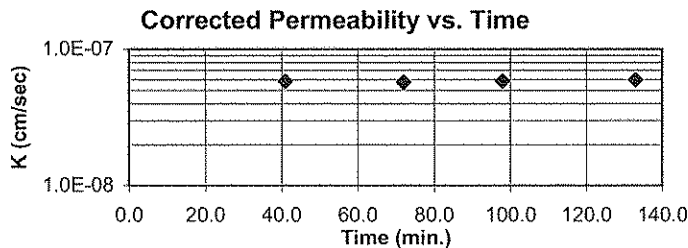
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-32, 14.0'-14.5' Test ID 359
 Visual Classification Fat Clay with Gravel (CH), red brown, moist, firm Prepared By RC
 Undisturbed XX Specific Gravity 2.75 ASTM D854-A Date 5-12-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4620	2.4466	2.4468	Chamber	75
Diameter (in.)	2.7920		2.7829	Influent	70
Moisture Content (%)	27.5		28.4	Effluent	65
Dry Unit Weight (pcf)	94.8		96.0	Applied Head Difference (psi)	5
Void Ratio	0.810		0.788	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	93.2		99.1	Maximum Effective Consolidation Stress (psi)	10
Trimming MC (%)	27.7			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-15-09	7:40	70.0	22.11	3.52	0	---	---	---	---
5-15-09	8:21	70.0	21.71	3.93	2.46E+03	6.0E-10	6.0E-08	5.8E-10	5.8E-08
5-15-09	8:52	70.0	21.40	4.22	1.86E+03	5.9E-10	5.9E-08	5.7E-10	5.7E-08
5-15-09	9:18	70.0	21.14	4.47	1.56E+03	6.0E-10	6.0E-08	5.8E-10	5.8E-08
5-15-09	9:53	70.0	20.81	4.84	2.10E+03	6.1E-10	6.1E-08	6.0E-10	6.0E-08



A gradient of approximately 56.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 5.85E-10 cm/s 5.85E-08
 Average Hydraulic Conductivity @ 20°C (last run) m/s 5.85E-10 cm/s 5.85E-08

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

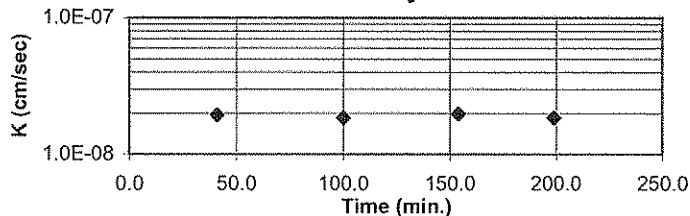
Project Name Kingston Ash Pond Project No. 171468117
 Source STN-36 / ST-2, 29.6'-30.1' Test ID 337B
 Visual Classification Lean Clay with Sand (CL), light brown, moist, soft Prepared By KDG
 Undisturbed XX Specific Gravity 2.7 ASTM D854-A Date 5-11-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____
 Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4708	2.3994	2.4061	Chamber	75
Diameter (in.)	2.7753		2.7576	Influent	70
Moisture Content (%)	24.8		22.4	Effluent	65
Dry Unit Weight (pcf)	100.5		104.6	Applied Head Difference (psi)	5
Void Ratio	0.677		0.612	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	99.0		98.8	Maximum Effective Consolidation Stress (psi)	10
Trimmings MC (%)	24.6			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-15-09	10:05	70.0	22.24	3.43	0	---	---	---	---
5-15-09	10:46	70.0	22.10	3.56	2.46E+03	2.0E-10	2.0E-08	1.9E-10	1.9E-08
5-15-09	11:45	70.0	21.93	3.76	3.54E+03	1.9E-10	1.9E-08	1.9E-10	1.9E-08
5-15-09	12:39	70.0	21.80	3.99	3.24E+03	2.0E-10	2.0E-08	2.0E-10	2.0E-08
5-15-09	13:24	70.0	21.67	4.14	2.70E+03	1.9E-10	1.9E-08	1.8E-10	1.8E-08

Corrected Permeability vs. Time



A gradient of approximately 55.9 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations) m/s 1.91E-10 cm/s 1.91E-08
 Average Hydraulic Conductivity @ 20°C (last run) m/s 1.91E-10 cm/s 1.91E-08

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-48, 5.1'-5.6' Test ID 351B
 Visual Classification Fat Clay with Gravel (CH), red brown, moist, firm Prepared By RC
 Undisturbed XX Specific Gravity 2.75 ASTM D854-A Date 5-12-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

Permeant: De-aired tap water

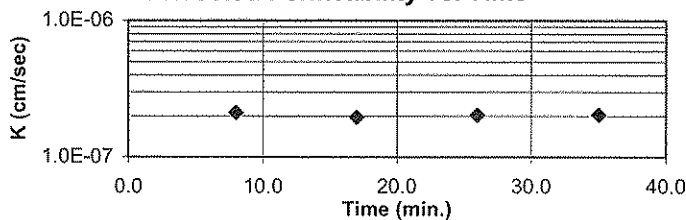
Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4570	2.4570	2.4572	Chamber	75
Diameter (in.)	2.8023		2.8009	Influent	70
Moisture Content (%)	27.9		29.4	Effluent	65
Dry Unit Weight (pcf)	94.8		94.9	Applied Head Difference (psi)	5
Void Ratio	0.812		0.810	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	94.5		99.7	Maximum Effective Consolidation Stress (psi)	10
Trimmings MC (%)	28.4			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-14-09	13:29	70.0	21.79	2.34	0	---	---	---	---
5-14-09	13:37	70.0	21.51	2.64	4.80E+02	2.2E-09	2.2E-07	2.1E-09	2.1E-07
5-14-09	13:46	70.0	21.21	2.94	5.40E+02	2.0E-09	2.0E-07	2.0E-09	2.0E-07
5-14-09	13:55	70.0	20.90	3.25	5.40E+02	2.1E-09	2.1E-07	2.0E-09	2.0E-07
5-14-09	14:04	70.0	20.59	3.56	5.40E+02	2.1E-09	2.1E-07	2.0E-09	2.0E-07

Corrected Permeability vs. Time



A gradient of approximately 56.2 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations)

m/s 2.04E-09

cm/s 2.04E-07

Average Hydraulic Conductivity @ 20°C (last run)

m/s 2.04E-09

cm/s 2.04E-07

Reviewed by: _____



Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Kingston Ash Pond Project No. 171468117
 Source STN-48, 34.1'-34.6' Test ID 354B
 Visual Classification Sandy Lean Clay (CL), light brown, moist, soft Prepared By RC
 Undisturbed XX Specific Gravity 2.69 ASTM D854-A Date 5-12-09
 Maximum Dry Density (pcf) _____ Percent of Maximum _____

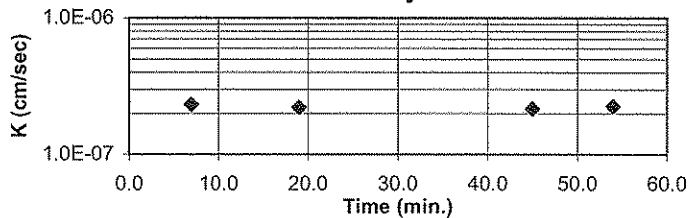
Permeant: De-aired tap water
 Selection and Preparation Comments: _____

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4510	2.1745	2.1743	Chamber	75
Diameter (in.)	2.8010		2.8701	Influent	70
Moisture Content (%)	20.8		16.2	Effluent	65
Dry Unit Weight (pcf)	107.8		115.8	Applied Head Difference (psi)	5
Void Ratio	0.558		0.451	Back Pressure Saturated to (psi)	65
Degree of Saturation (%)	100.2		96.9	Maximum Effective Consolidation Stress (psi)	10
Trimmings MC (%)	19.9			Minimum Effective Consolidation Stress (psi)	5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity			
						k (m/s)	k (cm/s)	k @ 20°C (m/s)	k @ 20°C (cm/s)
5-18-09	10:31	70.0	22.10	3.53	0	---	---	---	---
5-18-09	10:38	70.0	21.80	3.89	4.20E+02	2.4E-09	2.4E-07	2.3E-09	2.3E-07
5-18-09	10:50	70.0	21.30	4.46	7.20E+02	2.3E-09	2.3E-07	2.2E-09	2.2E-07
5-18-09	11:16	70.0	20.25	5.65	1.56E+03	2.2E-09	2.2E-07	2.2E-09	2.2E-07
5-18-09	11:25	70.0	19.81	6.01	5.40E+02	2.3E-09	2.3E-07	2.3E-09	2.3E-07

Corrected Permeability vs. Time



A gradient of approximately 56.3 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20°C (last 4 determinations)

m/s 2.24E-09

cm/s 2.24E-07

Average Hydraulic Conductivity @ 20°C (last run)

m/s 2.24E-09

cm/s 2.24E-07

Reviewed by: _____

Appendix F

Boring Layout, Stability
Sections, Profile Sheets
and Logs of Borings

BORING	NORTHING	EASTING	ELEV. (FT.)	BORING TYPE
STN-2	556.804.57	2,442.329.32	751.2	Sample
STN-2A	556.806.57	2,442.329.32	751.2	PZ-1
STN-2B	556.801.25	2,442.323.04	751.0	Cone Penetration Test
STN-3	556.756.78	2,442.263.59	763.7	Sample
STN-3A	556.761.99	2,442.259.75	763.9	PZ-1, PZ-2
STN-3B	556.765.05	2,442.259.36	763.8	Sample
STN-3C	556.763.50	2,442.257.42	763.8	Sample
STN-3D	556.762.50	2,442.258.42	763.8	Sample
STN-3E	556.764.10	2,442.259.45	763.8	Cone Penetration Test
STN-4	556.625.96	2,442.047.01	763.3	Sample and Core
STN-5	556.611.15	2,442.365.31	764.9	Sample
STN-6	556.416.17	2,442.407.10	763.4	Sample
STN-8	556.248.52	2,442.540.30	752.2	Sample and Core / Slope Inclinator
STN-8A	556.254.96	2,442.535.17	751.7	Cone Penetration Test
STN-9	556.233.82	2,442.799.72	764.8	Sample
STN-9A	556.234.82	2,442.499.81	764.8	Cone Penetration Test
STN-10	556.162.76	2,442.251.83	765.0	Sample and Core
STN-11	556.034.83	2,442.535.05	763.2	Sample
STN-12	555.873.09	2,442.622.48	765.1	Sample
STN-14	555.686.58	2,442.733.21	763.1	Sample
STN-14A	555.687.58	2,442.734.21	763.1	PZ-1
STN-14B	555.690.29	2,442.730.41	763.0	Cone Penetration Test
STN-15	555.662.69	2,442.667.52	763.7	Sample
STN-15A	555.669.72	2,442.691.43	763.3	PZ-1, PZ-2
STN-15B	555.672.20	2,442.690.32	765.3	PZ-1
STN-15C	555.671.50	2,442.690.88	765.3	Sample
STN-15D	555.665.72	2,442.690.78	765.3	Sample
STN-15E	555.694.24	2,442.691.34	765.0	Cone Penetration Test
STN-16	555.521.40	2,442.726.94	764.5	Sample
STN-16A	555.204.87	2,442.894.11	751.0	Sample and Core / Slope Inclinator
STN-18A	555.204.57	2,442.886.00	751.8	Cone Penetration Test
STN-19	555.204.68	2,442.842.94	765.6	Sample
STN-19A	555.204.68	2,442.843.94	765.6	Cone Penetration Test
STN-20	555.168.84	2,442.695.55	762.9	Sample
STN-21	555.076.61	2,442.149.85	765.0	Sample and Core
STN-22	554.990.27	2,441.723.40	765.0	Sample and Core
STN-23	555.020.22	2,442.897.46	764.7	Sample
STN-24	554.823.45	2,442.943.15	765.1	Sample
STN-25	554.624.86	2,442.889.00	750.0	Sample
STN-26A	554.604.66	2,442.904.17	750.0	PZ-1
STN-26B	554.604.57	2,442.896.12	751.0	Cone Penetration Test
STN-27	554.601.77	2,442.850.67	765.1	Sample
STN-27A	554.600.64	2,442.840.21	765.0	Sample / PZ-1, PZ-2
STN-27B	554.606.18	2,442.840.52	765.0	Sample / PZ-1
STN-27C	554.607.18	2,442.840.92	765.0	Cone Penetration Test
STN-28	554.406.25	2,442.841.10	764.8	Sample
STN-29	554.155.15	2,442.854.72	764.7	Sample
STN-31	553.954.94	2,442.758.22	749.5	Sample
STN-31A	553.960.30	2,442.764.66	749.7	Cone Penetration Test
STN-32	553.994.90	2,442.746.44	764.8	Sample
STN-32A	553.996.72	2,442.751.13	764.8	Cone Penetration Test
STN-34	553.853.66	2,442.184.35	764.7	Sample / Slope Inclinator
STN-36	553.776.74	2,442.198.78	751.9	Sample
STN-36A	553.766.08	2,442.199.97	751.9	PZ-1
STN-36B	553.753.47	2,442.155.66	751.5	Cone Penetration Test
STN-37	553.799.91	2,442.184.40	763.8	Sample
STN-37A	553.799.38	2,442.182.40	763.8	PZ-1, PZ-2
STN-37B	553.800.49	2,442.186.20	763.7	PZ-1
STN-37C	553.796.81	2,442.171.01	763.6	Sample
STN-37D	553.796.25	2,442.168.95	763.6	Sample
STN-37E	553.796.26	2,442.183.40	763.8	Cone Penetration Test
STN-38	553.730.83	2,441.988.70	764.1	Sample
STN-41	553.583.10	2,441.510.71	752.7	Sample and Core
STN-41A	553.584.59	2,441.512.86	751.8	Cone Penetration Test
STN-42	553.633.48	2,441.513.68	764.7	Sample
STN-42A	553.624.48	2,441.512.69	764.7	Cone Penetration Test
STN-43	554.004.68	2,441.548.50	765.9	Sample
STN-43A	554.005.71	2,441.549.61	765.9	Cone Penetration Test
STN-45	553.740.50	2,441.308.40	763.9	Sample
STN-47	553.747.39	2,441.146.83	753.4	Sample
STN-47A	553.733.63	2,441.141.18	753.1	PZ-1
STN-47B	553.742.43	2,441.143.28	753.8	Cone Penetration Test
STN-48	553.773.29	2,441.154.53	765.3	Sample
STN-48A	553.771.75	2,441.159.01	765.3	PZ-1, PZ-2
STN-48B	553.769.40	2,441.163.30	765.3	PZ-1
STN-48C	553.770.51	2,441.164.28	765.3	Cone Penetration Test
STN-49	553.921.85	2,441.024.39	763.1	Sample
STN-49A	553.931.99	2,440.496.85	741.6	Sample and Core
STN-50A	553.832.98	2,440.497.85	741.6	Cone Penetration Test
STN-51	553.696.02	2,440.548.46	750.4	Sample
STN-52	553.692.98	2,440.817.40	753.2	Sample
STN-53	554.012.12	2,440.902.46	763.9	Sample
STN-53A	554.012.14	2,440.904.05	763.9	Cone Penetration Test
STN-54	555.263.94	2,441.476.12	765.0	Sample
STN-55	554.943.73	2,442.287.49	764.1	Sample
STN-56	554.555.61	2,441.996.50	765.8	Sample and Core
STN-59	556.076.53	2,442.933.06	762.2	Sample
STN-60	555.886.92	2,442.663.31	762.5	Sample
STN-61	555.513.59	2,442.782.80	762.5	Sample
STN-62	555.020.69	2,442.907.23	749.8	Sample
STN-63	554.822.75	2,442.910.51	750.0	Sample
STN-64	554.411.29	2,442.911.08	749.4	Sample / Slope Inclinator
STN-65	554.147.51	2,442.915.09	748.6	Sample
STN-66	553.888.83	2,442.564.24	750.9	Sample
STN-69	553.607.58	2,441.718.01	752.3	Sample / Slope Inclinator
STN-71	553.840.20	2,440.981.04	752.0	Sample / Slope Inclinator

STATION	BEGIN PROJECT BASELINE	NORTHING	EASTING
100+00.00	554.363.86	2,440,477.77	
160+00.00	557,109.43	2,441,888.33	

STATION	BEGIN PROJECT BASELINE	NORTHING	EASTING
100+00.00	554.363.86	2,440,477.77	
160+00.00	557,109.43	2,441,888.33	

BASELINE CURVE DATA		
1	2	3
P.I. Sta. = 108+20.73	P.I. Sta. = 112+99.93	P.I. Sta. = 128+71.85
Northing = 553,819.18	Northing = 553,591.02	Northing = 554,024.61
Easting = 2,441,091.71	Easting = 2,441,514.77	Easting = 2,442,840.47
Δ = 13°20'07"	Δ = 46°19'15"	Δ = 71°45'44"
D = 5°52'42"	D = 11°56'26"	D = 31°19'10"
T = 113.94'	T = 205.26'	T = 132.33'
L = 226.89'	L = 387.92'	L = 228.13'
R = 974.68'	R = 479.84'	R = 182.89'
E = 6.64'	E = 42.06'	E = 42.85'
P.C. Sta. = 107+06.80	P.C. Sta. = 110+94.67	P.C. Sta. = 125+39.52
P.T. Sta. = 109+33.64	P.T. Sta. = 114+82.59	P.T. Sta. = 127+68.65

BASELINE CURVE DATA		
4	5	
P.I. Sta. = 138+12.12	P.I. Sta. = 154+96.30	
Northing = 555,200.41	Northing = 556,792.40	
Easting = 2,442,843.77	Easting = 2,442,289.43	
Δ = 19°21'33"	Δ = 32°28'34"	
D = 11°56'26"	D = 11°56'26"	
T = 81.89'	T = 139.76'	
L = 162.13'	L = 271.98'	
R = 479.84'	R = 479.84'	
E = 6.93'	E = 19.94'	
P.C. Sta. = 137+30.28	P.C. Sta. = 153+56.55	
P.T. Sta. = 138+92.40	P.T. Sta. = 156+28.53	



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NOTES
 1. Topographic mapping was generated from a LIDAR survey performed on January 8, 2009 by Tuck Mapping Solutions, Inc. This plan was developed for discussion purposes only and is not to be used for construction.
 2. The geotechnical information and data furnished herein are not intended as representation or warranties but are furnished for information only. It shall be distinctly understood that the Owner or Engineer will not be responsible for any deduction, interpretation or conclusion drawn therefrom. The information is made available in order that the Contractor may have ready access to the same information available to the Owner and the Engineer and is not part of this contract.

LEGEND
 ● Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests
 ● Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests and Rock Core
 ● Previously Drilled by AECOM

NOT FOR CONSTRUCTION

SCALE: 1"=200'	EXCEPT AS NOTED
----------------	-----------------

YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 BORING PLAN AND BASELINE LAYOUT**

DESIGNED BY: A. CRACE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUITT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUCH	APPROVED BY:	ISSUED BY:
-----------------------	----------------------	-----------------------	--------------------------	-----------------------	--------------	------------

**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-01 R 0

PLANT FACTOR: XX
 W_TVA

C.A.D. DRAWING
 DO NOT ALTER MANUALLY

GRAPHIC SCALE: 1" = 200'
 CONTOUR INTERVAL = 2'

PLOT DATE: 08/07/2009 USER: ELWIN_RHINE
 L:\PROJECTS\10W229\10W229.dwg (GEOTECHNICAL)

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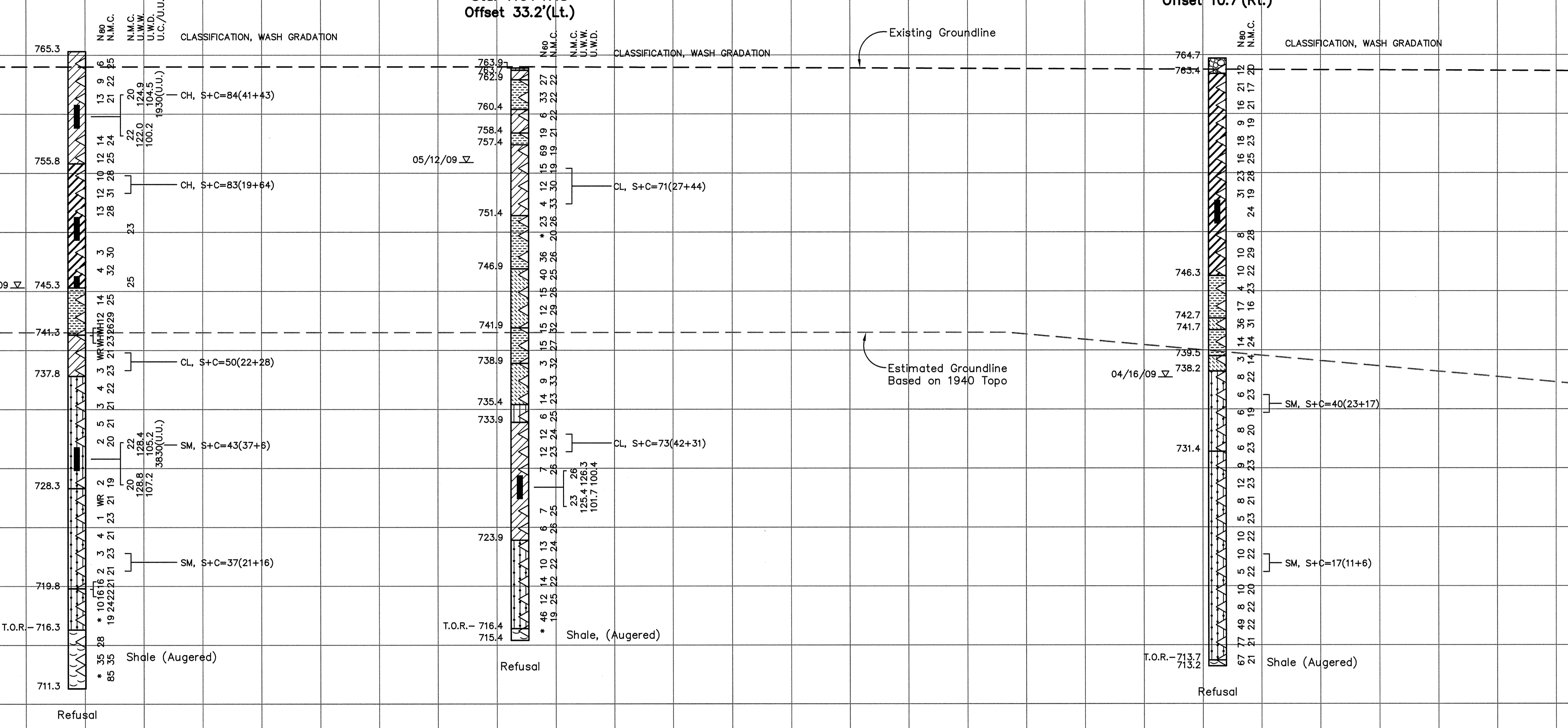
SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-42A	763.9	CONE PENETRATION TEST	N/A
STN-48A	765.3	(2) PIEZOMETER	N/A
STN-48B	765.3	(1) PIEZOMETER	N/A
STN-48C	765.3	CONE PENETRATION TEST	N/A

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

STN-48
 Sta. 108+97.2
 Offset 11.4'(Rt.)

