Report of Geotechnical Exploration and Evaluation of Slope Stability

DuPont Road Dredge Cell
Johnsonville Fossil Plant
Humphreys County, Tennessee

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Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

April 19, 2010

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Mr. Michael S. Turnbow
Tennessee Valley Authority
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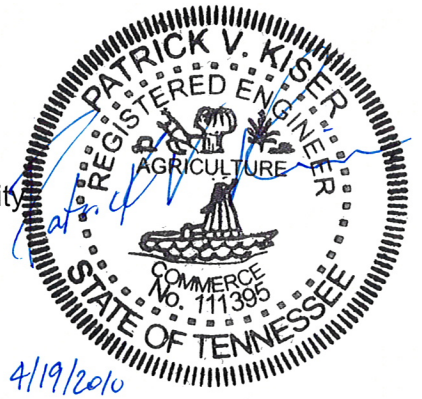

4/19/2010

Re: Report of Geotechnical Exploration and Evaluation of Slope Stability
DuPont Road Dredge Cell
Johnsonville Fossil Plant
Humphreys County, Tennessee

Dear Mr. Turnbow:

As requested, Stantec Consulting Services Inc. (Stantec) has completed the geotechnical exploration and evaluation of slope stability of the DuPont Road Dredge Cell at the Johnsonville Fossil Plant located in New Johnsonville, Humphreys County, Tennessee. This report documents the subsurface conditions, results of laboratory testing, findings from historical document reviews, results of our slope stability analyses, and our conclusions and recommendations. These services were performed under Engineering Service Request ESR 1208 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.

Shaikh Z. Rahman, PE
Project Engineer

Patrick V. Kiser, PE
Project Manager/Senior Associate

/cmw

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Executive Summary

Stantec Consulting Services Inc. (Stantec) has completed the geotechnical exploration and slope stability evaluation for the DuPont Road Dredge Cell at the Tennessee Valley Authority's (TVA) Johnsonville Fossil Plant. The dredge cell was constructed in the early 1990's and has been experiencing water seepage along the perimeter slopes, at the interface of the upper and lower dikes. Stantec has been tasked to design a less permeable cap and a leachate collection system as a measure to reduce the infiltration of surface drainage, reduce the potential for elevated water levels in the cell, and address the seepage issues. The purpose of this study is to evaluate the stability of dredge cell and provide information and recommendations to support design and construction of the cap and leachate collection system. To this end, Stantec reviewed historical documents, developed and executed a geotechnical exploration to obtain subsurface information; installed and monitored piezometers; and performed slope stability analyses to evaluate the stability of the dike for long-term conditions.

Two cross-sections were evaluated as part of this study; Section A-A' through the tallest portion of the dredge cell and B-B' through the tallest portion of the clay perimeter dike at the northwestern corner of the cell. Stantec developed the cross-sectional geometry and subsurface profile based on historic documentation, survey information, piezometer data, and the subsurface exploration performed as part of this study.

Previous studies performed by TVA included the installation of piezometers and monitoring of water levels in the dredge cell over a three year period. These piezometric data were used in the modeled analyses. Stantec performed three sets of static slope stability analyses to evaluate existing slope configurations at various water levels within the dredge cell. The water levels modeled are (i) high water level during wet season, (ii) low water level during dry season and (iii) an anticipated lower water level after cap and leachate collection system installation. The estimated water levels were based on the piezometer data provided in a TVA seepage study report published in 2008 and shown in Figure 4 of this report. According to the TVA report, the water level in the wet season varies from elevation 430 ft near the middle of the cell to elevation 420 ft along the perimeter. Corresponding water level during dry season reportedly varies from elevation 420 ft to 412 ft. An anticipated water elevation of 409 ft was used for analyses after installing the cap and leachate collection system.

For a high water level associated with wet season, the analyses results indicate the long-term factor of safety for global, deep-seated failures varies from 1.5 at section A-A' to 1.3 at cross-section B-B'. Corresponding global factor of safety for a dry season low water level varies from 1.6 at cross-section A-A' to 1.4 at cross-section B-B'.

The calculated factor of safety for a maintenance-type, shallow failure at wet season water level is 1.2 at both cross-sections A-A' and B-B'. Corresponding factors of safety at the dry season water level vary from 1.4 at cross-section A-A' to 1.2 at cross-section B-B'. It should be noted that the critical failure surfaces for wet season water levels are within the Phase II ash dike and those for dry season water levels are within the Phase I clay dike. TVA Drawing 10W218-4, R0 indicates the Phase I clay dike was built for a minimum long term factor of safety of 1.4. The factor of safety values are shown in Table 8 of this report.

The results of analyses with the cap and leachate collection system indicate an increase in factor of safety for both global and maintenance failure at the two analyzed cross-sections.

These results indicate the factor of safety for global failures increases to 1.9 at section A-A' and 1.5 at cross-section B-B'. Corresponding factors of safety for maintenance-type failures increases to 1.5 at cross-section A-A' and 1.3 at cross-section B-B'.

Based on the results of the slope stability analyses, the existing configuration of the Phase I clay dike does not provide the required factor of safety against shallow, maintenance-type failures and portions of the dike do not provide adequate factors of safety against deep seated, global failure. Lowering the water level in the cell improves the factors of safety, but portions of the Phase I clay dike will not provide adequate factors of safety for shallow, maintenance-type failures even when the water level in the cell lowers as a result of the construction of the new cap and reduction in infiltration. This does not imply that the dredge cell is in immediate danger of failure, but TVA should undertake measures to improve the factor of safety of this facility as per the recommendations presented herein.

Stantec anticipates the proposed cap will help lowering the water level in the dredge cell. However, the effect of the new cap on long-term water levels is not yet known. Instead of flattening the slopes of the Phase I dike or implementing other measures to improve stability, Stantec recommends constructing the improved cap, installing additional piezometers around the perimeter of the dredge cell and within the Phase I clay dike, and monitoring the water levels in the piezometers for a period of one year. This will help to develop an understanding the effect of the cap on the long-term water levels in the cell. The water levels in the piezometers should be measured at least once per month over the one year monitoring period. At the end of the monitoring period, the stability of the dredge cell should be re-evaluated using the piezometric data.

Lowering the water level in the dredge cell will not provide acceptable factor of safety for shallow, maintenance-type failures. These maintenance-type failures are associated with a shallow slide within the Phase I clay dike which exhibits a relatively steep slope of 2.5H:1V (Horizontal:Vertical). Based on the analyses performed as part of this study, Stantec recommends armoring sections of the Phase I clay dike in excess of 14 feet in height with 3 feet of riprap to provide the required factor of safety. A brief review of topographic survey information suggests approximately 20% of the length of the Phase I dike is taller than 14 feet.

Review of the piezometer data provided in the TVA seepage study indicates water levels within the dredge cell are above the top of the Phase I clay dike for most of the year. Even during dry seasons, the lowest recorded water levels in the piezometers adjacent to the perimeter Phase I dike are around elevation 412 feet. As such, Stantec recommends a temporary dewatering trench be constructed around the perimeter of the dredge cell in order to lower the water level in the cell to a maximum evaluation of 412 feet. The lowered water level should be maintained during construction to reduce the potential for water build up behind the cap and possible "blowout" of the cap material. Additional recommendations associated with design and construction of the improved cap and leachate collection system are provided herein.

This report provides detailed discussions of the scope of work performed as part of this study; results of the historic document review, subsurface exploration, and laboratory testing program; assumptions, methodologies and results of the engineering analyses; and Stantec's conclusions and recommendations for future actions.

Report of Geotechnical Exploration and Evaluation of Slope Stability

DuPont Road Dredge Cell
Johnsonville Fossil Plant
Humphreys County, Tennessee

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

April 19, 2010

Report of Geotechnical Exploration and Evaluation of Slope Stability

DuPont Road Dredge Cell
Johnsonville Fossil Plant
Humphreys County, Tennessee

1. Introduction

1.1. Background and Purpose

The DuPont Road Dredge Cell is an inactive 'dry' ash storage area at the Tennessee Valley Authority's (TVA) Johnsonville Fossil Plant located in New Johnsonville, Humphreys County, Tennessee. The dredge cell is approximately 22 acres in area and was constructed in the early 1990's. The cell is filled with dredged ash enclosed by two perimeter dikes, a clay dike at the bottom and an ash dike at the top. The cell, closed in the summer of 2001, has been experiencing water seepage along the perimeter slopes, at the interface of the upper and lower dikes. Approximately 50% of the perimeter exhibits wet soils or ponded water at these locations regardless of season or prior rainfall conditions. TVA has made previous attempts to address this issue by planting trees on the landfill surface with the intent of intercepting infiltration from surface drainage instead of allowing it to seep into the underlying ash. Those trees were recently destroyed by an unintended mowing and TVA was recently asked by TDEC to more aggressively pursue a solution to this problem. Stantec has been tasked to design a less permeable cap and a leachate collection system as a measure to reduce the infiltration of surface drainage, reduce the potential for elevated water levels in the cell, and address the seepage issues. The purpose of this study is to evaluate the stability of dredge cell and provide information and recommendations to support the design and construction of the cap and leachate collection system.

1.2. Project Location and Description

The Johnsonville Fossil Plant is situated on the eastern shore of Kentucky Lake (Tennessee River), approximately 12 miles west of Waverly, Tennessee. The plant is on the north side of US 70, approximately 3,000 feet from the US 70 bridge over Kentucky Lake. The dredge cell is located on the northeast side of the facility, between North Street and County Road 929. An aerial view of the plant is shown in Figure 1.

Development of the original dredge cell configuration included the construction of a clay perimeter dike (Phase I dike) and compacted clay bottom liner. Clay soils were excavated from within the dredge cell footprint to provide material for construction o f the Phase I dike. The surface elevation of the clay liner is reported to be at approximate elevation 393 feet and the top of the Phase I dike is reportedly at elevation 416 feet. Both bottom ash and fly ash were dredged from the ash pond and sluiced to the subject dredge cell, allowed to settle, and the water decanted and returned to a stilling pond. When the ash fill reached an elevation approaching the top of the Phase I dike, TVA constructed a second tier dike (Phase II dike) just inside of the Phase I dike and on top of the dredged ash to provide for additional storage in the cell. The Phase II dike was constructed using ash excavated from within the dredge cell that was dewatered, and compacted in lifts. The Phase II dike was reportedly constructed up to elevation 430 feet. After filling the cell with dredge ash and dewatering, the final grading of the ash material was completed and the cell was subsequently capped in 2001 with 18 inches of compacted soil and 6 inches of vegetative cover.

Johnsonville Fossil Plant
New Johnsonville
Humphreys County, Tennessee

Figure 1. Facility Overview

Stantec

1.3. Scope of Work

The geotechnical study was performed to evaluate the stability of the existing cell configuration and to provide recommendations for designing a cap and leachate collection system. The scope of work for this effort included the following tasks:

- Review of available documentation to develop a work plan for the geotechnical exploration and engineering evaluations;
- Develop and execute a geotechnical exploration to collect data for slope stability analyses;
- Installation of piezometers to monitor water levels in the cell;
- Execution of a laboratory testing program to develop strength data to support engineering analyses;
- Prepare cross-sections as per topographic survey. Survey services were provided by TVA;
- Perform slope stability analyses of the dike for static, long-term condition; and
- Develop a geotechnical report, outlining the results of the exploration, discussing the engineering analyses, and providing recommendations regarding slope stability and construction of the cap and leachate collection system.

2. General Site Description and Geologic Setting

2.1. Site Description

The dredge cell is constructed on a 35-acre tract located at the northeast side of the power plant facility. The dredge cell is surrounded by the DuPont plant on the north, TVA fuel tanks and gas turbines on the west, a closed landfill on the south, and a railroad track followed by undeveloped wooded tracts on the east. Prior to dredge cell construction, the property was an undeveloped wooded tract. Pre-construction contours indicate the site was moderately sloping with grades varying between elevations 396 feet and 402 feet. A drainage swale bisected the site directing drainage towards the northwest.

2.2. Geologic Setting

The plant is located in the west-central part of Tennessee, along the eastern bank of the Tennessee River, just south (upstream) of the confluence of the river and Trace Creek. As such, much of the site is underlain by alluvium and terrace deposits varying in thickness from less than 20 feet along the tributary stream banks up to more than 100 feet within the floodplain of the Tennessee River. Foundation drilling for the railroad bridge south of the plant indicated that alluvial deposits ranged up to 67 feet in depth, and averaged 60 feet deep beneath the floodplain (now submerged by Kentucky Lake) of the Tennessee River. Near the surface the alluvium consisted of fine grained silt and silty clay that grade into sand and river gravel with increasing depth. A groundwater monitoring well drilled at the Active Ash Disposal Area in 1986 encountered bedrock at approximate Elevation 290 feet. The sand and gravel alluvium was logged as about 40 feet thick.

The underlying bedrock consists of the Lower Mississippian age Fort Payne Formation and Devonian age Chattanooga Shale and Camden Formations, in general order of descending lithology. The Fort Payne Formation varies from a sandy, cherty limestone in the upper portions of the unit to an interbedded shale and cherty limestone lower in the stratigraphic column. The Chattanooga Shale is a fissile, carbonaceous shale thought to act as an aquitard preventing the downward migration of groundwater, etc. into the underlying Camden formation, the principal aquifer in the region. The Camden formation consists of thin beds of cherty limestone interbedded with hard, dense, brittle, white chert, separated by softer gritty clay layers. Previous drilling at the site, discussed in reports and other documentation provided by TVA, suggests the presence of several small faults and a larger fault in the bedrock underlying the plant, as inferred from borehole data in the Camden Formation.

3. Review of Available Information

3.1. General

As part of this study, Stantec reviewed documents provided by TVA with the objective of developing an understanding of the history and development of the dredge cell. The following documents were reviewed as part of this assessment:

- Drawing No. 10W218-1: Plan and Gravity Drain - Main Plant – Ash Dredge Cell - East of Gas Turbines, R0 and R3
- Drawing No. 10W218-2: Profile, Sections and Details - Main Plant – Ash Dredge Cell - East of Gas Turbines, R0 and R3
- Drawing No. 10W218-3: Spillway, Plan and Sections - Main Plant – Ash Dredge Cell - East of Gas Turbines, R0 and R3
- Drawing No. 10W218-4: Sump Pump Box for Underdrain, Plan, Sections and Details - Main Plant – Ash Dredge Cell - East of Gas Turbines, R0 and R3
- Drawing No. 10W218-5: Closure, Plan and Sections - Main Plant – Ash Dredge Cell - East of Gas Turbines, R2
- "Johnsonville Steam Plant – Evaluation of Tree Plantation Control of Ashfill Seepage", TVA Internal Study Paper by M. D. Williams, et. al., November, 2008.
- Johnsonville Fossil Plant – Operations Manual - Dredge Ash Disposal Area, April, 2001.
- Site Topographic Survey, Drawing No. 461 K 553(D) R.0, 2009.

3.2. Dike Cross-Section

Based on the review of available design plans, the Phase I dike varies from less than 10 feet up to about 18 feet in height. The Phase II dike was constructed within the limits of the cell, on top of dredged ash. The base of the Phase II dike is situated at approximate elevation 411 feet. The drawings suggest the top of Phase I and Phase II dikes are at elevation 413.5 feet and 423.5 feet, respectively. However, the TVA paper “Evaluation of Tree Plantation

Control of Ashfill Seepage" reported top of dike elevations at 416 feet and 430 feet, respectively.

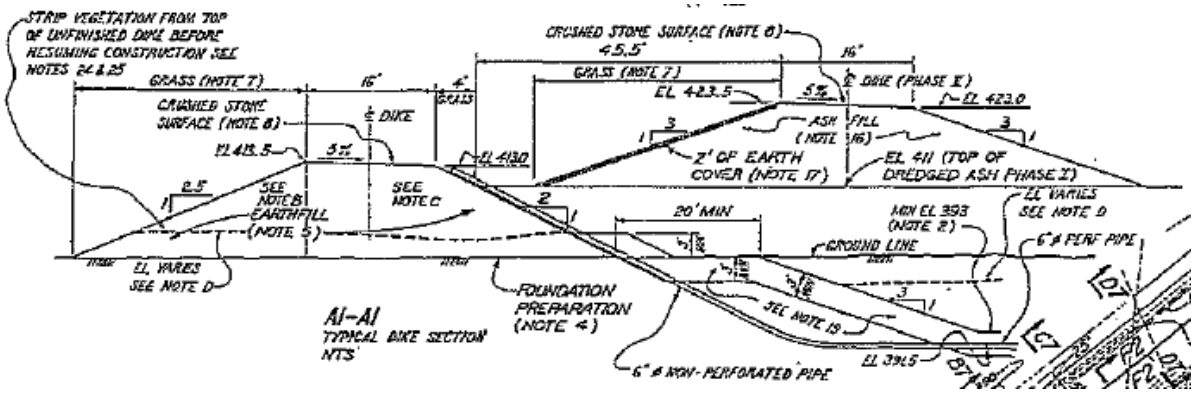


Figure 2. Design Cross-Section of Perimeter Dikes from TVA Drawing 10W218-1

The drawing 10W218-3, R3 showed the Phase II ash dike as two tiered. An as-built drawing was not available to confirm the dike configuration. Our conversation with plant personnel indicated the ash dike was constructed as single tier, similar to what is shown in Figure 2. The Closure Plan and Section Drawing (No. 10W218-5, R2), prepared in 2001, shows the Phase II dike as a single tier as well. This drawing depicts the closure cross-section and outlines the placement of fill at the toe of the Phase II dike within the setback and placement of the cover. Field observations and recent topographic survey data further indicate the setback area was filled as part of the closure. Therefore, Stantec modeled a single-tiered Phase II dike and an ash-filled setback area for stability analyses based on the closure cross-section and latest topographic survey data provided by TVA. Figure 3 depicts the design closure cross-section shown on TVA drawing 10W218-5 R2.

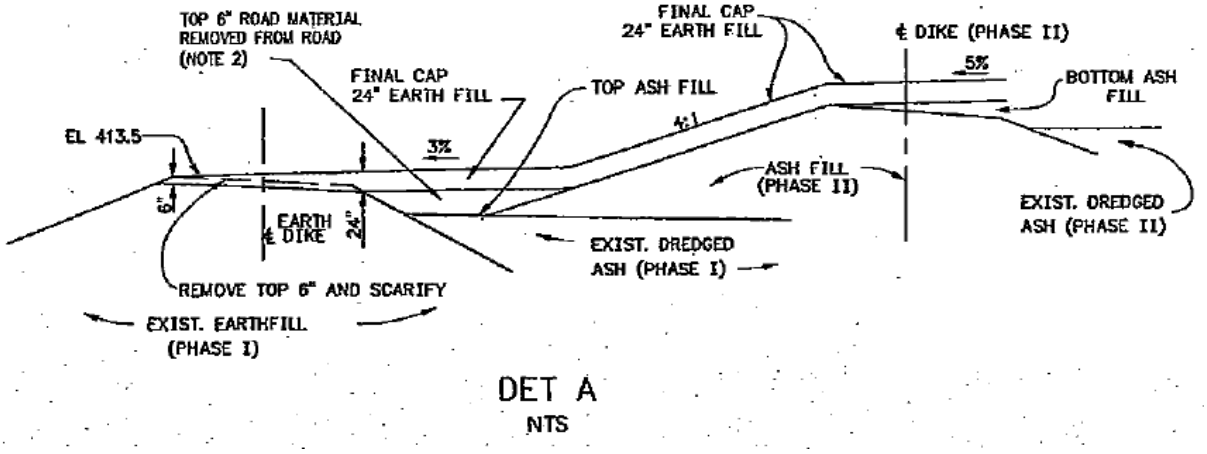


Figure 3. Design Closure Cross-Section from TVA Drawing 10W218-5 R2

For this study, Stantec used Phase I and II top-of-dike elevations of 414 feet and 430 feet based on the latest topographic survey data provided by TVA.

4. Subsurface Exploration

4.1. General

Stantec prepared a subsurface exploration program based on a review of historic documents, geologic mapping, aerial photography, available topographic mapping, and site observations. The boring locations were established in the field by Stantec personnel based on existing site features. A survey request has been submitted to TVA to have the as-drilled locations and elevations established in the field by TVA survey personnel. Only the piezometer locations were surveyed as of this writing.

The subsurface exploration program consisted of drilling and sampling 16 soil test borings on perimeter dikes and within the dredge cell. The borings were drilled using a track-mounted rotary drill rig. These borings (DDC-1 through DDC-16) were extended to depths of about 31.5 to 48 feet below the existing ground surface. The boring layout in Appendix A shows the locations of the borings. The borings were backfilled with sand and cement-bentonite grout. Table 1 provides a summary of the borings advanced as part of the subject geotechnical exploration.

Table 1. Summary of Borings

Boring No.	Approximate Surface Elevation	Boring Termination Depth, ft	Bottom of Hole Elevation, ft
DDC-1	414.0*	41.5	372.5
DDC-2	413.0*	31.5	381.5
DDC-3	432.7	41.5	391.2
DDC-4	400.0*	41.5	358.5
DDC-5	414.0*	41.5	372.5
DDC-6	440.0*	48.0	392.0
DDC-7	432.9	41.5	391.4
DDC-8	415.0*	31.5	383.5
DDC-9	404.0*	41.5	362.5
DDC-10	403.0*	41.5	361.5
DDC-11	415.0*	41.5	373.5
DDC-12	430.7	41.5	389.2
DDC-13	432.1	39.5	392.6
DDC-14	414.0*	31.5	382.5
DDC-15	408.0*	41.5	366.5
DDC-16	432.5	40.5	392.0

*Boring Elevation was obtained by interpolation from plan contours provided by TVA.

In general, standard penetration (SP) tests were performed in each of the borings to obtain information as to the consistency or density of the dike and foundation materials and to obtain samples for subsequent laboratory testing. Thin-wall Shelby tube samples were also obtained at select locations within cohesive soil to obtain relatively undisturbed samples for laboratory strength and permeability testing. A Stantec geologist or geotechnical engineer was on site full time with the rig to observe the drilling and piezometer installation operations; prepare boring logs, and sampling. The boring logs prepared in the field included visual classifications of the soil samples and notations of lithologic changes within or between samples. The final boring logs included in this report are a revised version of the

field logs based on further observation of the soil samples in the laboratory and test data. Typed boring logs are included in Appendix B.

The borings were drilled using an automatic hammer to advance the split spoon sampler. In SP testing, the number of blows required to advance a standard two-inch (outer diameter) split barrel sampler the last 12 inches of the typical total 18 inch penetration by means of a 140 pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). This value is used to estimate the in situ relative density of cohesionless soils and the consistency of cohesive materials. Standard correlations for SP test have historically been based upon blow counts using a safety hammer (rope/cat-head) system, generally estimated to be about 60 percent efficient. Thus, most correlations report values termed as N_{60} data. The efficiency of the automatic hammers used for this exploration was estimated to be about 80 percent based on previous efficiency test of Stantec drill rigs equipped with automatic hammers. As such, Stantec corrected the blow counts resulting from SP testing using the automatic hammer. The correction of the SP data is discussed in further detail in Section 5.2.1 of this report.

Piezometers were installed at five boring locations to assist in developing an understanding of the piezometric surface for use in the slope stability analyses. The piezometers were constructed from 1-inch diameter Schedule 40 PVC riser pipe and 5-foot long No. 10 slot well screens. The annular backfill consisted of a sand filter pack to some distance above the screen followed by a minimum 2-foot bentonite seal. After allowing the bentonite to hydrate, the remaining annulus was backfilled with cement-bentonite grout tremmied into place. Piezometer constructions were completed with a concrete surface pads and aluminum risers and were protected by concrete-filled steel bollards. Piezometer locations and installation logs are provided in Appendix C.

4.2. Subsurface Conditions

Based on the borings, the subsurface conditions at the site can be generalized as outlined in Table 2 below. The subsurface lithology, SP blow counts, and laboratory test data are shown on individual boring logs in Appendix B as well as graphic logs included in Appendix A. The descriptions of the soils indicated on the typed boring logs are in general accordance with the Unified Soil Classification System (USCS). The group symbols are shown on graphic boring logs included in Appendix A.

Table 2. Generalized Subsurface Conditions

Approximate Elevation	Materials	Consistency/Density
EI. 440 to EI. 390	Clay Cap – sandy and silty clay	Medium stiff to stiff
	Phase I Dike – lean and sandy clay	Stiff to very stiff
	Phase II Dike - compacted ash	Soft to stiff
	Hydraulic Ash	Very soft to medium stiff
EI. 390 to EI. 360 (termination depth)	Alluvium – Irregularly bedded sandy lean clay, sand, and gravel with clay	Stiff to very stiff / medium dense to very dense

The clay cap consisted primarily of sandy (CL) and silty clays (CL-ML) with roots in the upper 6 inches. Based on design documents, the clay cap is about 2 feet thick. The Phase I dike consisted primarily of brown to red-brown, moist lean and sandy clay (CL) with some chert and gravel. N_{80}-values from SP testing within the clay dike ranged from 6 to 20 blows per foot (bpf). Based on N_{80}-values, these soils exhibited a stiff to very stiff consistency. The Phase II dike consisted primarily of dark gray, moist to saturated fly ash with some bottom ash. N_{80}-values from SP testing within the ash dike ranged from 1 to 38 bpf with the majority ranging between 3 to 15 bpf. Based on N_{80}-values, these soils exhibited a soft to stiff consistency. The hydraulic ash primarily consisted of dark gray, saturated fly ash with some bottom ash. N_{80}-values from SP testing within the ash ranged from 0 to 30 blows per foot (bpf) with the majority ranging between 2 to 7 bpf. Based on N_{80}-values, these soils exhibited a very soft to medium stiff consistency.

The foundation clay consisted primarily of brown to red-brown, moist lean and sandy clay (CL) with some chert and gravel. N_{80}-values from SP testing within the foundation clay ranged from 13 to 36 bpf with the majority ranged between 13 and 23 bpf. Based on N_{80}-values, these soils exhibited a stiff to very stiff consistency. The presence of gravel in this stratum most likely inflated the higher blow counts. The alluvial deposits consisted primarily of brown to red-brown, moist to saturated sand (SP, SC) and gravel (GP, GC) with varying amounts of clay. N_{80}-values from SP testing within the foundation sand and gravel ranged from 17 to 68 bpf with the majority between 18 and 50 bpf. Based on N_{80}-values, these soils were medium dense to very dense.

4.3. Laboratory Test Data

4.3.1. General

Stantec performed laboratory tests in accordance with applicable ASTM soil testing standards. The laboratory testing program consisted of natural moisture content determinations (ASTM D 2216), sieve and hydrometer analyses (ASTM D 422), Atterberg limits (ASTM D 4318), specific gravity determinations (ASTM D 854), and consolidated-undrained triaxial compression tests (ASTM D 4767). The test results were used to verify visual soil classifications and to select/derive appropriate parameters for the slope stability analyses. The results of these laboratory tests are provided in Appendix D and depicted on the graphical boring logs presented in Appendix A.

4.3.2. Natural Moisture Content and Laboratory Classification Testing

Natural moisture content determinations were performed on all soil samples recovered from SP test and Shelby tube sampling. The results of the natural moisture content tests are presented on the graphical boring logs in Appendix A and typed boring logs in Appendix B. Soil classification tests consisting of sieve and hydrometer analyses, Atterberg Limits, and specific gravity determinations were performed on combined SP test samples from representative soil horizons and select specimens trimmed from Shelby tube samples.

In general, granular soils, e.g. sand, gravel etc., exhibit low moisture content in comparison with lean and fat clays. This is evident in our laboratory test results, summarized in Table 3. The higher moisture content in the sand and gravel strata are most likely impacted by the clay content within the granular soil matrix. The fill soils in the dike exhibited relatively lower moisture content than the foundation soils. The results of the natural moisture content and laboratory classification tests are summarized in Table 3 below.

Table 3. Summary of Natural Moisture Content and Classification Testing

Horizon	Predominant USCS Classification	Water Content Typical Range, %	Liquid Limit	Plasticity Index	% Passing #200 Sieve
Phase I Dike	CL	15 to 28	31 to 47	16 to 31	65 to 86
Phase II Dike	-	15 to 35	-	-	-
Clay Cap	CL	17 to 30	26	8	63
Hydraulic Ash	-	21 to 45	-	-	-
Alluvial Clay	CL, CL/CH	18 to 33	40 to 52	19 to 37	67 to 70
Alluvial Sand and Gravel	SC, SP, GP, GS, GC	10 to 25	NP	NP	5 to 26

- No test performed
NP – Non Plastic

4.3.3. Consolidated-Undrained Triaxial Testing

Stantec performed consolidated-undrained (CU) triaxial testing with pore pressure measurements on selected six-inch specimens extruded from the Shelby tubes to establish effective-stress shear-strength parameters to be used in slope stability analyses. Table 4 provides a summary of the CU triaxial test results.