STN-45
 Sta. 110+47.8
 Offset 33.2'(Lt.)

STN-42
 Sta. 112+84.9
 Offset 10.7'(Rt.)



NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Silty Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - N₆₀
 - N₆₀
 - N.M.C. Natural Moisture Content (%)
 - U.W.W. Unit Weight Wet (lbs./cu.ft.)
 - U.W.D. Unit Weight Dry (lbs./cu.ft.)
 - U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - T.O.R. Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - B.C. Begin Rock Core
 - R.Q.D. Rock Quality Designation (%)
 - REC. Recovery (%)
 - Refusal Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Star Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

STA. 108+20 TO 114+80
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

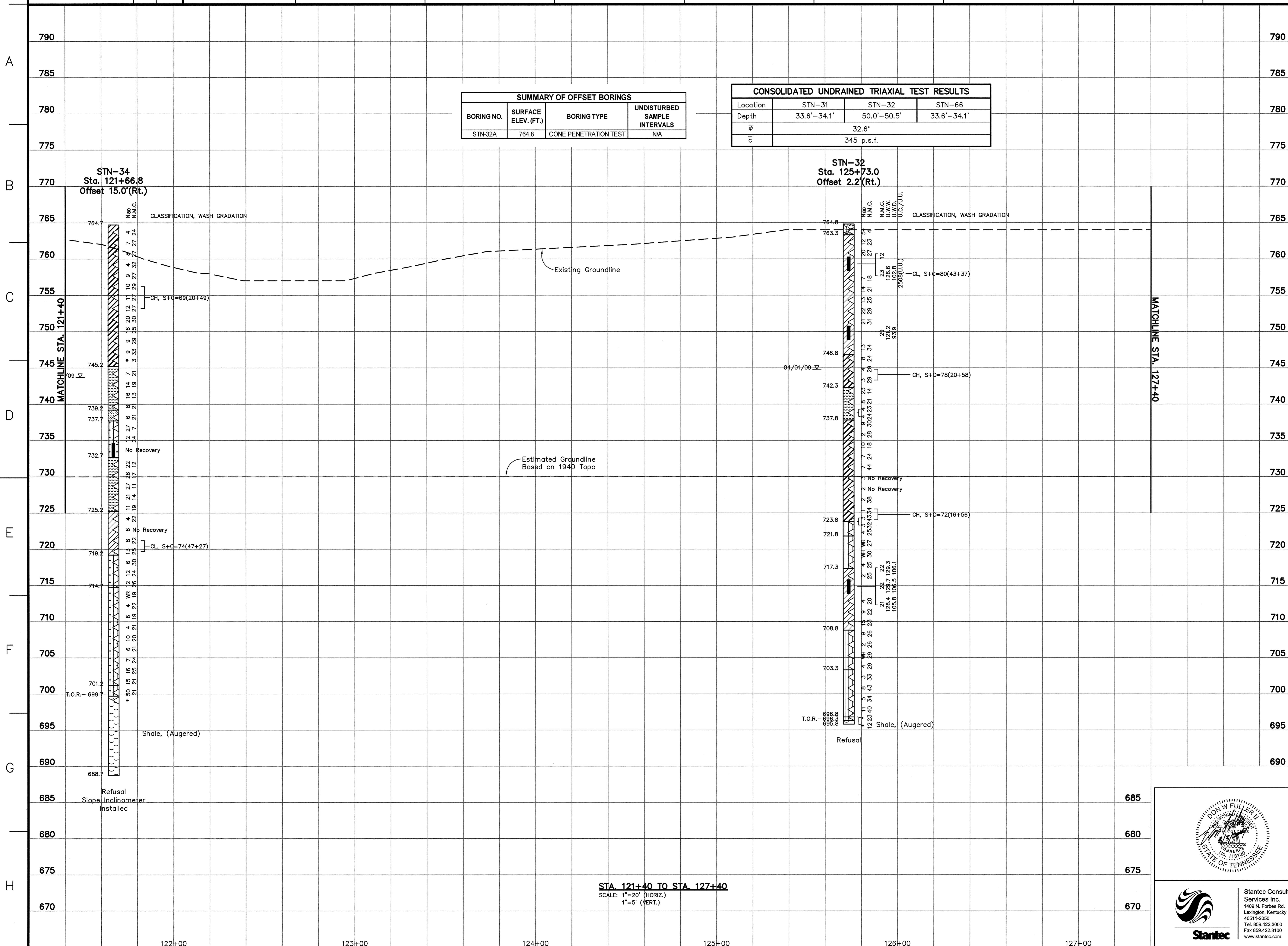
Stantec
 Stantec Consulting Services Inc.
 1409 N. Forbes Rd.
 Lexington, Kentucky
 40511-2050
 Tel: 859.422.3000
 Fax: 859.422.3100
 www.stantec.com

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
A. CRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUGH		
KINGSTON FOSSIL PLANT						
TENNESSEE VALLEY AUTHORITY						
FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-04	R 0	

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SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-32A	764.8	CONE PENETRATION TEST	N/A

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-31	STN-32	STN-66
Depth	33.6'-34.1'	50.0'-50.5'	33.6'-34.1'
$\bar{\phi}$	32.6'		
\bar{c}	345 p.s.f.		



NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lbs./cu.ft.)
 - Unit Weight Dry (lbs./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - Begin Rock Core
 - Rock Quality Designation (%)
 - Recovery (%)
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

STA. 121+40 TO STA. 127+40
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

Stantec
 Stantec Consulting Services Inc.
 1409 N. Forbes Rd.
 Lexington, Kentucky 40511-2050
 Tel. 859.422.3000
 Fax 859.422.3100
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REV. NO.	DATE	DISN	DRWN	CHKD	SUPV	RVWD	APPR	ISSD	PROJECT	AS CONST	BY
0	08/09	AAC	TJ	OKR	DWF	AR					

SCALE: AS SHOWN EXCEPT AS NOTED

YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 PROFILE - CENTERLINE**

DESIGNED BY: A. CRAGE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUITT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUGH	APPROVED BY:	ISSUED BY:
--------------------------	-------------------------	--------------------------	-----------------------------	--------------------------	--------------	------------

**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-06 R 0

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-28		
Depth	38.3'-38.9'	38.9'-39.5'	46.3'-46.9'
$\bar{\sigma}$	32.3'		
\bar{c}	103 p.s.f.		
Location	STN-29		
Depth	60.2'-60.8'	60.8'-61.4'	61.4'-62.0'
$\bar{\sigma}$	34.0'		
\bar{c}	0 p.s.f.		

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-26	STN-64	STN-27
Depth	20.0'-20.5'	20.6'-21.1'	30.3'-30.8'
$\bar{\sigma}$	37.8'		
\bar{c}	125 p.s.f.		

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-27A	765.0	SAMPLE/ (2) PIEZOMETER	26.0-28.0 28.0-30.0 30.0-32.0 32.0-34.0 34.0-36.0
STN-27B	765.0	SAMPLE/ (1) PIEZOMETER	26.0-28.0 28.0-30.0 30.0-32.0 32.0-34.0 34.0-36.0
STN-27C	765.0	CONE PENETRATION TEST	N/A

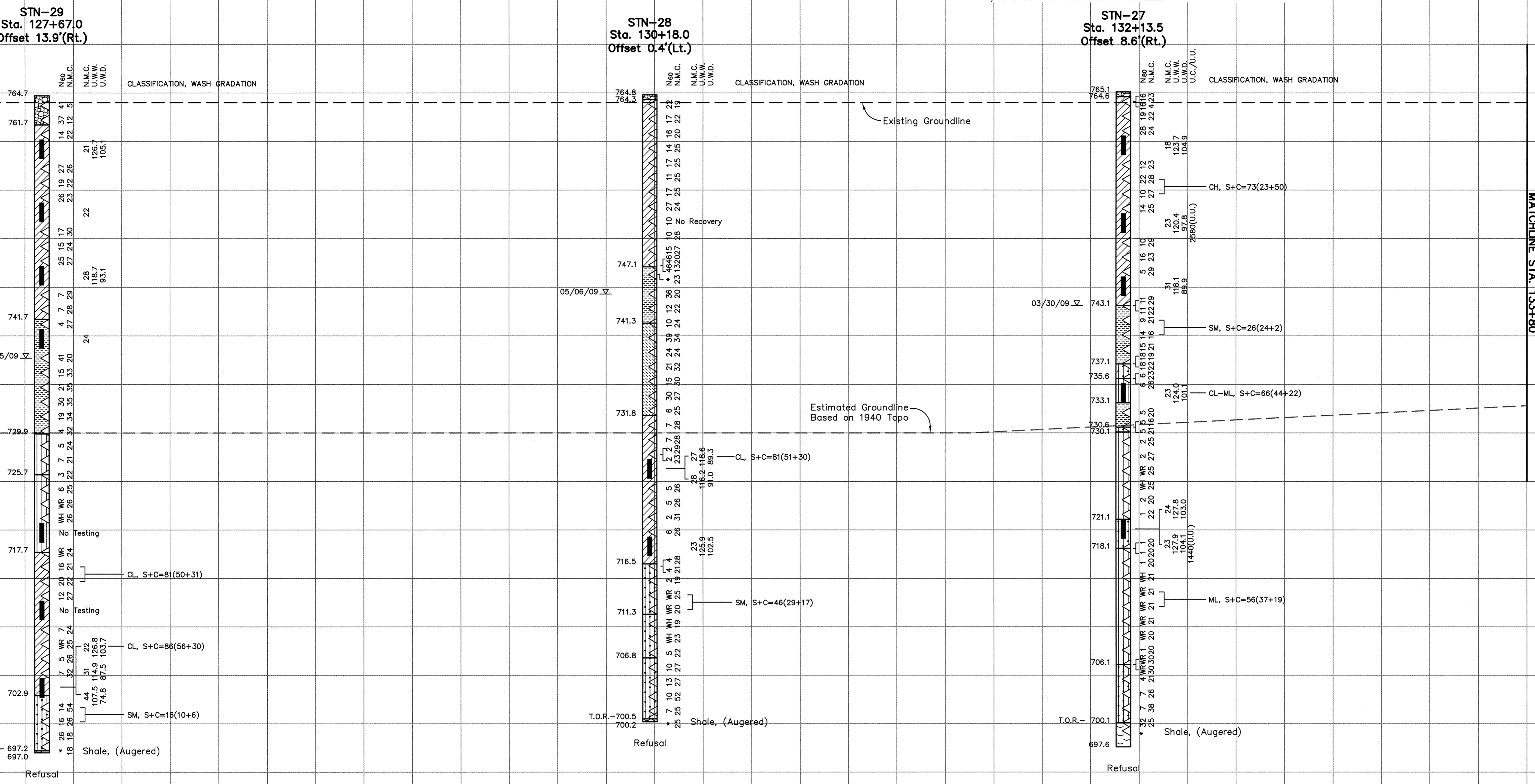
1) DENOTES NO. OF INSTRUMENTS INSTALLED

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NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
- Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
- Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
- Silty Clay, brown to red brown, moist to wet, soft to medium stiff
- Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
- Silt to Silty Sand, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- WH Weight of Hammer
- WR Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- N₆₀ Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- N.M.C. Natural Moisture Content (%)
- U.W.W. Unit Weight Wet (lbs./cu.ft.)
- U.W.D. Unit Weight Dry (lbs./cu.ft.)
- U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- T.O.R. Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- B.C. Begin Rock Core
- R.Q.D. Rock Quality Designation (%)
- REC. Recovery (%)
- Refusal Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal No Refusal Encountered
- * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



DIRECT SIMPLE SHEAR TEST RESULTS			
Location	STN-27B		
Depth	33.2'-33.45'	35.2'-35.45'	35.45'-35.8'
$\bar{\sigma}$	22.0'	25.0'	27.0'
\bar{c}	60 p.s.f.	260 p.s.f.	100 p.s.f.

STA. 127+40 TO STA. 133+80
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)



REV. NO.	DATE	DESIGN	DRAWN	CHKD	SUPV	RVND	APPR	ISSD	PROJECT	AS CONST	REV
08/09		AAC	TJ	OKR	DWF	AR					

SCALE: AS SHOWN EXCEPT AS NOTED

YARD

GEOTECHNICAL EXPLORATION

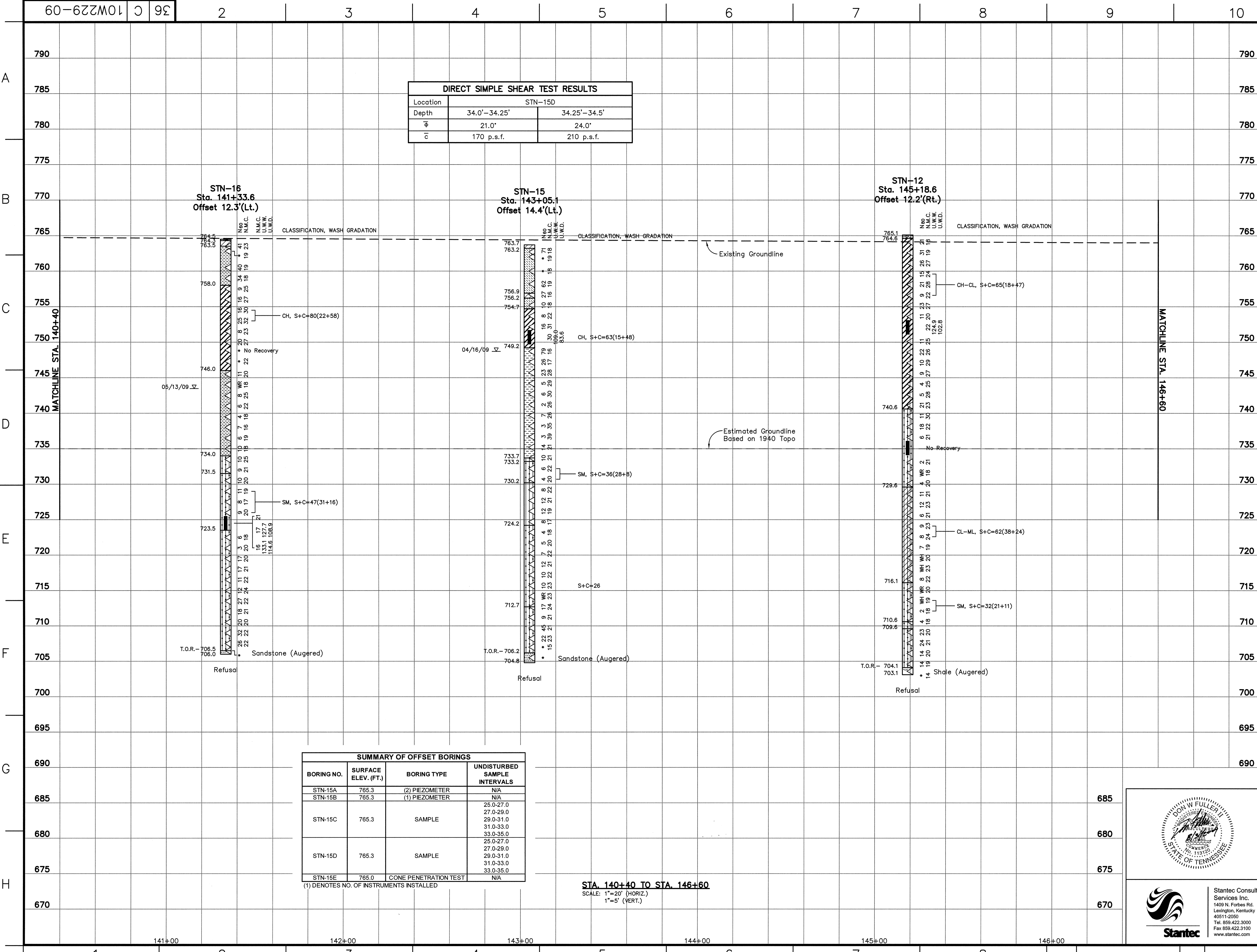
ASH POND STABILITY

PROFILE - CENTERLINE

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
A. GRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUCH		

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2008 DATE 08/09 36 C 10W229-07 R 0



DIRECT SIMPLE SHEAR TEST RESULTS		
Location	STN-15D	
Depth	34.0'-34.25'	34.25'-34.5'
ϕ	21.0°	24.0°
\bar{c}	170 p.s.f.	210 p.s.f.