Table 4. Consolidated-Undrained Triaxial Compression Test Results

Boring No.	Approx. Sample Elevation (ft)	Soil Classification	Wet Unit Weight (lb/ft^3)	Effective Strength Parameters		Atterberg Limits %	% Passing #200 Sieve
				c' tsf	Φ' degree		
DDC-4	390 to 397	Foundation - Lean Clay	121 to 124	0.21	28	LL – 39 PI – 20	97 Silt – 63 Clay – 34
DDC-5	405 to 411	Phase I Dike – Lean to Fat Clay	123 to 129	0.09	35	LL – 52 PI – 34	54 Silt – 19 Clay – 35
DDC-8 and DDC-15	403 to 412	Phase I Dike - Lean Clay	127 to 129	0.26	30	LL – 43 PI – 27	89 Silt – 52 Clay - 37

The CU test results from DDC-4, DDC-8 and DDC-15 indicate similar friction angles for native soils and the Phase I dike materials which was anticipated since the dike was constructed from on-site soils. Relatively higher friction angle was determined for the clay sample from DDC-5. Generally, soils with higher internal angle of friction and lower cohesion can be attributed to increased percentages of sand and gravel in the samples selected for testing. This is evident in the test results shown on Table 4. Individual test result sheets are attached in Appendix D.

4.4. Instrumentation Monitoring Program

TVA installed 7 piezometers between August 2005 and June 2006 to monitor water levels within the dredge cell. Locations of these piezometers, designated as P-1 through P-7, are shown on the enclosed 'Instrumentation Layout' diagram included in Appendix A. Based on piezometer installation logs provided by TVA, the screens of these piezometers are within the soft, saturated ash.

The TVA report titled "Johnsonville Fossil Plant, Evaluation Of Tree Plantation Control of Ashfille Seepage", published in November, 2008 provides graphical representations of the water level data observed in piezometers P-1 through P-7 as well as rainfall events over a three year period. Based on that report, the water level in the dredge cell is highest at piezometers P-6 and P-7 located near the top of the cell and gradually decreases towards the perimeter dikes. The report also shows year to year variations proportional to rainfall amounts as well as seasonal variations within a year. Based on this data, the water levels in the cell are typically at or above the top of the Phase I clay dike, except during the drier portion of the year between late summer and early fall, thereby allowing the water to seep through the more pervious Phase II ash dike. Figure 4 on the following page reproduces the graphical piezometer and rainfall data presented in the TVA report.

Stantec installed 5 additional piezometers at DDC-3, 7, 12, 13 and 16. Long-term piezometer readings provide an estimate of the piezometric surface fluctuation at this site. Since their installation, seven (7) sets of readings have been recorded. Table 5 summarizes the piezometer data. Individual piezometer readings as well as installation logs are provided in Appendix C. The piezometric levels recorded in previous months are within the range of data presented in the TVA report for the same time of year.

Table 5. Piezometer Data

PZ No.	Surface Elevation*	Top of Casing Elevation*	Depth of PZ Tip	PZ Tip Elevation	Range of Observed Water Elevations (from 1/12/10 to 4/9/10)	
					Min.	Max.
P-1	416.79	422.71	15.05	407.66	417.56	420.15
P-2	431.18	434.35	21.30	413.05	423.93	425.91
P-3	437.90	441.18	35.15	406.03	424.56	426.25
P-4	415.90	420.06	12.40	407.66	417.60	417.91
P-5	430.65	433.46	24.05	409.41	418.44	419.65
P-6	439.55	442.64	26.85	415.79	426.89	428.36
P-7	440.26	439.62	22.89	416.73	425.73	427.70
P-8 / DDC-3	432.81	435.28	40.75	394.53	421.16	422.46
P-9 / DDC-7	432.94	435.70	41.92	393.78	419.48	420.83
P-10 / DDC-12	430.71	433.68	42.72	390.96	421.71	423.11
P-11 / DDC-13	432.08	435.01	39.50	395.51	421.80	423.33
P-12 / DDC-16	432.51	435.20	41.33	393.87	418.12	420.62

*Elevation provided by TVA.

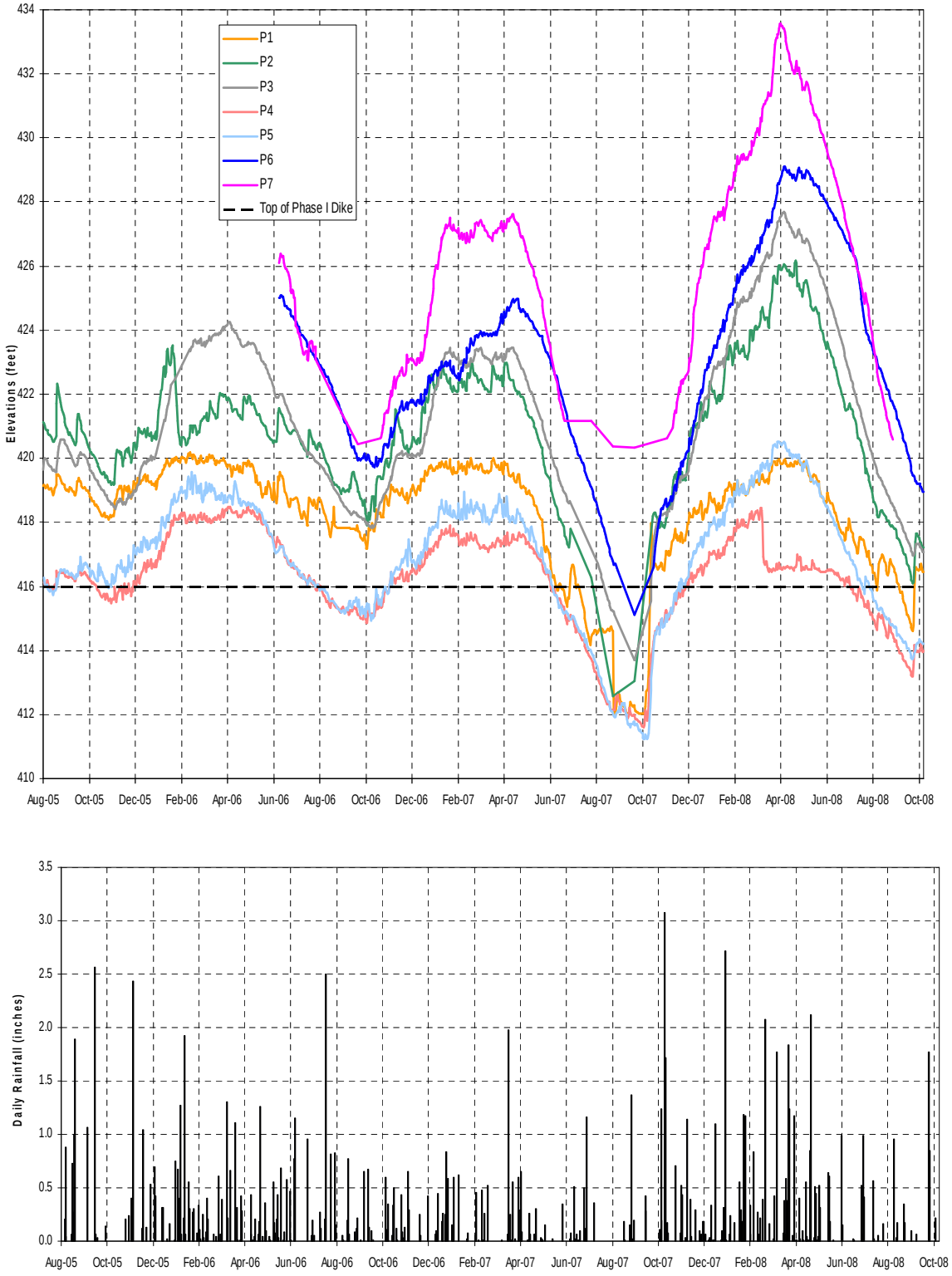


Figure 4. Piezometer Hydrographs and Rainfall Information – August 2005 to October 2008, reproduced from the TVA seepage report.

5. Engineering Analyses and Considerations

5.1. General

Stantec performed slope stability analyses at two cross-sections of the dredge cell. Section A-A', along borings DDC-4 through DDC-9, bisects the dredge cell through the tallest portion of the fill. Section B-B' is located at the northwest corner of the dredge cell, south of boring DDC-3 to evaluate slope stability for the tallest portion of the Phase I clay dike. The locations of these cross-sections are shown on the boring layout diagram provided in Appendix A.

Stantec developed the dike geometry at each cross-section using design drawings and recent topographic survey provided by TVA. It should be noted that dredge cell construction records including fill placement, compaction and as-built configurations, etc. were not available for review. As a result, generalizations in the cross-section geometry and soil parameters were required to construct the stability models. Therefore, these profiles should be considered accurate only to the degree by the means and methods used to define them.

Stantec developed the subsurface profile at each cross-section based on the borings, the results of laboratory testing discussed herein, and design drawings. Generalized subsurface profiles are shown on the cross-sections included in Appendix A. Stantec derived the soil strength parameters used in the slope stability analysis based on the field and laboratory test data, historical information, and our experience with similar soils and ash. The selection process for material properties used in the analyses is discussed in detail in Sections 5.2.1 of this report.

Stantec performed three sets of static slope stability analyses to evaluate existing slope configurations at various water levels within the dredge cell. The water levels modeled are

(i) High water level during wet season,

(ii) Low water level during dry season and

(iii) Anticipated lower water level after cap and leachate collection system installation.

The estimated water levels in the stack for the analyses were based on the piezometer data provided in the 2008 TVA report and shown in Figure 4 of this report. According to the TVA report, the water level in the wet season varies from elevation 430 ft near the middle of the cell to elevation 420 ft along the perimeter. Corresponding water level during dry season reportedly varies from elevation 420 ft to 412 ft.

The proposed cap is expected to significantly reduce the infiltration of surface drainage into the underlying ash, lowering the water table within the dredge cell. Although the long-term effect of the improved cap on water levels in the cell is not known, Stantec performed a third set of analyses assuming a water elevation of 409 feet for the purpose of analyzing slope stability modeling a lowered water surface resulting from the proposed construction efforts. Table 6 outlines the elevation of the water level within the cell modeled in the slope stability analyses.

Table 6. Water Levels Modeled In Slope Stability Analyses

Analysis Condition	Water Elevation in the Dredge Cell	
	Middle	Perimeter
Wet Season	430 ft	420 ft
Dry Season	420 ft	412 ft
Improved Cap	409 ft	409 ft

Stantec performed long-term slope stability analyses using the GeoStudio 7.14 software package developed by GEO-SLOPE International, Ltd. of Calgary, Alberta, Canada. This package includes SLOPE/W module for slope stability analysis. The analyses were performed in accordance with the recommendations and criteria outlined in the USACE Design Manuals EM 1110-2-1902 "Slope Stability" and EM 1110-2-1913 "Design and Construction of Levees".

5.2. Slope Stability Analyses

The stability of the existing cell configuration was evaluated using static limit equilibrium methods as implemented in the SLOPE/W module. The distribution of pore water pressures within the earth mass is calculated using static water table within the dredge cell. The unit weight and shear strength properties used in the stability analyses are discussed in Section 5.2.1 of this report.

Spencer's solution procedure (1967), which satisfies both moment and force equilibrium, was used in this study. Spencer's procedure computes factors of safety for an assumed failure surface; a search must be made to find the critical slip surface corresponding to the lowest factor of safety. Both circular and noncircular potential failure surfaces can be evaluated. The trial slip surfaces were subsequently optimized to find critical slip surface and corresponding critical factor of safety. Optimization was performed using an optimization routine in SLOPE/W that incrementally alters a portion of the slip surface, usually within a certain soil horizon for circular failure pattern, to optimize the solution generating non-circular, curved failure surface. The results of the slope stability analyses discussed in Section 5.2.3, and depicted graphically on the cross-sections in Appendix A, represent factors of safety computed from the optimized, circular slip surface routine.

5.2.1. Strength Parameter Selection

The dredge cell was originally constructed in the early 1990's and closed in 2001. Hence, excess pore pressures generated in the dikes and underlying soil during construction have had sufficient time to dissipate. Additionally, the current analyses will focus only on static conditions (no earthquake or other dynamic loads). For these conditions, only soil unit weights and effective strength parameters (c' and Φ') are needed.

The soil parameters used for the dike and existing foundation materials were derived using laboratory test data (consolidated-undrained triaxial tests, standard penetration test data and classification test data) and Stantec's experience with these materials in similar applications. The strength parameters for the clay dike and underlying foundation clay (lean and sandy clay) are based on triaxial test results performed as part of this study. The results of these tests are provided on Table 4 in Section 4.3.3. The parameters for hydraulic and compacted ash are based on historical test results performed by AECOM and Law Engineering at other TVA fossil plants.

The parameters for the foundation sand and gravel, generally encountered at elevation 390 feet or below, were determined from published correlations between SP test blow counts (N_{60}), relative density, and effective friction angle (Φ'). However, the borings were drilled with an automatic hammer with an estimated 80 percent efficiency. Therefore, the blow counts were corrected prior to applying them in correlations with other soil index properties. The correction for hammer efficiency is a direct ratio of relative efficiencies as shown in Equation 1.

$$N_{60} = N_{80}\left(\frac{80}{60}\right) \qquad \textbf{Eqn. 1}$$

Stantec also corrected the N_{60} values for the effect of overburden pressure. The N_{60} values were standardized to vertical effective overburden stresses of 2,000 pounds per-square foot. This calculation requires an effective unit weight for each soil horizon multiplied by the depth of the soil sampled during the subject SP test. The relationship between the correction factor, C_N, and the effective overburden stress, σ', was based on a relationship proposed by Liao and Whitman as referenced in Seed and Harder [1990]:

$$C_N = \frac{1}{\sqrt{\sigma'}} \qquad \textbf{Eqn. 2}$$

Where:

C_N = correction factor for overburden stress
σ' = vertical effective overburden stress (tsf)

Consequently, the standardized corrected N-value, $(N')_{60}$ is equal to:

$$(N')_{60} = C_N N_{60} \qquad \textbf{Eqn. 3}$$

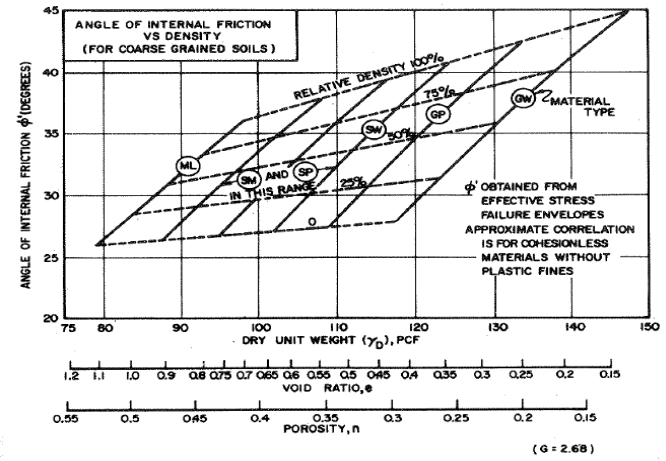
Where:

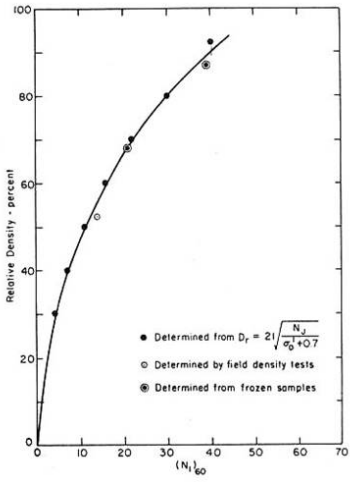
C_N = correction factor for overburden stress
$(N')_{60}$ = standardized N-value

The N-values presented on the graphical boring logs in Appendix A and typed boring logs in Appendix B are the raw data (N_{80}-values) and do not reflect corrections for hammer efficiency or overburden stress.

The N'_{60} values were used to obtain relative densities based on relationships developed by Tokimatsu and Seed (1988) as shown in Figure 5 below. NAVFAC (1982) presents a relationship using relative density and specific soil types to correlate angle of internal friction, unit weight, and void ratio as shown in Figure 5 below. Soil classifications for the

correlations are based on laboratory testing results and visual classifications performed by the on-site geotechnical engineer or geologist 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.





From NAVFAC (1982) From Tokimatsu and Seed (1988)

Figure 5. Charts used to Correlate N_{60} to ϕ'

Typical N_{60} values for the sand and gravel horizon are in the range of 30 to 70 blows per foot. Using the correction factors and correlations stated above, the unit weight of this soil horizon was estimated to vary between 118 to 142 pcf. Corresponding friction angle varied between 33 and 40 degrees. Representative values of 130 pcf and 35 degrees were used for slope stability analysis.

The soil parameters for the dike and generalized foundation soil horizons modeled in the slope stability analyses are summarized in Table 6 and shown on the cross-sections in Appendix A.

Table 7. Selected Strength Parameters for Stability Analysis

Soil Horizon	Saturated Unit Weight (pcf)	Effective Stress Strength Parameters	
		C' (psf)	φ' (degrees)
Phase I – Clay Dike	125	0	30
Phase II – Compacted Ash	110	0	27
Hydraulic Ash	105	0	25
Clay Cap	115	0	28
Foundation Lean Clay	120	0	28
Foundation Sand and Gravel	130	0	35

For the Phase II compacted ash, a relatively modest effective angle was selected primarily due to the fact that the dike was constructed using dewatered ash excavated from the

dredge cell. The borings and historic documents indicate that the dike primarily consists of fly ash (80% fly ash, 20% bottom ash).

5.2.2. Slope Stability Results

Stantec analyzed the two referenced cross-sections using the strength parameters outlined in Table 7 and the subsurface profiles depicted on drawings in Appendix A. The analyses were performed for the three water level conditions outlined in Table 6 to evaluate slope stability for existing conditions during the wet and dry seasons of the year as well as the assumed a lowered water table once construction of the new cap is complete. The failure surfaces were generated using the "Grid and Radius" method where a wide variation of trial slip surfaces can be generated with a defined grid of possible circle centers and a defined range of radii. The cross-sections in Appendix A show the modeled shear-strength parameters, predicted failure surfaces, and associated factors of safety. The results of the analyses are included in Appendix F and summarized in Table 8 below.

Table 8. Summary of Computed Factors of Safety for Slope Stability

	Factor of Safety					
	Existing Conditions				Improved Cap Lowered Water Level (Water El. 409 ft)	
	Wet Season (Water El. 430 to 420 ft)		Dry Season (Water El. 430 to 420 ft)			
Cross-Section	Global Failure	Maint. Failure*	Global Failure	Maint. Failure*	Global Failure	Maint. Failure*
A – A' (West Slope)	1.5	1.2	1.6	1.4	1.9	1.5
A – A' (East Slope)	1.6	2.3	2.3	2.3	2.7	2.5
B – B'	1.3	1.2	1.4	1.2	1.5	1.3

* Maintenance Failure

The term 'Global Failure' is used in the table above to refer to relatively deep seated failures (≥10 feet) that could result in a breach of the perimeter dikes and the spilling of ash outside of the permitted limits of the facility before corrective measures can be implemented. The term 'Maintenance Failure' refers to relatively shallow slides (≥3 feet) that can be stabilized before it becomes detrimental to the overall stability of the perimeter dike.

Review of the predicted slip surfaces indicates stability concerns for the existing facility configuration are associated with failures in the upper ash dike during wet times of the year, when the water surface daylights on the face of the slope (seeps) and with failures in the lower clay dike during the dry season. The analyses show that the lowered water level within the cell during dry seasons improves the factors of safety for slope stability and that they are further improved by lowering the water surface through construction of the improved cap and reduction in infiltration. However, Stantec understands that TVA is using the guidelines presented in the USACE Engineering Manual EM 1110-2-1902 "Slope Stability" which stipulates that slopes should have a minimum factor of safety of 1.5 for long term conditions. Thus, the factor of safety of 1.3 for a maintenance failure at cross-section B-B' with the lowered water surface resulting from the improved cap still does not meet the minimum requirement indicating remedial measures will need to be implemented. This maintenance failure at cross-section B-B' is associated with a shallow slide within the Phase I clay dike which exhibits a relatively steep slope of 2.5H:1V (Horizontal:Vertical). It should be noted that the critical failure surfaces are within the lower clay dike and that TVA Drawing 10W218-4, R0 indicates the dike was built for a minimum long term factor of safety of 1.4.

5.3. Preliminary Analysis of Remedial Measures

Based on the slope stability analysis performed for cross-section A-A' with a lowered water level of 409 ft within the dredge cell, the 13-foot tall Phase I clay dike exhibits an adequate factor of safety for long-term slope stability. However, the analysis for cross-section B-B' indicates the 18-foot tall Phase I clay dike does not exhibit an adequate factor of safety for the assumed lowered water elevation in the cell. As such, Stantec performed slope stability analyses modeling the lowered elevation of 409 feet and varying the height of the Phase I clay dike to determine a height threshold to assist in determining sections of the dike that will need to be remediated to provide an adequate factor of safety for shallow, maintenance-type failures. These analyses indicate sections of the dike 14 feet in height exhibit factors of safety less than 1.5 for shallow, maintenance-type failures.

Stantec performed additional analyses to develop alternatives for remedial actions. These analyses indicate flattening of the slopes to 3H:1V or armoring with a 3-foot thick layer of riprap will provide adequate factors of safety against shallow, maintenance-type failures. It should be noted that these analyses were based on an assumed lowered water level of 409 feet in the dredge cell and assumed phreatic surface within the Phase I clay dike. These assumptions should be revisited once the improved cap has been constructed and the water levels in the cell and dike monitored for a minimum of one year.

5.4. Construction Considerations

Construction of the proposed cap and leachate collection system will include excavations of three to five foot deep trenches to anchor the cap and install leachate collection pipes. Review of the piezometer data provided by the TVA seepage study published in 2008 indicates water levels within the dredge cell are above the top of the phase I clay dike for most of the year. Even during dry seasons, the lowest recorded water levels in the piezometers adjacent to the perimeter Phase I dike are around elevation 412 feet. Additionally, soft, saturated ash was encountered below the base of the Phase II dike in the borings advanced as part of this study. As such, excavations will encounter the water table in the cell unless the water level is lowered prior to construction. The trenches will also likely be excavated in soft, saturated ash.

6. Conclusions

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

The results of slope stability analyses for the existing cell configuration during wet periods of the year indicate the long-term factor of safety for deep seated, global failures varies from 1.3 for cross-section B-B' to 1.5 for cross-section A-A' and those for shallow, maintenance-type failures are on the order of 1.2. The analyses indicate the factors of safety will improve as the water level in the cell lowers during dry periods, varying from 1.4 at cross-section B-B' to 1.6 for section A-A' for global failure and from 1.2 at section B-B' to 1.4 at section A-A'.

Currently, the water level in the dredge cell is directly related to precipitation and infiltration of surface drainage. The improved cap is being constructed to significantly reduce infiltration, which should, in turn, result in a lowered water level within the cell. Slope

stability analyses performed with an assumed lowered water elevation of 409 feet result in factors of safety for global, deep seated failures varying from 1.5 at cross-section B-B' to 1.9 at section A-A'. Corresponding factors of safety from shallow, maintenance-type failures vary from 1.3 at cross-section B-B' to 1.5 for A-A'. This maintenance failure at cross-section B-B' is associated with a shallow slide within the Phase I clay dike which exhibits a relatively steep slope of 2.5H:1V (Horizontal:Vertical).

Based on the results of the slope stability analyses, the existing configuration of the Phase I clay dike does not provide the required factor of safety against shallow, maintenance-type failures and portions of the dike do not provide adequate factors of safety against deep seated, global failure. Lowering the water level in the cell improves the factors of safety, but portions of the Phase I clay dike will still not provide adequate factors of safety for shallow, maintenance-type failures even when the water level in the cell lowers as a result of the construction of the new cap and reduction in infiltration. As such, remedial measures will need to be implemented to provide the required minimum factor of safety.

7. Recommendations

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

7.1. Lower the water level in the dredge cell and maintain the lowered elevation. Construction of the new cap will significantly reduce infiltration of surface drainage which, in turn, should assist in maintaining the lowered water elevation in the cell. Slope stability analyses indicate lowering the water elevation in the cell to 409 feet will provide the required minimum factor of safety for deep seated, global failures. However, lowering water elevation does not improve the factor of safety for shallow, maintenance-type failures to acceptable levels for portions of the dike in excess of 14 feet in height. The shallow, maintenance failures are situated within the Phase 1 clay dike and result from the relatively steep outslope of 2.5H:1V.

7.2. Armor sections of the Phase I clay dike in excess of 14 feet in height with a 3-foot thick layer of riprap to provide an adequate factor of safety for against shallow, maintenance-type failures.

7.3. Install additional piezometers around the perimeter of the dredge cell and within the Phase I clay dike. Constructing the new cap will significantly reduce the infiltration of surface drainage into the underlying ash and should promote lowering of the water level in the cell. Instead of flattening the slopes of the Phase I dike or implementing other measures to improve stability, Stantec recommends constructing the improved cap, installing additional piezometers around the perimeter of the dredge cell and within the Phase I clay dike, and monitoring the water levels in the piezometers for a period of one year. This will help understanding the effect of the cap on the long-term water levels in the cell. The water levels in the piezometers should be measured at least once per month over the one year monitoring period. At the end of the monitoring period, the stability of the dredge cell should be re-evaluated using the piezometric data.

7.4 Review of the piezometer data provided by the TVA seepage study published in 2008 indicates water levels within the dredge cell are above the top of the Phase I clay dike for most of the year. Even during dry seasons, the lowest recorded water levels in the piezometers adjacent to the perimeter Phase I dike are around elevation 412 feet. As such, Stantec recommends a temporary dewatering trench be constructed around the perimeter of

the dredge cell in order to lower the water level in the cell to a maximum elevation of 412 feet. The lowered water level should be maintained during construction to reduce the potential for water buildup behind the cap and possible “blowout” of the cap material.

7.5. Excavations for the leachate collection system will likely be made in soft, saturated ash. Because of the proximity of the trench to the toe of the Phase II dike, laying back the walls of the trench should not be performed to reduce the potential for undercutting the dike. As such, Stantec recommends the design plans and specifications require the use of a trench box to facilitate excavation and provide a safe work environment for the construction crews.

7.6. The proposed construction recommends stockpiling of existing topsoil and underlying cap soils for re-use. Stantec recommends stockpiling these materials outside the perimeter of the Phase I dike in order to avoid placing surcharge loads on the perimeter dikes.

8. Limitations of Study

The scope of this evaluation was limited to consider only the potential risks to the perimeter dike from slope instability. The stability of the dike during a potential earthquake was not analyzed. It should be noted, the seismic risk at this site (likelihood of experiencing a large magnitude earthquake) is high because of its proximity to the New Madrid Seismic Zone.

9. Closure

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.

It should be noted that construction records indicating the methods used to construct the perimeter dikes; existing dike configurations, etc. were not available for review. 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.

10. References

The following is a list of documents referenced in this report and/or used to evaluate the stability of the eastern perimeter dike:

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.

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

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).

Liao, S.C. and Whitman, R.V. Overburden Correction Factors for SPT in Sand, JGED, ASCE, Vol. 112, No. 3, pp. 373-377, 1985 as referenced in Seed and Harder, "SPT Based Analysis of Cyclic Pore Pressure Generation and Undrained Residual Strength", Volume 2 Memorial Symposium Proceedings, pp. 361-362, May 1990.

A Method of Analysis of Embankments assuming Parallel Interslice Forces, Geotechnique, Vol 17 (1), pp. 11-26, Spencer, E. (1967).