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-15A	765.3	(2) PIEZOMETER	N/A
STN-15B	765.3	(1) PIEZOMETER	N/A
STN-15C	765.3	SAMPLE	25.0-27.0 27.0-29.0 29.0-31.0 31.0-33.0 33.0-35.0
STN-15D	765.3	SAMPLE	25.0-27.0 27.0-29.0 29.0-31.0 31.0-33.0 33.0-35.0
STN-15E	765.0	CONE PENETRATION TEST	N/A

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

STA. 140+40 TO STA. 146+60
SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

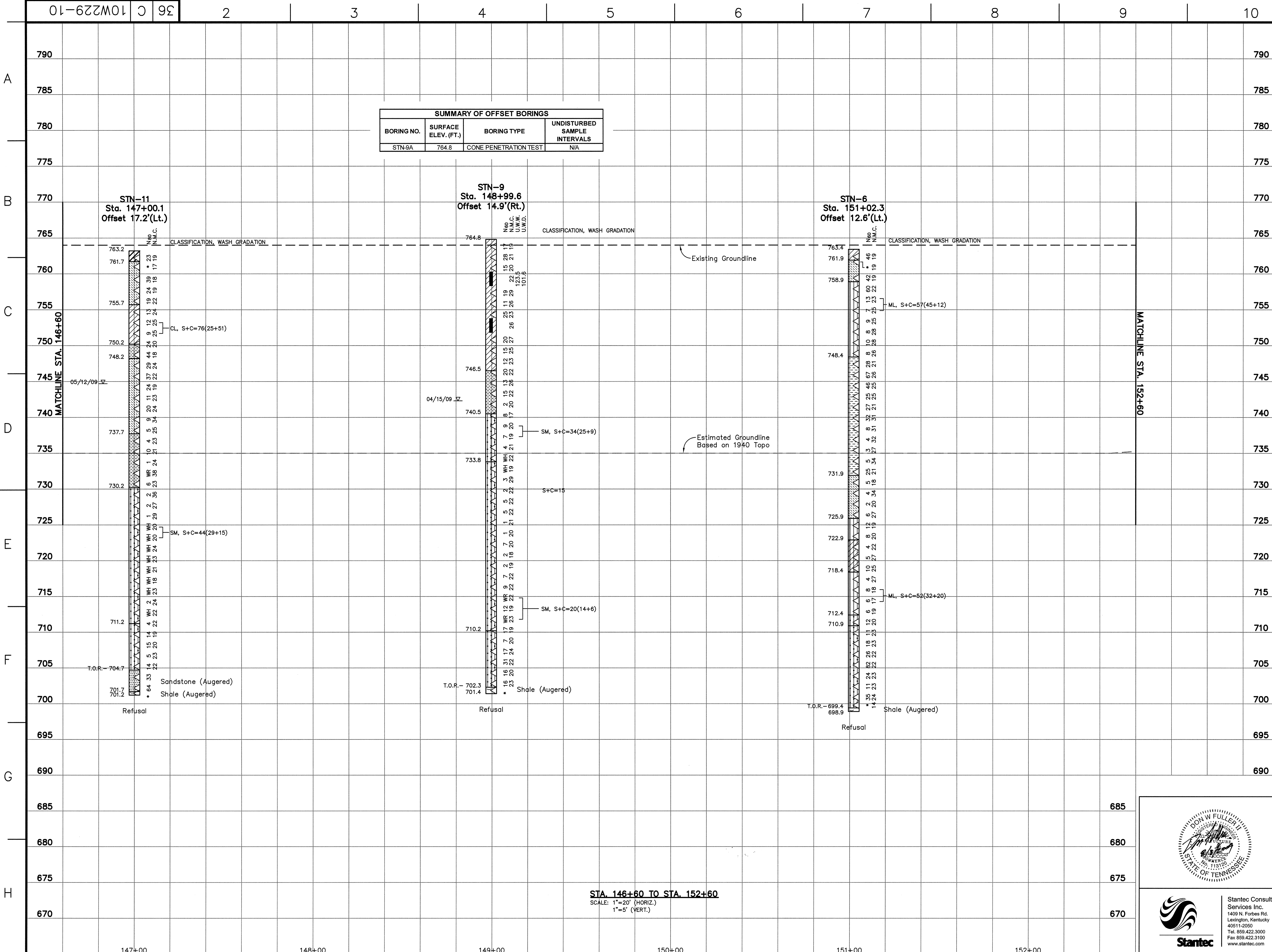
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NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lb./cu.ft.)
 - Unit Weight Dry (lb./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - Begin Rock Core
 - Rock Quality Designation (%)
 - Recovery (%)
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

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KINGSTON FOSSIL PLANT						
TENNESSEE VALLEY AUTHORITY						
FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-09	R 0	



SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-9A	764.8	CONE PENETRATION TEST	N/A

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NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
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 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lbs./cu.ft.)
 - Unit Weight Dry (lbs./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - Begin Rock Core
 - Rock Quality Designation (%)
 - Recovery (%)
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

STA. 146+60 TO STA. 152+60
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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KINGSTON FOSSIL PLANT						
TENNESSEE VALLEY AUTHORITY						
FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-10	R 0	

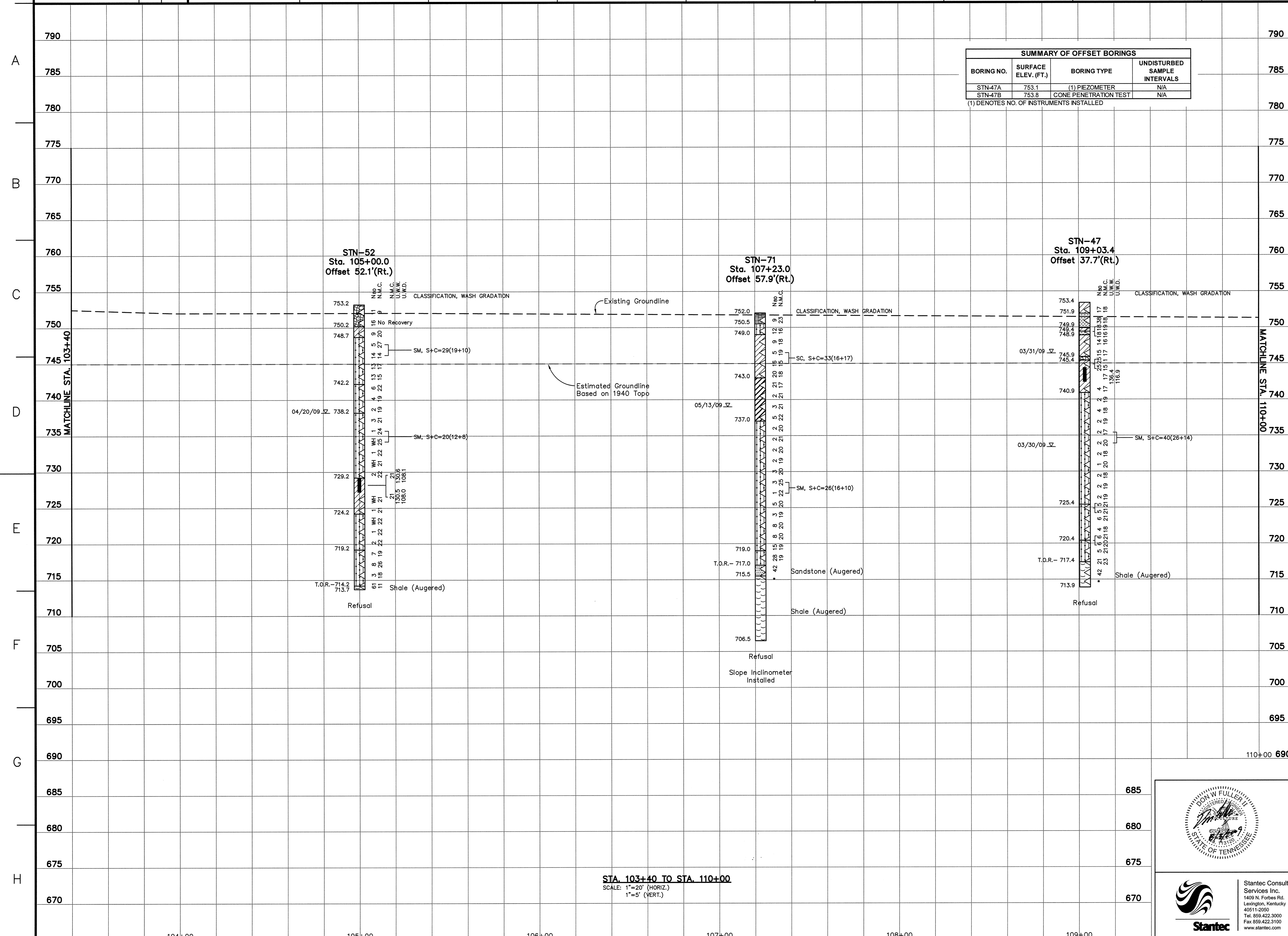
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SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-47A	753.1	(1) PIEZOMETER	N/A
STN-47B	753.8	CONE PENETRATION TEST	N/A

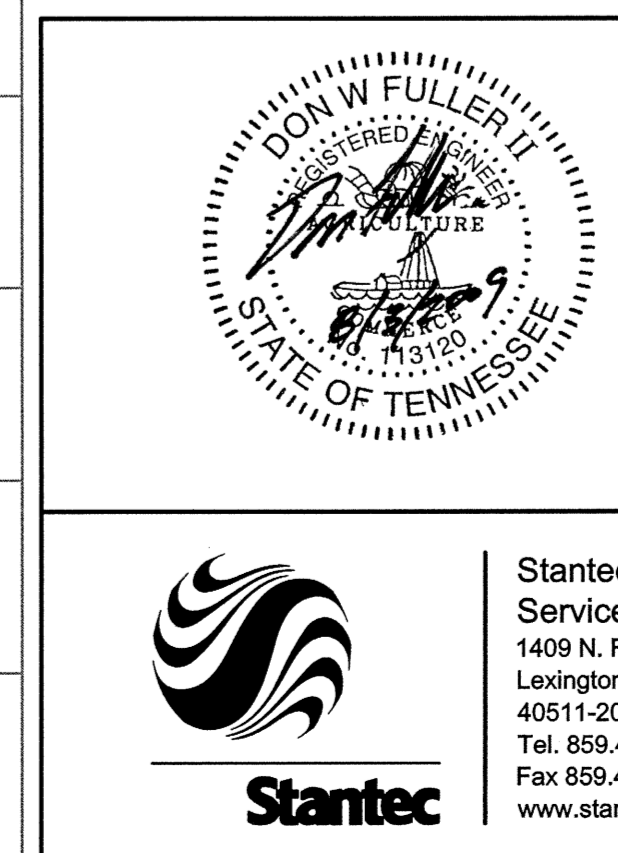
(1) DENOTES NO. OF INSTRUMENTS INSTALLED

NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - WH Weight of Hammer
 - WR Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - N₆₀ Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - N₆₀ Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - N.M.C. Natural Moisture Content (%)
 - U.W.W. Unit Weight Wet (lbs./cu.ft.)
 - U.W.D. Unit Weight Dry (lbs./cu.ft.)
 - U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - 03/31/09 Σ Water Level and Date Recorded
 - T.O.R.- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - B.C.- Begin Rock Core
 - R.Q.D. Rock Quality Designation (%)
 - REC. Recovery (%)
 - Refusal Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal No Refusal Encountered
 - * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



STA. 103+40 TO STA. 110+00
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)



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REV. NO.	DATE	ISSN	DRWN	CHKD	SUPV	INVD	APPR	ISSD	PROJECT	AS CONST	REV. CO.
1	08/09		AAC	TJ	OKR	DWF	AR				

SCALE: AS SHOWN EXCEPT AS NOTED

YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 PROFILE - 50 FEET RIGHT**

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
A. CRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUCH		

**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-14 R 0

TASK COMPLETED BY: REV NO.

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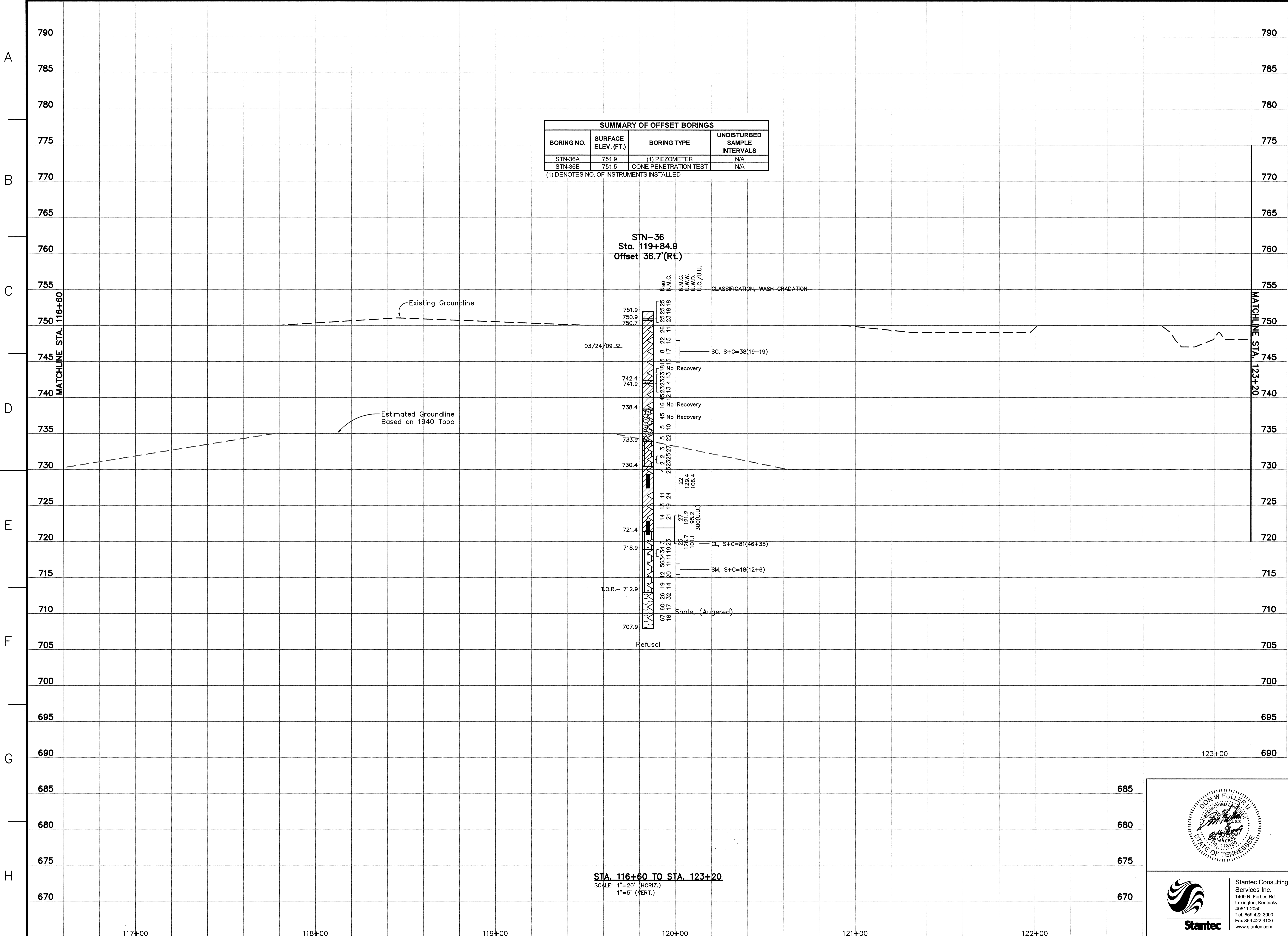
SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-36A	751.9	(1) PIEZOMETER	N/A
STN-36B	751.5	CONE PENETRATION TEST	N/A

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
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- Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- WH Weight of Hammer
- WR Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- N₆₀ Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- N₉₀ Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- N.M.C. Natural Moisture Content (%)
- U.W.W. Unit Weight Wet (lbs./cu.ft.)
- U.C./U.U. Unconfined Compressive Strength (psf) / Unconsolidated Undrained Triaxial Test (psf)
- 03/31/09 ∇ Water Level and Date Recorded
- T.O.R.- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- B.C.- Begin Rock Core
- R.Q.D. Rock Quality Designation (%)
- REC. Recovery (%)
- Refusal Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal No Refusal Encountered
- * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



STA. 116+60 TO STA. 123+20
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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A. CRACE	T. JOHNSON	O. ROUIT	D. FULLER	A. RAUCH		
KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING						
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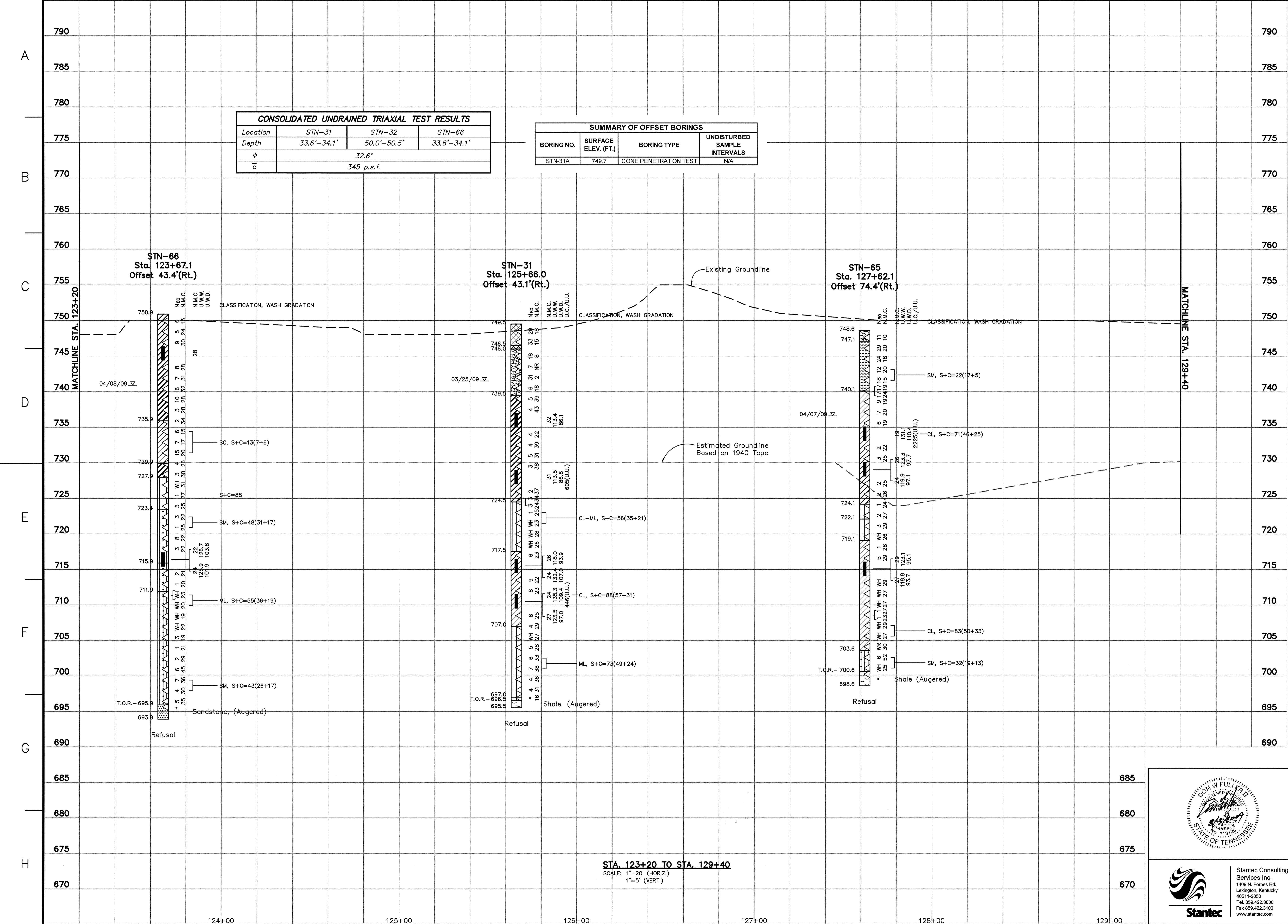
CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-31	STN-32	STN-66
Depth	33.6'-34.1'	50.0'-50.5'	33.6'-34.1'
$\bar{\phi}$	32.6°		
c	345 p.s.f.		

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-31A	749.7	CONE PENETRATION TEST	N/A

NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
- Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
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- Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
- Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- Weight of Hammer
- Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- N.M.C. Natural Moisture Content (%)
- U.W.W. Unit Weight Wet (lbs./cu.ft.)
- U.W.D. Unit Weight Dry (lbs./cu.ft.)
- U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- B.C.- Begin Rock Core
- R.Q.D. Rock Quality Designation (%)
- REC. Recovery (%)
- Refusal Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal No Refusal Encountered
- * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



STA. 123+20 TO STA. 129+40
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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A. CRACE	T. JOHNSON	O. ROUTH	D. FULLER	A. RAUCH		
KINGSTON FOSSIL PLANT						
TENNESSEE VALLEY AUTHORITY						
FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-17	R 0	

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-26	STN-64	STN-27
Depth	20.0'-20.5'	20.6'-21.1'	30.3'-30.8'
ϕ	37.8°		
c	125 p.s.f.		