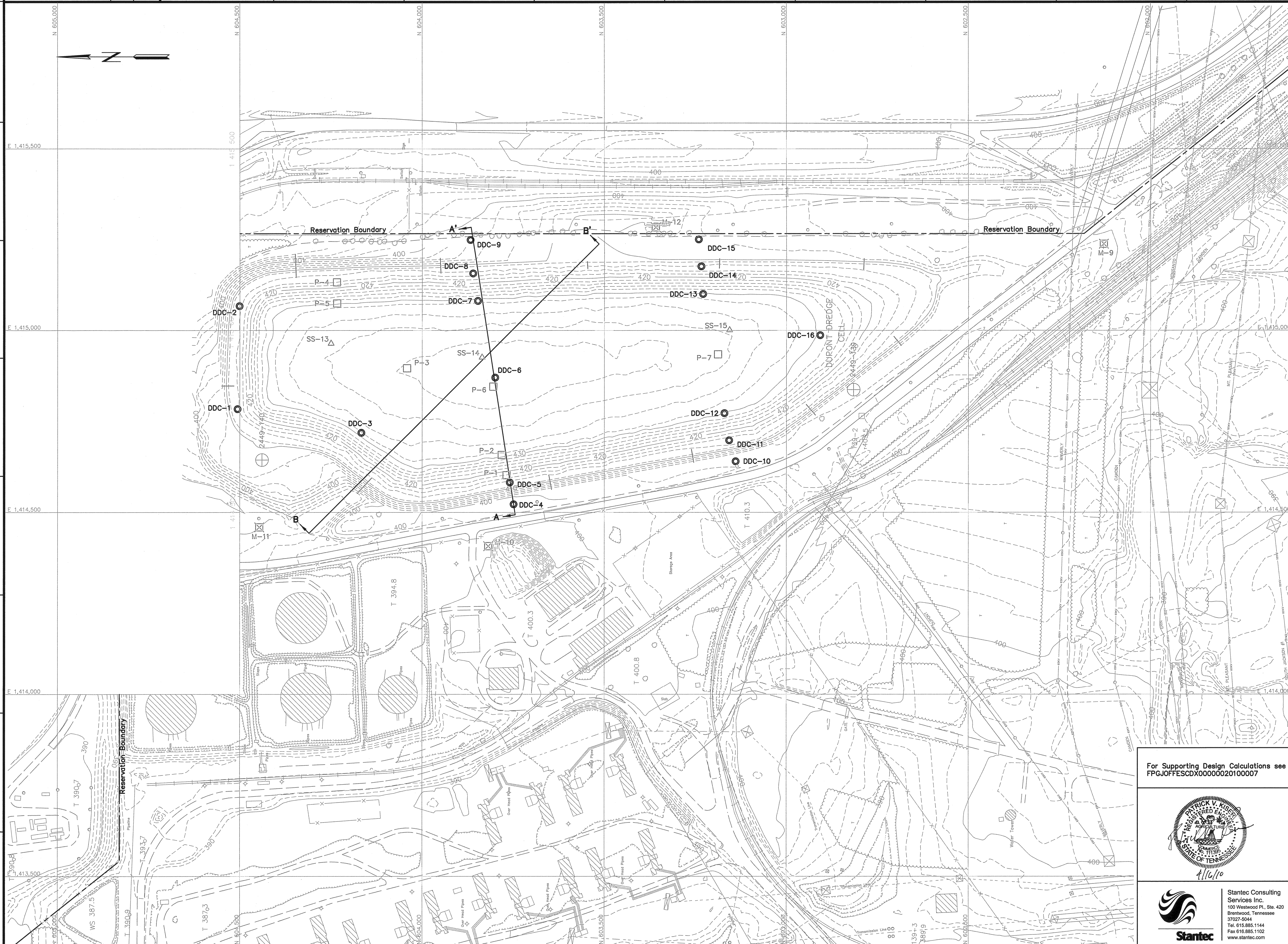
Root Cause Analysis of TVA Kingston Dredge Cell Pond Failure from December 22, 2008, AECOM, June 12, 2009.

Williams, M.D.; Yankee, D.H.; Mays, P.A.; Wolfe, M.H.; Boggs, J.M. Johnsonville Fossil Plant: Evaluation of Tree Plantation Control of Ashfill Seepage. Tennessee Valley Authority Office of Environment & Research, Environmental Resources and Services, Knoxville, Tennessee; November, 2008.

Tennessee Valley Authority Johnsonville Fossil Plant Operations Manual Dredged Ash Disposal Area. Tennessee Valley Authority Fossil Engineering Services; April, 2001.

Appendix A

Boring Layout & Dike Cross-Sections



LEGEND

- DDC-6 ◎ Soil Boring with Standard Penetration Tests and/or Undisturbed (Shelby) Tube Samples
- P-1 □ Existing Piezometer
- SS-7 △ Previous Test Boring
- M-9 ⊠ Existing Monitoring Well

NOTES:

1. The topographic mapping presented on this drawing was provided to Stantec by TVA Surveying and Project Services. This plan view was prepared to support development of the geotechnical exploration program and should not 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.

BORING LOCATION TABLE

BORING	NORTHING	EASTING	ELEV. (FT.) *
DDC-1	604,506.22	1,414,783.57	414.0
DDC-2	604,501.15	1,415,066.81	413.0
DDC-3	604,166.23	1,414,718.47	432.0
DDC-4	603,748.18	1,414,522.12	400.0
DDC-5	603,758.70	1,414,582.12	414.0
DDC-6	603,799.14	1,414,870.18	440.0
DDC-7	603,846.82	1,415,081.19	431.0
DDC-8	603,860.21	1,415,156.83	415.0
DDC-9	603,867.24	1,415,249.28	404.0
DDC-10	603,139.85	1,414,639.98	403.0
DDC-11	603,157.70	1,414,697.64	415.0
DDC-12	603,170.62	1,414,772.24	430.0
DDC-13	603,229.00	1,415,100.04	430.0
DDC-14	603,233.88	1,415,176.27	414.0
DDC-15	603,240.72	1,415,250.58	408.0
DDC-16	602,907.05	1,414,986.55	429.0

* Approximate Elevations from Plan Contours

RECORD DRAWING

50 0 100 200 FEET
GRAPHIC SCALE: 1" = 100'
CONTOUR INTERVAL = 2'

PLOT DATE: 04/16/2010

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	04/19/10	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–	–
RECORD DRAWING											

DISCIPLINE INTERFACE

SCALE: 1"=100' EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION DUPONT ROAD DREDGE CELL BORING LAYOUT

PATRICK V. KISER REGISTERED ENGINEER AGRICULTURE COMMERCE No. 111395 STATE OF TENNESSEE
4/16/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
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JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

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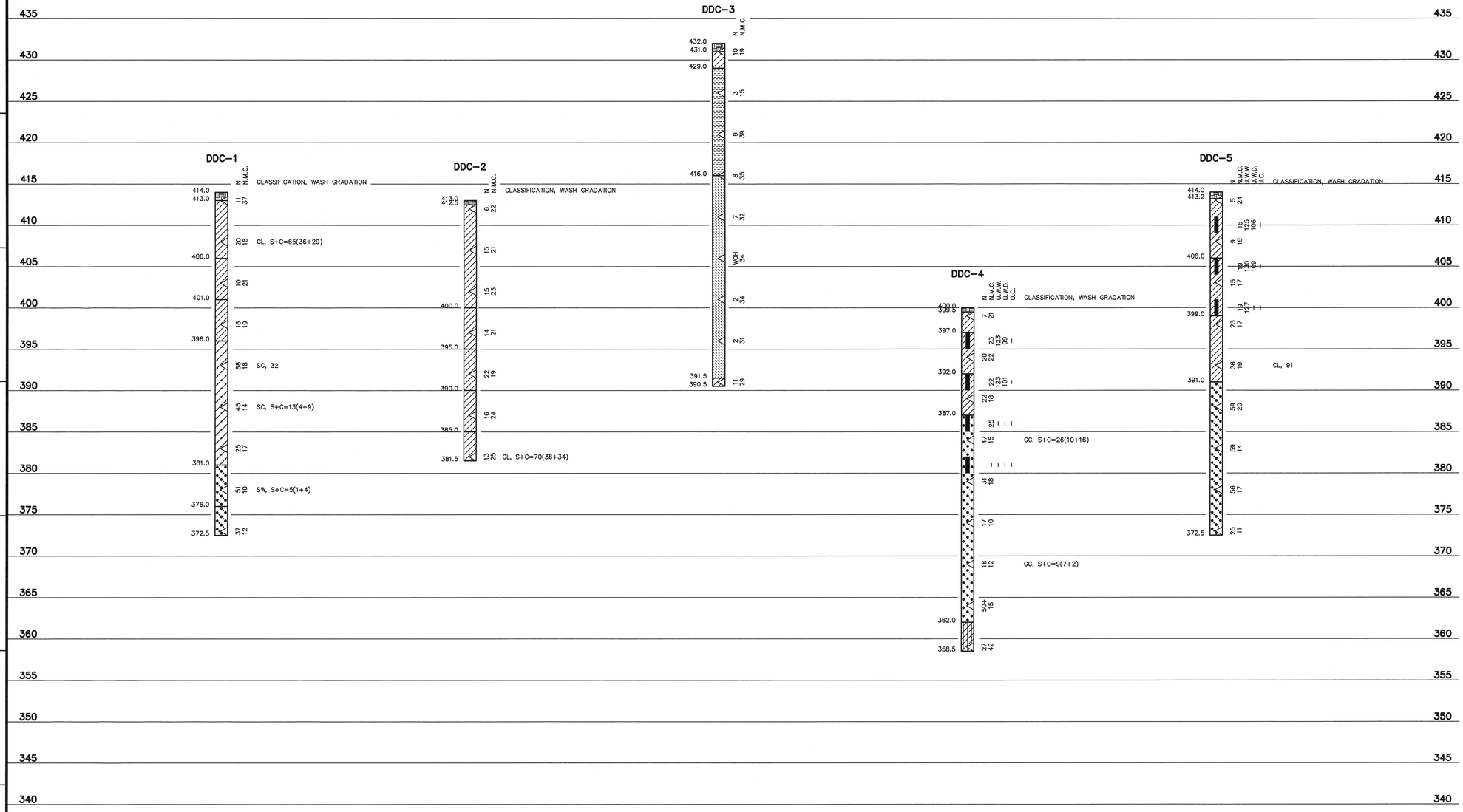
C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

- Topsoil
- Fat Clay, brown to grayish brown, moist to saturated
- Compacted Ash, gray to dark gray and black, damp to wet, soft to stiff
- Fly Ash, gray to dark gray, damp to wet
- Lean Clay, brown to gray, moist to saturated stiff, with sandy and silty zones
- Clayey Sand, fine grained, brown to reddish brown, dense to vey dense
- Sand and Gravel, course grained, brown, saturated, dense to vey dense
- Silty Clay, yellowish tan, very moist

WOH	Weight of Hammer
WOR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	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.

RECORD DRAWING

LOGS OF BORINGS

SCALE: 1"=5' (VERTICAL ONLY)

NOTES:

1. The boring logs and related information shown on this drawing 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. Any correlations shown between borings are generally based on straight line interpolation. Actual conditions between borings are unknown and may differ from those shown.
2. The subsurface 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, Engineer or Geotechnical Engineer will not be responsible for any deduction, interpretation or conclusion drawn therefrom by the Contractor. The information is made available in order that the Contractor may have ready access to the same information available to the Owner, Engineer and Geotechnical Engineer and is not part of this contract.

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	DDC-4	DDC-4	DDC-4
Depth	3.1'-3.6'	3.7'-4.2'	8.5'-9.0'
$\bar{\Phi}$	28.0°		
$\bar{c}$	420.00 p.s.f.		

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	DDC-5	DDC-5	DDC-5
Depth	3.1'-3.6'	3.7'-4.2'	8.1'-8.6'
$\bar{\Phi}$	35.0°		
$\bar{c}$	180.00 p.s.f.		

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

PATRICK V. KISER — REGISTERED ENGINEER — 115788 — STATE OF TENNESSEE

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	DISCIPLINE INTERFACE
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	04/19/10 RECORD DRAWING	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–	–

SCALE: AS SHOWN — EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION
DUPONT ROAD DREDGE CELL
LOGS OF BORINGS

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

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100 Westwood Pl., Ste. 420
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Fax 616.885.1102
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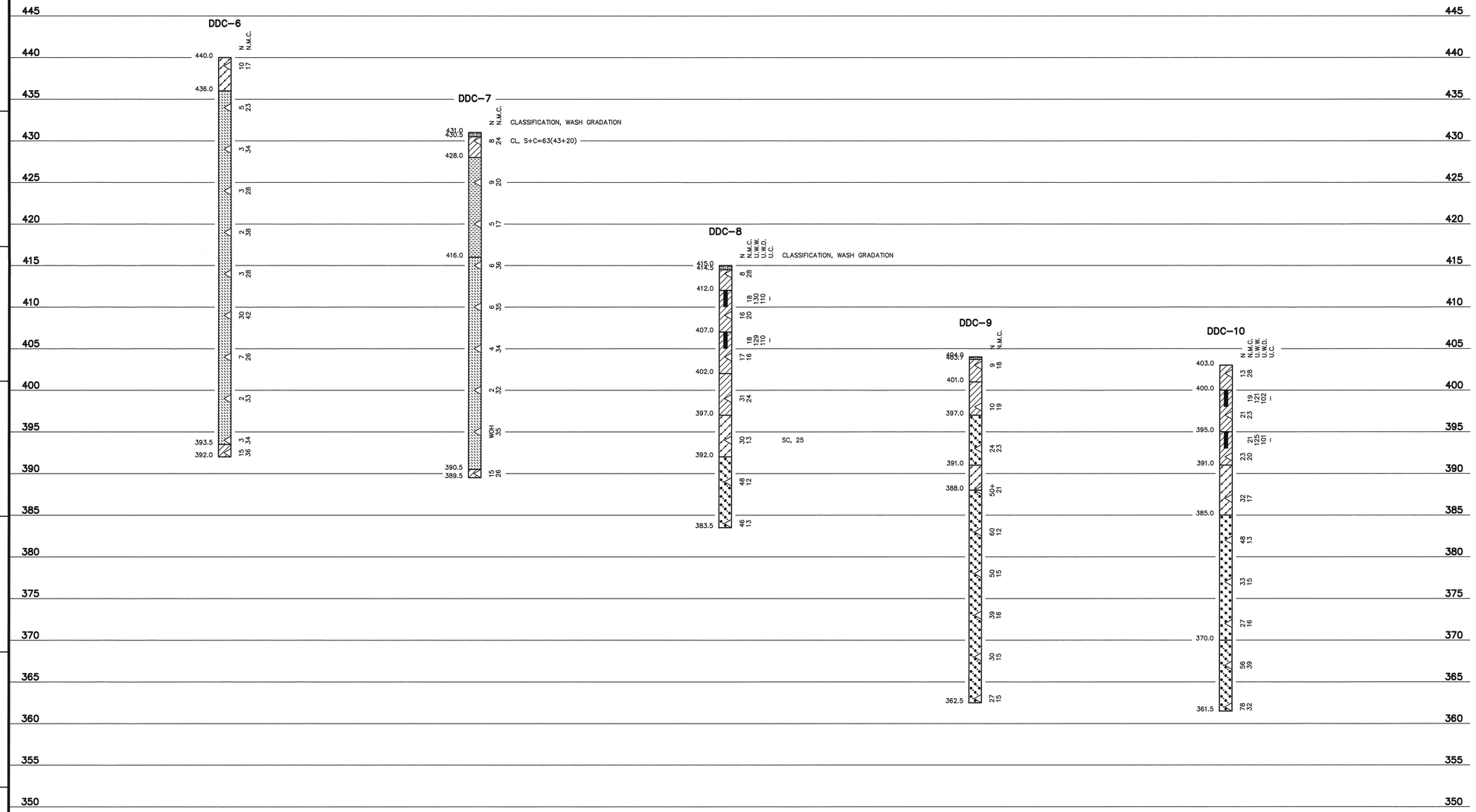
JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000	DATE 04/19/10	30	C	10W508-02	R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

- Topsoil
- Fat Clay, brown to grayish brown, moist to saturated
- Compacted Ash, gray to dark gray and black, damp to wet, soft to stiff
- Fly Ash, gray to dark gray, damp to wet
- Lean Clay, brown to gray, moist to saturated stiff, with sandy and silty zones
- Clayey Sand, fine grained, brown to reddish brown, dense to vey dense
- Sand and Gravel, course grained, brown, saturated, dense to vey dense
- Silty Clay, yellowish tan, very moist

WOH	Weight of Hammer
WOR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{60}	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
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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.

RECORD DRAWING

LOGS OF BORINGS
SCALE: 1"=5' (VERTICAL ONLY)

NOTES;

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CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	DDC-8	DDC-8	DDC-15
Depth	3.1'-3.6'	8.6'-9.1'	3.5'-4.0'
$\bar{\Phi}$	30.6°		
$\bar{c}$	520.00 p.s.f.		

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

R	–	–	–	–	–	–	–	–	–	–	–	–	–
R 0	04/19/10	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–	–	DISCIPLINE INTERFACE	
RECORD DRAWING												1	
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ED	AS CONST	REV. BY	2	
												3	
												4	

SCALE: AS SHOWN EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION
DUPONT ROAD DREDGE CELL
LOGS OF BORINGS

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000	DATE 04/19/10	30	C	10W508-03	R 0

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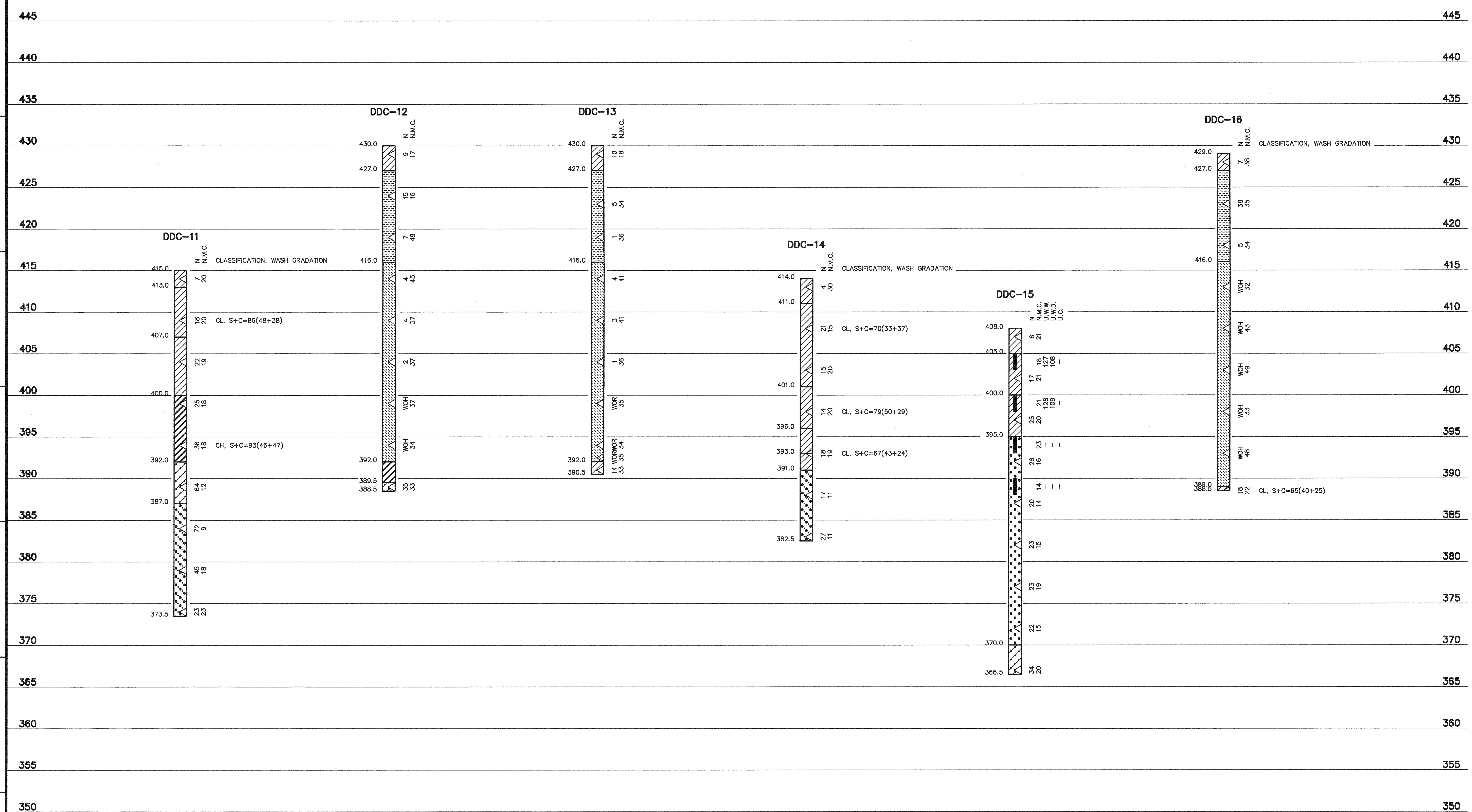
Fax 616.885.1102
www.stantec.com

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

- Topsoil
- Fat Clay, brown to grayish brown, moist to saturated
- Compacted Ash, gray to dark gray and black, damp to wet, soft to stiff
- Fly Ash, gray to dark gray, damp to wet
- Lean Clay, brown to gray, moist to saturated stiff, with sandy and silty zones
- Clayey Sand, fine grained, brown to reddish brown, dense to vey dense
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- Silty Clay, yellowish tan, very moist

WOH	Weight of Hammer
WOR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	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.

RECORD DRAWING

LOGS OF BORINGS

SCALE: 1"=5' (VERTICAL ONLY)

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	DDC-8	DDC-8	DDC-15
Depth	3.1'-3.6'	8.6'-9.1'	3.5'-4.0'
$\bar{\phi}$	30.6°		
$\bar{c}$	520.00 p.s.f.		

NOTES:

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For Supporting Design Calculations see FPGJOFFESCDX00000020100007

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R -	-	-	-	-	-	-	-	-	-	-	-
R 0	04/19/10	PVK	PS	SF	HRA	HRA	PVK	TJ	-	-	-
RECORD DRAWING											

DISCIPLINE INTERFACE 1 2 3 4

SCALE: AS SHOWN EXCEPT AS NOTED

YARD
ASH DREDGE CELL - EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION
DUPONT ROAD DREDGE CELL
LOGS OF BORINGS

PATRICK V. KISER REGISTERED ENGINEER AGRICULTURE COMMERCE No. 111395 STATE OF TENNESSEE
4/16/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

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www.stantec.com

JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

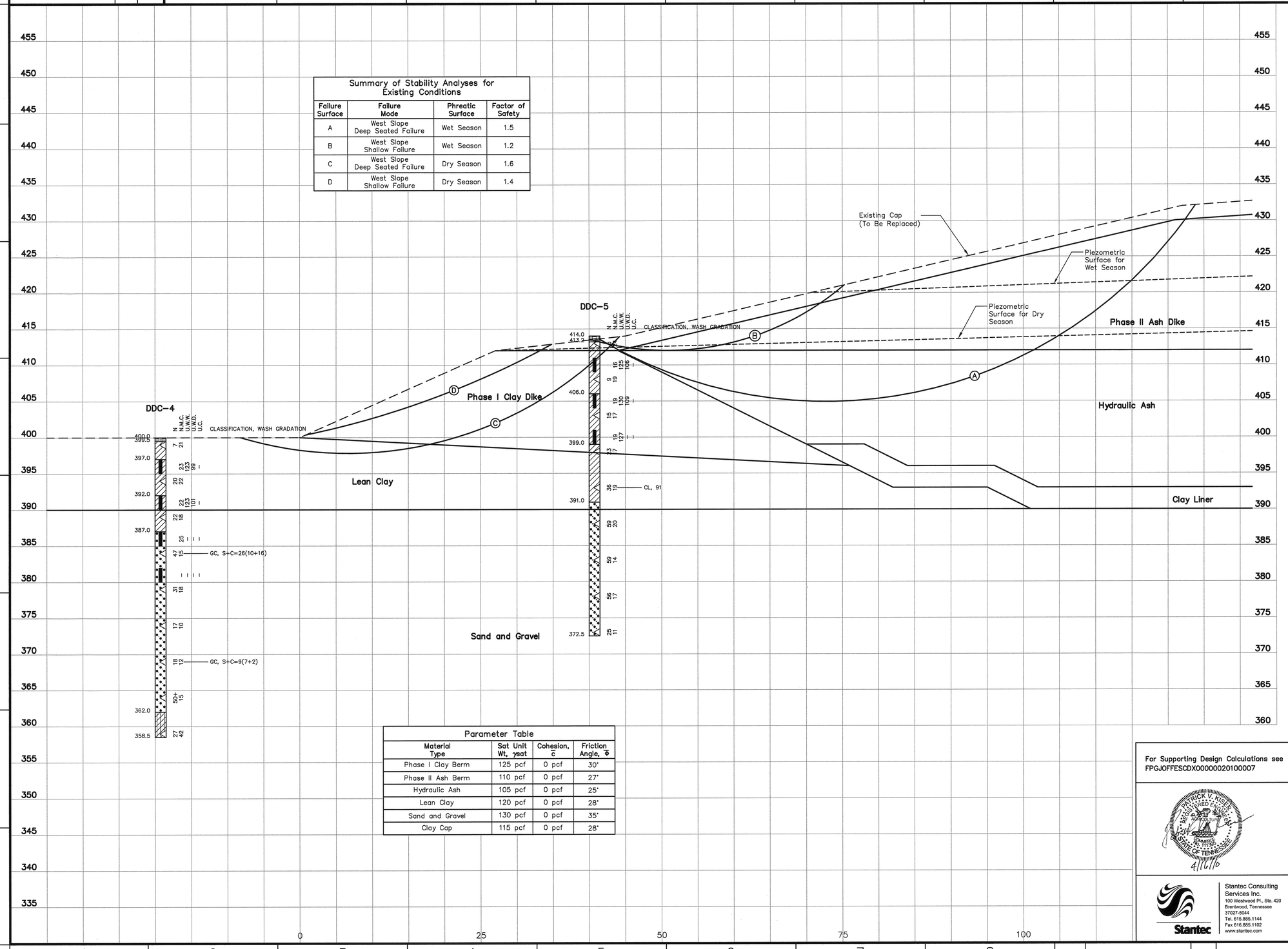
AUTOCAD R 2000 | DATE | 30 | C | 10W508-04 | R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

Summary of Stability Analyses for Existing Conditions			
Failure Surface	Failure Mode	Phreatic Surface	Factor of Safety
A	West Slope Deep Seated Failure	Wet Season	1.5
B	West Slope Shallow Failure	Wet Season	1.2
C	West Slope Deep Seated Failure	Dry Season	1.6
D	West Slope Shallow Failure	Dry Season	1.4



Parameter Table			
Material Type	Sat Unit Wt, γsat	Cohesion, c	Friction Angle, Φ
Phase I Clay Berm	125 pcf	0 pcf	30°
Phase II Ash Berm	110 pcf	0 pcf	27°
Hydraulic Ash	105 pcf	0 pcf	25°
Lean Clay	120 pcf	0 pcf	28°
Sand and Gravel	130 pcf	0 pcf	35°
Clay Cap	115 pcf	0 pcf	28°

LEGEND

- Topsoil
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WOH	Weight of Hammer
WOR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
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N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
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U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
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REC.	Recovery (%)
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RECORD DRAWING

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

PATRICK V. FISHER — REGISTERED ENGINEER — AGRICULTURAL — STATE OF TENNESSEE — 4/16/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R 0	04/19/10	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–
RECORD DRAWING										

SCALE: AS SHOWN EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION
DUPONT ROAD DREDGE CELL
LOGS OF BORINGS

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 04/19/10 | 30 | C | 10W508-05 | R 0

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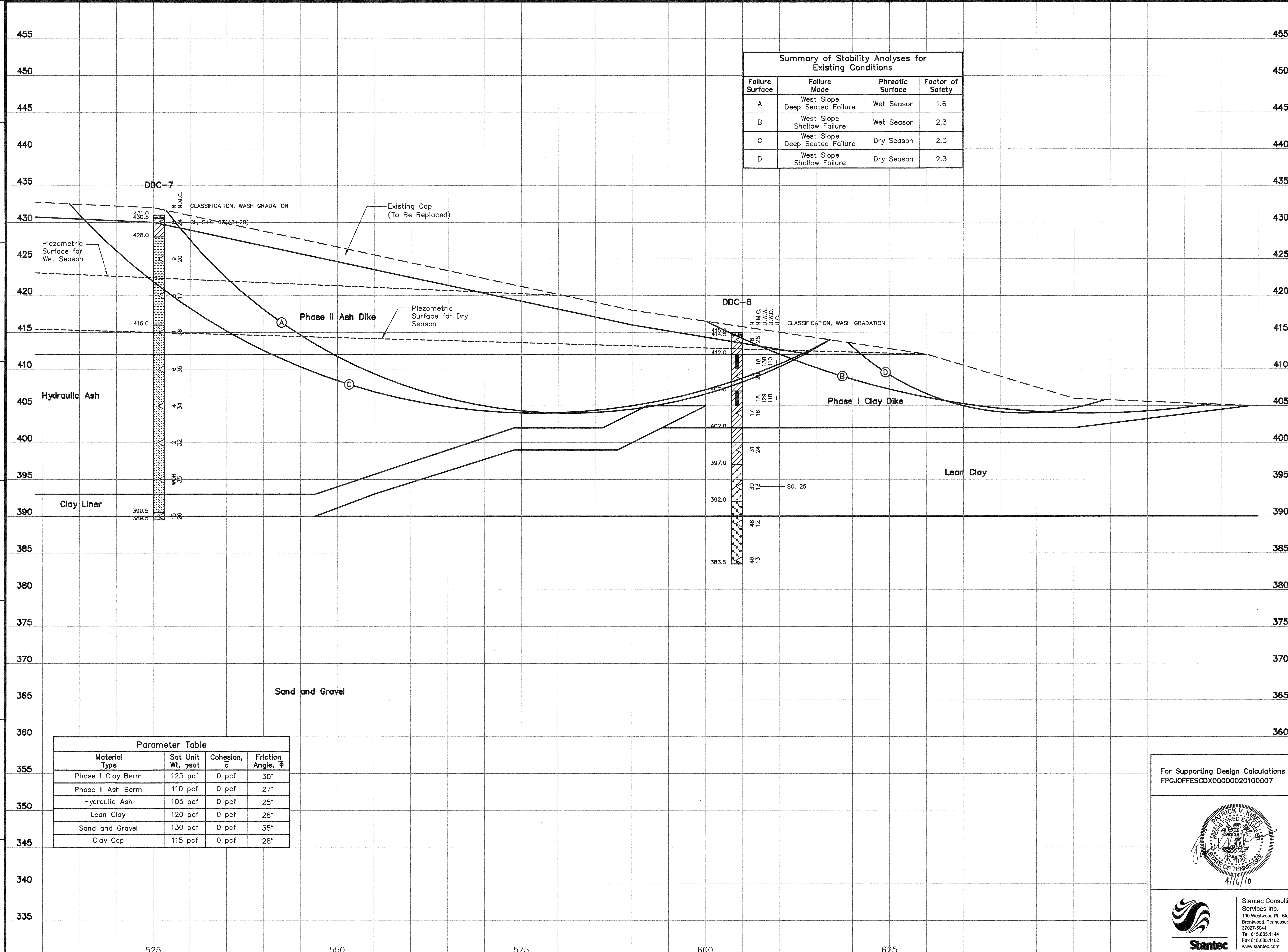
STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



Summary of Stability Analyses for Existing Conditions			
Failure Surface	Failure Mode	Phreatic Surface	Factor of Safety
A	West Slope Deep Seated Failure	Wet Season	1.6
B	West Slope Shallow Failure	Wet Season	2.3
C	West Slope Deep Seated Failure	Dry Season	2.3
D	West Slope Shallow Failure	Dry Season	2.3

Parameter Table			
Material Type	Sat Unit Wt, γsat	Cohesion, c	Friction Angle, Φ
Phase I Clay Berm	125 pcf	0 pcf	30°
Phase II Ash Berm	110 pcf	0 pcf	27°
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WOR Weight of Rods
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RECORD DRAWING

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

R 0 04/19/10 PVK PS SF HRA HRA PVK TJ
RECORD DRAWING

SCALE: AS SHOWN — EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION DUPONT ROAD DREDGE CELL LOGS OF BORINGS

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

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JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

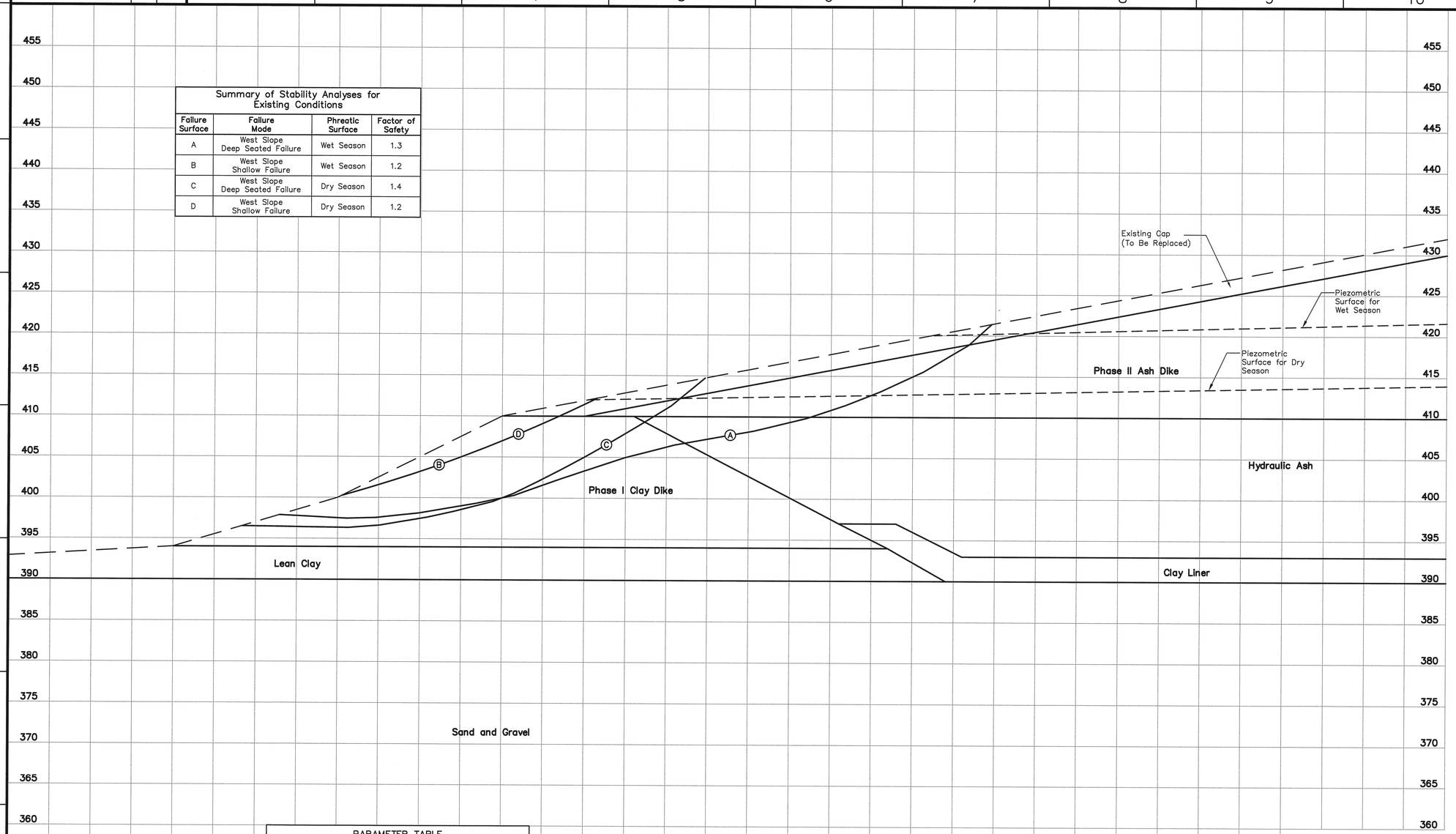
AUTOCAD R 2000 — DATE 04/19/10 — 30 C 10W508-06 — R 0

STANTEC 0
TASK COMPLETED BY: REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY

Summary of Stability Analyses for Existing Conditions			
Failure Surface	Failure Mode	Phreatic Surface	Factor of Safety
A	West Slope Deep Seated Failure	Wet Season	1.3
B	West Slope Shallow Failure	Wet Season	1.2
C	West Slope Deep Seated Failure	Dry Season	1.4
D	West Slope Shallow Failure	Dry Season	1.2



PARAMETER TABLE			
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RECORD DRAWING

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

PATRICK V. KISER — REGISTERED ENGINEER — STATE OF TENNESSEE — No. 111595 — 4/16/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R –	–	–	–	–	–	–	–	–	–	–
R 0	04/19/10 RECORD DRAWING	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–

DISCIPLINE INTERFACE: 1 2 3 4

SCALE: AS SHOWN EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION
DUPONT ROAD DREDGE CELL
LOGS OF BORINGS

Stantec Consulting Services Inc.
100 Westwood Pl., Ste. 420
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JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000	DATE 04/19/10	30	C	10W508-07	R 0

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

STANTEC	0
TASK COMPLETED BY:	REV NO.

Appendix B

Typed Boring Logs

Stantec

SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-1** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	414.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/29/09 Completed 12/29/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
414.0'	0.0'	Top of Hole							
413.0'	1.0'	TOPSOIL		SPT-1	0.0 - 1.5	0.5	2-4-7	22	
		FILL-SANDY LEAN TO FAT CLAY, with chert gravel, brown to reddish brown, moist, very stiff		SPT-2	5.0 - 6.5	1.2	12-9-11	18	65% passing #200 S+C (36+29) LL-47, PI-30
406.0'	8.0'								
		FILL-SANDY CLAY, with chert gravel, reddish brown, moist, stiff		SPT-3	10.0 - 11.5	1.5	6-5-5	21	
401.0'	13.0'								
		FILL-LEAN CLAY, brown to mottled gray, moist, very stiff		SPT-4	15.0 - 16.5	1.0	7-7-9	19	
396.0'	18.0'								
		CLAYEY SAND and GRAVEL, reddish brown, moist to very moist, medium dense, coarse grained		SPT-5	20.0 - 21.5	1.5	13-23-45	18	32% passing #200

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-1** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		CLAYEY SAND and GRAVEL, reddish brown, moist to very moist, medium dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5		17-24-21	14	13% passing #200 S+C (4+9) LL-42, PI-18
				SPT-7	30.0 - 31.5		14-11-14	17	
381.0'	33.0'								
		SAND and GRAVEL, reddish brown, saturated, very dense, coarse grained		SPT-8	35.0 - 36.5		15-23-28	10	5% passing #200 S+C (1+4) Non-Plastic
376.0'	38.0'								
		GRAVEL, with sand, reddish brown, saturated, dense, poorly graded		SPT-9	40.0 - 41.5		15-17-20	12	
372.5'	41.5'								
		No Refusal / Bottom of Hole							

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	DDC-2
Location	New Johnsonville, Tennessee	Total Depth	31.5 ft
Project Type	Geotechnical Exploration	Surface Elevation	413.0 ft. (NGVD29)
Supervisor	S. Vinson	Driller	M.Wethington
Date Started	12/29/09	Completed	12/29/09
Logged By	S. Zayko	Depth to Water	34.0 ft
		Date/Time	
		Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
413.0'	0.0'	Top of Hole							
412.5'	0.5'	TOPSOIL							
		FILL-SANDY CLAY, with gravel, reddish brown, moist, medium stiff to stiff		SPT-1	0.0 - 1.5	0.5	1-2-4	22	
				SPT-2	5.0 - 6.5	0.1	6-7-8	21	
				SPT-3	10.0 - 11.5	1.0	5-8-7	23	
400.0'	13.0'	LEAN CLAY, with gravel and sand, brown, moist, stiff							
				SPT-4	15.0 - 16.5	1.3	5-6-8	21	
395.0'	18.0'	LEAN CLAY, brown to reddish brown, moist, very stiff							
				SPT-5	20.0 - 21.5	1.5	6-9-13	19	
390.0'	23.0'	SANDY CLAY, reddish brown, moist, very stiff							

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-2** Total Depth 31.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY CLAY, reddish brown, moist, very stiff *(Continued)*		SPT-6	25.0 - 26.5	1.5	7-8-8	24	
385.0'	28.0'								
		SANDY CLAY, with silt, reddish brown, moist, stiff							
				SPT-7	30.0 - 31.5		6-6-7	25	70% passing #200 S+C (36+34) LL-40, PI-19
381.5'	31.5'								

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	N 604074.54, E 1414663.34 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-3** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	432.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/28/09 Completed 12/29/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
432.8'	0.0'	Top of Hole							
431.8'	1.0'	TOPSOIL		SPT-1	0.0 - 1.5	1.3	4-5-5	19	
429.8'	3.0'	FILL-SILTY CLAY, trace course sand, gray to light brown, moist, stiff							
		COMPACTED ASH, dark gray, moist to saturated, soft to stiff		SPT-2	5.0 - 6.5	0.3	3-2-1	15	
				SPT-3	10.0 - 11.5	1.5	4-4-5	39	
416.8'	16.0'			SPT-4	15.0 - 16.5	1.5	2-2-6	35	
		HYDRAULIC ASH, dark gray, saturated, soft to stiff							
				SPT-5	20.0 - 21.5	1.0	3-4-3	32	

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SUBSURFACE LOG

Project No.	172679048	Location	N 604074.54, E 1414663.34 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-3** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, saturated, soft to stiff *(Continued)*		SPT-6	25.0 - 26.5	0.2	WOH	34	
				SPT-7	30.0 - 31.5		1-1-1	34	
				SPT-8	35.0 - 36.5	1.3	1-1-1	31	
392.3'	40.5'								
391.3'	41.5'	LEAN CLAY, light brown, moist, stiff		SPT-9	40.0 - 41.5	1.0	2-5-6	29	

No Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Slotted Screen piezometer installed, tip elevation approximately 394.53 ft above mean sea level.
0.5' sand seat, followed by 5.0 ft slotted screen with sand pack to 3.0 ft above screen, and a 4.0 ft bentonite seal on top. Grout in the upper 27.0 ft (to top of boring)

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-4** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	400.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/6/10 Completed 1/6/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	21.2 ft Date/Time
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
400.0'	0.0'	Top of Hole							
399.5'	0.5'	TOPSOIL							
		FILL-LEAN CLAY, with organics, grayish brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.2	3-2-5	21	
397.0'	3.0'								
		LEAN CLAY, mottled reddish brown to tan brown, moist, very stiff, trace fine sand		ST-1	3.0 - 5.0			23	Wet Unit Weight 123 pcf
				SPT-2	5.0 - 6.5	1.5	3-9-11	22	
392.0'	8.0'								
		SANDY CLAY, reddish brown to tan brown, moist, very stiff		ST-2	8.0 - 10.0			22	Wet Unit Weight 123 pcf
				SPT-3	10.0 - 11.5	1.5	7-10-12	18	
387.0'	13.0'								
		SANDY GRAVEL, tan to reddish brown, moist to very moist, medium dense to very dense		ST-3	13.0 - 15.0			25	
				SPT-4	15.0 - 16.5	1.5	10-20-27	15	26% passing #200 S+C (10+16) LL-40, PI-22
				ST-4	18.0 - 20.0			--	No recovery in ST
				SPT-5	20.0 - 21.5	1.5	20-18-13	18	Saturated Below 21'

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-4**
		Total Depth	41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY GRAVEL, tan to reddish brown, moist to very moist, medium dense to very dense *(Continued)*		SPT-6	25.0 - 26.5	1.5	11-9-8	10	
				SPT-7	30.0 - 31.5	1.5	9-12-6	12	9% passing #200 S+C (7+2) Non-Plastic
				SPT-8	35.0 - 36.5	0.5	50+	15	
362.0'	38.0'								
		CHERTY SILTY CLAY, yellowish tan, very moist, very stiff							LL-38, PI-7
				SPT-9	40.0 - 41.5	1.5	2-9-18	42	
358.5'	41.5'								
		No Refusal / Bottom of Hole							

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-5** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	414.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/28/09 Completed 12/28/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	35.0 ft Date/Time
Logged By	S. Vinson	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
414.0'	0.0'	Top of Hole							
413.2'	0.8'	TOPSOIL		SPT-1	0.0 - 1.5	1.0	1-2-3	24	
		FILL-LEAN CLAY, with sand and gravel, reddish brown, moist, medium stiff to stiff		ST-1	3.0 - 5.0	1.9		16	Wet Unit Weight 125 pcf
				SPT-2	5.0 - 6.5	1.5	4-4-5	19	
406.0'	8.0'								
		FILL-LEAN CLAY, trace chert, brown to reddish brown, moist, stiff		ST-2	8.0 - 10.0	1.6		19	Wet Unit Weight 130 pcf
				SPT-3	10.0 - 11.5	1.5	5-6-9	17	
				ST-3	13.0 - 15.0	1.5		19	Wet Unit Weight 127 pcf
399.0'	15.0'								
		LEAN CLAY, with fine sand and gravel, yellowish brown to brown, very stiff to hard		SPT-4	15.0 - 16.5	1.5	9-10-13	17	
				SPT-5	20.0 - 21.5	1.5	13-17-19	19	91% passing #200
391.0'	23.0'								

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-5** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY GRAVEL, with clay, tan brown to reddish brown, moist to saturated, medium dense to very dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.5	20-27-32	20	
				SPT-7	30.0 - 31.5	1.5	33-27-32	14	
				SPT-8	35.0 - 36.5	1.2	15-27-29	17	
372.5'	41.5'			SPT-9	40.0 - 41.5	1.0	10-12-13	11	

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-6** Total Depth 48.0 ft
Location	New Johnsonville, Tennessee	Surface Elevation	440.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/17/09 Completed 12/18/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
440.0'	0.0'	Top of Hole							
		FILL-CLAYEY SAND, with some root hairs, light brown, moist, medium dense, fine grained		SPT-1	0.0 - 1.5	1.0	2-4-6	17	
436.0'	4.0'								
		HYDRAULIC ASH, dark gray, wet, very soft to medium stiff		SPT-2	5.0 - 6.5	0.8	3-2-3	23	
				SPT-3	10.0 - 11.5	1.2	1-2-1	34	
				SPT-4	15.0 - 16.5	0.5	1-1-2	28	
				SPT-5	20.0 - 21.5	1.3	3-1-1	38	

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-6** Total Depth 48.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, wet, very soft to medium stiff *(Continued)*		SPT-6	25.0 - 26.5	0.7	2-1-2	28	
				SPT-7	30.0 - 31.5	1.5	13-13-17	42	
				SPT-8	35.0 - 36.5	1.5	3-3-4	26	
				SPT-9	40.0 - 41.5	1.5	1-1-1	33	
393.5'	46.5'			SPT-10	45.0 - 46.5	1.5	1-1-2	34	
392.0'	48.0'	SANDY CLAY, yellowish brown, moist, stiff		SPT-11	46.5 - 48.0	1.5	4-6-9	36	

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

FMSM_LEGACY JOF-DDC.GPJ FMSM.GDT 4/19/10

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SUBSURFACE LOG

Project No.	172679048	Location	N 603834.16, E 1415064.64 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	DDC-7 Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	432.9 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/30/09 Completed 12/30/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
432.9'	0.0'	Top of Hole							
432.4'	0.5'	TOPSOIL							
		FILL-SANDY CLAY, with silt, brown, moist, stiff, trace roots		SPT-1	0.0 - 1.5	0.7	2-4-4	24	63% passing #200 S+C (43+20) LL-26, PI-8
429.9'	3.0'								
		COMPACTED ASH, dark gray, moist, stiff		SPT-2	5.0 - 6.5	1.5	6-4-5	20	
				SPT-3	10.0 - 11.5	1.2	2-2-3	17	
417.9'	15.0'								
		HYDRAULIC ASH, dark gray, saturated, very soft to medium stiff		SPT-4	15.0 - 16.5	1.5	3-3-3	36	
				SPT-5	20.0 - 21.5	1.5	2-2-4	35	

FMSM_LEGACY JOF-DDC.GPJ FMSM.GDT 4/19/10

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SUBSURFACE LOG

Project No.	172679048	Location	N 603834.16, E 1415064.64 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-7** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, saturated, very soft to medium stiff *(Continued)*		SPT-6	25.0 - 26.5	0.3	2-2-2	34	
				SPT-7	30.0 - 31.5	1.5	2-1-1	32	
				SPT-8	35.0 - 36.5	1.5	WOH	35	
392.4'	40.5'								
391.4'	41.5'	LEAN CLAY, mottled reddish brown to tan brown, moist, stiff		SPT-9	40.0 - 41.5	0.8	WOH-7-8	26	

No Refusal /
Bottom of Hole

WOH = Weight of Hammer

Slotted Screen piezometer installed, tip elevation approximately 393.78 ft above mean sea level.
1.0' sand seat, followed by 5.0 ft slotted screen with sand pack to 2.0 ft above screen, and a 2.0 ft bentonite seal on top. Grout in the upper 30.0 ft (to top of boring)

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-8** Total Depth 31.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	415.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/6/10 Completed 1/6/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	N/A Date/Time N/A
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
415.0'	0.0'	Top of Hole							
414.5'	0.5'	TOPSOIL							
		FILL-LEAN TO FAT CLAY, with gravel, reddish brown, moist, stiff		SPT-1	0.0 - 1.5	0.5	4-4-4	28	
412.0'	3.0'								
		FILL-LEAN CLAY, yellowish brown to grayish brown, moist, very stiff, trace wood pieces		ST-1	3.0 - 5.0	1.5		18	Wet Unit Weight 130 pcf
				SPT-2	5.0 - 6.5		7-7-9	20	
407.0'	8.0'								
		FILL-LEAN CLAY, with gravel, reddish brown to brown, moist, very stiff to hard		ST-2	8.0 - 10.0	1.7		18	Wet Unit Weight 129 pcf
				SPT-3	10.0 - 11.5	1.5	6-7-10	16	
402.0'	13.0'								
		LEAN CLAY, with sand and gravel, brown, moist, very stiff		SPT-4	15.0 - 16.5	1.5	9-13-18	24	
397.0'	18.0'								
		CLAYEY SAND, with gravel, reddish brown, moist, dense, medium to coarse grained		SPT-5	20.0 - 21.5	1.3	7-12-18	13	25% passing #200
392.0'	23.0'								

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-8** Total Depth 31.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY GRAVEL, with clay, reddish brown to dark reddish brown, moist, dense to very dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.5	24-21-27	12	
383.5'	31.5'			SPT-7	30.0 - 31.5	1.5	23-28-18	13	

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

FMSM_LEGACY JOF-DDC.GPJ FMSM.GDT 4/19/10

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	DDC-9
Location	New Johnsonville, Tennessee	Total Depth	41.5 ft
Project Type	Geotechnical Exploration	Surface Elevation	404.0 ft. (NGVD29)
Supervisor	S. Vinson	Driller	J. Wethington
Logged By	B. Evans	Date Started	1/6/10
		Completed	1/6/10
		Depth to Water	25.0 ft
		Date/Time	
		Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
404.0'	0.0'	Top of Hole							
403.8'	0.3'	TOPSOIL							
		FILL-LEAN CLAY, with sand and gravel, brown to reddish brown, moist, stiff, trace roots		SPT-1	0.0 - 1.5	0.8	3-3-6	18	moist @ 0.5'
401.0'	3.0'								
		FILL-LEAN CLAY, brown, moist, stiff		SPT-2	5.0 - 6.5	1.5	3-6-4	19	
397.0'	7.0'								
		CLAYEY GRAVEL, with sand, reddish brown, moist, very stiff		SPT-3	10.0 - 11.5	1.5	7-11-13	23	
391.0'	13.0'								
		CLAYEY SAND, with gravel, reddish brown to dark gray, moist, very dense, medium to coarse grained		SPT-4	15.0 - 16.5	1.5	12-38-50+	21	
388.0'	16.0'								
		SANDY GRAVEL, with clay, dark gray to reddish brown, moist to saturated, medium dense to very dense, medium to coarse grained		SPT-5	20.0 - 21.5	1.5	17-28-32	12	

Stantec

SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-9**
		Total Depth	41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY GRAVEL, with clay, dark gray to reddish brown, moist to saturated, medium dense to very dense, medium to coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.4	11-20-30	15	
				SPT-7	30.0 - 31.5		13-18-21	16	
				SPT-8	35.0 - 36.5	1.5	8-13-17	15	
362.5'	41.5'			SPT-9	40.0 - 41.5	1.5	14-12-15	15	

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

Stantec

SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-10** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	403.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/6/10 Completed 1/6/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	25.5 ft Date/Time
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
403.0'	0.0'	Top of Hole							
		FILL-LEAN CLAY, with silt, brown, very moist, stiff, trace roots		SPT-1	0.0 - 1.5	1.3	2-4-9	28	
400.0'	3.0'								
		FILL-LEAN CLAY, brown, moist, very stiff		ST-1	3.0 - 5.0	1.3		19	Wet Unit Weight 121 pcf
				SPT-2	5.0 - 6.5	1.5	3-9-12	23	
395.0'	8.0'								
		LEAN CLAY, reddish brown to tan brown, moist, very stiff		ST-2	8.0 - 10.0	2.0		21	Wet Unit Weight 125 pcf
				SPT-3	10.0 - 11.5	1.5	7-9-14	20	
391.0'	12.0'								
		CLAYEY SAND, reddish brown, moist, dense, fine to medium grained							
				SPT-4	15.0 - 16.5	1.5	9-12-20	17	
385.0'	18.0'								
		SANDY GRAVEL, with clay, reddish brown, moist to saturated, dense, coarse grained							
				SPT-5	20.0 - 21.5	1.5	17-22-26	13	

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-10** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SANDY GRAVEL, with clay, reddish brown, moist to saturated, dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.3	12-15-18	15	
				SPT-7	30.0 - 31.5	1.2	10-12-15	16	
370.0'	33.0'								
		CLAYEY GRAVEL, yellowish tan, moist to very moist, very dense, coarse grained		SPT-8	35.0 - 36.5	1.5	14-24-32	39	
				SPT-9	40.0 - 41.5	1.5	27-36-42	32	
361.5'	41.5'								
		No Refusal / Bottom of Hole							

Boring was backfilled with portland-bentonite grout to the surface.