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-26A	750.0	(1) PIEZOMETER	N/A
STN-26B	751.0	CONE PENETRATION TEST	N/A

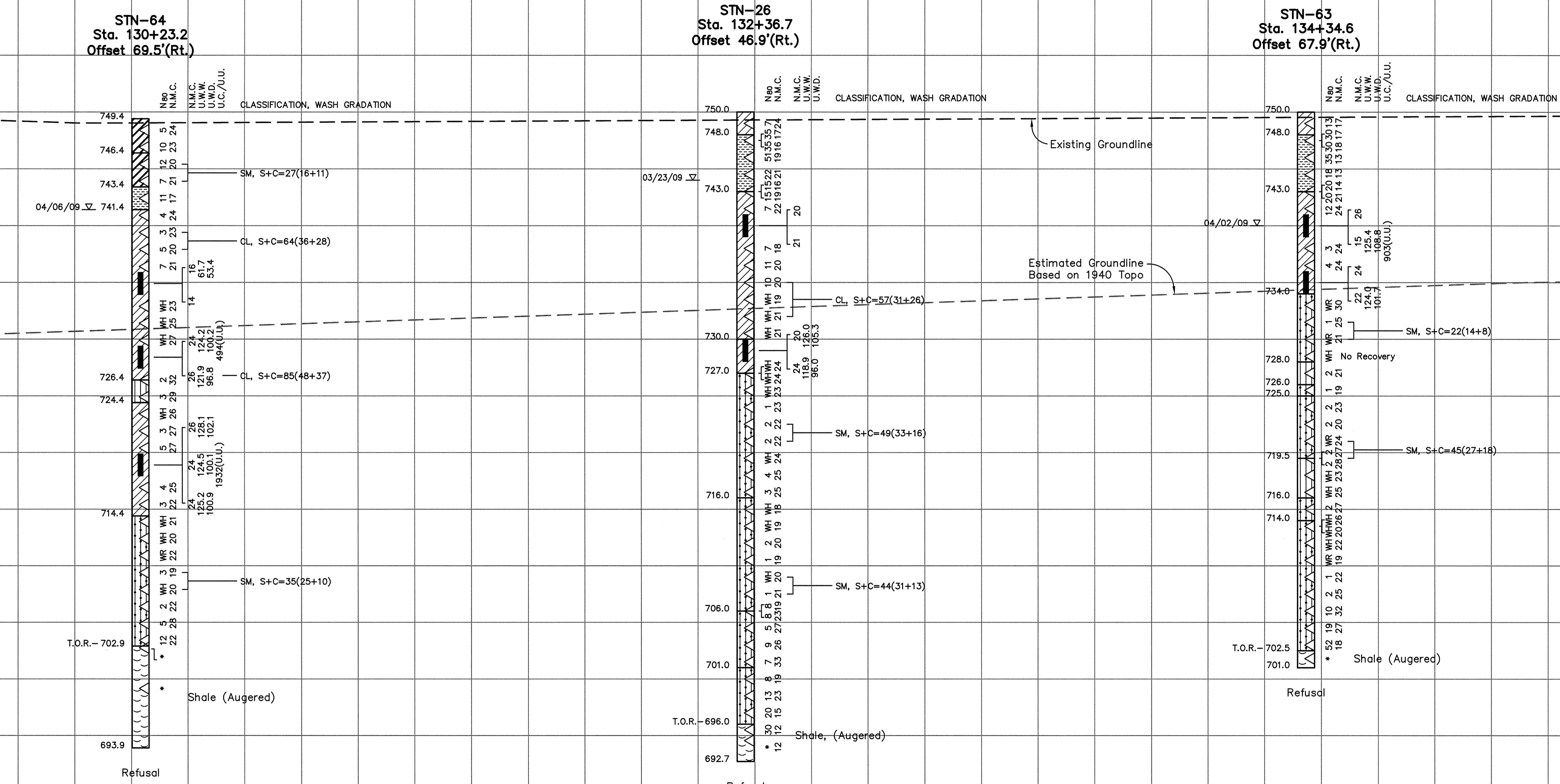
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NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
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- Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
- Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- Weight of Hammer
- Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- Natural Moisture Content (%)
- Unit Weight Wet (lbs./cu.ft.)
- Unit Weight Dry (lbs./cu.ft.)
- Unconfined Compressive Strength (psf) / Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- Begin Rock Core
- Rock Quality Designation (%)
- Recovery (%)
- Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal Encountered
- Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



STA. 129+40 TO STA. 135+80
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-18	R 0	

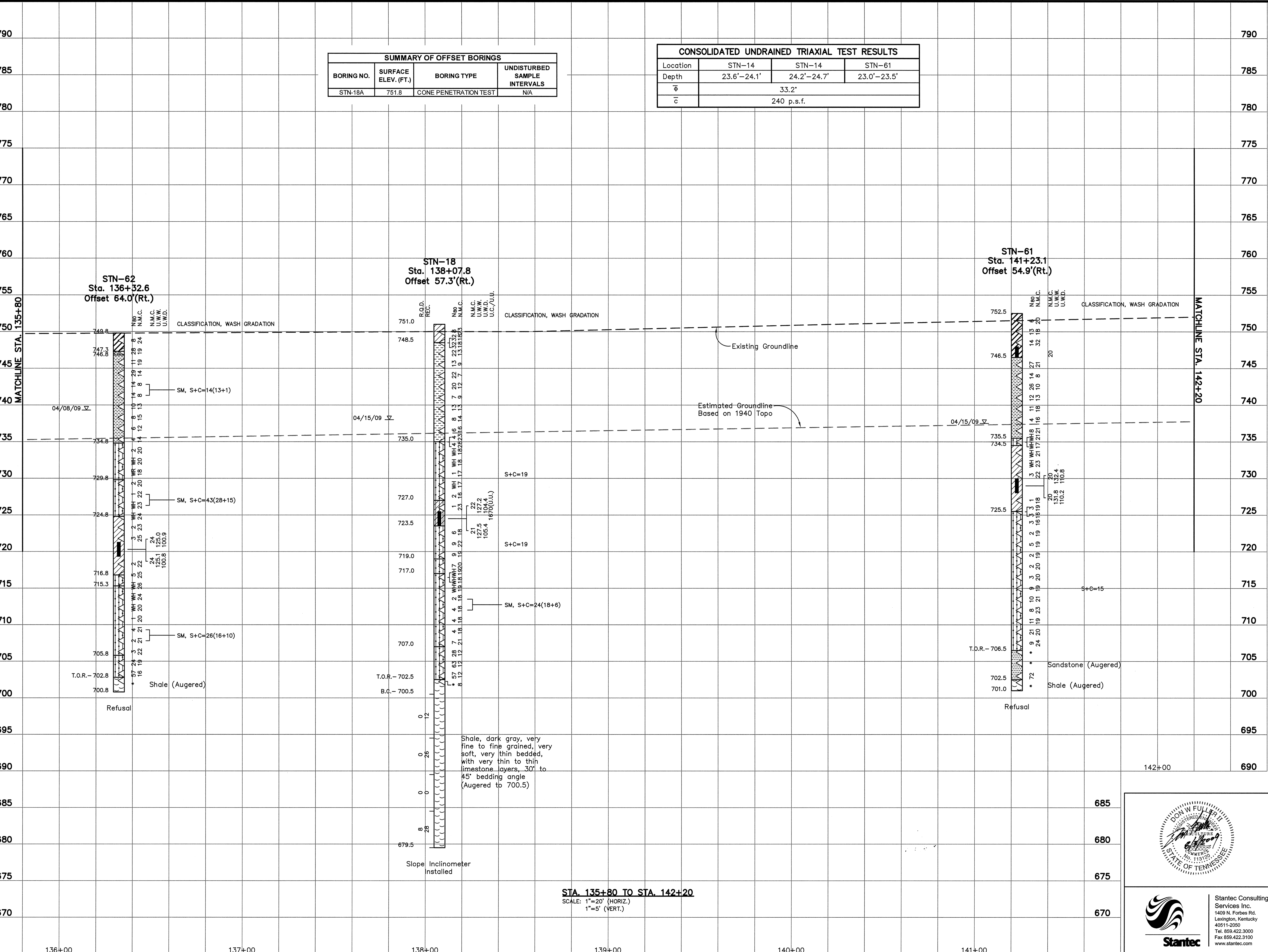
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SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-18A	751.8	CONE PENETRATION TEST	N/A

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-14	STN-14	STN-61
Depth	23.6'-24.1'	24.2'-24.7'	23.0'-23.5'
ϕ	33.2°		
c	240 p.s.f.		

NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
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 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lbs./cu.ft.)
 - Unit Weight Dry (lbs./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - B.C. - Begin Rock Core
 - R.Q.D. - Rock Quality Designation (%)
 - REC. - Recovery (%)
 - Refusal
 - No Refusal
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



STA. 135+80 TO STA. 142+00
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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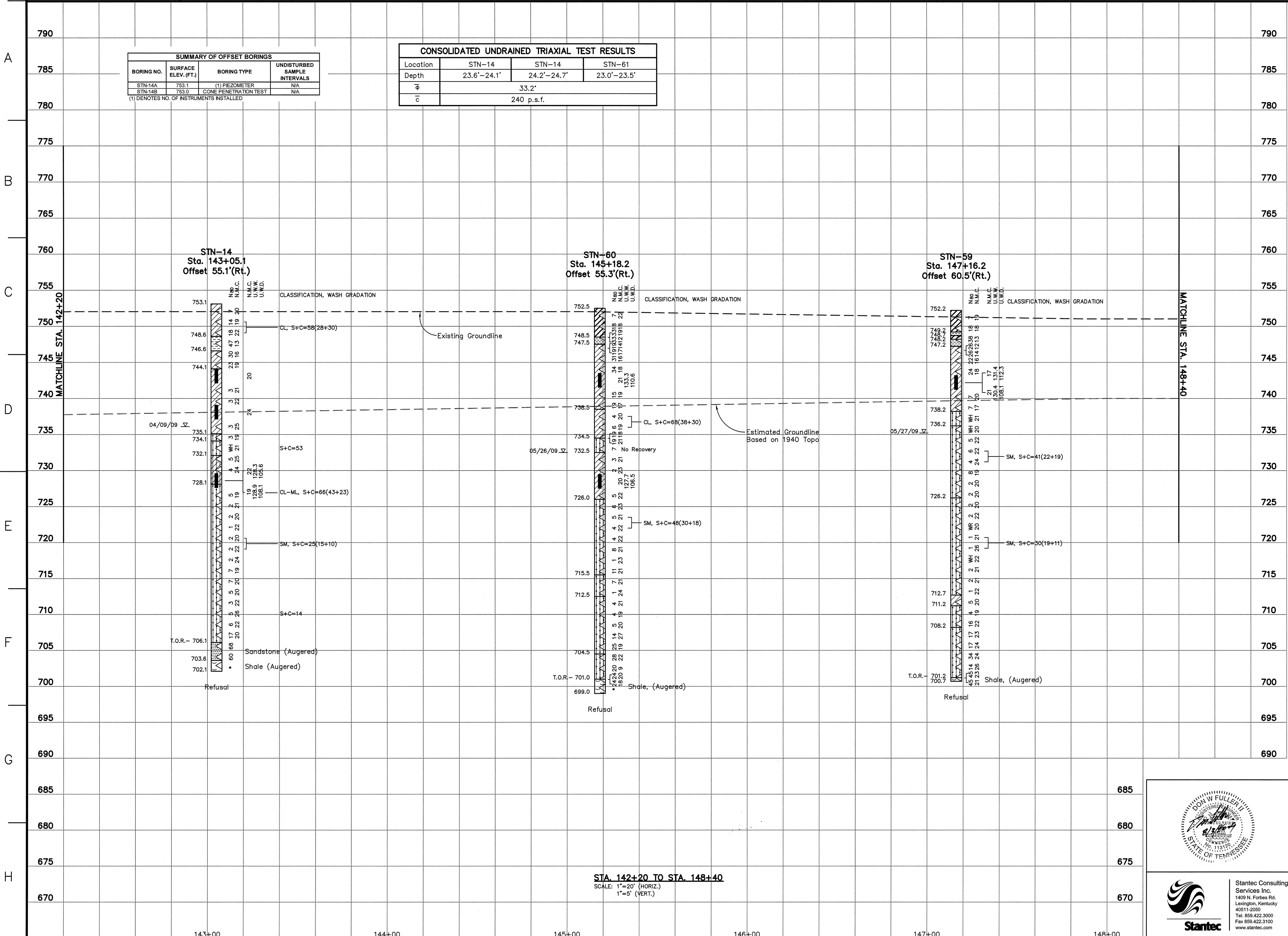
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A. CRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUCH		
KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING						
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SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-14A	753.1	(1) PIEZOMETER	N/A
STN-14B	753.0	CONE PENETRATION TEST	N/A

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-14	STN-14	STN-61
Depth	23.6'-24.1'	24.2'-24.7'	23.0'-23.5'
ϕ	33.2'		
c	240 p.s.f.		



NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - WH Weight of Hammer
 - WR Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - N.M.C. Natural Moisture Content (%)
 - U.W.W. Unit Weight Wet (lbs./cu.ft.)
 - U.W.D. Unit Weight Dry (lbs./cu.ft.)
 - U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - 03/31/09 W.L. Water Level and Date Recorded
 - T.O.R. Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - B.C. Begin Rock Core
 - R.Q.D. Rock Quality Designation (%)
 - REC. Recovery (%)
 - Refusal Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal No Refusal Encountered
 - * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

STA. 142+20 TO STA. 148+40
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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REV. NO.	DATE	ISSN	DRWN	CHKD	SUPV	RYND	APPR	ISSD	PROJECT	AS CONST	REV. NO.	DISCIPLINE
0	08/09		AAC	TJ	OKR	DWF	AR					INTERFACE

SCALE: AS SHOWN EXCEPT AS NOTED

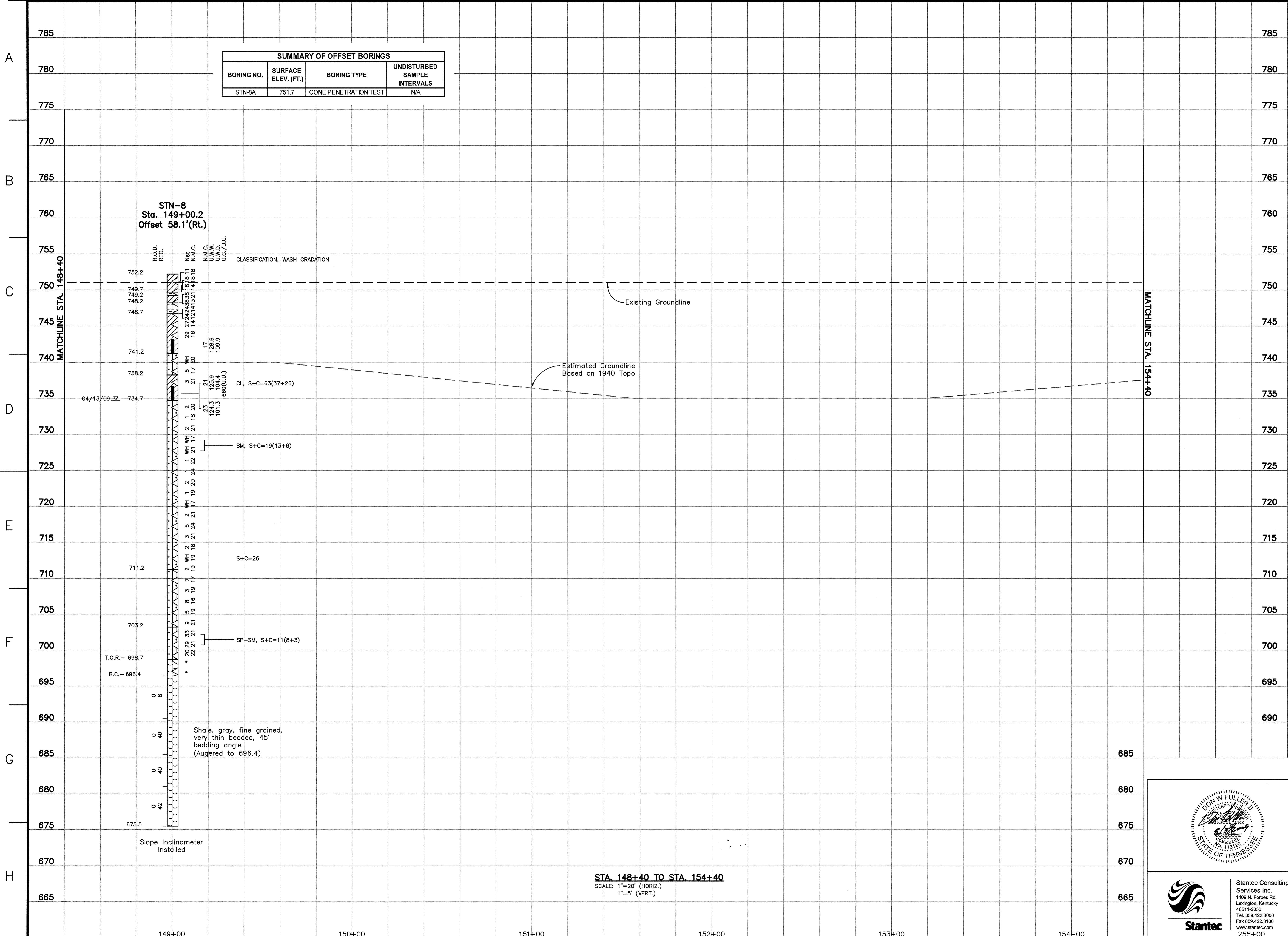
YARD

GEOTECHNICAL EXPLORATION
ASH POND STABILITY
PROFILE - 50 FEET RIGHT

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
A. CRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUCH		

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2008 DATE 08/09 36 C 10W229-20 R 0



SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-8A	751.7	CONE PENETRATION TEST	N/A

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NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
- Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
- Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
- Silty Clay, brown to red brown, moist to wet, soft to medium stiff
- Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
- Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
- Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- Weight of Hammer
- Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- Natural Moisture Content (%)
- Unit Weight Wet (lbs./cu.ft.)
- Unit Weight Dry (lbs./cu.ft.)
- Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- Begin Rock Core
- Rock Quality Designation (%)
- Recovery (%)
- Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal Encountered
- Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

STA. 148+40 TO STA. 154+40
 SCALE: 1"=20' (HORIZ.)
 1"=5' (VERT.)

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 255+00

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
A. CRACE	T. JOHNSON	O. ROUITT	D. FULLER	A. RAUCH		
KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING						
AUTOCAD R 2008	DATE 08/09	36	C	10W229-21	R 0	

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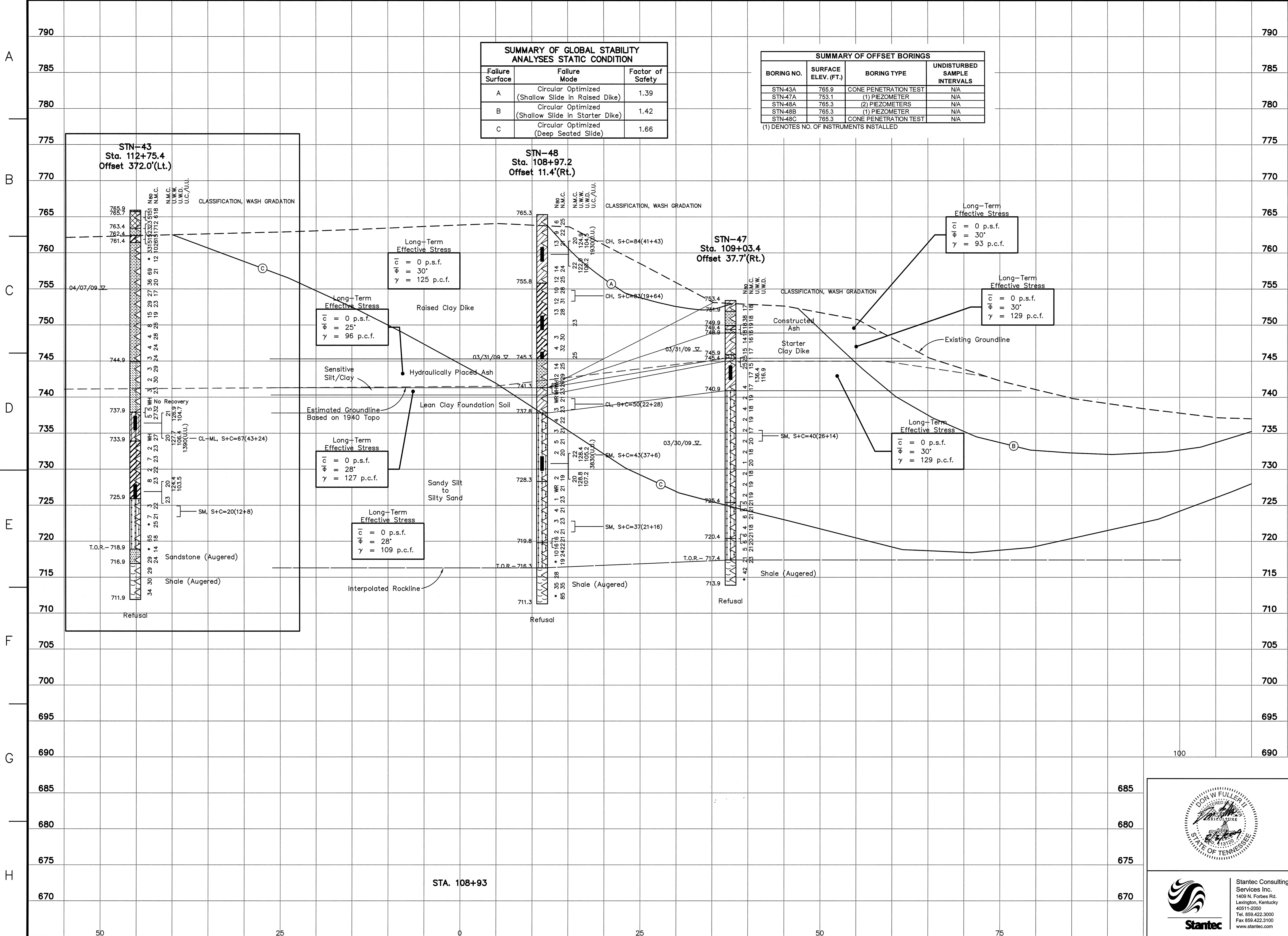
SUMMARY OF GLOBAL STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Factor of Safety
A	Circular Optimized (Shallow Slide in Raised Dike)	1.39
B	Circular Optimized (Shallow Slide in Starter Dike)	1.42
C	Circular Optimized (Deep Seated Slide)	1.66

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-43A	765.9	CONE PENETRATION TEST	N/A
STN-47A	753.1	(1) PIEZOMETER	N/A
STN-48A	765.3	(2) PIEZOMETERS	N/A
STN-48B	765.3	(1) PIEZOMETER	N/A
STN-48C	765.3	CONE PENETRATION TEST	N/A

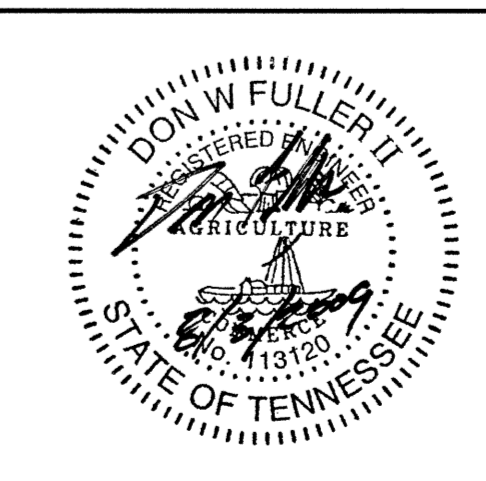
(1) DENOTES NO. OF INSTRUMENTS INSTALLED



NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
- Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
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- Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
- Sand to Silty Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- WH Weight of Hammer
- WR Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- N.M.C. Natural Moisture Content (%)
- U.W.W. Unit Weight Wet (lbs./cu.ft.)
- U.W.D. Unit Weight Dry (lbs./cu.ft.)
- U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- 03/31/09 Water Level and Date Recorded
- T.O.R. Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- B.C. Begin Rock Core
- R.Q.D. Rock Quality Designation (%)
- REC. Recovery (%)
- Refusal Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal No Refusal Encountered
- * Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



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SCALE: 1"=5'

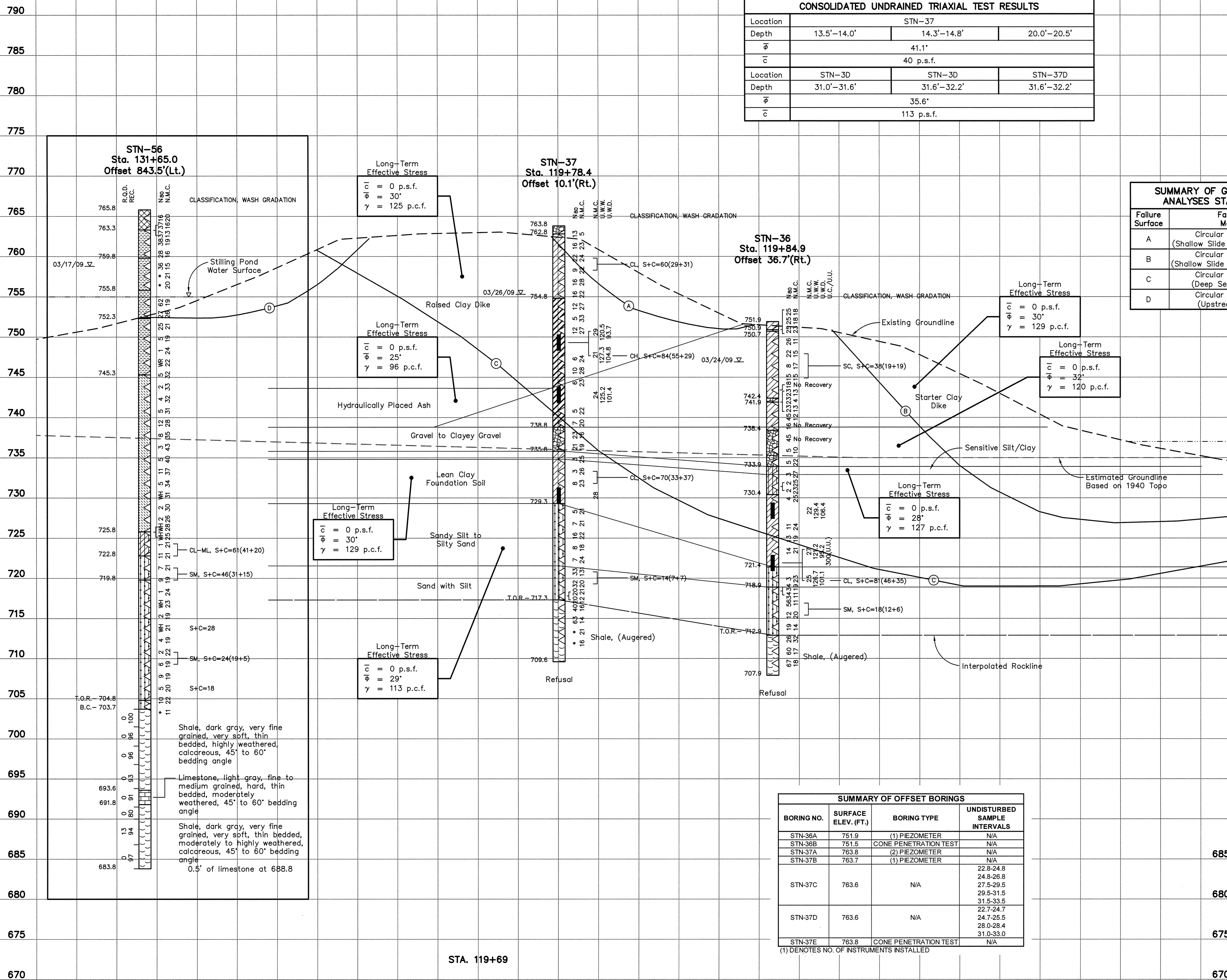
YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 CROSS SECTION**

DESIGNED BY: A. CRACE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUIT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUCH	APPROVED BY:	ISSUED BY:
--------------------------	-------------------------	-------------------------	-----------------------------	--------------------------	--------------	------------

**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-25 R 0



CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-37		
Depth	13.5'-14.0'	14.3'-14.8'	20.0'-20.5'
ϕ	41.1'		
c	40 p.s.f.		
Location	STN-3D	STN-3D	STN-37D
Depth	31.0'-31.6'	31.6'-32.2'	31.6'-32.2'
ϕ	35.6'		
c	113 p.s.f.		

SUMMARY OF GLOBAL STABILITY ANALYSES STATIC CONDITION		
Failure Surface	Failure Mode	Factor of Safety
A	Circular Optimized (Shallow Slide in Raised Dike)	1.39
B	Circular Optimized (Shallow Slide in Starter Dike)	1.25
C	Circular Optimized (Deep Seated Slide)	1.48
D	Circular Optimized (Upstream Slide)	1.78

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NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
 - Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
 - Silty Clay, brown to red brown, moist to wet, soft to medium stiff
 - Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Sandy Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lbs./cu.ft.)
 - Unit Weight Dry (lbs./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - Begin Rock Core
 - Rock Quality Designation (%)
 - Recovery (%)
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-36A	751.9	(1) PIEZOMETER	N/A
STN-36B	751.5	CONE PENETRATION TEST	N/A
STN-37A	763.8	(2) PIEZOMETER	N/A
STN-37B	763.7	(1) PIEZOMETER	N/A
STN-37C	763.6	N/A	22.8-24.8
			24.8-26.8
			27.5-29.5
			29.5-31.5
STN-37D	763.6	N/A	31.5-33.5
			22.7-24.7
			24.7-25.5
STN-37E	763.8	CONE PENETRATION TEST	28.0-28.4
			31.0-33.0

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVMD	APPD	ISSD	PROJECT	AS CONST	REV
0	08/09	AAC	TJ	OKR	DWF	AR					

SCALE: 1"=5'
EXCEPT AS NOTED

YARD

**GEOTECHNICAL EXPLORATION
ASH POND STABILITY
CROSS SECTION**

DESIGNED BY: A. CRACE | DRAWN BY: T. JOHNSON | CHECKED BY: O. ROUITT | SUPERVISED BY: D. FULLER | REVIEWED BY: A. RAUCH | APPROVED BY: | ISSUED BY: |

**KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 | DATE 08/09 | 36 | C | 10W229-26 | R 0

SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-26A	750.0	(1) PIEZOMETER	N/A
STN-26B	750.0	CONE PENETRATION TEST	N/A
STN-27A	765.0	(1) PIEZOMETER	26.0-28.0
			28.0-30.0
			30.0-32.0
			32.0-34.0
STN-27B	765.0	(2) PIEZOMETER	26.0-28.0
			28.0-30.0
			30.0-32.0
			32.0-34.0
STN-27C	765.0	CONE PENETRATION TEST	N/A

(1) DENOTES NO. OF INSTRUMENTS INSTALLED

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-26	STN-64	STN-27
Depth	20.0'-20.5'	20.6'-21.1'	30.3'-30.8'
ϕ	37.8°		
c	125 p.s.f.		

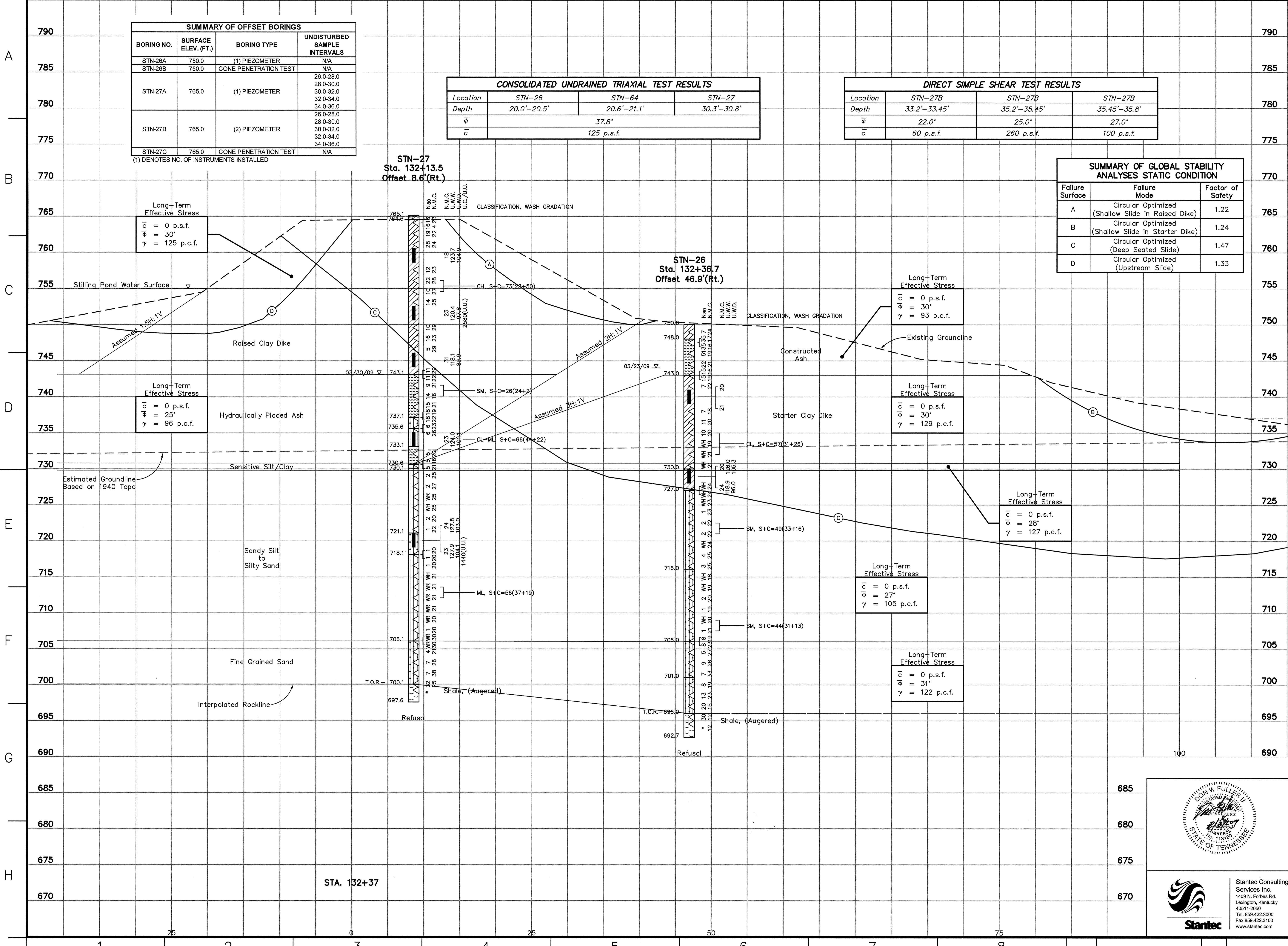
DIRECT SIMPLE SHEAR TEST RESULTS			
Location	STN-27B	STN-27B	STN-27B
Depth	33.2'-33.45'	35.2'-35.45'	35.45'-35.8'
ϕ	22.0°	25.0°	27.0°
c	60 p.s.f.	260 p.s.f.	100 p.s.f.

SUMMARY OF GLOBAL STABILITY ANALYSES STATIC CONDITION		
Failure Surface	Failure Mode	Factor of Safety
A	Circular Optimized (Shallow Slide in Raised Dike)	1.22
B	Circular Optimized (Shallow Slide in Starter Dike)	1.24
C	Circular Optimized (Deep Seated Slide)	1.47
D	Circular Optimized (Upstream Slide)	1.33

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NOT FOR CONSTRUCTION

- LEGEND**
- Overburden
 - Topsoil
 - Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
 - Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
 - Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
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 - Silt to Silty Sand, brown to gray, moist to saturated, very loose to medium dense, occasional clay zones
 - Sand to Silty Sand, brown to gray, moist to saturated, loose to very dense, occasional zones silty
 - Weight of Hammer
 - Weight of Rods
 - Standard Penetration Test Interval
 - Undisturbed Thin-Walled (Shelby) Tube Sample
 - Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
 - Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
 - Natural Moisture Content (%)
 - Unit Weight Wet (lbs./cu.ft.)
 - Unit Weight Dry (lbs./cu.ft.)
 - Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
 - Water Level and Date Recorded
 - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
 - Begin Rock Core
 - Rock Quality Designation (%)
 - Recovery (%)
 - Auger Refusal using a carbide-tipped tooth auger bit
 - No Refusal Encountered
 - Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



R	0	08/09	AAC	TJ	OKR	DWF	AR	-	-	-	-	-	-	-	-	-	-	-	-	-
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVDG	APPR	ISSD	PROJECT	AS CONST	REV	ISSD	DATE	BY	REASON	ISSD	DATE	BY	REASON	ISSD

SCALE: 1"=5'

YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 CROSS SECTION**

DESIGNED BY: A. CRACE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUITT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUCH	APPROVED BY:	ISSUED BY:
--------------------------	-------------------------	--------------------------	-----------------------------	--------------------------	--------------	------------

**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-27 R 0

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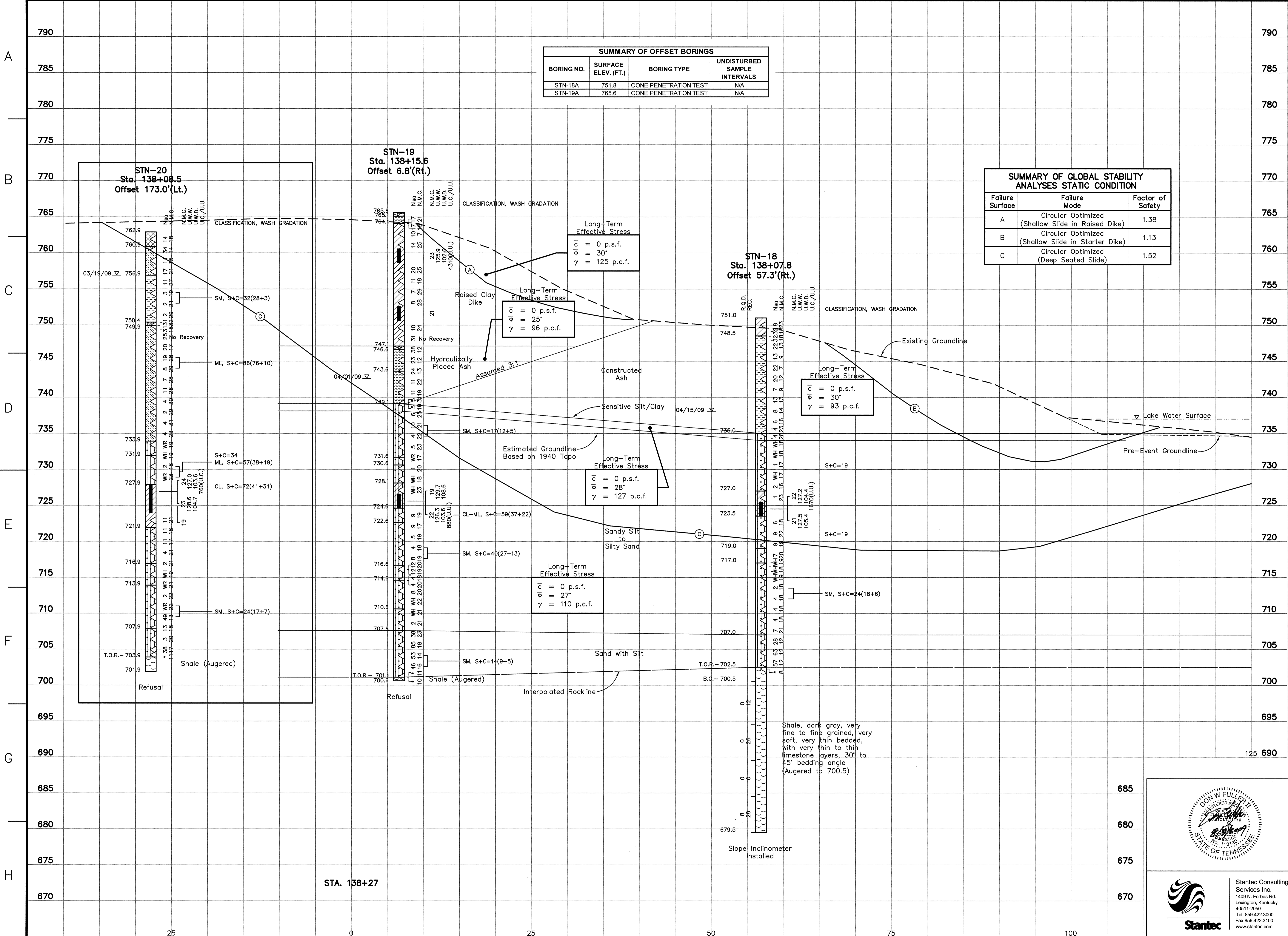
SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-18A	751.8	CONE PENETRATION TEST	N/A
STN-19A	765.6	CONE PENETRATION TEST	N/A

SUMMARY OF GLOBAL STABILITY ANALYSES STATIC CONDITION		
Failure Surface	Failure Mode	Factor of Safety
A	Circular Optimized (Shallow Slide in Raised Dike)	1.38
B	Circular Optimized (Shallow Slide in Starter Dike)	1.13
C	Circular Optimized (Deep Seated Slide)	1.52

NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet very loose to medium dense, medium to very coarse grained, poorly sorted, angular
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- Weight of Hammer
- Weight of Rods
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- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- Natural Moisture Content (%)
- Unit Weight Wet (lbs./cu.ft.)
- Unit Weight Dry (lbs./cu.ft.)
- Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- Begin Rock Core
- Rock Quality Designation (%)
- Recovery (%)
- Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal Encountered
- Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	INVD	APPR	ISSD	PROJECT	AS CONST	REV
0	08/09	AAC	TJ	OKR	DWF	AR					

SCALE: 1"=5'
 EXCEPT AS NOTED

YARD

GEOTECHNICAL EXPLORATION
ASH POND STABILITY
CROSS SECTION

DESIGNED BY: A. CRACE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUIT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUCH	APPROVED BY:	ISSUED BY:
--------------------------	-------------------------	-------------------------	-----------------------------	--------------------------	--------------	------------

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2008 DATE 08/09 36 C 10W229-28 R 0

Stantec
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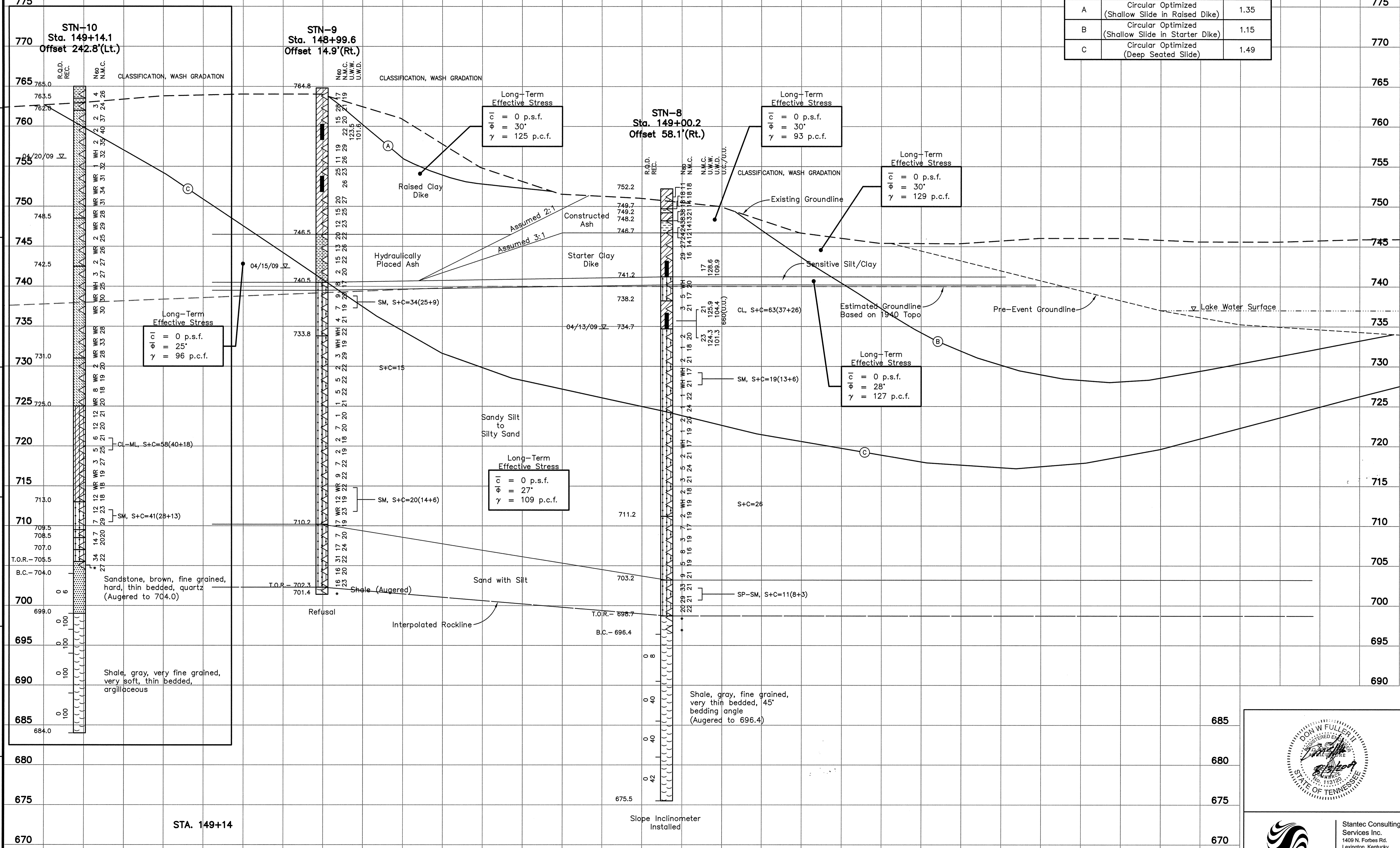
SUMMARY OF OFFSET BORINGS			
BORING NO.	SURFACE ELEV. (FT.)	BORING TYPE	UNDISTURBED SAMPLE INTERVALS
STN-8A	751.7	CONE PENETRATION TEST	N/A
STN-9A	764.8	CONE PENETRATION TEST	N/A