Stantec

SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-11** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	415.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/17/09 Completed 12/17/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
415.0'	0.0'	Top of Hole							
413.0'	2.0'	FILL-SANDY CLAY, with traces of organics and gravel, dark yellowish brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	1-4-3	20	
407.0'	8.0'	FILL-LEAN CLAY, with sand and gravel, reddish brown to mottled gray, moist, very stiff		SPT-2	5.0 - 6.5	1.5	6-8-10	20	86% passing #200 S+C (48+38) LL-45, PI-28
400.0'	15.0'	FILL-LEAN CLAY, with fine grained sand, dark yellowish brown, moist, very stiff		SPT-3	10.0 - 11.5	1.5	6-8-14	19	
392.0'	23.0'	LEAN TO FAT CLAY, trace fine grained sand, dark yellowish brown, moist, very stiff to hard		SPT-4	15.0 - 16.5	1.5	9-12-13	18	
				SPT-5	20.0 - 21.5	1.5	12-19-17	18	93% passing #200 S+C (46+47) LL-52, PI-37

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-11** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		CLAYEY SAND and GRAVEL, dark yellowish brown to mottled gray, moist, very dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.3	18-36-28	12	
387.0'	28.0'								
		SILTY SAND and GRAVEL, reddish brown, moist, very dense to medium dense, coarse grained		SPT-7	30.0 - 31.5	1.3	25-39-33	9	
				SPT-8	35.0 - 36.5		20-21-24	18	
				SPT-9	40.0 - 41.5		9-11-12	23	
373.5'	41.5'								

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

FMSM_LEGACY JOF-DDC.GPJ FMSM.GDT 4/19/10

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SUBSURFACE LOG

Project No.	172679048	Location	N 603160.75, E 1414779.25 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-12** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	430.7 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/17/09 Completed 12/17/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
430.7'	0.0'	Top of Hole							
		FILL-SANDY CLAY, with some root hairs, brown, moist, stiff		SPT-1	0.0 - 1.5	1.2	1-3-6	17	
427.7'	3.0'								
		COMPACTED ASH, dark gray, moist or saturated, stiff		SPT-2	5.0 - 6.5	1.5	9-6-9	16	
				SPT-3	10.0 - 11.5	1.5	2-3-4	49	
416.7'	14.0'								
		HYDRAULIC ASH, dark gray, moist to wet, very soft to stiff		SPT-4	15.0 - 16.5	1.5	2-2-2	45	
				SPT-5	20.0 - 21.5	1.5	2-2-2	37	

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SUBSURFACE LOG

Project No.	172679048	Location	N 603160.75, E 1414779.25 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-12** Total Depth 41.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, moist to wet, very soft to stiff *(Continued)*		SPT-6	25.0 - 26.5	1.5	1-1-1	37	
				SPT-7	30.0 - 31.5	1.5	WOH	37	
				SPT-8	35.0 - 36.5	1.5	WOH	34	
392.7'	38.0'								
		FAT CLAY, trace fine grained sand, yellowish brown to mottled gray							
390.2'	40.5'								
				SPT-9	40.0 - 41.5	1.5	14-18-17	33	
389.2'	41.5'	CLAYEY SAND, with gravel, moist, dense							

No Refusal /
Bottom of Hole

WOH = Weight of Hammer

Slotted Screen piezometer installed, tip elevation approximately 385.23 ft above mean sea level.
1.0' sand seat, followed by 5 ft slotted screen with sand pack to 2.0 ft above screen, and a 2.0 ft bentonite seal on top.
Grout in the upper 30.0 ft (to top of boring)

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SUBSURFACE LOG

Project No.	172679048	Location	N 603210.69, E 1415082.20 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-13** Total Depth 39.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	432.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/4/10 Completed 1/5/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	N/A Date/Time N/A
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
432.1'	0.0'	Top of Hole							
		FILL-LEAN CLAY, trace roots, brown, moist, stiff		SPT-1	0.0 - 1.5	1.2	3-5-5	18	
429.1'	3.0'								
		COMPACTED ASH, dark gray, very moist to saturated, very soft to medium stiff		SPT-2	6.0 - 7.5	1.5	1-3-2	34	
				SPT-3	10.0 - 11.5	1.5	WOH-WOH-1	36	
418.1'	14.0'								
		HYDRAULIC ASH, dark gray, very moist to saturated, very soft to medium stiff		SPT-4	15.0 - 16.5	1.5	1-2-2	41	
				SPT-5	20.0 - 21.5	1.2	1-1-2	41	

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SUBSURFACE LOG

Project No.	172679048	Location	N 603210.69, E 1415082.20 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-13** Total Depth 39.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, very moist to saturated, very soft to medium stiff *(Continued)*		SPT-6	25.0 - 26.5	1.5	WOH-WOH-1	36	
				SPT-7	30.0 - 31.5	1.2	WOR	35	
				SPT-8	35.0 - 36.5	1.5	WOR	34	
				SPT-9	36.5 - 38.0	1.5	WOR	35	
394.1'	38.0'								
392.6'	39.5'	SANDY CLAY, reddish brown, moist, stiff		SPT-10	38.0 - 39.5	1.0	3-7-7	33	

No Refusal /
Bottom of Hole

WOH = Weight of Hammer
WOR = Weight of Rods

Slotted Screen piezometer installed, tip elevation approximately 393.45 ft above mean sea level.
1.3' sand seat, followed by 5.0 ft slotted screen with sand pack to 2.0 ft above screen, and a 5.5 ft bentonite seal on top. Grout in the upper 25.7 ft (to top of boring)

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-14** Total Depth 31.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	414.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/5/10 Completed 1/5/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	N/A Date/Time N/A
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
414.0'	0.0'	Top of Hole							
411.0'	3.0'	FILL-LEAN CLAY, trace sand and chert, yellowish brown to brown, very moist, soft		SPT-1	0.0 - 1.5	0.5	2-1-3	30	
401.0'	13.0'	FILL-LEAN CLAY, with sand and chert, brown, moist, very stiff		SPT-2	5.0 - 6.5	1.5	8-10-11	15	70% passing #200 S+C (33+37) LL-47, PI-31
				SPT-3	10.0 - 11.5	0.3	6-7-8	20	Large chert fragment blocked SPT
396.0'	18.0'	FILL-SILTY LEAN CLAY, with sand and chert, yellowish brown to reddish brown, moist, stiff, traces of organics (root hairs, grass)		SPT-4	15.0 - 16.5	1.4	2-5-9	20	79% passing #200 S+C (50+29) LL-35, PI-18
393.0'	21.0'	LEAN CLAY, with sand and chert, reddish brown, moist, very stiff		SPT-5	20.0 - 21.5	1.5	4-8-10	19	67% passing #200 S+C (43+24) LL-39, PI-24 Two samples collected: 20-21.1' and 21.1-211.5'
391.0'	23.0'	SANDY CLAY, with weathered chert, reddish brown, moist, very stiff							
		SILTY SAND, with gravel, dark brown, moist, medium dense, coarse grained							

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-14** Total Depth 31.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		SILTY SAND, with gravel, dark brown, moist, medium dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	0.8	4-6-11	11	
382.5'	31.5'			SPT-7	30.0 - 31.5	0.2	4-11-16	11	Large chert fragment blocked SPT

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	Not Yet Surveyed
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-15** Total Depth 41.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	408.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	1/5/10 Completed 1/6/10
Supervisor	S. Vinson Driller J. Wethington	Depth to Water	N/A Date/Time N/A
Logged By	B. Evans	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
408.0'	0.0'	Top of Hole							
		FILL-SANDY CLAY, with gravel, reddish brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	2-3-3	21	
405.0'	3.0'								
		FILL-LEAN CLAY, silty, trace roots, brown, moist, very stiff, trace roots		ST-1	3.0 - 5.0	1.6		18	Wet Unit Weight 127 pcf
				SPT-2	5.0 - 6.5	1.3	5-6-11	21	
400.0'	8.0'								
		LEAN CLAY, with sand and gravel, reddish brown, moist, very stiff		ST-2	8.0 - 10.0	2.0		21	Wet Unit Weight 129 pcf
				SPT-3	10.0 - 11.5	1.5	7-12-13	20	
395.0'	13.0'								
		SANDY GRAVEL, with clay, reddish brown, moist to saturated, medium dense to dense, coarse grained		ST-3	13.0 - 15.0	0.4		23	
				SPT-4	15.0 - 16.5	1.5	10-14-12	16	
				ST-4	18.0 - 20.0			14	
				SPT-5	20.0 - 21.5	1.0	7-13-7	14	

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SUBSURFACE LOG

Project No. 172679048 Location Not Yet Surveyed

Project Name Dupont Road Dredge Cell Boring No. **DDC-15** Total Depth 41.5 ft

Lithology		Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Classification
Approx Elev	Depth								
		SANDY GRAVEL, with clay, reddish brown, moist to saturated, medium dense to dense, coarse grained *(Continued)*		SPT-6	25.0 - 26.5	1.0	8-9-14	15	
				SPT-7	30.0 - 31.5	1.5	8-10-13	19	wet @ 30' chert @ 31'
				SPT-8	35.0 - 36.5	1.5	5-9-13	15	
370.0'	38.0'								
		CLAYEY SAND and GRAVEL, yellowish brown, very moist,. dense, fine to coarse grained		SPT-9	40.0 - 41.5	1.5	9-14-20	20	
366.5'	41.5'								

No Refusal /
Bottom of Hole

Boring was backfilled with portland-bentonite grout to the surface.

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SUBSURFACE LOG

Project No.	172679048	Location	N 602991.68, E 1414974.82 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-16** Total Depth 40.5 ft
Location	New Johnsonville, Tennessee	Surface Elevation	432.5 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	12/16/09 Completed 12/16/09
Supervisor	S. Vinson Driller M.Wethington	Depth to Water	N/A Date/Time N/A
Logged By	S. Zayko	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
432.5'	0.0'	Top of Hole							
430.5'	2.0'	FILL-LEAN CLAY, with fine grained sand, brown, moist, medium stiff		SPT-1	0.0 - 1.5	1.0	1-4-3	38	
419.5'	13.0'	COMPACTED ASH, dark gray, saturated, medium stiff to hard		SPT-2	5.0 - 6.5	1.5	15-18-20	35	
				SPT-3	10.0 - 11.5	1.5	3-3-2	34	
		HYDRAULIC ASH, dark gray, saturated, very soft		SPT-4	15.0 - 16.5	0.4	WOH	32	
				SPT-5	20.0 - 21.5	1.2	WOH	43	

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SUBSURFACE LOG

Project No.	172679048	Location	N 602991.68, E 1414974.82 (NAD27)
Project Name	Dupont Road Dredge Cell	Boring No.	**DDC-16** Total Depth 40.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Approx Elev	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Classification
		HYDRAULIC ASH, dark gray, saturated, very soft *(Continued)*		SPT-6	25.0 - 26.5	0.5	WOH	49	
				SPT-7	30.0 - 31.5	0.7	WOH	33	
				SPT-8	35.0 - 36.5	0.7	WOH	48	
392.5'	40.0'								65% passing #200 S+C (40+25) LL-31, PI-16
392.0'	40.5'	LEAN CLAY, sandy, with chert, yellowish brown to mottled gray, moist		SPT-9	40.0 - 40.5	0.5	18	22	

No Refusal /
Bottom of Hole
Boring terminated within 6-inches of the percieved bottom liner.

WOH = Weight of Hammer

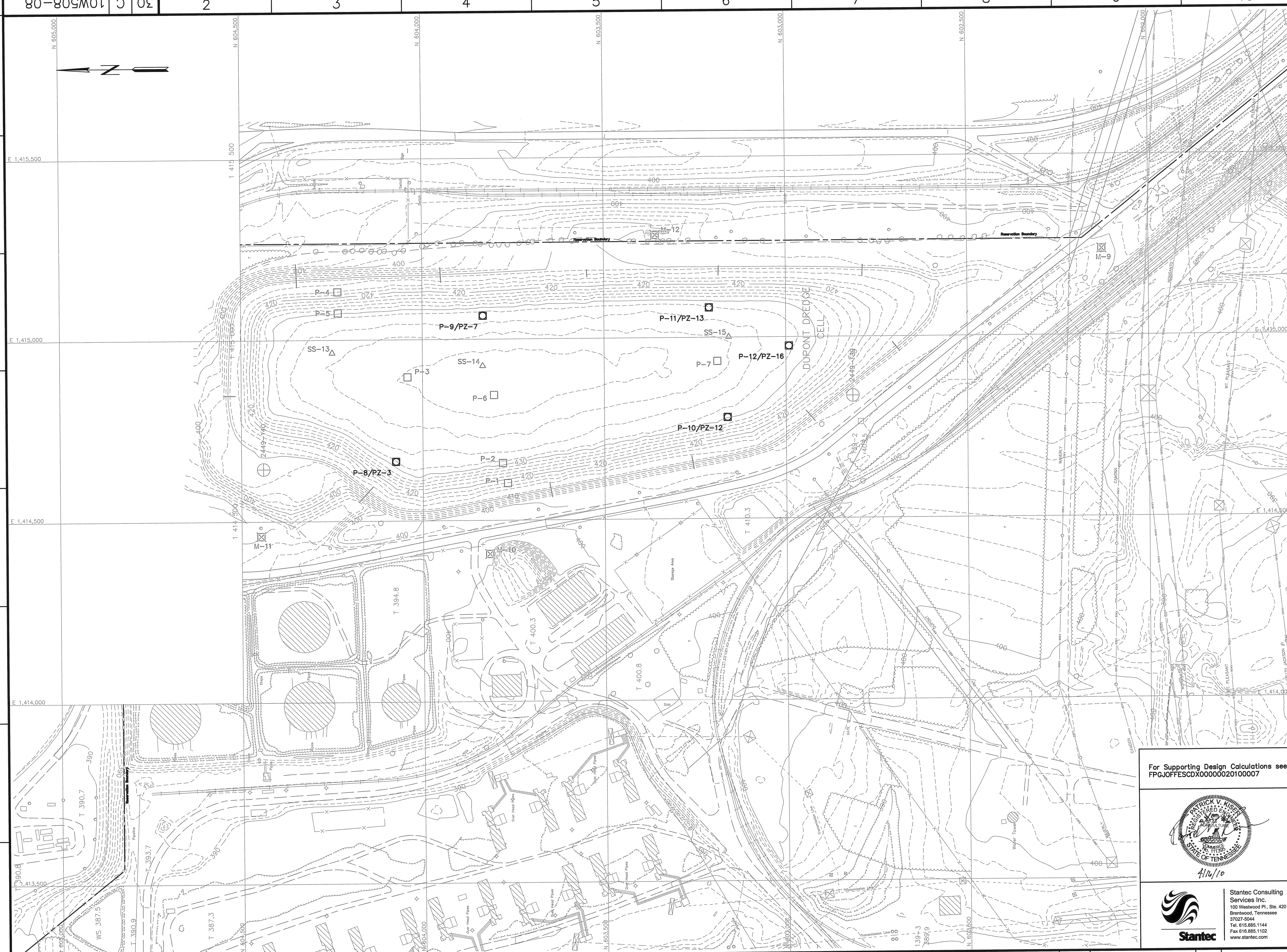
Slotted Screen piezometer installed, tip elevation approximately 394.30 ft above mean sea level.
1.0' sand seat, followed by 10.0 ft slotted screen with sand pack to 2.0 ft above screen, and a 3.0 ft bentonite seal on top. Grout in the upper 24.0 ft (to top of boring)

Appendix C

Instrumentation Monitoring Program

- Instrumentation Layout
- Piezometer Installation Details
- Piezometer Data

Instrumentation Layout



LEGEND

- P-12/PZ-16 New Piezometer (PZ)
- P-1 Existing Piezometer
- SS-7 Previous Test Boring
- M-9 Existing Monitoring Well

NOTES:

1. The topographic mapping presented on this drawing was provided to Stantec by TVA Surveying and Project Services. This plan view was prepared to support development of the geotechnical exploration program and should not 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.

INSTRUMENTATION LOCATION TABLE

Boring	Northing	Easting	Top of Casing Elev. (ft.)	Surface Ground Elev. (ft.)
P-1	603,767.52	1,414,602.03	422.7	416.8
P-2	603,781.00	1,414,657.72	434.4	431.2
P-3	604,041.49	1,414,895.97	441.2	437.9
P-4	604,233.71	1,415,132.35	420.1	415.9
P-5	604,233.01	1,415,074.38	433.5	430.7
P-6	603,804.26	1,414,845.44	442.6	439.6
P-7	603,188.22	1,414,934.13	439.6	436.3
P-8/PZ-3	604,074.54	1,414,663.34	435.3	432.8
P-9/PZ-7	603,834.16	1,415,064.64	435.7	432.9
P-10/PZ-12	603,160.75	1,414,779.25	433.7	430.7
P-11/PZ-13	603,210.69	1,415,082.20	435.0	432.1
P-12/PZ-16	602,991.68	1,414,974.82	435.2	432.5

RECORD DRAWING

50 0 100 200 FEET
GRAPHIC SCALE: 1" = 100'
CONTOUR INTERVAL = 2'

For Supporting Design Calculations see FPGJOFFESCDX00000020100007

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	04/19/10	PVK	PS	SF	HRA	HRA	PVK	TJ	–	–	–

RECORD DRAWING

SCALE: 1"=100' EXCEPT AS NOTED

YARD
ASH DREDGE CELL – EAST OF GAS TURBINE

GEOTECHNICAL EXPLORATION DUPONT ROAD DREDGE CELL INSTRUMENTATION LAYOUT

PATRICK V. KISER REGISTERED ENGINEER AGRICULTURE COMMERCE No. 111395 STATE OF TENNESSEE
4/16/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. KISER	P. SILPACHARN	S. FIELD	H. APARICIO	H. APARICIO	P. KISER	T. JOHNSON

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Stantec Consulting Services Inc.
100 Westwood Pl., Ste. 420
Brentwood, Tennessee
37027-5044
Tel. 615.885.1144
Fax 616.885.1102
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JOHNSONVILLE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 04/19/10 | 30 | C | 10W508-08 | R 0

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

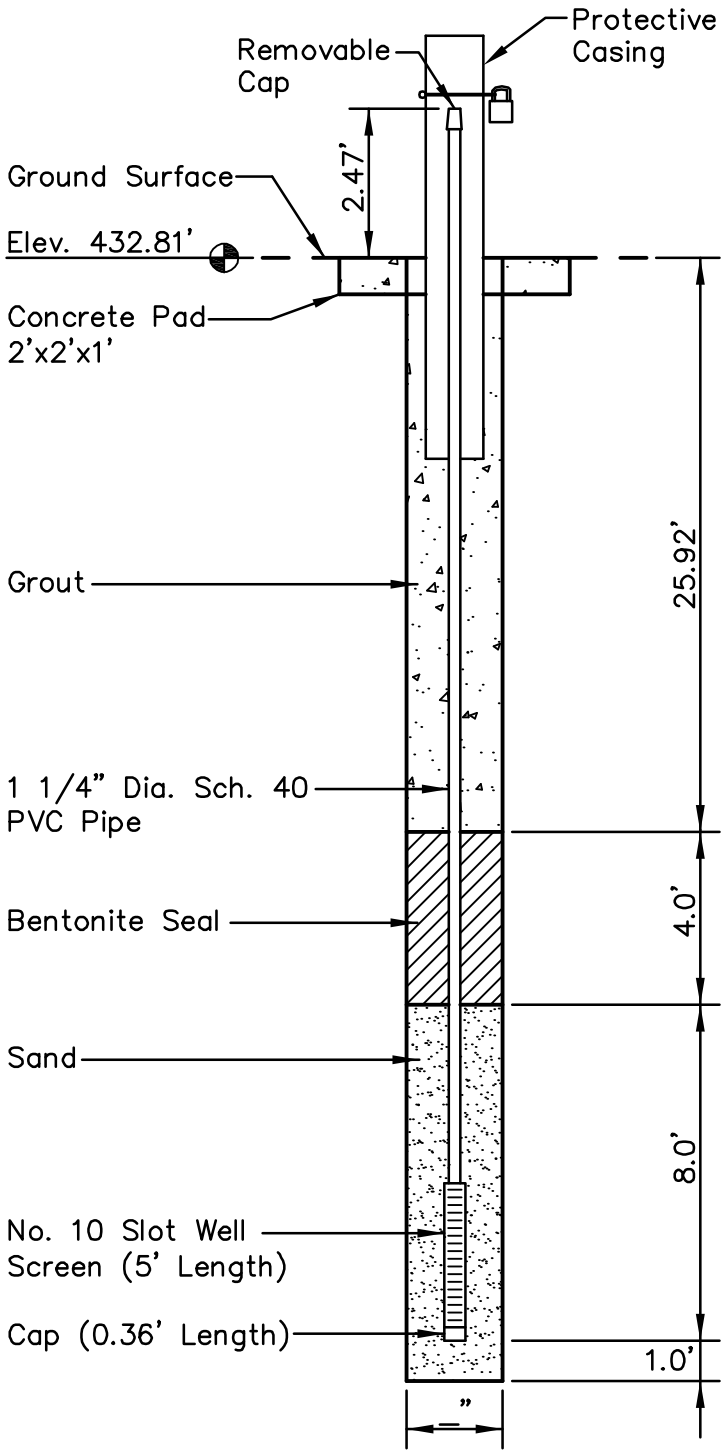
STANTEC | 0
TASK COMPLETED BY: | REV NO.

DISCIPLINE INTERFACE

PLOT DATE: 04/16/2010

30 C 10W508-08

Piezometer Installation Details



NOTES:

1. Installed on 12/29/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 04/16/2010 USER: SILPACHARN, PRAYUTH (BILLY)
V:\1726\ACTIVE\172679048\ENVIRONMENTAL\DRAWING\GEOTECH\INSTRUMENT\790488-JOF-PZ8.DWG

LOCATION:

Northing: 604074.54
Easting: 1414663.34
Ground Elevation: 432.81 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD 29

PIEZOMETER P-8/DDC-3
TVA - JOF - DDC
NEW JOHNSONVILLE, TN

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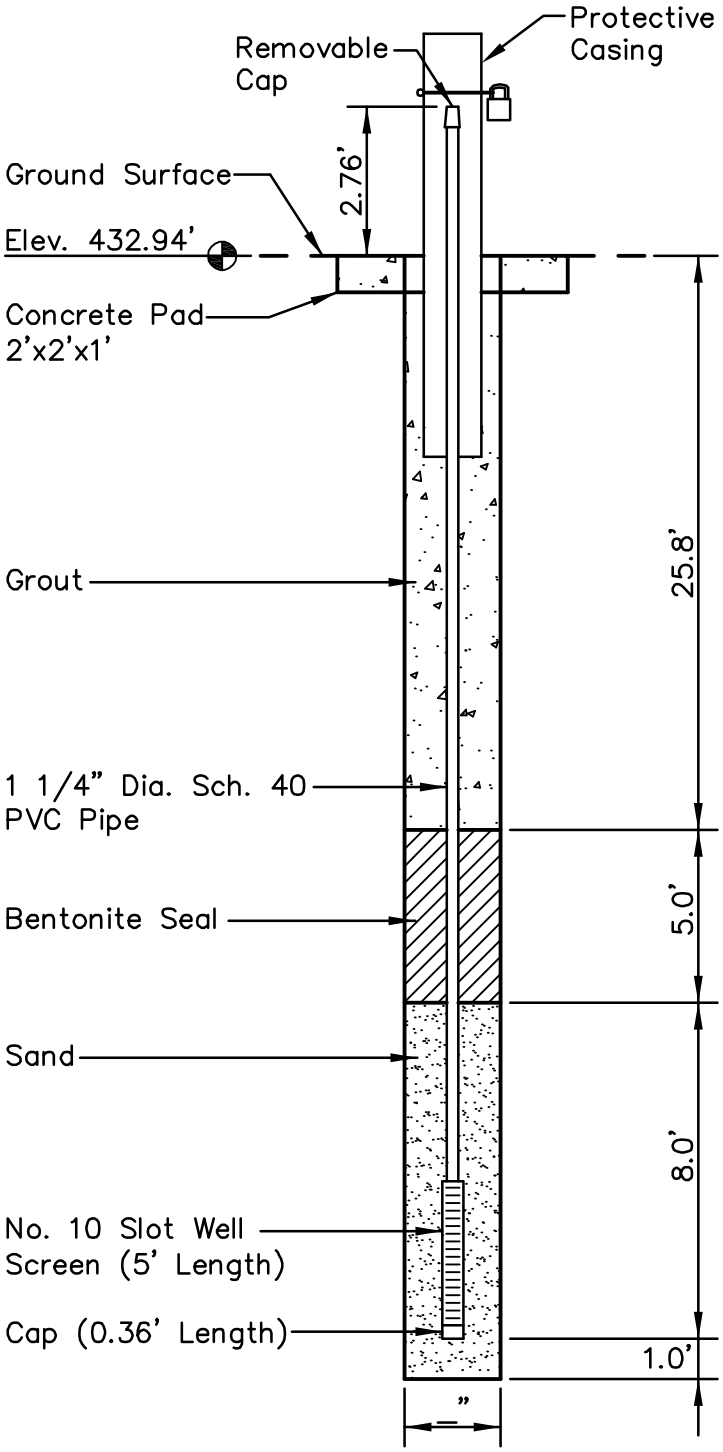
DRAWN BY	PS	DATE	JAN., 2010	REVISED			SHEET
CHECKED BY	PW	PROJ. NO.	172679048	1.	11/04/09	3.	1 OF 1
CHECKED BY	BE	SCALE	NTS	2.	04/16/10	4.	



NOTES:

1. Installed on 12/30/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 603834.16
Easting: 1415064.64
Ground Elevation: 432.94 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD 29

PIEZOMETER P-9/DDC-7
TVA - JOF - DDC
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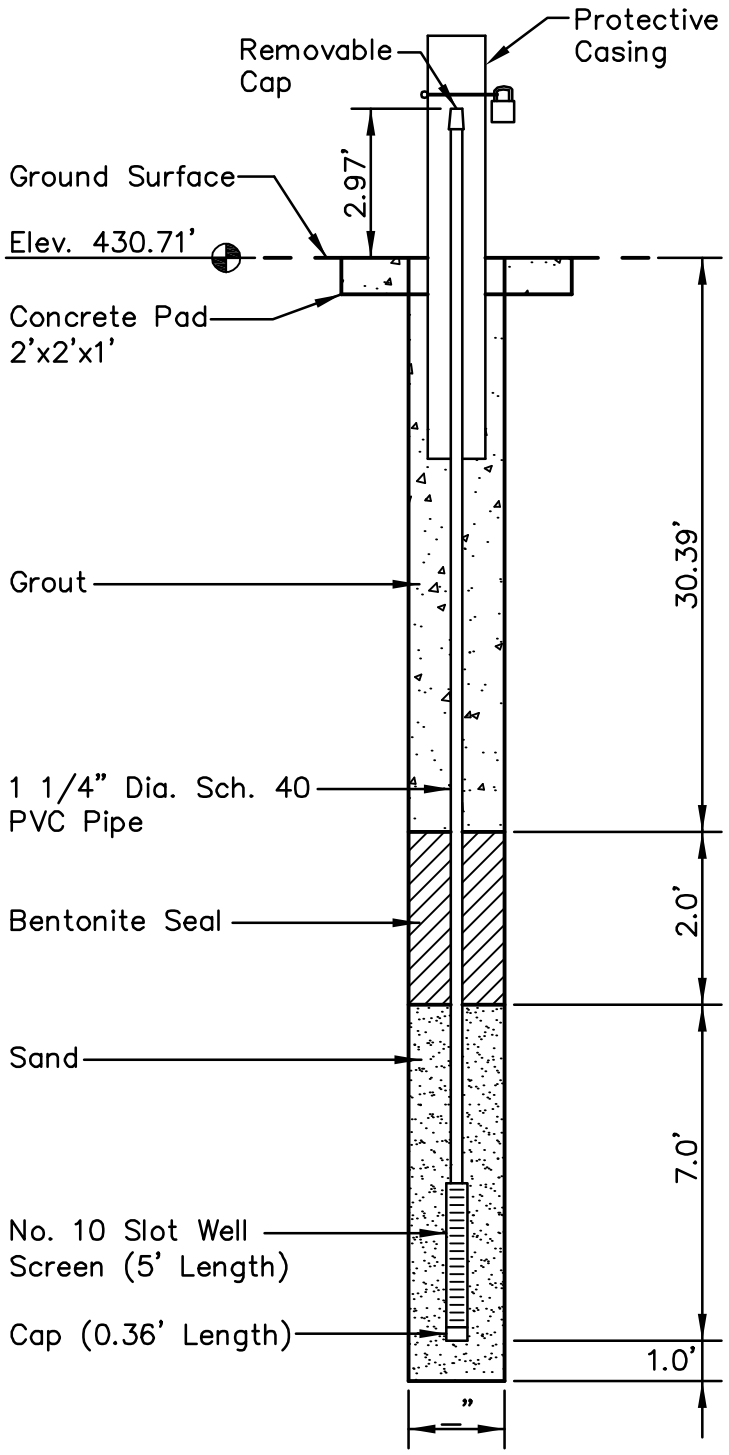
DRAWN BY	PS	DATE	JAN., 2010	REVISED			SHEET
CHECKED BY	PW	PROJ. NO.	172679048	1.	11/04/09	3.	1 OF 1
CHECKED BY	BE	SCALE	NTS	2.	04/16/10	4.	



NOTES:

1. Installed on 12/17/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

LOCATION:

Northing: 603160.75
Easting: 1414779.25
Ground Elevation: 430.71 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD 29

PIEZOMETER P-10/DDC-12
TVA - JOF - DDC
NEW JOHNSONVILLE, TN

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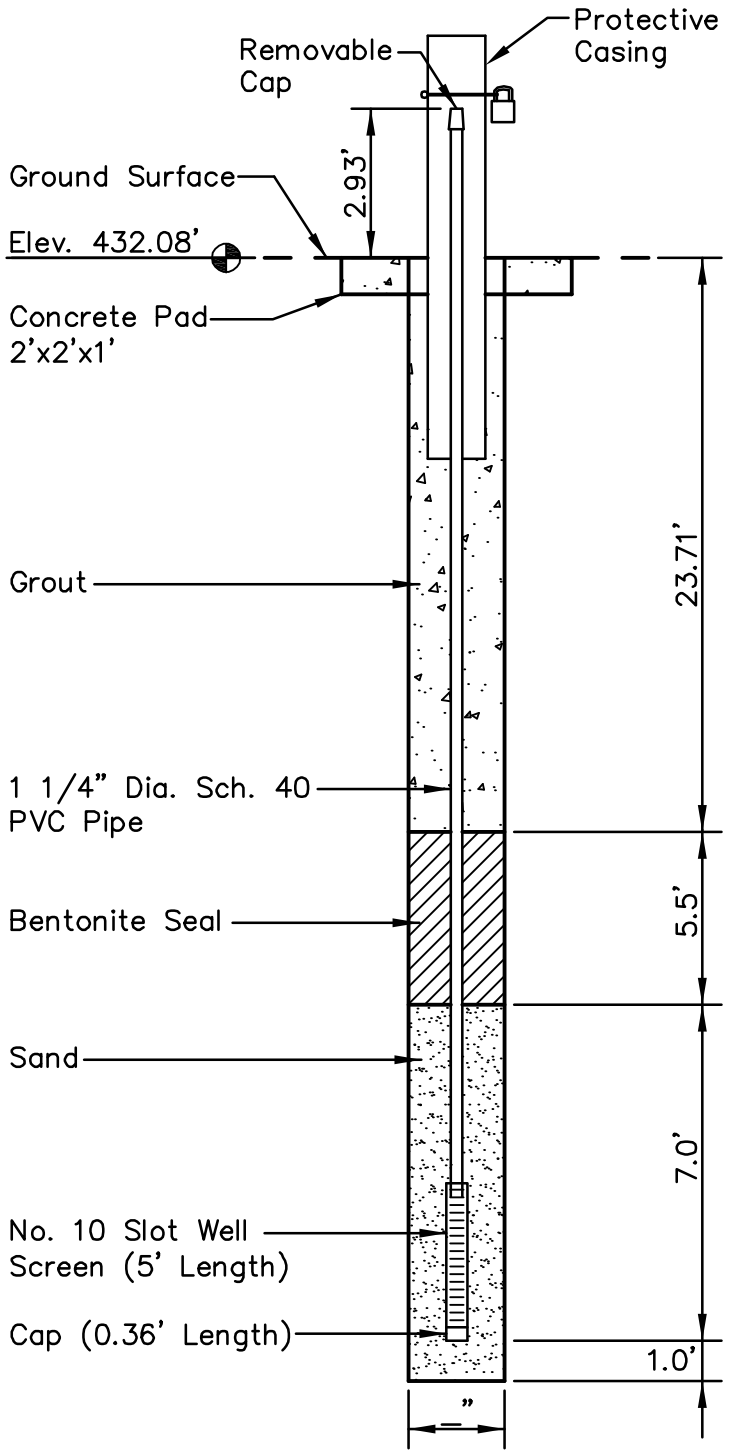
DRAWN BY	PS	DATE	JAN., 2010	REVISED			SHEET
CHECKED BY	PW	PROJ. NO.	172679048	1.	11/04/09	3.	1 OF 1
CHECKED BY	BE	SCALE	NTS	2.	04/16/10	4.	



NOTES:

1. Installed on 01/05/2010. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 04/16/2010 USER: SILPACHARN, PRAYUTH (BILLY)
V:\1726\ACTIVE\172679048\ENVIRONMENTAL\DRAWING\GEOTECH\INSTRUMENT\790488-JOF-PZ11.DWG

LOCATION:

Northing: 603210.69
Easting: 1415082.20
Ground Elevation: 432.08 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD 29

PIEZOMETER P-11/DDC-13
TVA - JOF - DDC
NEW JOHNSONVILLE, TN

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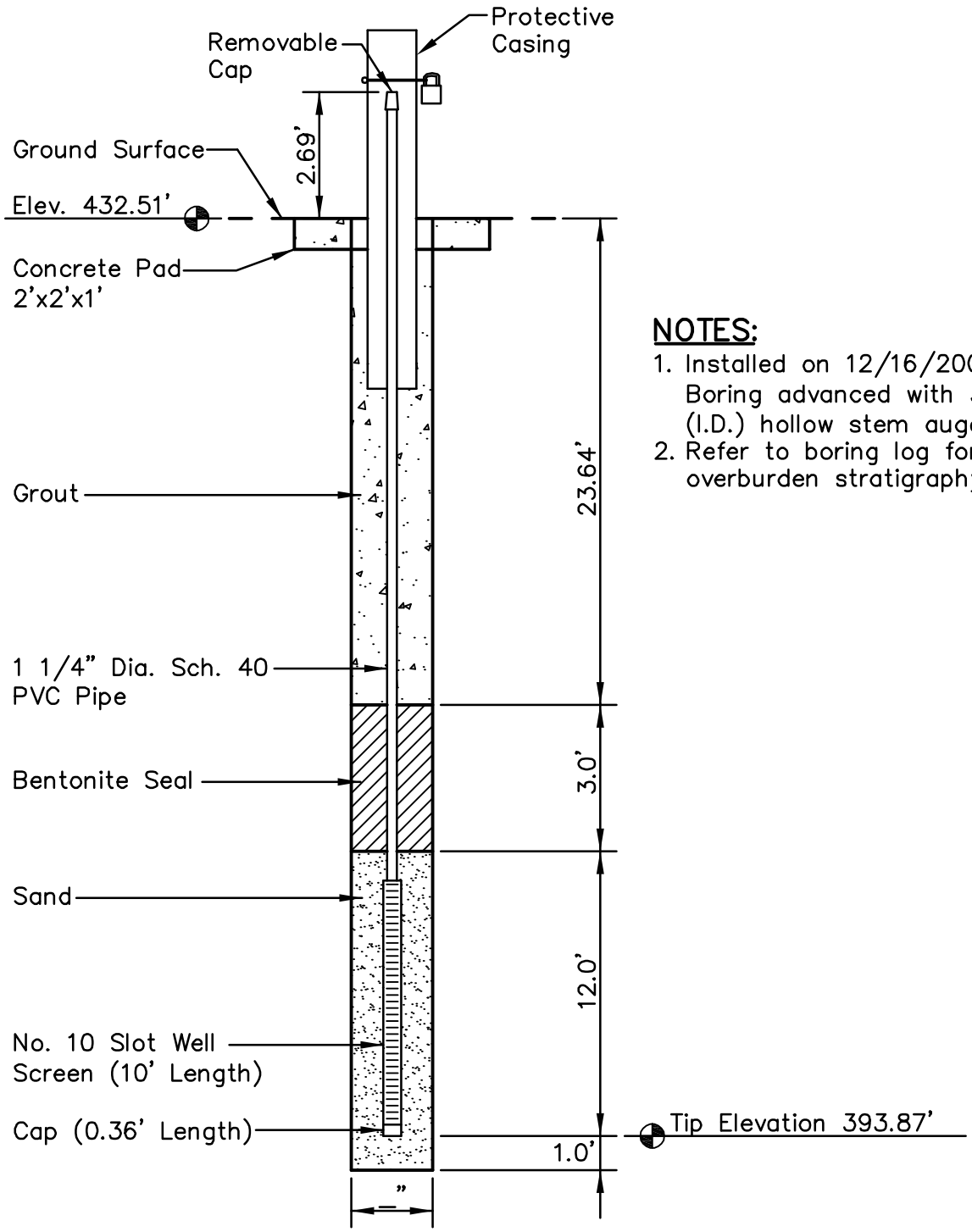
DRAWN BY	PS	DATE	JAN., 2010	REVISED			SHEET
CHECKED BY	PW	PROJ. NO.	172679048	1.	11/04/09	3.	1 OF 1
CHECKED BY	BE	SCALE	NTS	2.	04/16/10	4.	



NOTES:

1. Installed on 12/16/2009. Boring advanced with 3.25" (I.D.) hollow stem augers.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 04/16/2010 USER: SILPACHARN, PRAYUTH (BILLY)
V:\1726\ACTIVE\172679048\ENVIRONMENTAL\DRAWING\GEOTECH\INSTRUMENT\790488-JOF-PZ12.DWG

LOCATION:

Northing: 602991.68
Easting: 1414974.82
Ground Elevation: 432.51 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD 29

PIEZOMETER P-12/DDC-16
TVA - JOF - DDC
NEW JOHNSONVILLE, TN

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DRAWN BY	PS	DATE	JAN., 2010	REVISED			SHEET
CHECKED BY	PW	PROJ. NO.	172679048	1.	11/04/09	3.	1 OF 1
CHECKED BY	BE	SCALE	NTS	2.	04/16/10	4.	

Piezometer Data

TVA-JOF - Dupont Dredge Cell
535 Steam Plant Rd
New Johnsonville, TN
Stantec Project No. 172679048

					1/12/2010		1/25/2010		2/8/2010		2/22/2010	
Piezometer	PZ Depth (ft)	Surface Elevation (ft)	TOC Elevation (ft)	PZ Tip Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)
P-1	15.05	416.79	422.71	407.66	5.15	417.56	5.00	417.71	4.20	418.51	2.73	419.98
P-2	21.30	431.18	434.35	413.05	10.42	423.93	9.15	425.20	9.06	425.29	8.44	425.91
P-3	35.15	437.9	441.18	406.03	16.62	424.56	16.08	425.10	15.37	425.81	14.93	426.25
P-4	12.40	415.9	420.06	407.66	2.25	417.81	2.46	417.60	2.30	417.76	2.37	417.69
P-5	24.05	430.65	433.46	409.41	15.02	418.44	14.38	419.08	14.50	418.96	13.81	419.65
P-6	26.85	439.55	442.64	415.79	15.75	426.89	15.52	427.12	14.86	427.78	14.28	428.36
P-7	22.89	440.26	439.62	416.73	13.89	425.73	13.08	426.54	13.38	426.24	11.92	427.70
P-8/DDC-3	40.75	432.81	435.28	394.53	14.12	421.16	13.28	422.00	12.96	422.32	12.82	422.46
P-9/DDC-7	41.92	432.94	435.70	393.78	16.22	419.48	15.34	420.36	15.13	420.57	14.87	420.83
P-10/DDC-12	42.72	430.71	433.68	390.96	11.97	421.71	11.22	422.46	10.81	422.87	10.57	423.11
P-11/DDC-13	39.50	432.08	435.01	395.51	13.21	421.80	12.15	422.86	11.75	423.26	11.68	423.33
P-12/DDC-16	41.33	432.51	435.20	393.87	17.08	418.12	15.57	419.63	15.19	420.01	14.58	420.62

TVA-JOF - Dupont Dredge Cell
535 Steam Plant Rd
New Johnsonville, TN
Stantec Project No. 172679048

					3/12/2010		3/24/2010		4/9/2010			
Piezometer	PZ Depth (ft)	Surface Elevation (ft)	TOC Elevation (ft)	PZ Tip Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)	Depth Measurement (ft)	Water Elevation (ft)
P-1	15.05	416.79	422.71	407.66	2.56	420.15	2.99	419.72	2.65	420.06		
P-2	21.30	431.18	434.35	413.05	8.83	425.52	8.76	425.59	8.62	425.73		
P-3	35.15	437.9	441.18	406.03	15.43	425.75	15.63	425.55	15.14	426.04		
P-4	12.40	415.9	420.06	407.66	2.25	417.81	2.25	417.81	2.15	417.91		
P-5	24.05	430.65	433.46	409.41	14.08	419.38	14.12	419.34	14.12	419.34		
P-6	26.85	439.55	442.64	415.79	14.63	428.01	14.79	427.85	14.47	428.17		
P-7	22.89	440.26	439.62	416.73	12.76	426.86	12.88	426.74	12.52	427.10		
P-8/DDC-3	40.75	432.81	435.28	394.53	13.18	422.10	13.13	422.15	13.03	422.25		
P-9/DDC-7	41.92	432.94	435.70	393.78	15.26	420.44	15.16	420.54	15.00	420.70		
P-10/DDC-12	42.72	430.71	433.68	390.96	10.91	422.77	10.86	422.82	10.71	422.97		
P-11/DDC-13	39.50	432.08	435.01	395.51	11.99	423.02	11.87	423.14	11.74	423.27		
P-12/DDC-16	41.33	432.51	435.20	393.87	15.78	419.42	15.67	419.53	15.41	419.79		

Appendix D

Laboratory Test Data

- Laboratory Classification Testing
- Consolidated Undrained Triaxial Testing

Laboratory Classification Testing

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-1, 5.0'-6.5'	Lab ID	16
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 17.7

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	100.0
3/8"	9.5	97.6
No. 4	4.75	89.3
No. 10	2	83.3
No. 40	0.425	77.1
No. 200	0.075	65.1
	0.02	46.0
	0.005	29.5
	0.002	25.3
estimated	0.001	25.0

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	10.7	16.7
Coarse Sand	6.0	6.2
Medium Sand	6.2	---
Fine Sand	12.0	12.0
Silt	35.6	39.8
Clay	29.5	25.3

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	47
Plastic Limit:	17
Plasticity Index:	30
Activity Index:	1.20

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

Estimated

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 (17)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-1, 5.0'-6.5'
Lab ID: 16

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: JMB
Test Date: 01-28-2010
Date Received: 01-26-2010

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.6
No. 4	89.3
No. 10	83.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

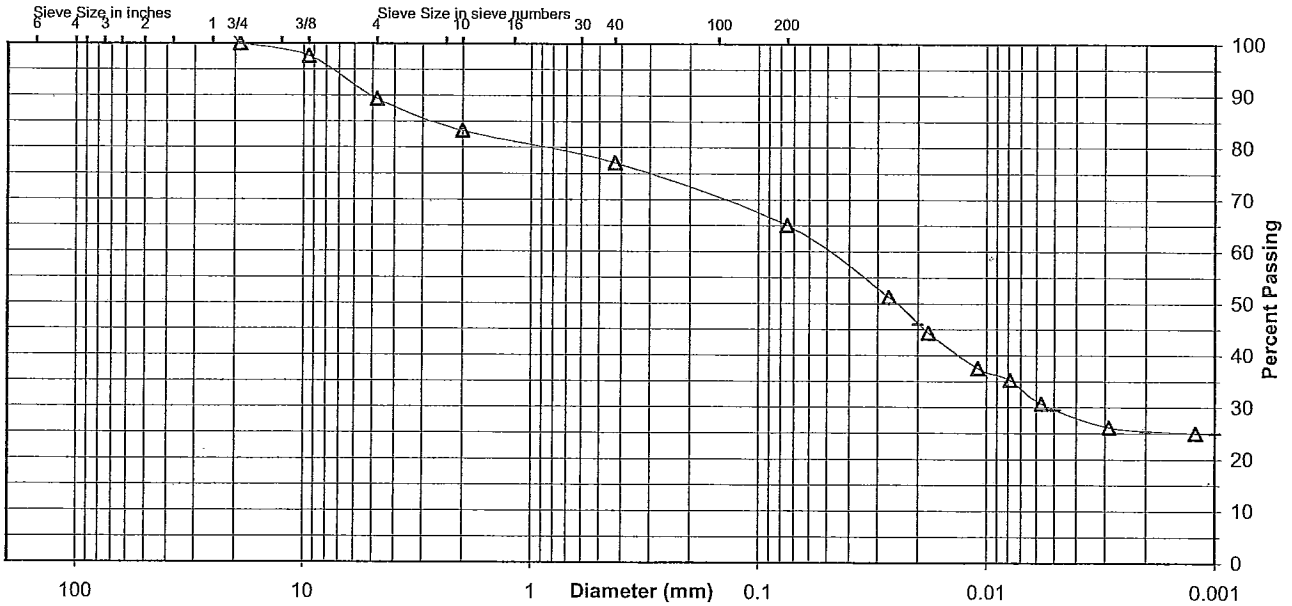
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	77.1
No. 200	65.1
0.02 mm	46.0
0.005 mm	29.5
0.002 mm	25.3
0.001 mm	25.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	10.7	6.0	6.2	12.0	35.6	29.5
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	16.7			6.2	12.0	39.8	25.3



Comments

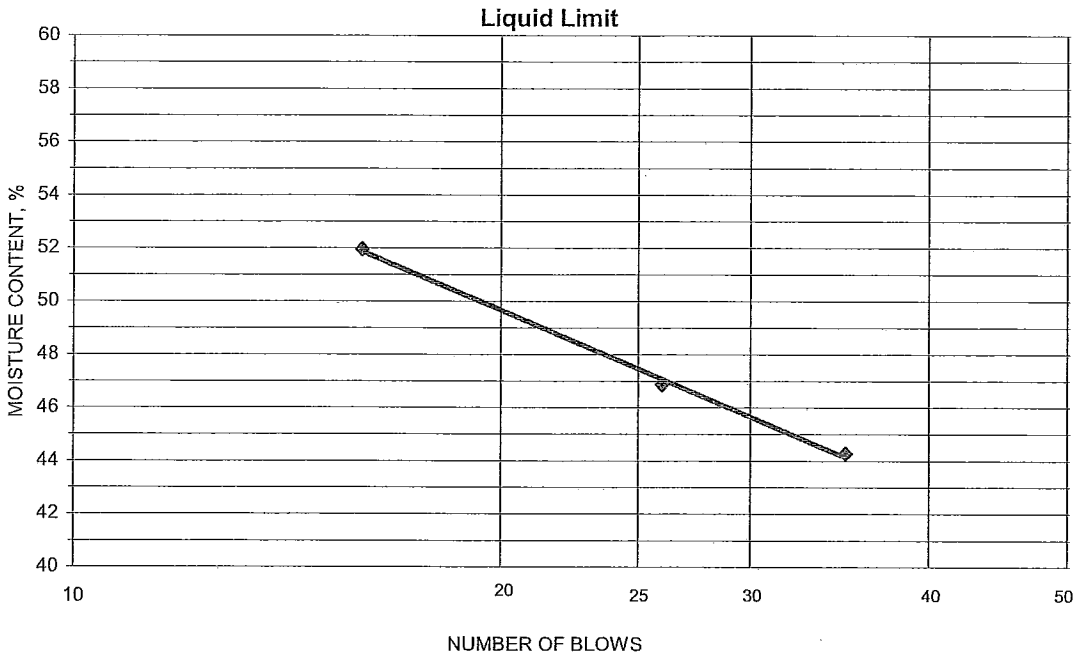
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-1, 5.0'-6.5'	Lab ID	16
		% + No. 40	23
Tested By	JMB	Test Method	ASTM D 4318 Method A
Test Date	02-02-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
9.87	8.17	4.33	35	44.3	
9.22	7.65	4.30	26	46.9	
10.14	8.15	4.32	16	52.0	47



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
8.76	8.11	4.30	17.1	17	30
8.46	7.85	4.32	17.3		

Remarks: _____

Reviewed By RHB

Stantec

Gradation Analysis
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Source: DDC-1, 20.0'-21.5'

Project Number: 172679048
Lab ID: 19
Date Received: 01-26-2010
Preparation Date: 03-09-2010
Test Date: 03-09-2010

Preparation Method: ASTM D 1140 Method B
Particle Shape: Angular
Particle Hardness: Hard and Durable
Sample Dry Mass (g): 411.04
Moisture Content (%): 17.1

Analysis based on total sample.

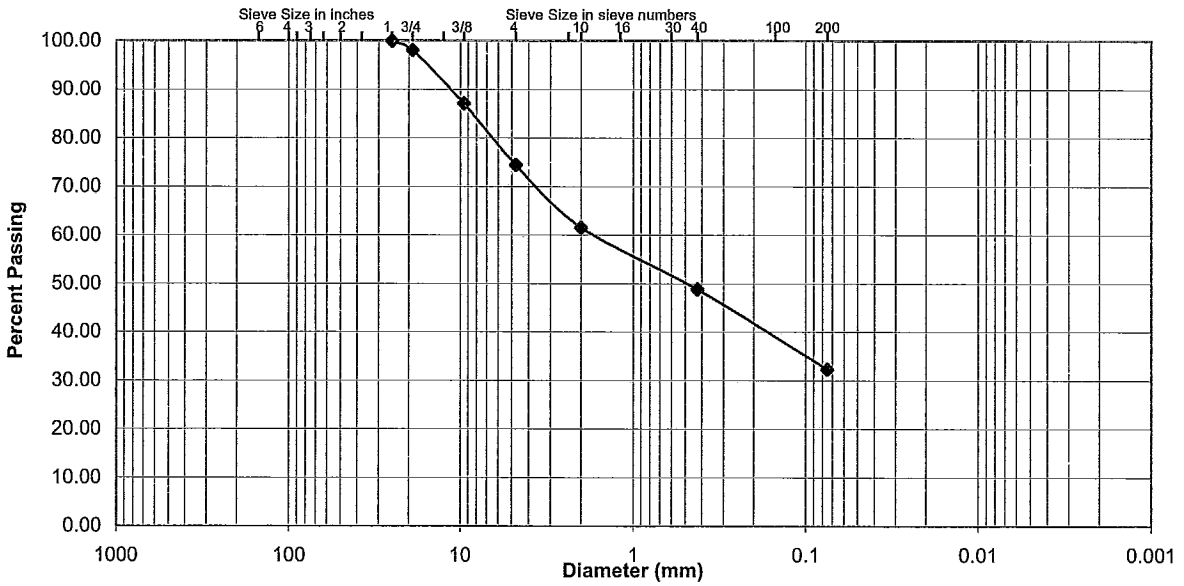
Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	7.93	1.9	98.1
3/8"	44.89	10.9	87.1
No. 4	52.22	12.7	74.4
No. 10	52.78	12.8	61.6
No. 40	52.51	12.8	48.8
No. 200	67.52	16.4	32.4
Pan	133.19	32.4	---

% Gravel: 25.6
% Sand: 42.0
% Fines: 32.4
Fines Classification: N/A

D_{10} (mm): N/A
D_{30} (mm): N/A
D_{60} (mm): N/A

Cu: N/A
Cc: N/A

Particle Size Distribution



Comments

Reviewed By: RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-1, 25.0'-26.5'	Lab ID	20
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 14.0

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	94.5
3/4"	19	94.5
3/8"	9.5	82.4
No. 4	4.75	69.0
No. 10	2	52.3
No. 40	0.425	22.6
No. 200	0.075	12.8
	0.02	11.2
	0.005	9.0
	0.002	7.6
estimated	0.001	7.3

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	31.0	47.7
Coarse Sand	16.7	29.7
Medium Sand	29.7	---
Fine Sand	9.8	9.8
Silt	3.8	5.2
Clay	9.0	7.6

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 42
Plastic Limit: 24
Plasticity Index: 18
Activity Index: 2.25

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

Estimated

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: SC
Group Name: Clayey sand with gravel

AASHTO Classification: A-2-7 (0)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-1, 25.0'-26.5'
Lab ID: 20

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: 01-29-2010
Date Received: 01-26-2010

Maximum Particle size: 1 1/2" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	94.5
3/4"	94.5
3/8"	82.4
No. 4	69.0
No. 10	52.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

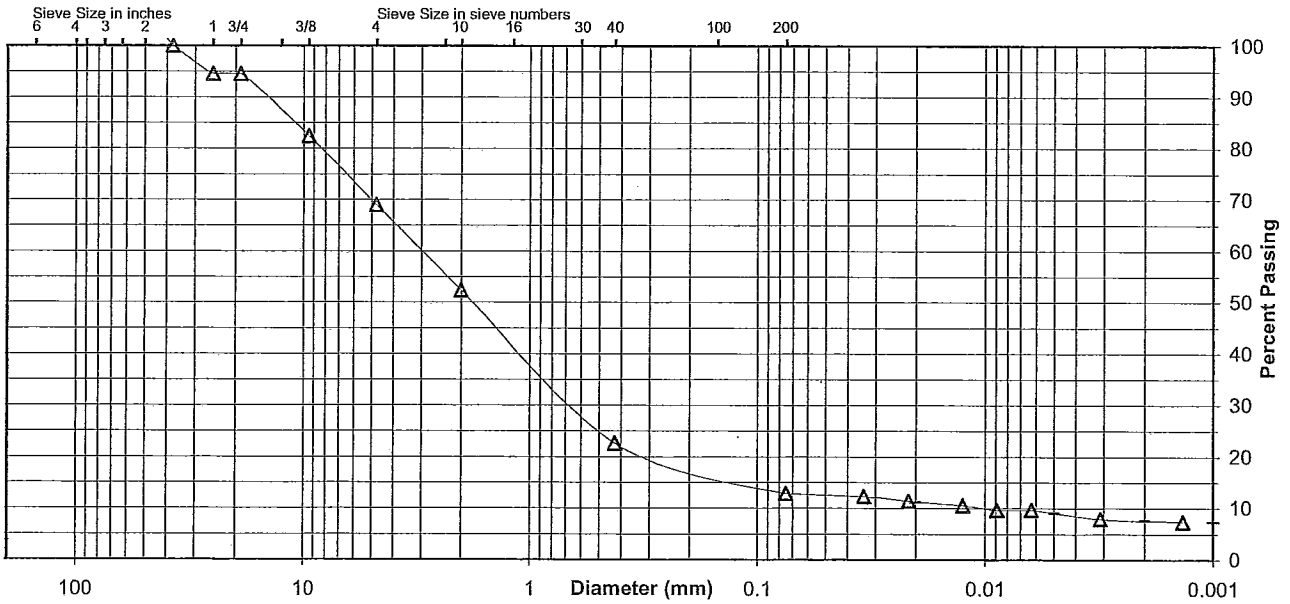
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	22.6
No. 200	12.8
0.02 mm	11.2
0.005 mm	9.0
0.002 mm	7.6
0.001 mm	7.3

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	5.5	25.5	16.7	29.7	9.8	3.8	9.0
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	47.7			29.7	9.8	5.2	7.6



Comments

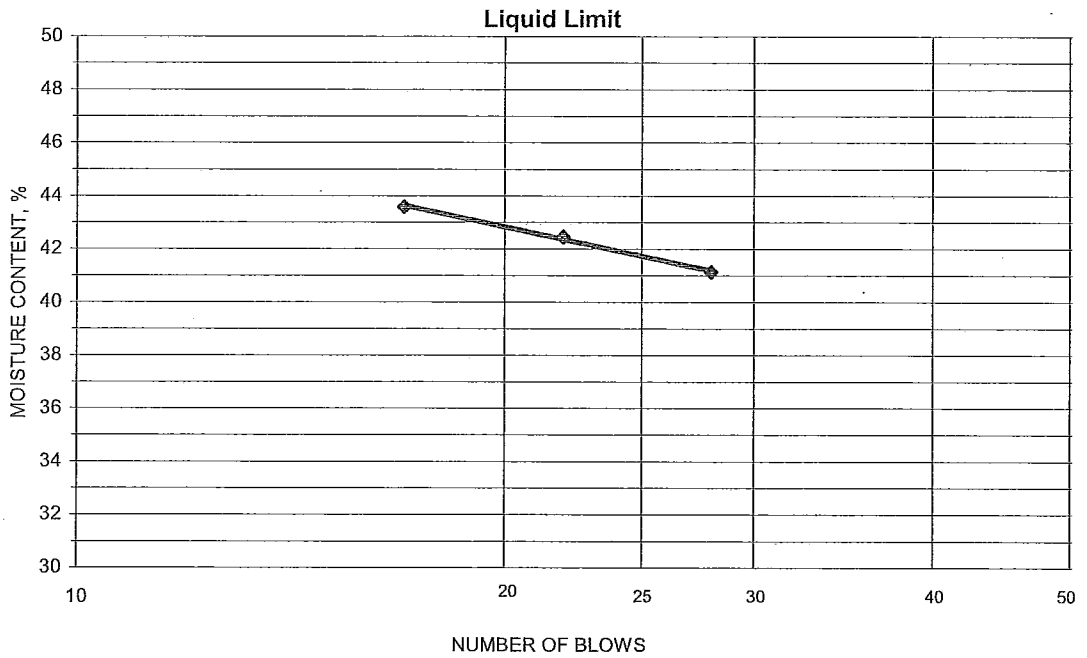
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-1, 25.0'-26.5'	Lab ID	20
		% + No. 40	77
Tested By	RHB	Test Method	ASTM D 4318 Method A
Test Date	02-04-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
11.83	9.65	4.35	28	41.1	
12.50	10.02	4.33	17	43.6	
11.49	9.35	4.31	22	42.5	42



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
7.36	6.78	4.30	23.4	24	18
8.00	7.29	4.33	24.0		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-1, 35.0'-36.5'	Lab ID	22
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 10.4

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	100.0
3/4"	19	93.6
3/8"	9.5	77.7
No. 4	4.75	53.8
No. 10	2	34.9
No. 40	0.425	15.2
No. 200	0.075	4.6
	0.02	4.6
	0.005	3.4
	0.002	2.6
estimated	0.001	2.6

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	46.2	65.1
Coarse Sand	18.9	19.7
Medium Sand	19.7	---
Fine Sand	10.6	10.6
Silt	1.2	2.0
Clay	3.4	2.6

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/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

Estimated

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: SW

Group Name: Well-graded sand with gravel

AASHTO Classification: A-1-a (1)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-1, 35.0'-36.5'
Lab ID: 22

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: 01-28-2010
Date Received: 01-26-2010

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	93.6
3/8"	77.7
No. 4	53.8
No. 10	34.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.7

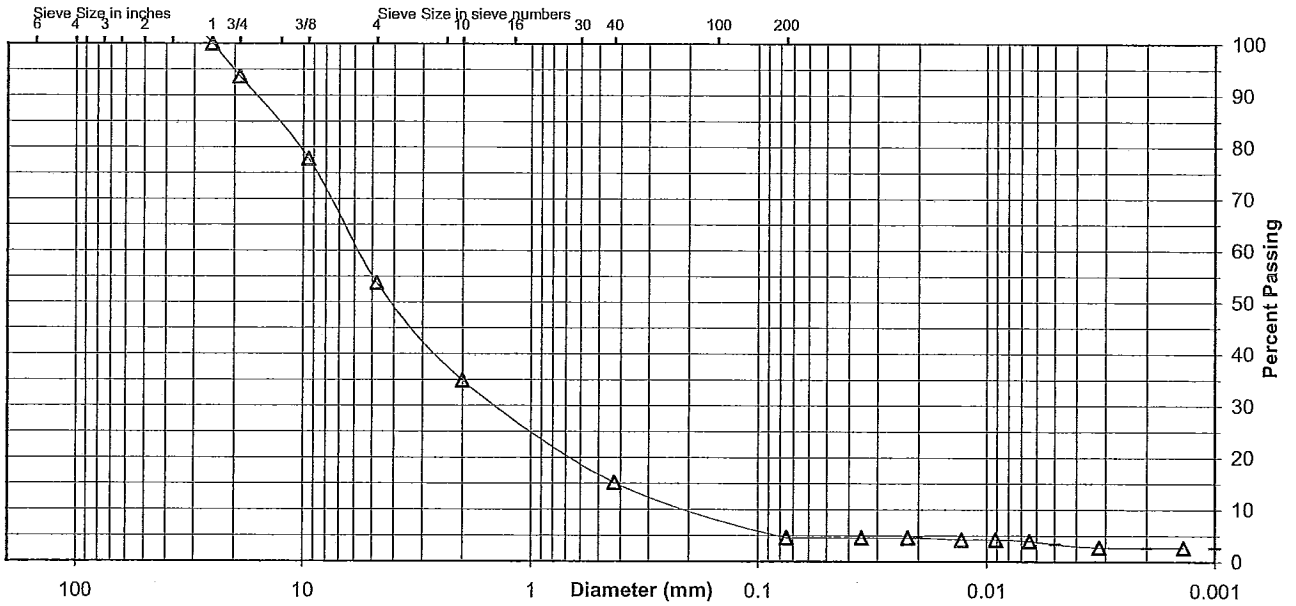
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	15.2
No. 200	4.6
0.02 mm	4.6
0.005 mm	3.4
0.002 mm	2.6
0.001 mm	2.6