SUMMARY OF GLOBAL STABILITY ANALYSES STATIC CONDITION		
Failure Surface	Failure Mode	Factor of Safety
A	Circular Optimized (Shallow Slide in Raised Dike)	1.35
B	Circular Optimized (Shallow Slide in Starter Dike)	1.15
C	Circular Optimized (Deep Seated Slide)	1.49

NOT FOR CONSTRUCTION

LEGEND

- Overburden
- Topsoil
- Fat Clay, brown to red brown, damp to wet, stiff to very stiff, with occasional manganese concretions, silty zones, and sand
- Bottom Ash, gray to dark gray and black, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
- Fly Ash, gray to dark gray, damp to wet, very loose to dense, with occasional clay seams, gravels, coal fragment
- Lean Clay, brown to gray, damp to wet, very soft to medium stiff, with sandy and silty zones
- Silty Clay, brown to red brown, moist to wet, soft to medium stiff
- Gravel with Sand, gray to brown, wet, medium dense to very dense, sand is fine to medium grained, poorly graded and sorted
- Silt to Silty Sand, brown to gray, moist to saturated, loose to very dense, occasional clay zones
- Sand to Silty Silt, brown to gray, moist to saturated, loose to very dense, occasional zones silty
- Weight of Hammer
- Weight of Rods
- Standard Penetration Test Interval
- Undisturbed Thin-Walled (Shelby) Tube Sample
- Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
- Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
- Natural Moisture Content (%)
- Unit Weight Wet (lbs./cu.ft.)
- Unit Weight Dry (lbs./cu.ft.)
- Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
- Water Level and Date Recorded
- Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- Begin Rock Core
- Rock Quality Designation (%)
- Recovery (%)
- Auger Refusal using a carbide-tipped tooth auger bit
- No Refusal Encountered
- Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer to typed boring log.



Stantec
 Stantec Consulting Services Inc.
 1409 N. Forbes Rd.
 Lexington, Kentucky 40511-2050
 Tel: 609-422-3000
 Fax: 609-422-3100
 www.stantec.com

REV.	DATE	DSGN	DRWN	CHKD	SUPV	RWVD	APPR	ISSD	PROJECT	AS CONST	REV
0											

SCALE: 1"=5' EXCEPT AS NOTED

YARD

**GEOTECHNICAL EXPLORATION
 ASH POND STABILITY
 CROSS SECTION**

DESIGNED BY: A. CRACE	DRAWN BY: T. JOHNSON	CHECKED BY: O. ROUITT	SUPERVISED BY: D. FULLER	REVIEWED BY: A. RAUCH	APPROVED BY:	ISSUED BY:
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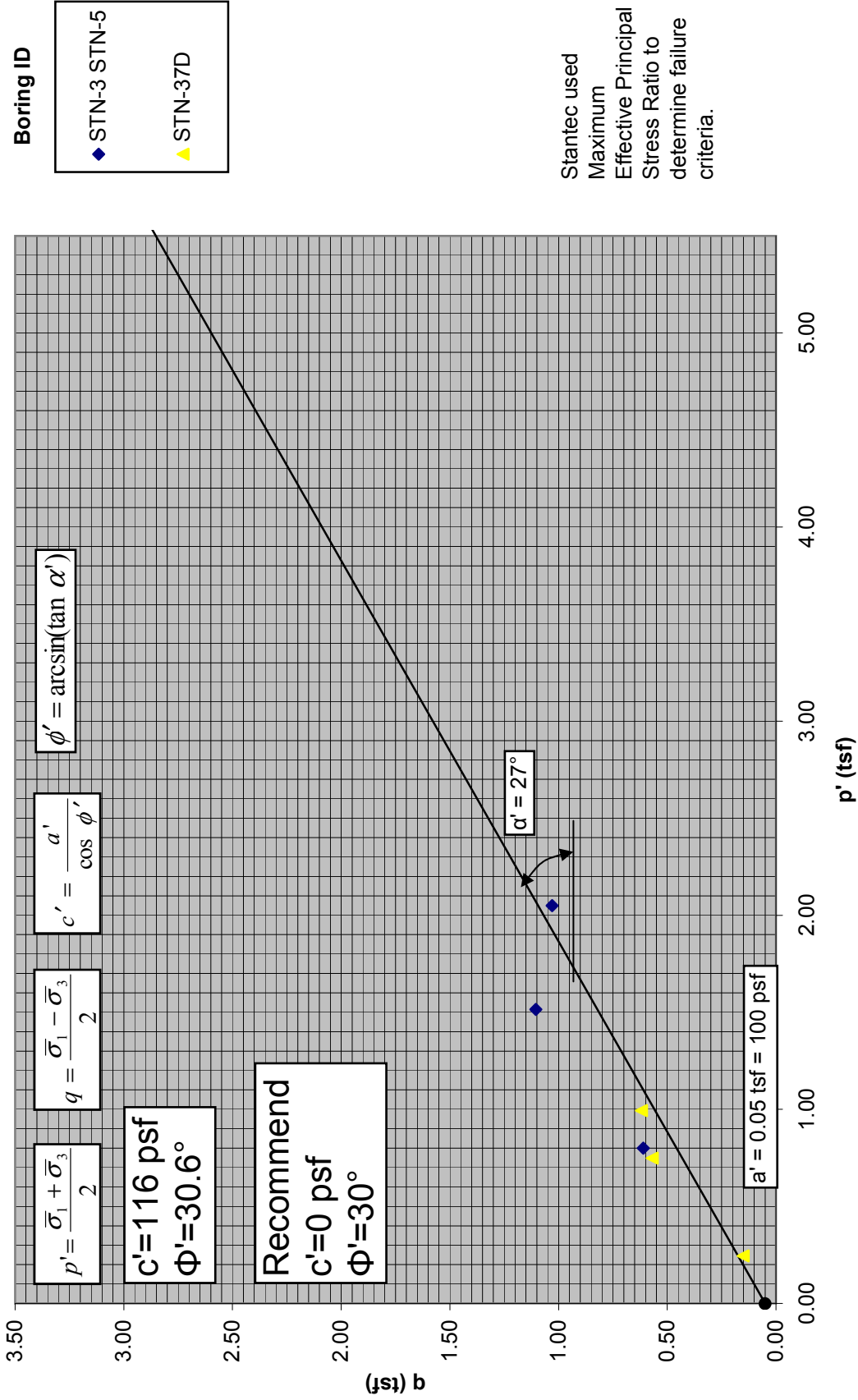
**KINGSTON FOSSIL PLANT
 TENNESSEE VALLEY AUTHORITY
 FOSSIL AND HYDRO ENGINEERING**