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	6.4	39.8	18.9	19.7	10.6	1.2	3.4

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	65.1	19.7	10.6	2.0	2.6



Comments

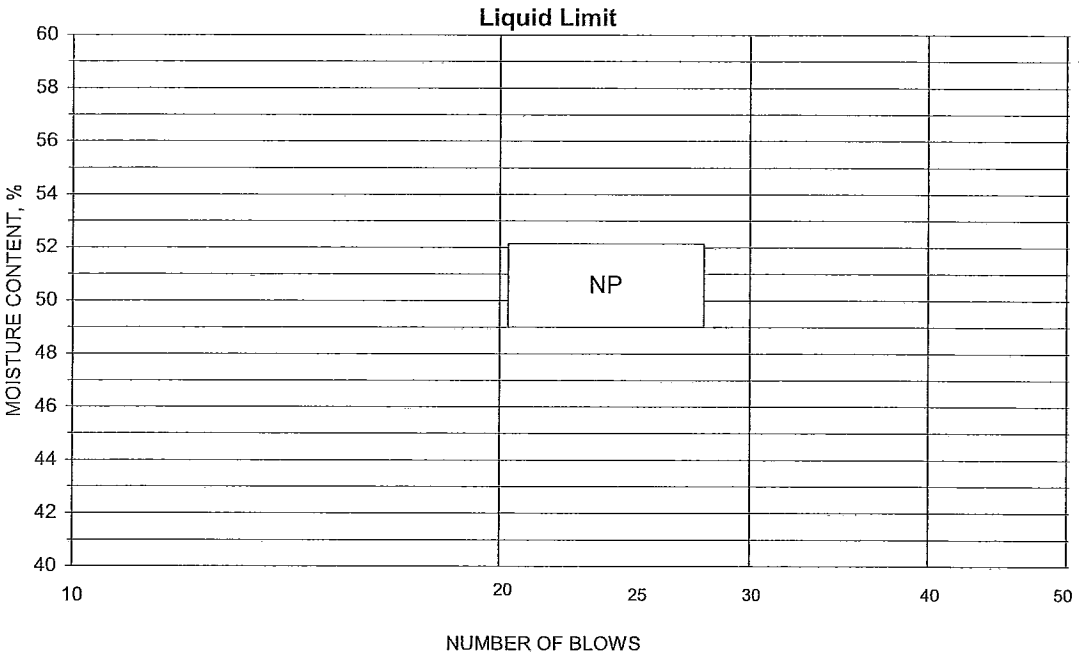
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA			Project No.	172679048
Source	DDC-1, 35.0'-36.5'			Lab ID	22
				% + No. 40	85
Tested By	RHB	Test Method	ASTM D 4318 Method A	Date Received	01-26-2010
Test Date	01-29-2010	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-2, 30.0'-31.5'	Lab ID	30
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 24.8

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	98.8
No. 200	0.075	69.5
	0.02	45.0
	0.005	33.8
	0.002	28.8
estimated	0.001	27.5

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.0	0.1
Coarse Sand	0.1	1.1
Medium Sand	1.1	---
Fine Sand	29.3	29.3
Silt	35.7	40.7
Clay	33.8	28.8

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	40
Plastic Limit:	21
Plasticity Index:	19
Activity Index:	0.66

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

Estimated

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 (12)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-2, 30.0'-31.5'
Lab ID: 30

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: 01-29-2010
Date Received: 01-26-2010

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

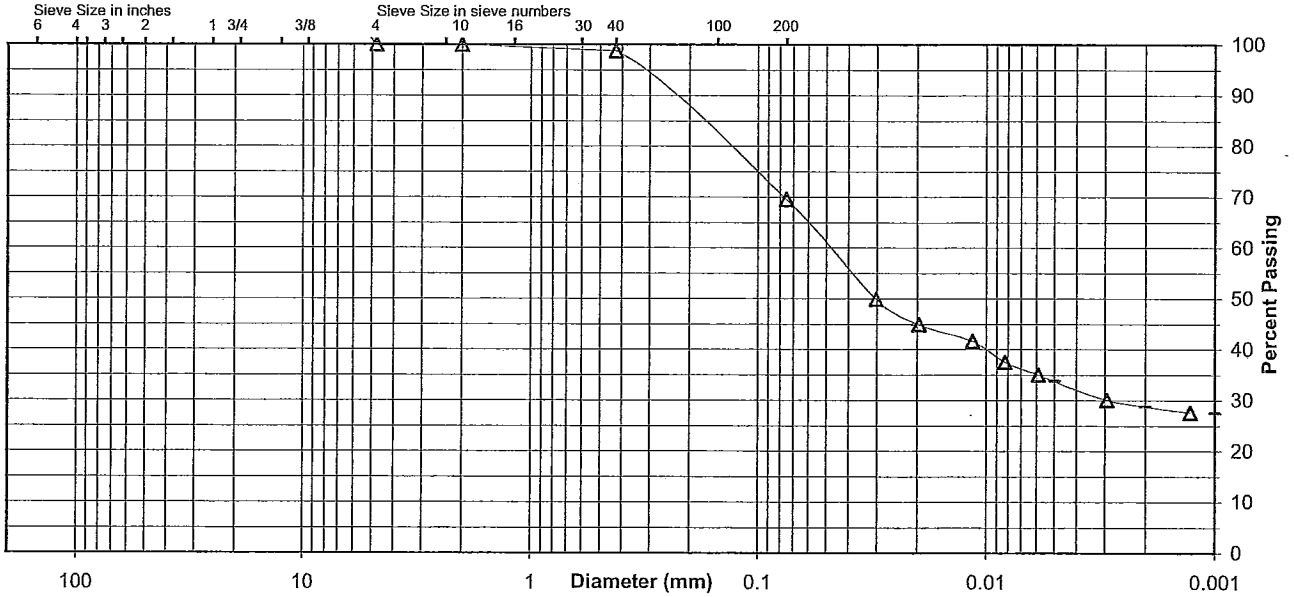
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.8
No. 200	69.5
0.02 mm	45.0
0.005 mm	33.8
0.002 mm	28.8
0.001 mm	27.5

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	1.1	29.3	35.7	33.8
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	0.1			1.1	29.3	40.7	28.8



Comments

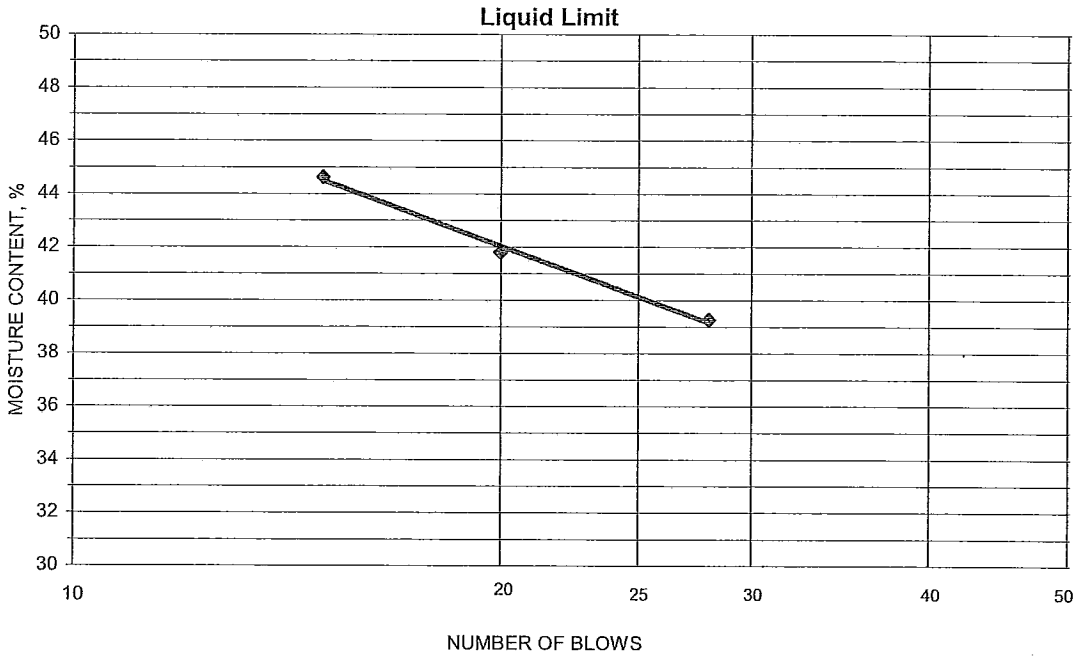
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-2, 30.0'-31.5'	Lab ID	30
		% + No. 40	1
Tested By	RHB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.09	12.07	4.38	28	39.3	
13.75	10.97	4.32	20	41.8	
15.06	11.74	4.30	15	44.6	40



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.49	10.24	4.29	21.0	21	19
12.87	11.38	4.30	21.0		

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Source	DC-4, 3.7'-4.2'	Lab ID	1B
County	Humphreys Co, TN	Date Received	1-25-10
Sample Type	ST	Date Reported	3-11-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 22.9

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	99.7
No. 40	0.425	99.1
No. 200	0.075	97.0
	0.02	66.9
	0.005	34.2
	0.002	27.1
estimated	0.001	23.0

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.0	0.3
Coarse Sand	0.3	0.6
Medium Sand	0.6	---
Fine Sand	2.1	2.1
Silt	62.8	69.9
Clay	34.2	27.1

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	39
Plastic Limit:	19
Plasticity Index:	20
Activity Index:	0.74

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:	2.69

Classification

Unified Group Symbol: CL

Group Name: Lean clay

AASHTO Classification: A-6 (20)

Comments:

Reviewed by:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: JOF-Dupont Dredge Cell
Source: DC-4, 3.7'-4.2'

Project Number: 172679048
Lab ID: 1B

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: Ford
Test Date: 02-23-2010
Date Received: 01-25-2010

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	99.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

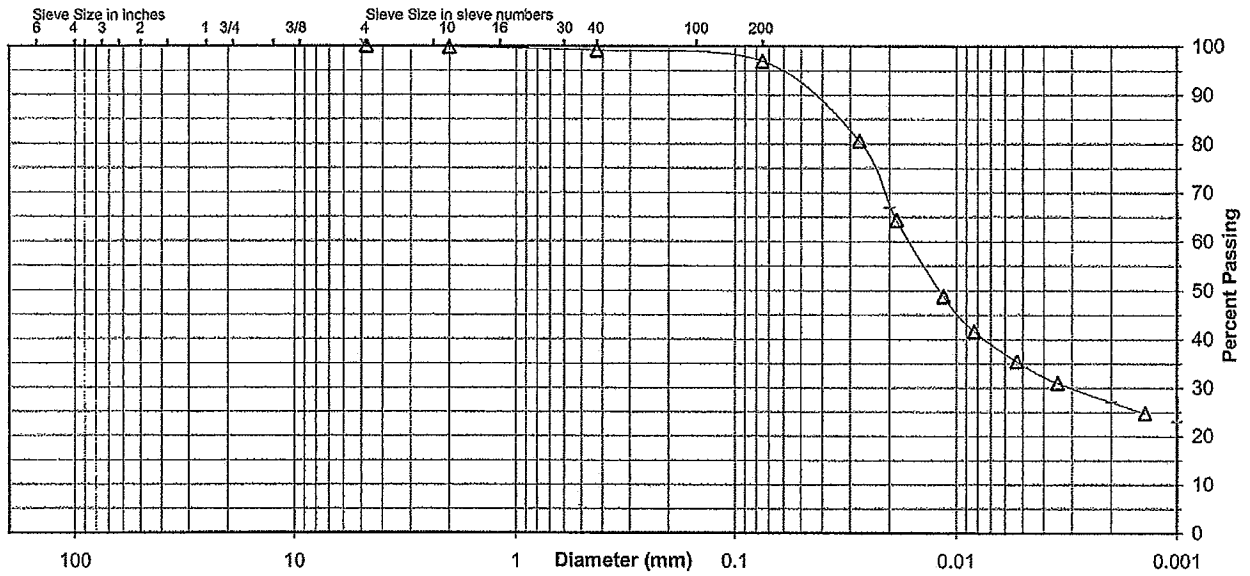
Specific Gravity: 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.1
No. 200	97.0
0.02 mm	66.9
0.005 mm	34.2
0.002 mm	27.1
0.001 mm	23.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.3	0.6	2.1	62.8	34.2
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	0.3			0.6	2.1	69.9	27.1



Comments

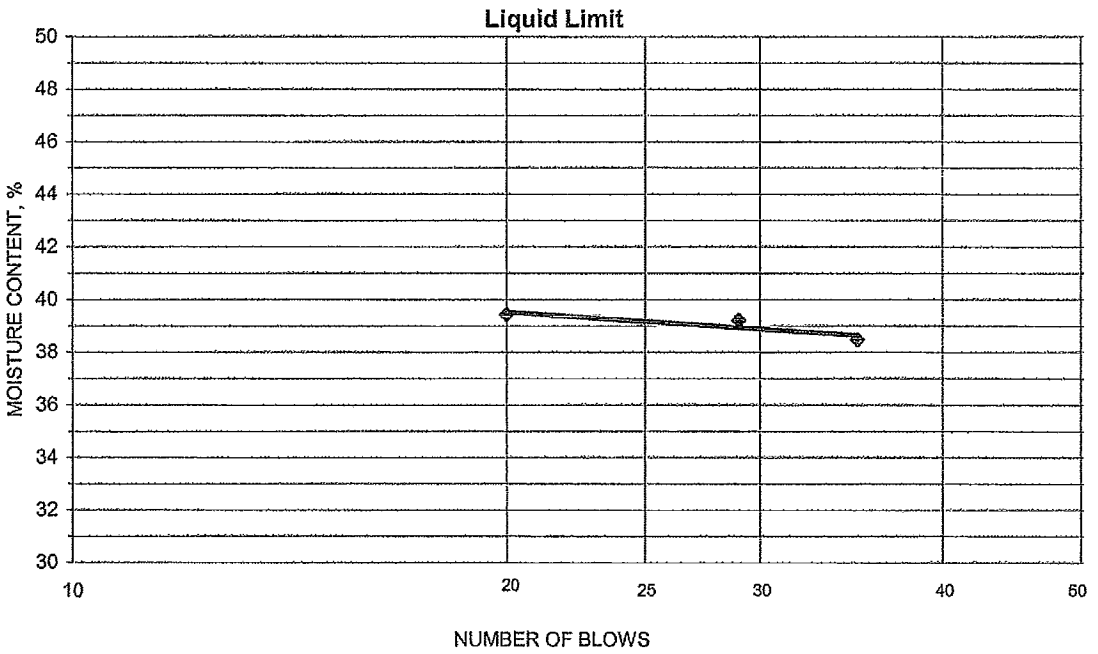
Reviewed By

Stantec

ATTERBERG LIMITS

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Source	DC-4, 3.7'-4.2'	Lab ID	1B
		% + No. 40	1
Tested By	DRB	Test Method	ASTM D 4318 Method A
Test Date	03-01-2010	Prepared	Dry
		Date Received	01-25-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
20.31	17.68	11.01	20	39.4	
21.05	18.42	11.71	29	39.2	
21.11	18.41	11.39	35	38.5	39



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.71	17.59	11.71	19.0	19	20
18.38	17.29	11.48	18.8		

Remarks: _____

Reviewed By _____

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-4, 15.0'-16.5'	Lab ID	43
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 14.6

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	96.2
3/4"	19	82.2
3/8"	9.5	71.5
No. 4	4.75	60.9
No. 10	2	50.7
No. 40	0.425	39.0
No. 200	0.075	25.5
	0.02	19.8
	0.005	15.7
	0.002	13.5
estimated	0.001	13.1

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	39.1	49.3
Coarse Sand	10.2	11.7
Medium Sand	11.7	---
Fine Sand	13.5	13.5
Silt	9.8	12.0
Clay	15.7	13.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 40
Plastic Limit: 18
Plasticity Index: 22
Activity Index: 1.57

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

Estimated

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: GC
Group Name: Clayey gravel with sand

AASHTO Classification: A-2-6 (1)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-4, 15.0'-16.5'
Lab ID: 43

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: 01-28-2010
Date Received: 01-26-2010

Maximum Particle size: 1 1/2" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	96.2
3/4"	82.2
3/8"	71.5
No. 4	60.9
No. 10	50.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

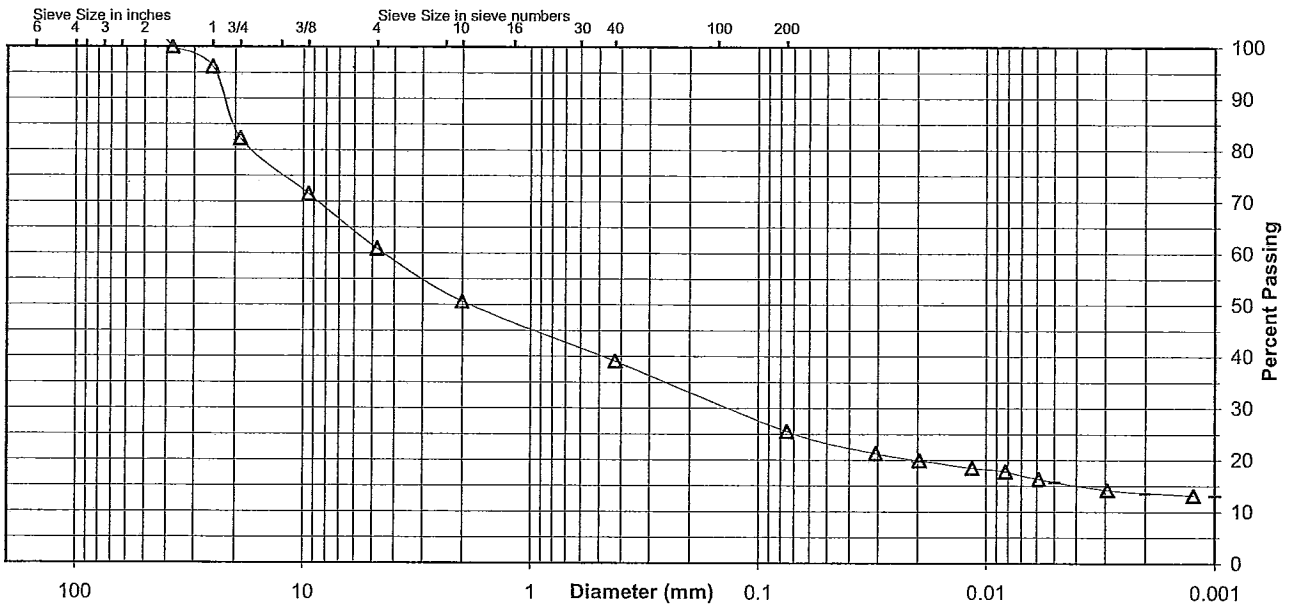
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	39.0
No. 200	25.5
0.02 mm	19.8
0.005 mm	15.7
0.002 mm	13.5
0.001 mm	13.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	17.8	21.3	10.2	11.7	13.5	9.8	15.7
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	49.3			11.7	13.5	12.0	13.5



Comments

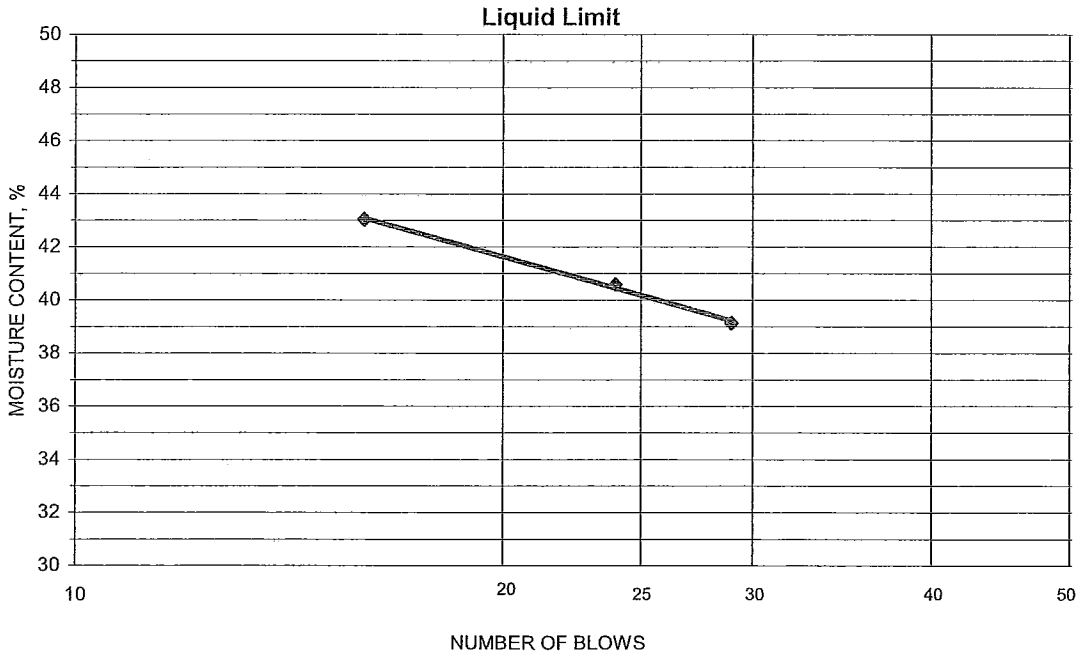
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-4, 15.0'-16.5'	Lab ID	43
		% + No. 40	61
Tested By	RHB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
12.33	10.08	4.33	29	39.1	
13.35	10.74	4.31	24	40.6	
12.25	9.87	4.34	16	43.0	40



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.00	9.99	4.30	17.8	18	22
11.99	10.84	4.32	17.6		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-4, 30.0'-31.5'	Lab ID	46
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 12.0

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	93.3
3/4"	19	85.2
3/8"	9.5	64.4
No. 4	4.75	46.1
No. 10	2	28.5
No. 40	0.425	16.2
No. 200	0.075	8.7
	0.02	2.7
	0.005	2.1
	0.002	1.9
estimated	0.001	1.8

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	53.9	71.5
Coarse Sand	17.6	12.3
Medium Sand	12.3	---
Fine Sand	7.5	7.5
Silt	6.6	6.8
Clay	2.1	1.9

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/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

Estimated

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: GP-GM
Group Name: Poorly graded gravel with silt and sand

AASHTO Classification: A-1-a (1)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-4, 30.0'-31.5'
Lab ID: 46

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: 01-28-2010
Date Received: 01-26-2010

Maximum Particle size: 1 1/2" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	93.3
3/4"	85.2
3/8"	64.4
No. 4	46.1
No. 10	28.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

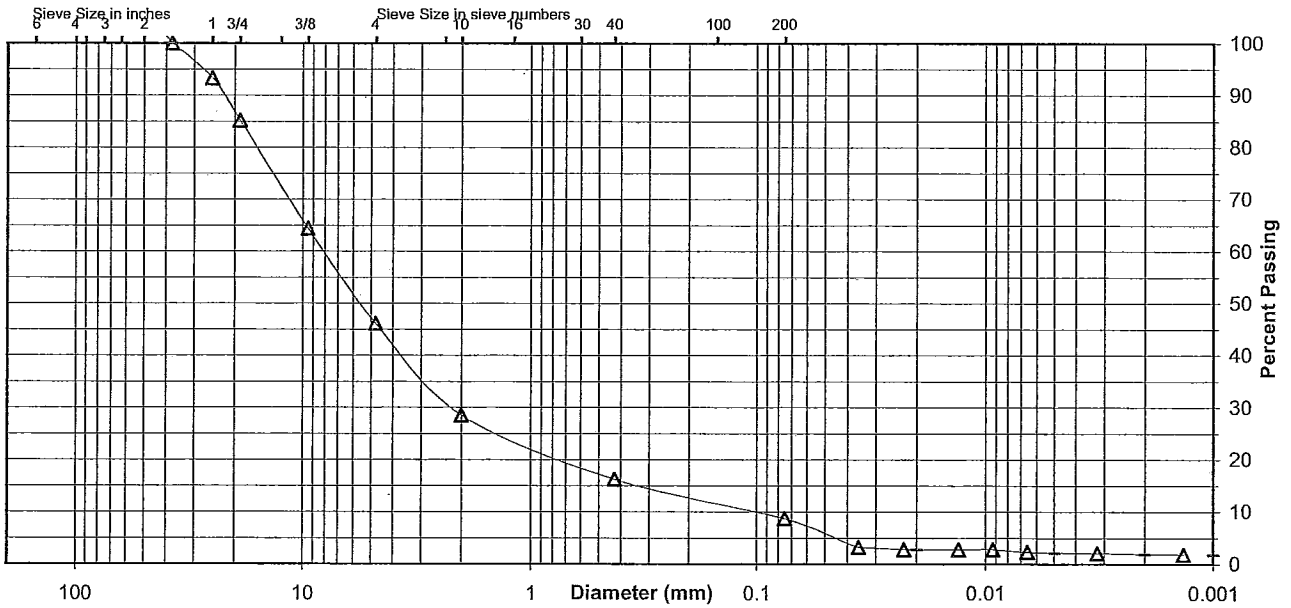
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	16.2
No. 200	8.7
0.02 mm	2.7
0.005 mm	2.1
0.002 mm	1.9
0.001 mm	1.8

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	14.8	39.1	17.6	12.3	7.5	6.6	2.1
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	71.5			12.3	7.5	6.8	1.9



Comments

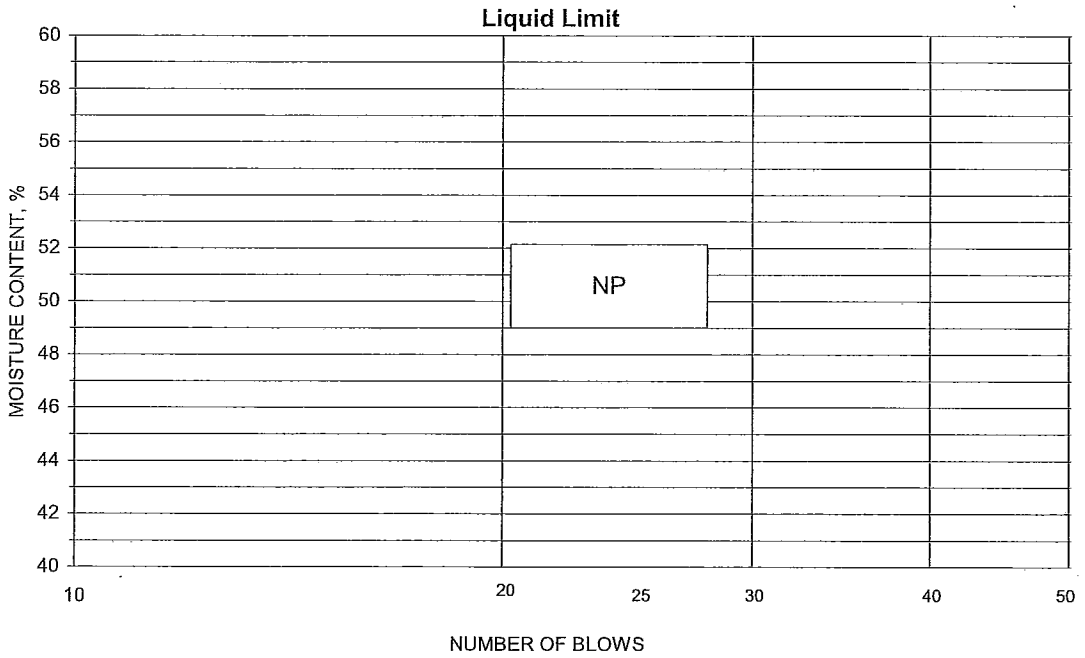
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-4, 30.0'-31.5'	Lab ID	46
		% + No. 40	84
Tested By	RHB	Test Method ASTM D 4318 Method A	Date Received 01-26-2010
Test Date	01-28-2010	Prepared Dry	

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Source	DC-5, 3.7'-4.2'	Lab ID	4B
County	Humphreys Co, TN	Date Received	1-25-10
Sample Type	ST	Date Reported	3-11-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 16.4

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	100.0
3/4"	19	97.8
3/8"	9.5	89.9
No. 4	4.75	84.7
No. 10	2	74.9
No. 40	0.425	67.9
No. 200	0.075	53.8
	0.02	44.2
	0.005	34.7
	0.002	31.5
estimated	0.001	30.0

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	15.3	25.1
Coarse Sand	9.8	7.0
Medium Sand	7.0	---
Fine Sand	14.1	14.1
Silt	19.1	22.3
Clay	34.7	31.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	52
Plastic Limit:	18
Plasticity Index:	34
Activity Index:	1.06