AUTOCAD R 2008 DATE 08/09 36 C 10W229-29 R 0

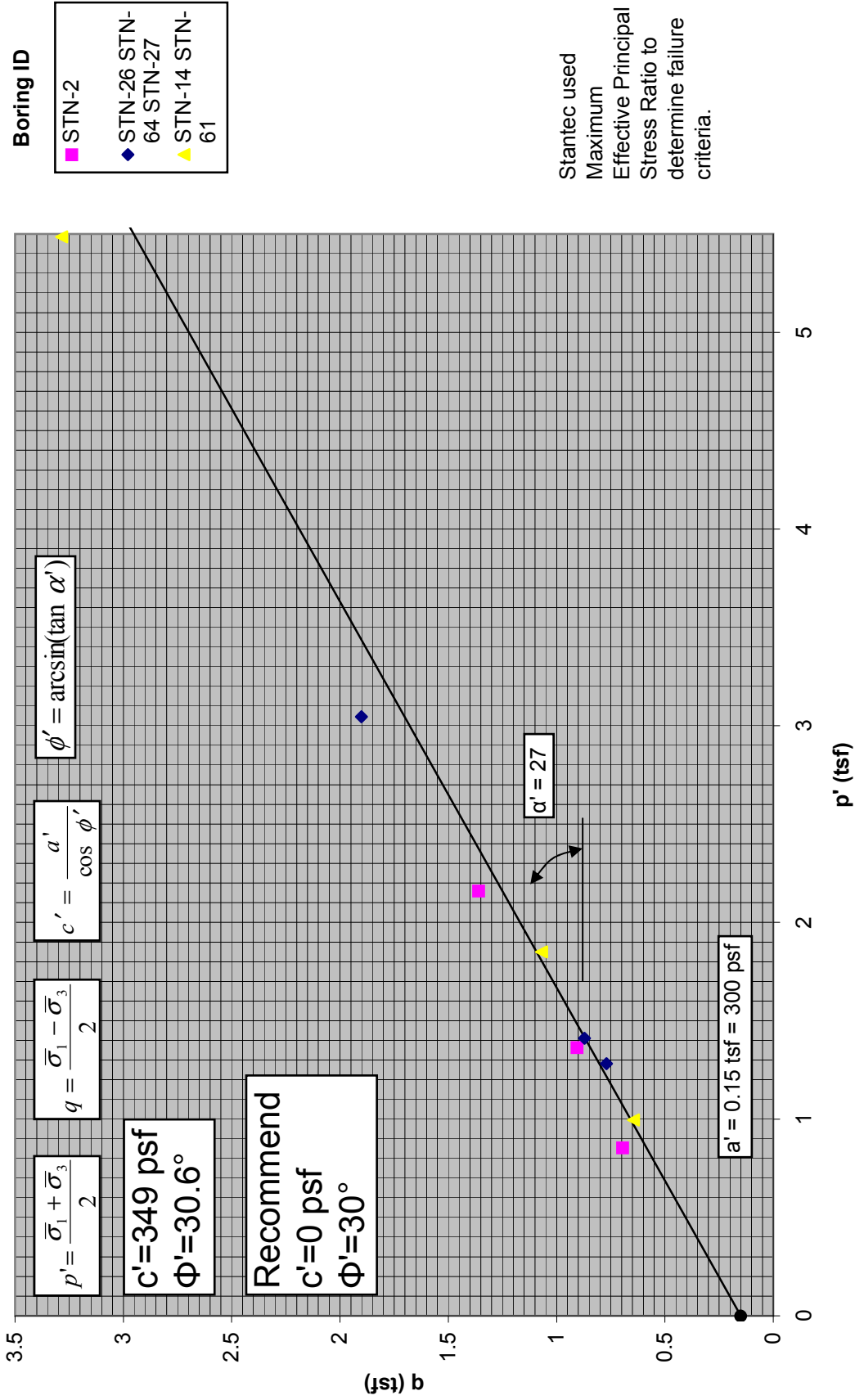
Appendix G

Strength Parameter Selection Charts

Raised Clay Dike Effective Stress from CU Triaxial Tests

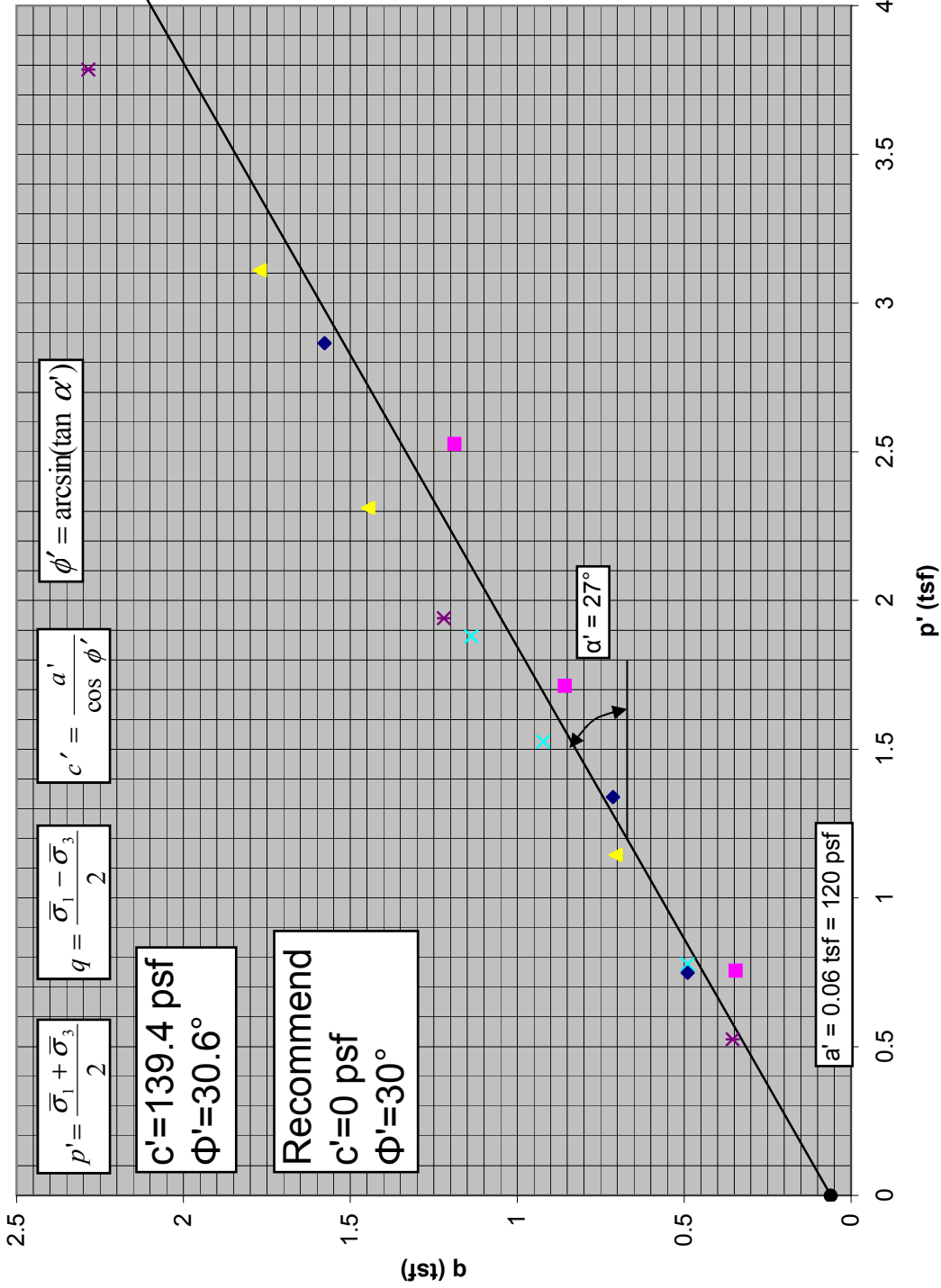


Starter Clay Dike Effective Stress from CU Triaxial Tests

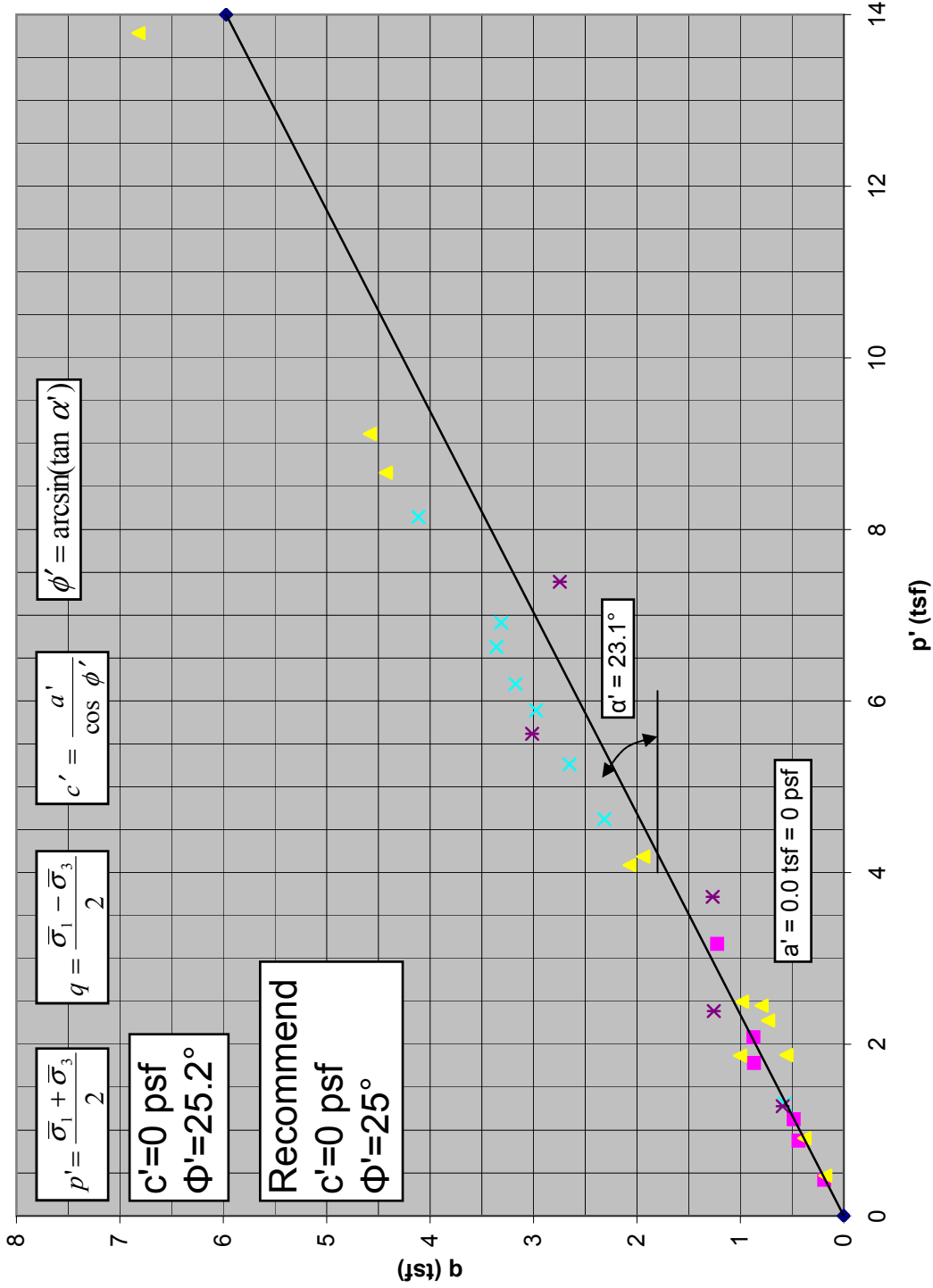


Foundation Clay

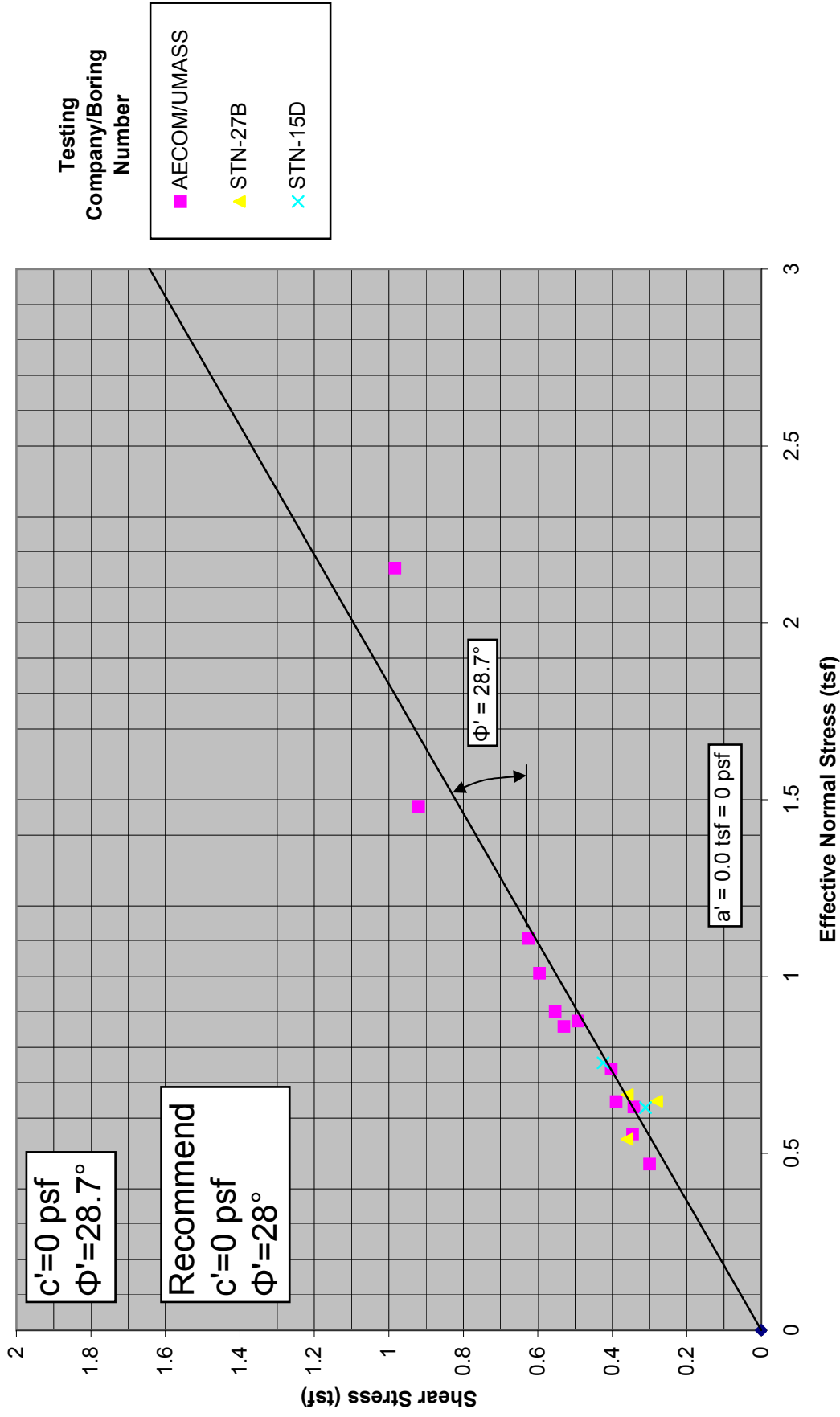
Effective Stress from CU Triaxial Tests



Hydraulically Placed Ash Effective Stress from CU Triaxial Tests



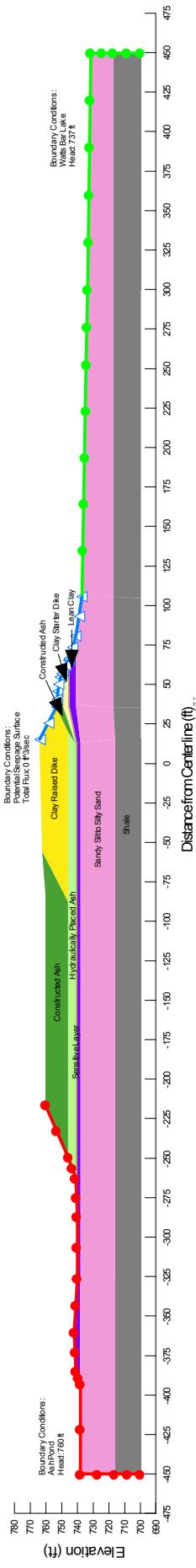
DSS Testing on Sensitive Silt/Clay Effective Stress from DSS Tests



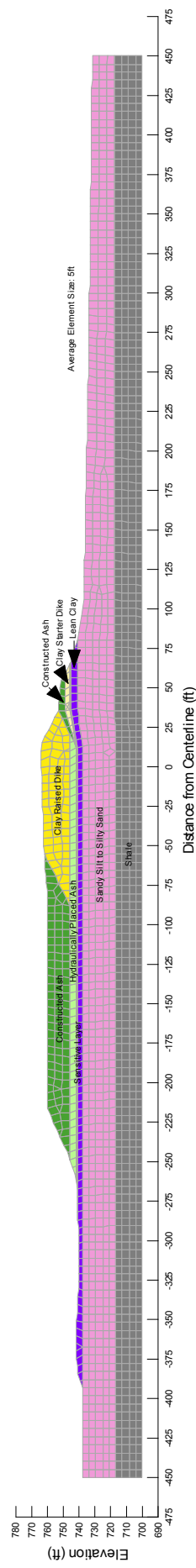
Appendix H

Pore Water Pressure Contours

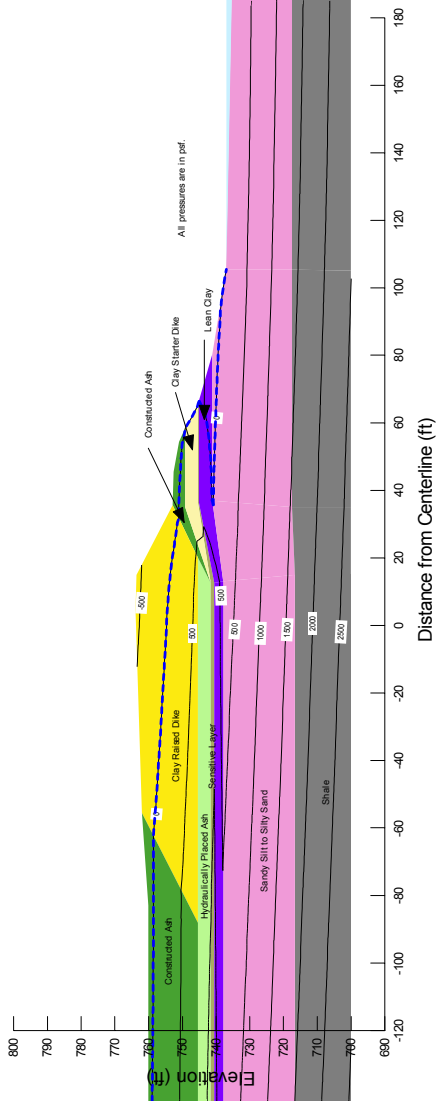
Kingston Fossil Plant Dike C - Station 108+93 Subsurface Profile and Boundary Conditions



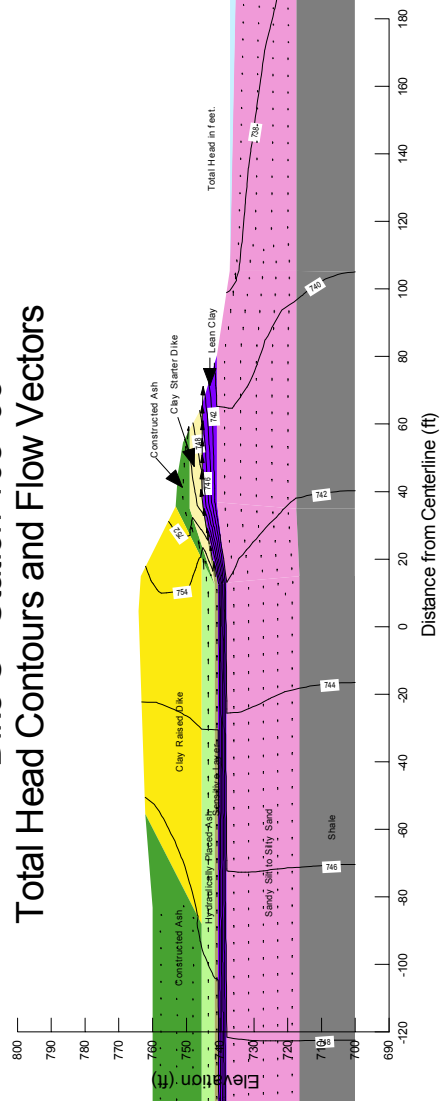
Kingston Fossil Plant Dike C - Station 108+93 Finite Element Mesh



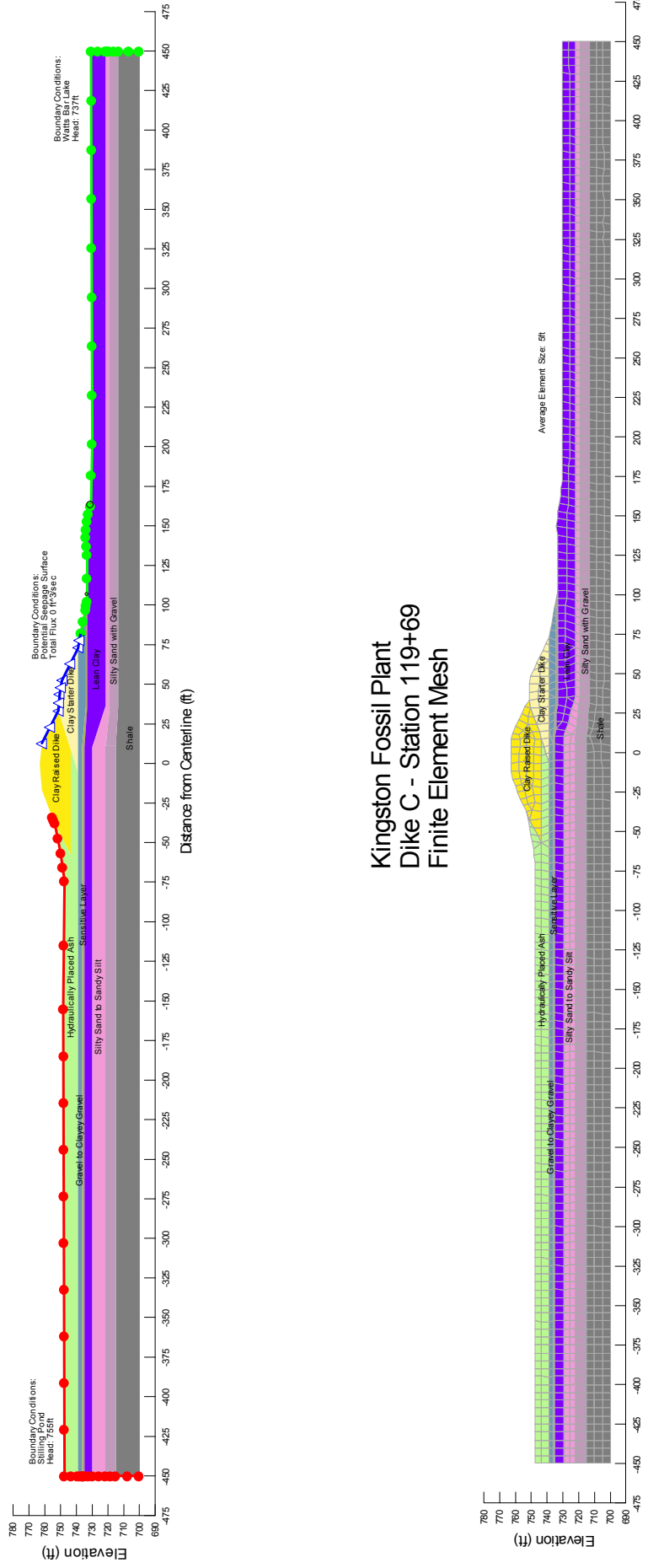
Kingston Fossil Plant Dike C - Station 108+93 Pore Water Pressure Contours



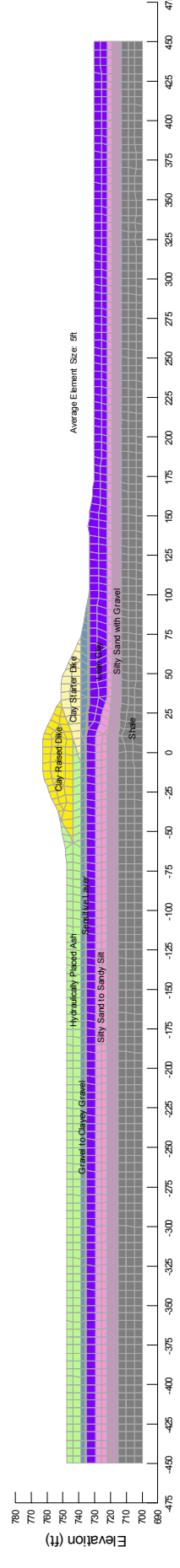
Kingston Fossil Plant Dike C - Station 108+93 Total Head Contours and Flow Vectors



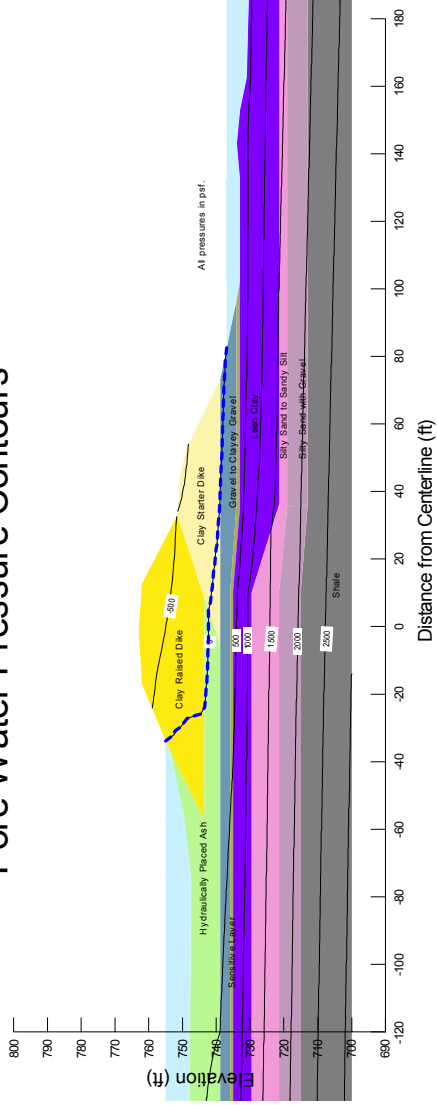
Kingston Fossil Plant Dike C - Station 119+69 Subsurface Profile and Boundary Conditions



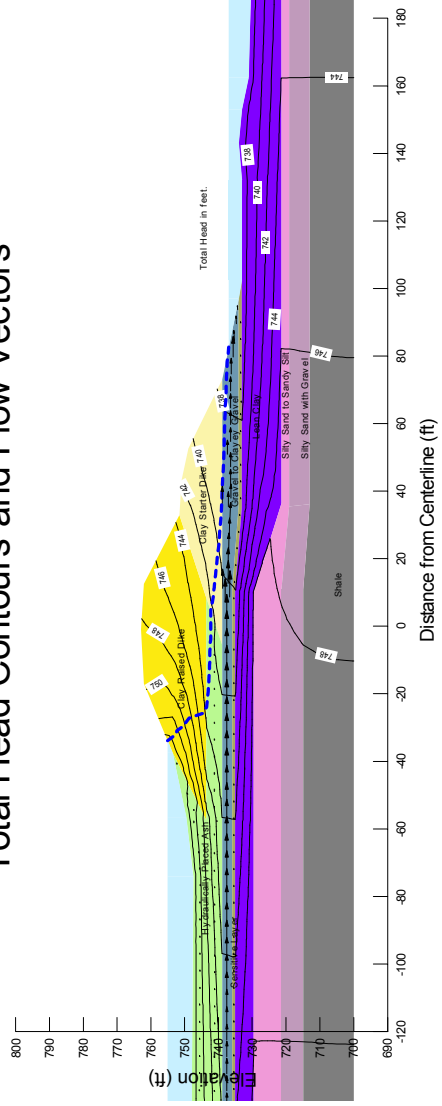
Kingston Fossil Plant Dike C - Station 119+69 Finite Element Mesh



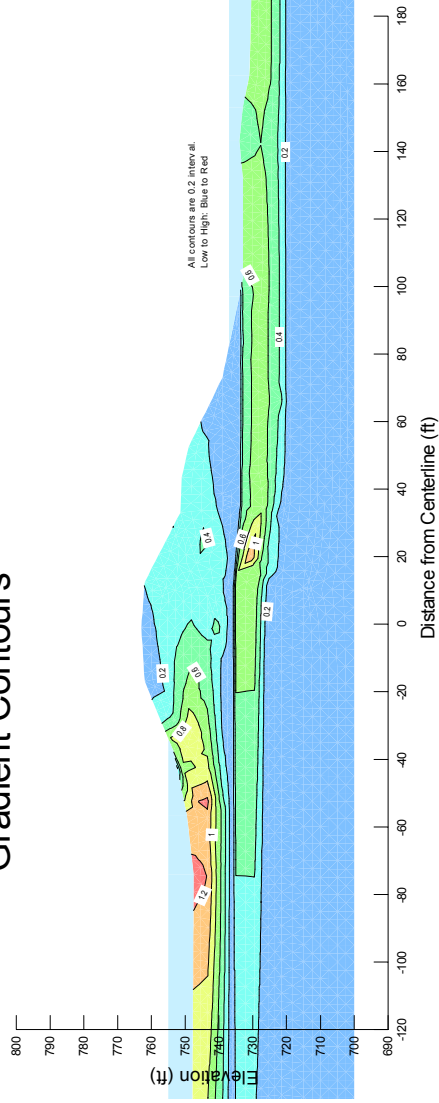
Kingston Fossil Plant Dike C - Station 119+69 Pore Water Pressure Contours



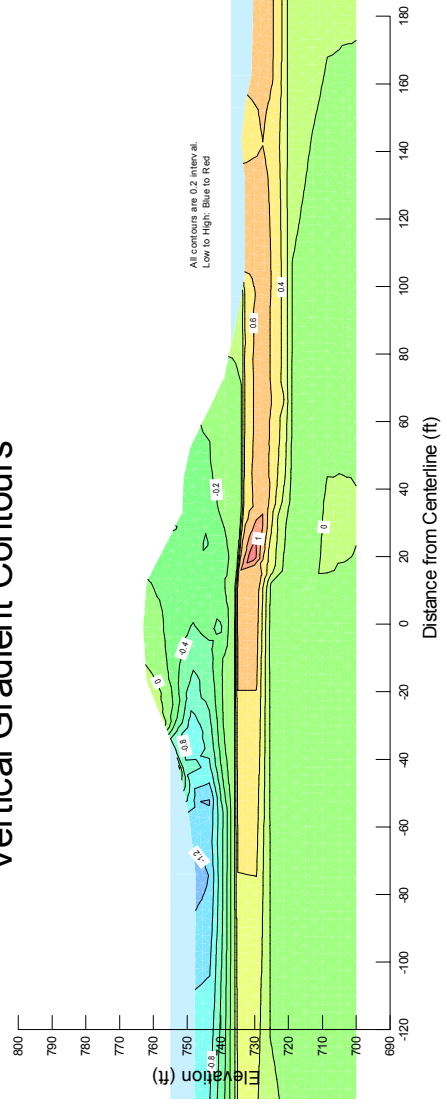
Kingston Fossil Plant Dike C - Station 119+69 Total Head Contours and Flow Vectors



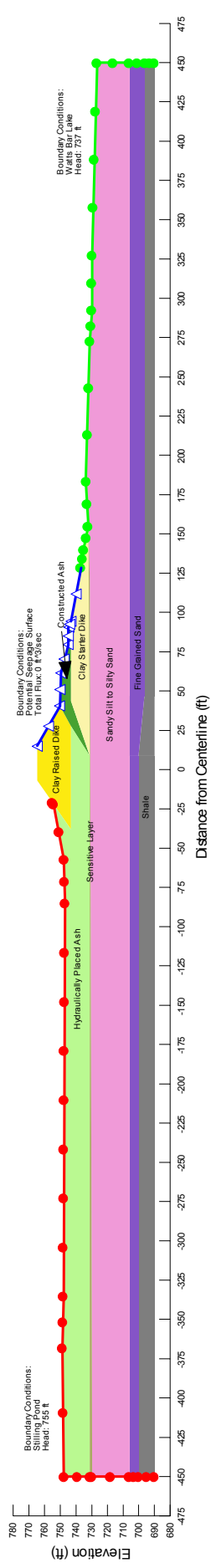
Kingston Fossil Plant Dike C - Station 119+69 Gradient Contours



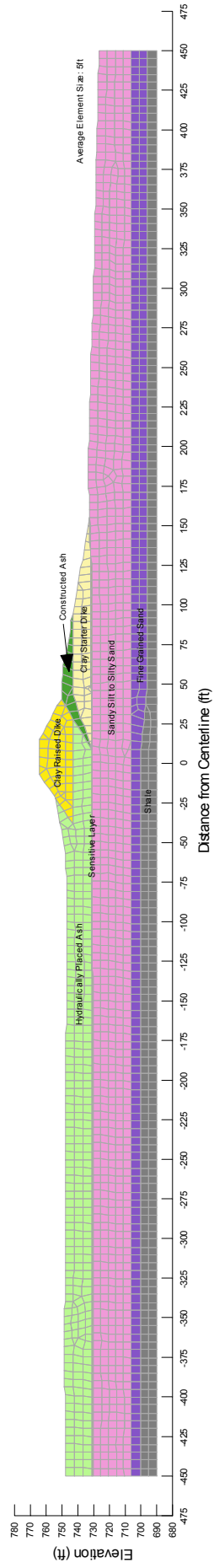
Kingston Fossil Plant Dike C - Station 119+69 Vertical Gradient Contours



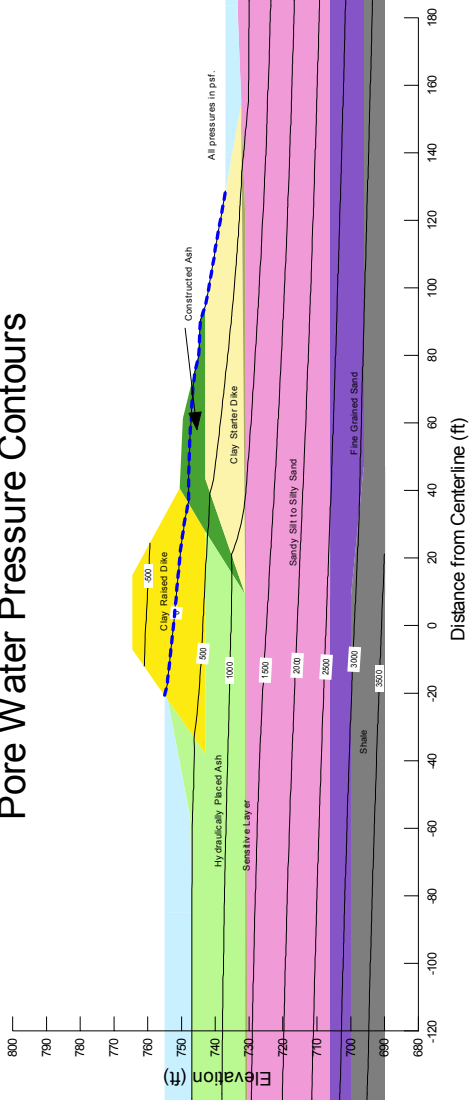
Kingston Fossil Plant Dike C - Station 132+37 Subsurface Profile and Boundary Conditions



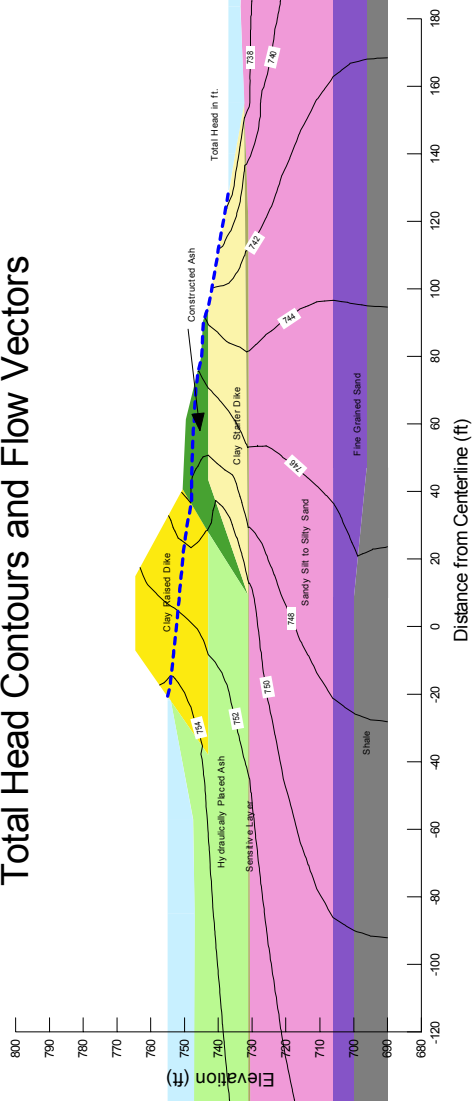
Kingston Fossil Plant Dike C - Station 132+37 Finite Element Mesh



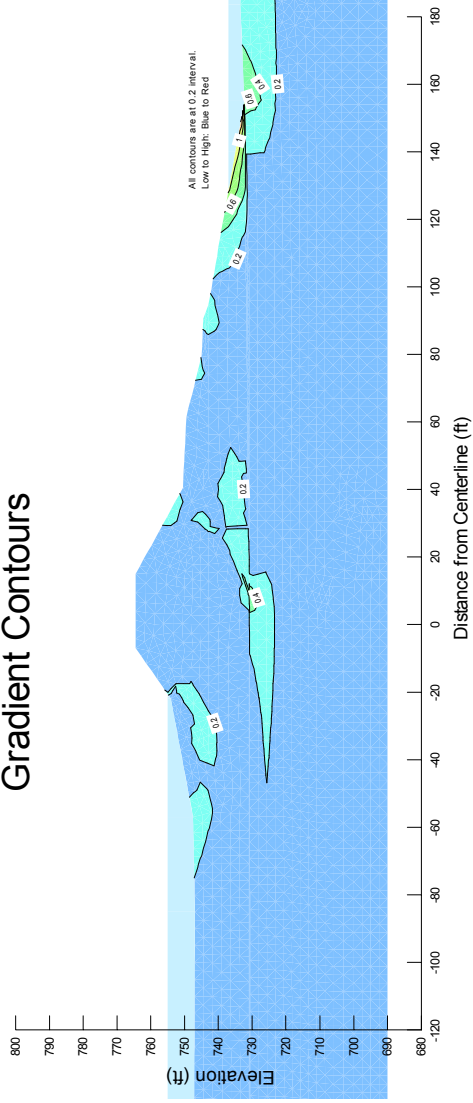
Kingston Fossil Plant Dike C - Station 132+37 Pore Water Pressure Contours



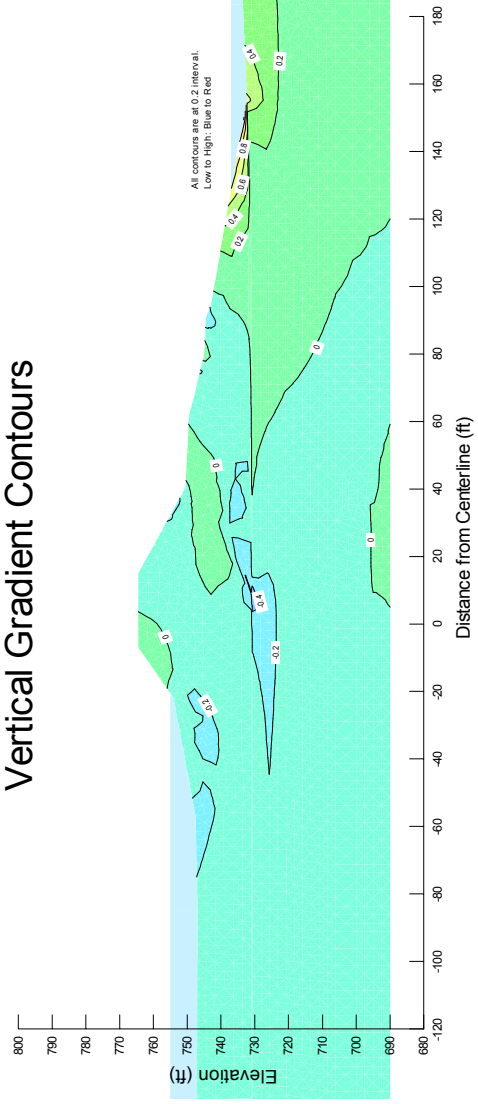
Kingston Fossil Plant Dike C - Station 132+37 Total Head Contours and Flow Vectors



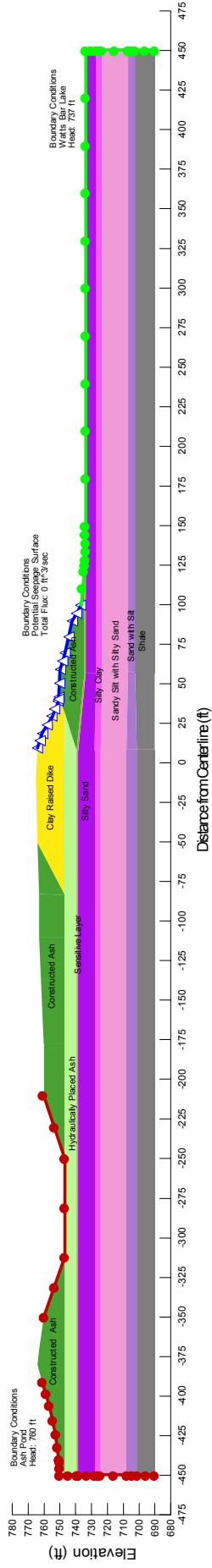
Kingston Fossil Plant Dike C - Station 132+37 Gradient Contours



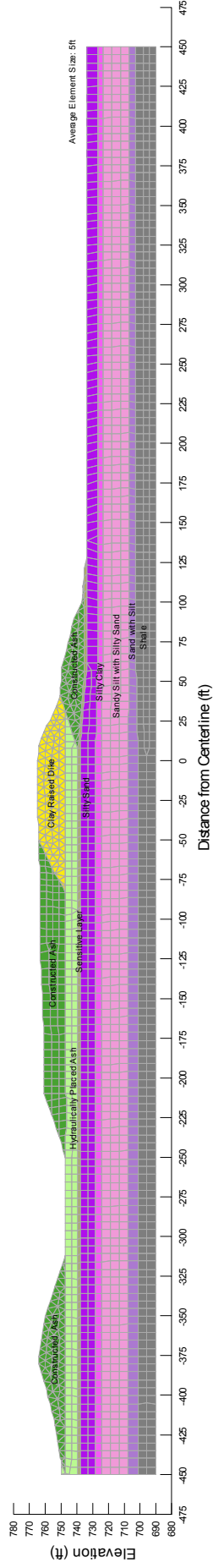
Kingston Fossil Plant Dike C - Station 132+37 Vertical Gradient Contours



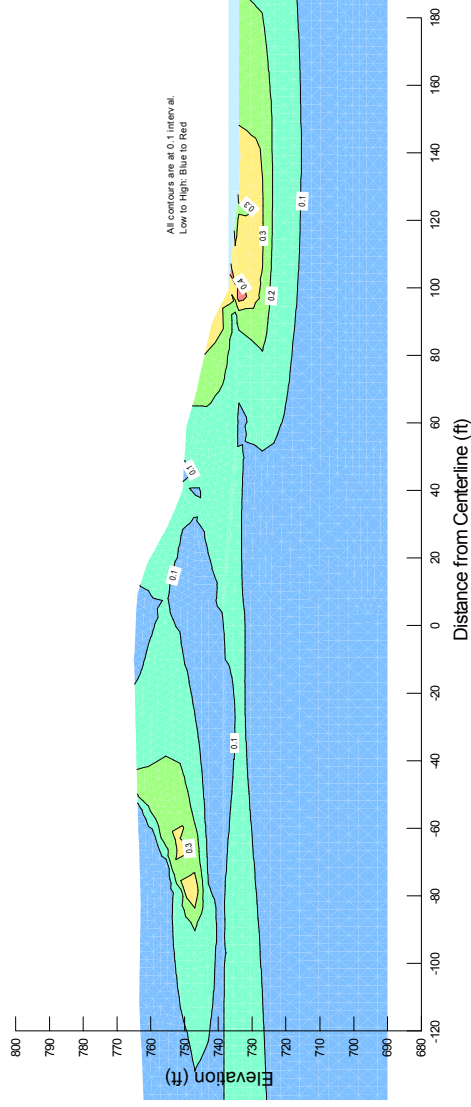
Kingston Fossil Plant Dike C - Station 138+27 Subsurface Profile and Boundary Conditions



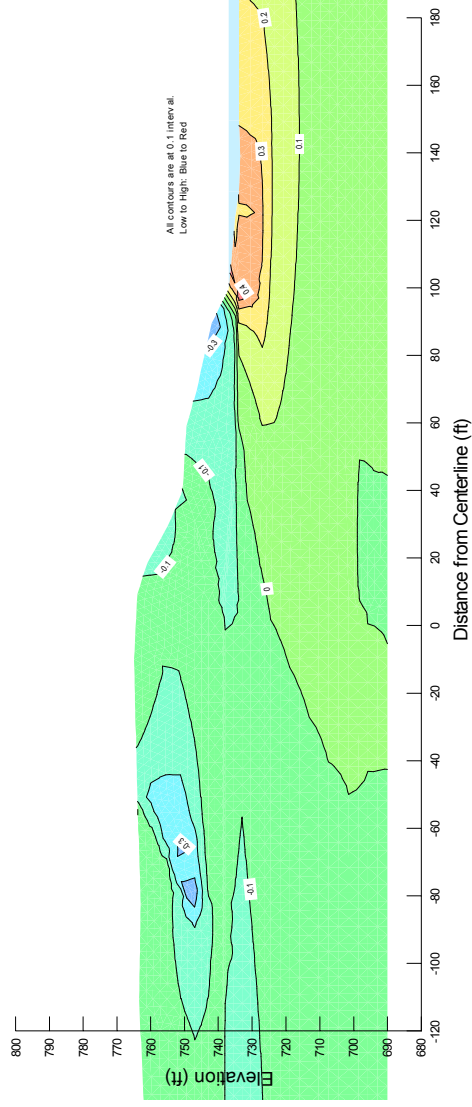
Kingston Fossil Plant Dike C - Station 138+27 Finite Element Mesh



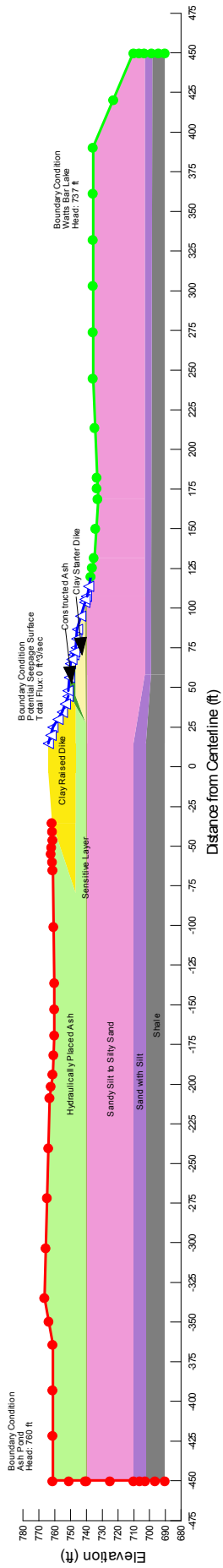
Kingston Fossil Plant Dike C - Station 138+27 Gradient Contours



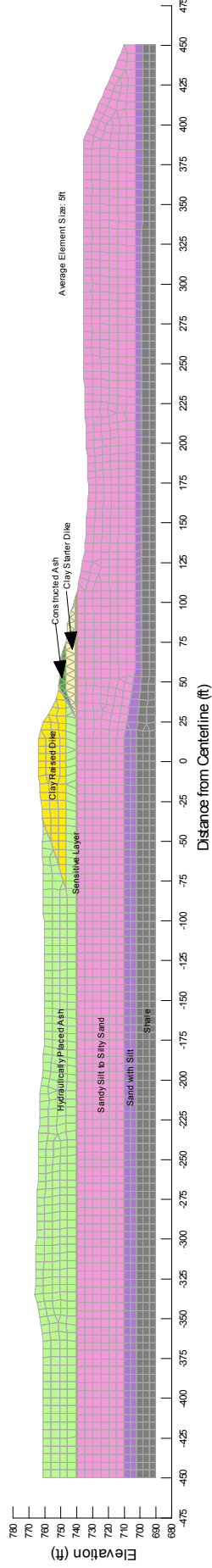
Kingston Fossil Plant Dike C - Station 138+27 Vertical Gradient Contours



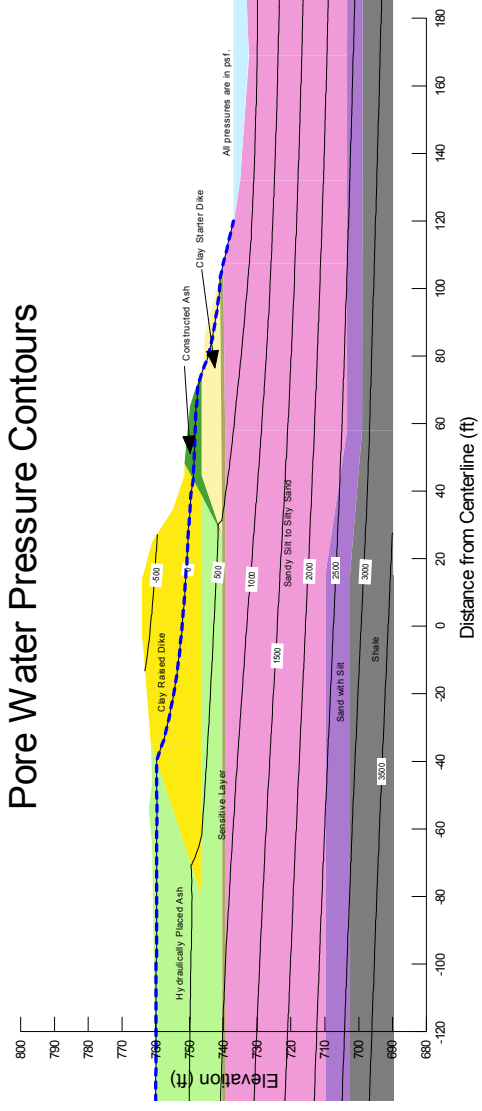
Kingston Fossil Plant Dike C - Station 149+14 Subsurface Profile and Boundary Conditions



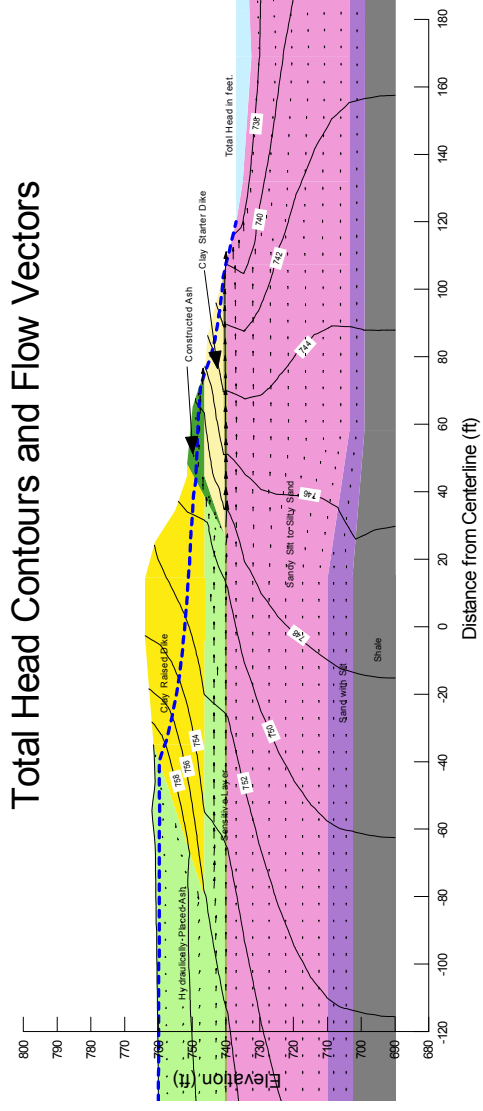
Kingston Fossil Plant Dike C - Station 149+14 Finite Element Mesh



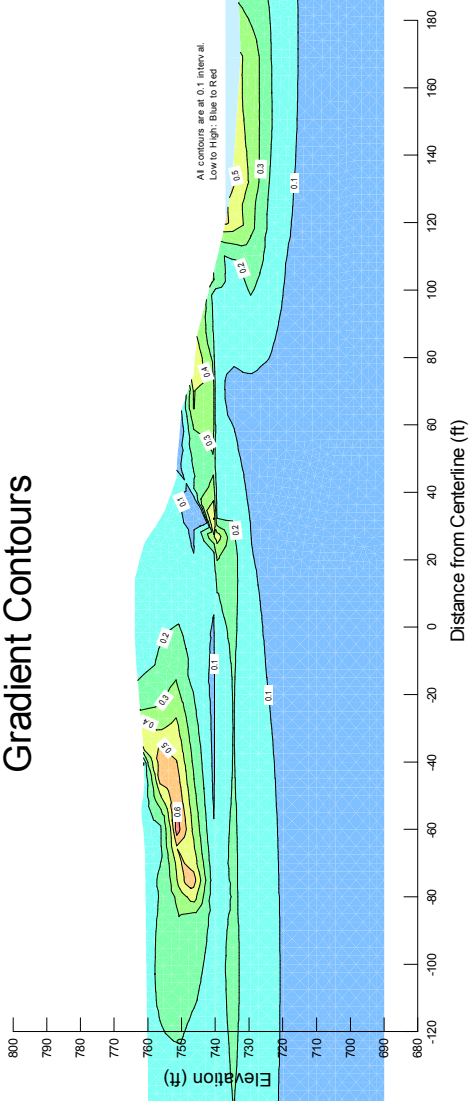
Kingston Fossil Plant Dike C - Station 149+14 Pore Water Pressure Contours



Kingston Fossil Plant Dike C - Station 149+14 Total Head Contours and Flow Vectors



Kingston Fossil Plant Dike C - Station 149+14 Gradient Contours



Kingston Fossil Plant Dike C - Station 149+14 Vertical Gradient Contours