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:	2.67

Classification

Unified Group Symbol: CH

Group Name: Sandy fat clay with gravel

AASHTO Classification: A-7-6 (14)

Comments:

Reviewed by:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: JOF-Dupont Dredge Cell
Project Number: 172679048
Source: DC-5, 3.7'-4.2'
Lab ID: 4B

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: ford
Test Date: 03-03-2010
Date Received: 01-25-2010

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	97.8
3/8"	89.9
No. 4	84.7
No. 10	74.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

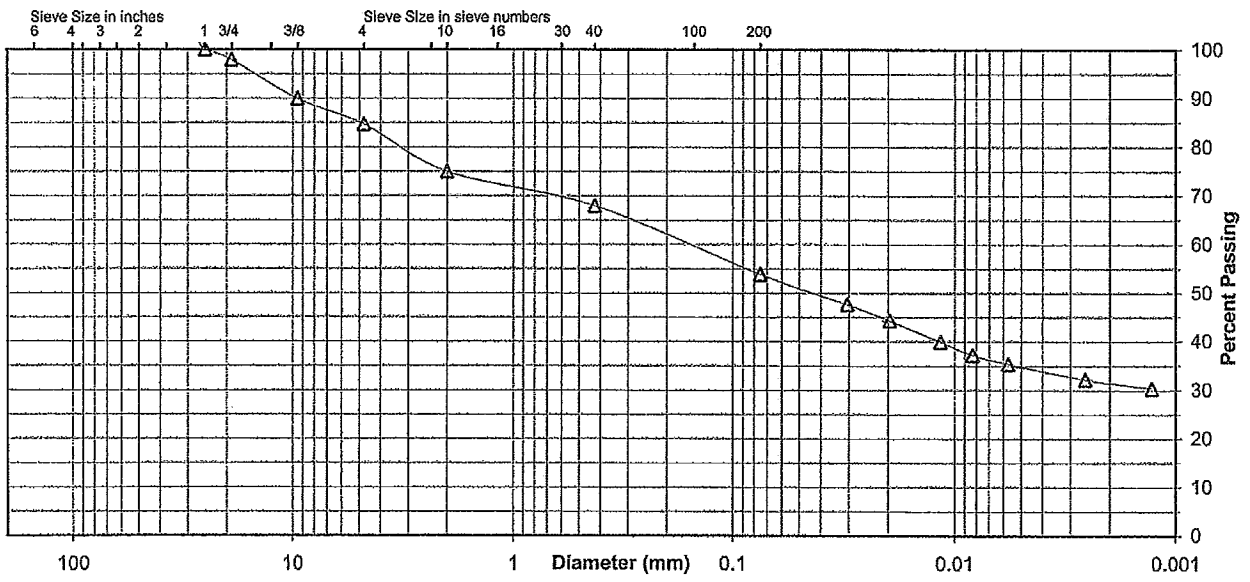
Specific Gravity: 2.67

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	67.9
No. 200	53.8
0.02 mm	44.2
0.005 mm	34.7
0.002 mm	31.5
0.001 mm	30.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	2.2	13.1	9.8	7.0	14.1	19.1	34.7
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	25.1			7.0	14.1	22.3	31.5



Comments

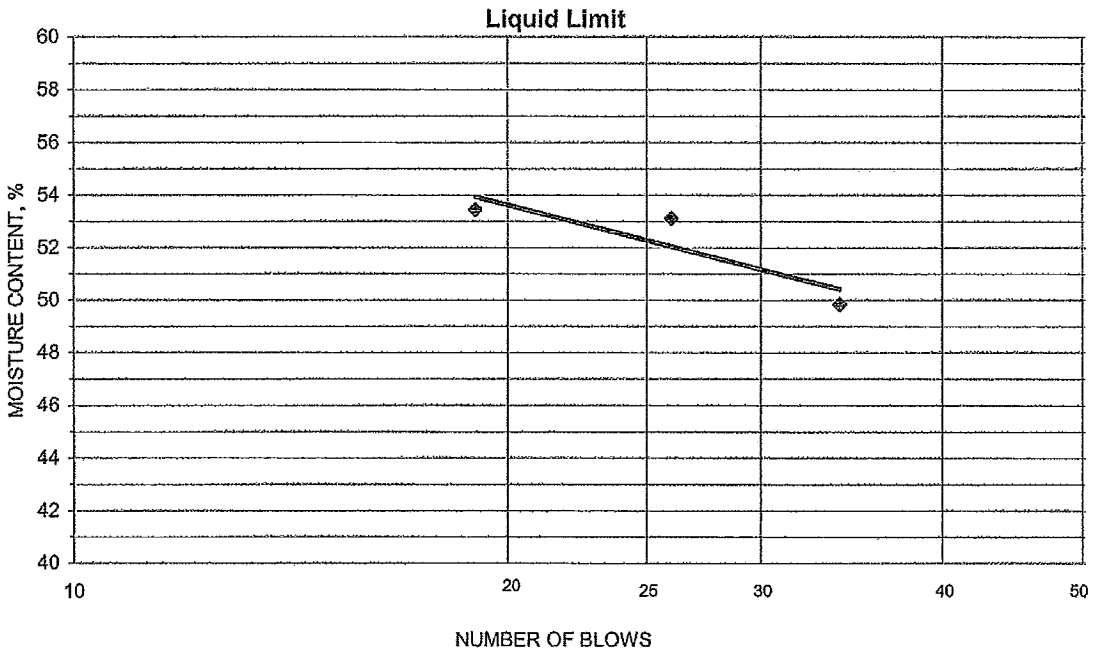
Reviewed By

Stantec

ATTERBERG LIMITS

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Source	DC-5, 3.7'-4.2'	Lab ID	4B
		% + No. 40	32
Tested By	DRB	Test Method	ASTM D 4318 Method A
Test Date	03-05-2010	Prepared	Dry
		Date Received	01-25-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
19.17	16.37	11.13	19	53.4	
19.88	16.88	11.23	26	53.1	
20.22	17.25	11.29	34	49.8	52



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
17.83	16.78	10.95	18.0	18	34
19.56	18.30	11.18	17.7		

Remarks: _____

Reviewed By _____

Stantec

Gradation Analysis
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Source: DDC-5, 20.0'-21.5'

Project Number: 172679048
Lab ID: 54
Date Received: 01-26-2010
Preparation Date: 03-09-2010
Test Date: 03-10-2010

Preparation Method: ASTM D 1140 Method B
Particle Shape: Angular
Particle Hardness: Hard and Durable
Sample Dry Mass (g): 293.01
Moisture Content (%): 18.8

Analysis based on total sample.

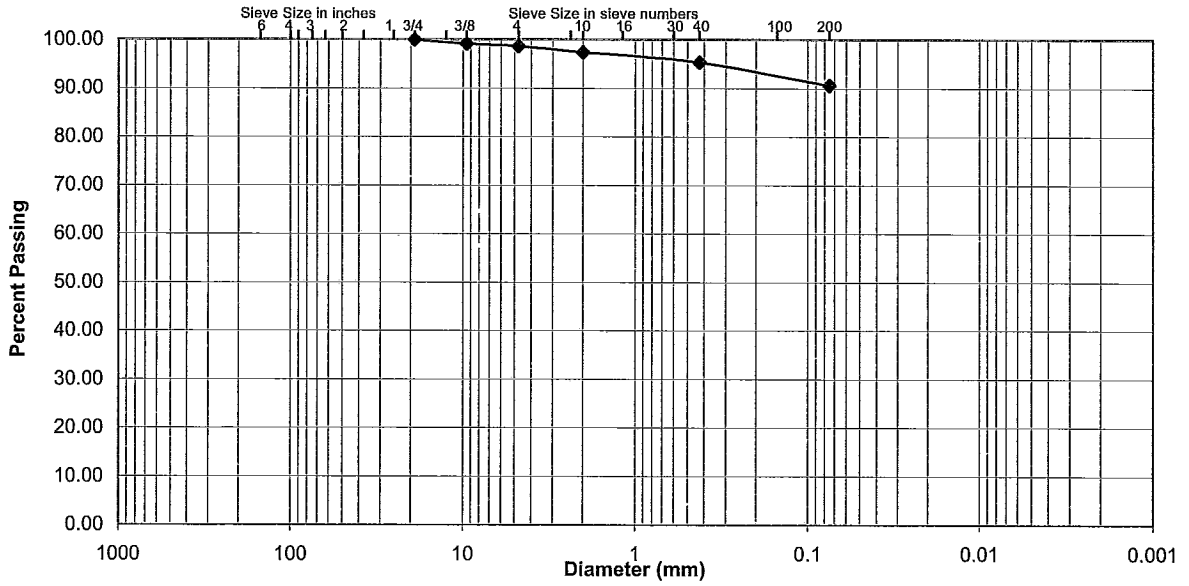
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	2.39	0.8	99.2
No. 4	1.48	0.5	98.7
No. 10	3.67	1.3	97.4
No. 40	5.94	2.0	95.4
No. 200	14.03	4.8	90.6
Pan	265.50	90.6	---

% Gravel: 1.3
% Sand: 8.1
% Fines: 90.6
Fines Classification: N/A

D_{10} (mm): N/A
D_{30} (mm): N/A
D_{60} (mm): N/A

Cu: N/A
Cc: N/A

Particle Size Distribution



Comments

Reviewed By: RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-7, 0.0'-1.5'	Lab ID	70
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 23.6

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	99.5
No. 40	0.425	98.3
No. 200	0.075	62.6
	0.02	37.4
	0.005	20.2
	0.002	15.4
estimated	0.001	13.1

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.4	0.5
Coarse Sand	0.1	1.2
Medium Sand	1.2	---
Fine Sand	35.7	35.7
Silt	42.4	47.2
Clay	20.2	15.4

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 26

Plastic Limit: 18

Plasticity Index: 8

Activity Index: 0.53

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

Estimated

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL

Group Name: Sandy lean clay

AASHTO Classification: A-4 (3)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-7, 0.0'-1.5'
Lab ID: 70

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: 01-29-2010
Date Received: 01-26-2010

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	99.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

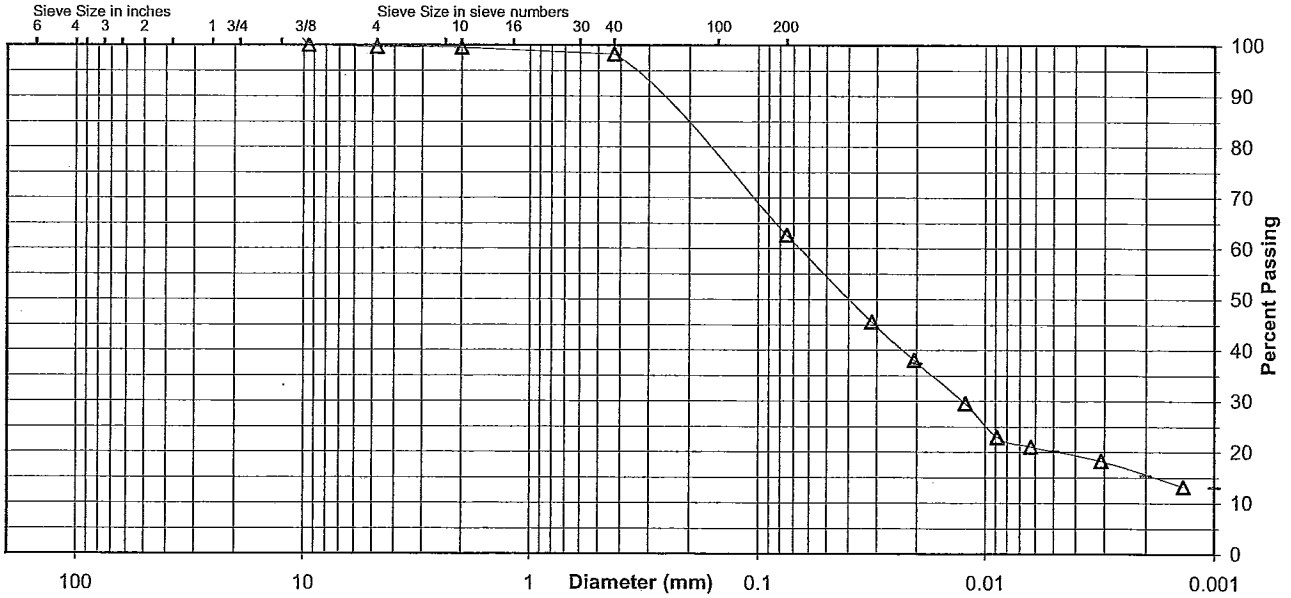
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.3
No. 200	62.6
0.02 mm	37.4
0.005 mm	20.2
0.002 mm	15.4
0.001 mm	13.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.4	0.1	1.2	35.7	42.4	20.2
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	0.5			1.2	35.7	47.2	15.4



Comments

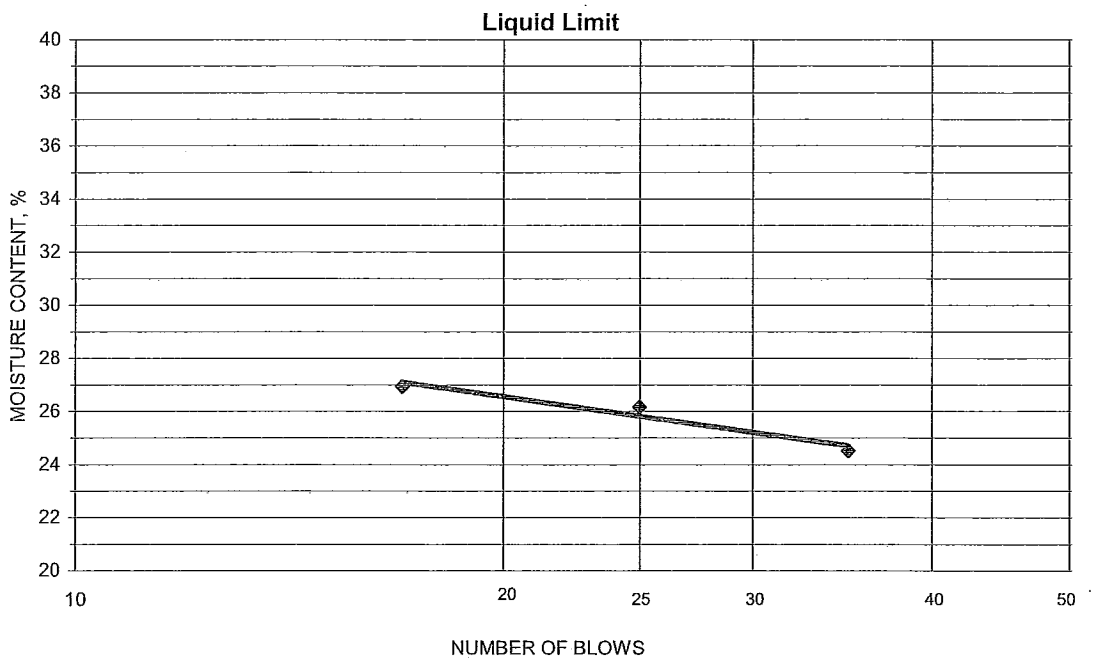
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-7, 0.0'-1.5'	Lab ID	70
		% + No. 40	2
Tested By	RHB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
11.83	10.23	4.29	17	26.9	
12.74	11.08	4.31	35	24.5	
13.52	11.61	4.31	25	26.2	26



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
13.44	12.06	4.28	17.7	18	8
15.41	13.69	4.20	18.1		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Source	DC-8, 8.6'-9.1'	Lab ID	8A
County	Humphreys Co, TN	Date Received	1-25-10
Sample Type	ST	Date Reported	3-11-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 17.8

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	100.0
3/8"	9.5	99.4
No. 4	4.75	98.4
No. 10	2	96.7
No. 40	0.425	94.6
No. 200	0.075	89.0
	0.02	65.8
	0.005	36.6
	0.002	31.0
estimated	0.001	28.0

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	1.6	3.3
Coarse Sand	1.7	2.1
Medium Sand	2.1	---
Fine Sand	5.6	5.6
Silt	52.4	58.0
Clay	36.6	31.0

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit:	43
Plastic Limit:	16
Plasticity Index:	27
Activity Index:	0.87

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

Group Name: Lean clay

AASHTO Classification: A-7-6 (24)

Comments:

Reviewed by:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: JOF-Dupont Dredge Cell
Project Number: 172679048
Source: DC-8, 8.6'-9.1'
Lab ID: 8A

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: 03-04-2010
Date Received: 01-25-2010

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.4
No. 4	98.4
No. 10	96.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.65

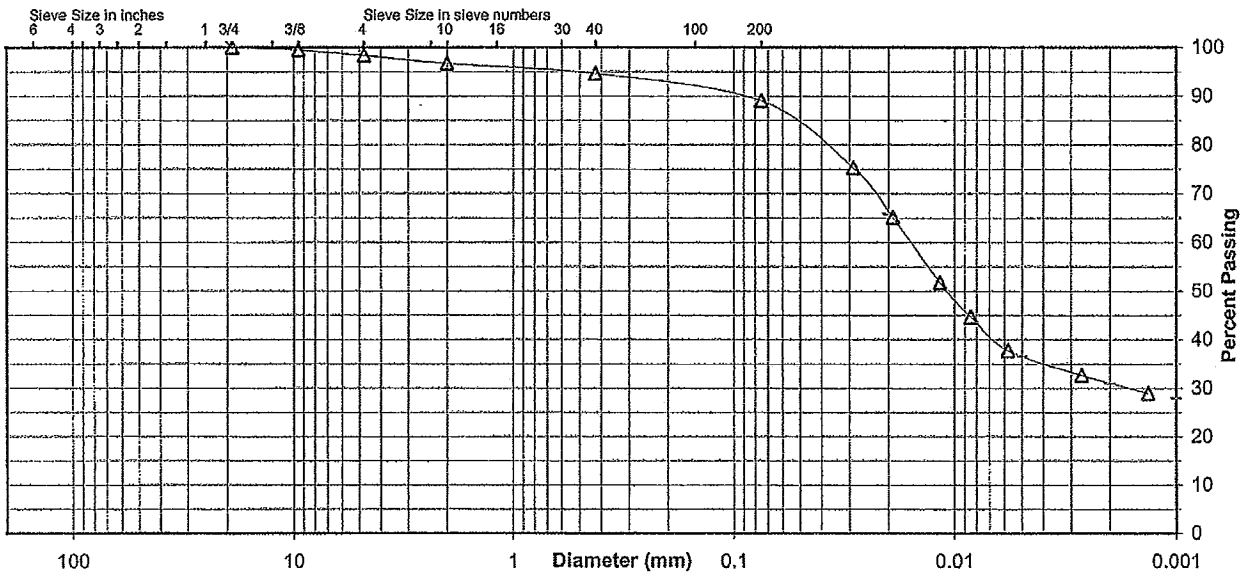
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	94.6
No. 200	89.0
0.02 mm	65.8
0.005 mm	36.6
0.002 mm	31.0
0.001 mm	28.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.6	1.7	2.1	5.6	52.4	36.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	3.3	2.1	5.6	58.0	31.0



Comments

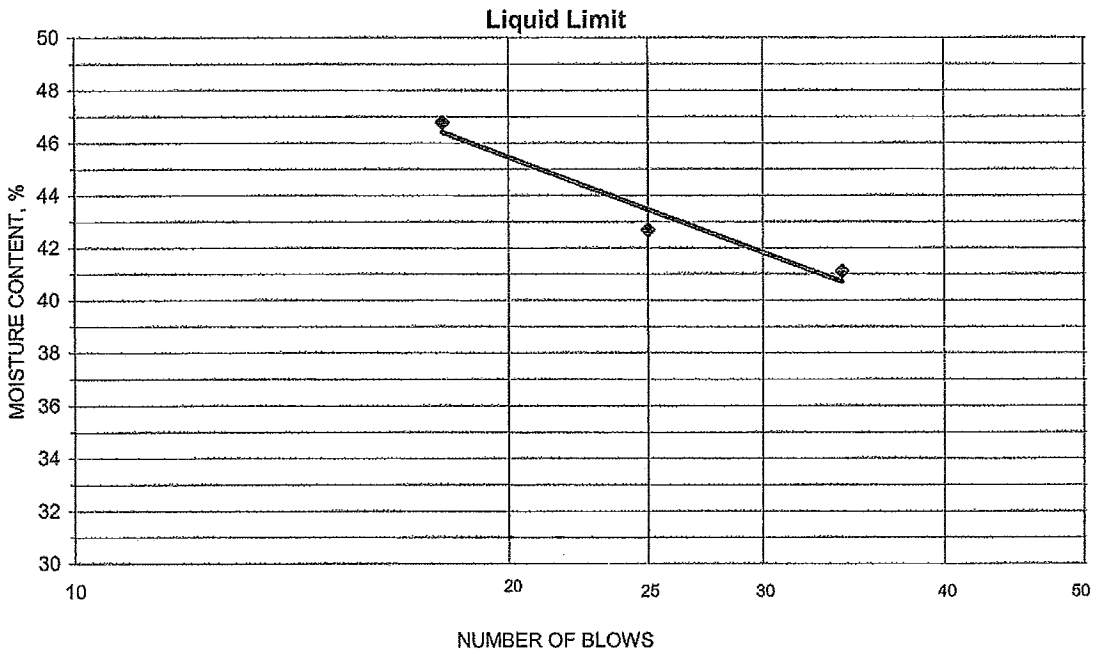
Reviewed By

Stantec

ATTERBERG LIMITS

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Source	DC-8, 8.6'-9.1'	Lab ID	8A
		% + No. 40	5
Tested By	DRB	Test Method	ASTM D 4318 Method A
Test Date	03-05-2010	Prepared	Dry
		Date Received	01-25-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
19.94	17.11	11.06	18	46.8	
20.69	17.99	11.42	34	41.1	
20.01	17.33	11.05	25	42.7	43



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.58	17.50	10.77	16.0	16	27
19.16	18.05	11.11	16.0		

Remarks: _____

Reviewed By _____

Stantec

Gradation Analysis
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Source: DDC-8, 20.0'-21.0'

Project Number: 172679048
Lab ID: 83
Date Received: 01-26-2010
Preparation Date: 03-09-2010
Test Date: 03-10-2010

Preparation Method: ASTM D 1140 Method B
Particle Shape: Angular
Particle Hardness: Hard and Durable
Sample Dry Mass (g): 359.12
Moisture Content (%): 13.4

Analysis based on total sample.

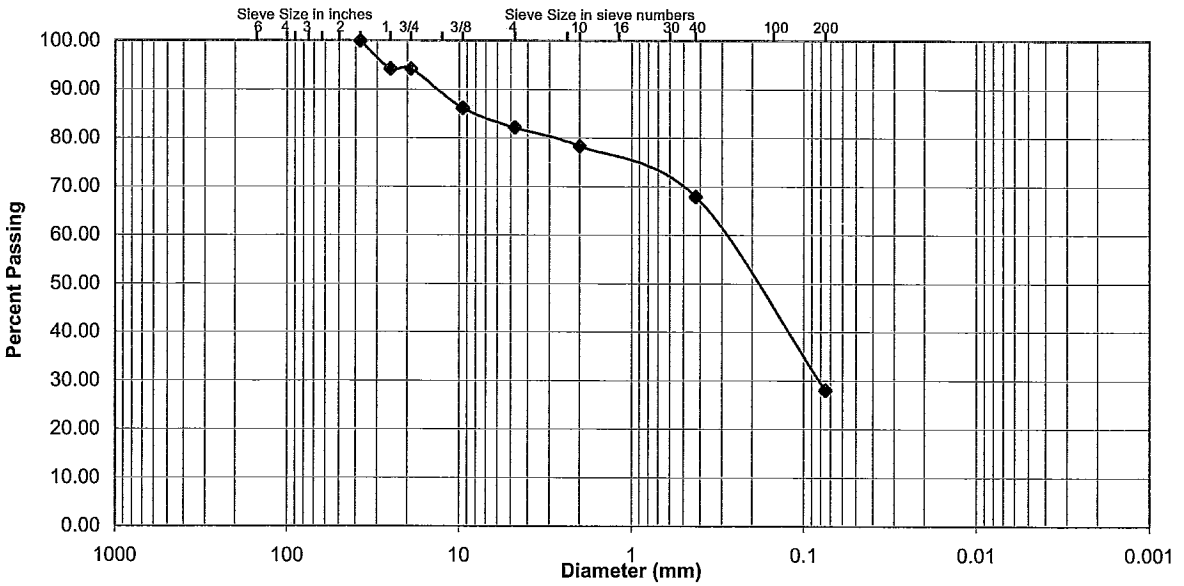
Sieve Size	Grams Retained	% Retained	% Passing
1 1/2"	0.00	0.0	100.0
1"	20.44	5.7	94.3
3/4"	0.00	0.0	94.3
3/8"	29.00	8.1	86.2
No. 4	14.51	4.0	82.2
No. 10	13.71	3.8	78.4
No. 40	37.47	10.4	67.9
No. 200	143.11	39.9	28.1
Pan	100.88	28.1	---

% Gravel: 17.8
% Sand: 54.1
% Fines: 28.1
Fines Classification: N/A

D_{10} (mm): N/A
D_{30} (mm): N/A
D_{60} (mm): N/A

Cu: N/A
Cc: N/A

Particle Size Distribution



Comments

Reviewed By: RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-11, 5.0'-6.5'	Lab ID	105
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-2-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 20.5

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	100.0
3/8"	9.5	97.6
No. 4	4.75	95.1
No. 10	2	93.7
No. 40	0.425	91.2
No. 200	0.075	85.9
	0.02	68.4
	0.005	38.0
	0.002	30.8
estimated	0.001	29.1

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	4.9	6.3
Coarse Sand	1.4	2.5
Medium Sand	2.5	---
Fine Sand	5.3	5.3
Silt	47.9	55.1
Clay	38.0	30.8

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 45
Plastic Limit: 17
Plasticity Index: 28
Activity Index: 0.90

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

Estimated

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL
Group Name: Lean clay

AASHTO Classification: A-7-6 (24)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-11, 5.0'-6.5'
Lab ID: 105

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: 01-29-2010
Date Received: 01-26-2010

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.6
No. 4	95.1
No. 10	93.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

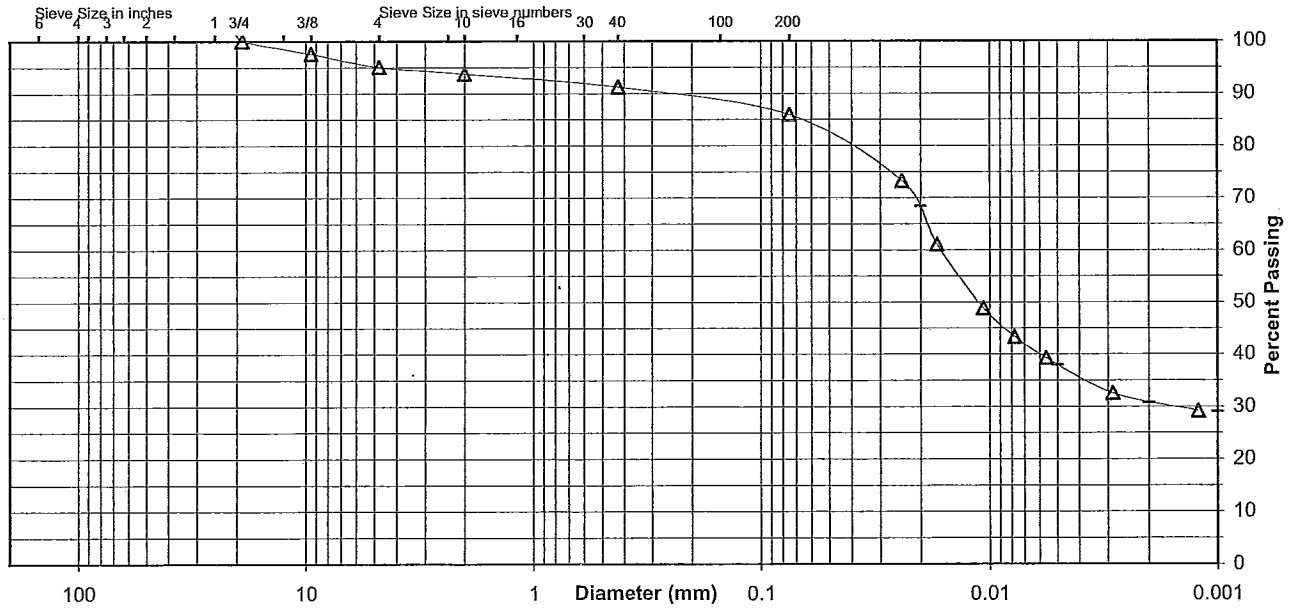
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	91.2
No. 200	85.9
0.02 mm	68.4
0.005 mm	38.0
0.002 mm	30.8
0.001 mm	29.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	4.9	1.4	2.5	5.3	47.9	38.0
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	6.3			2.5	5.3	55.1	30.8



Comments

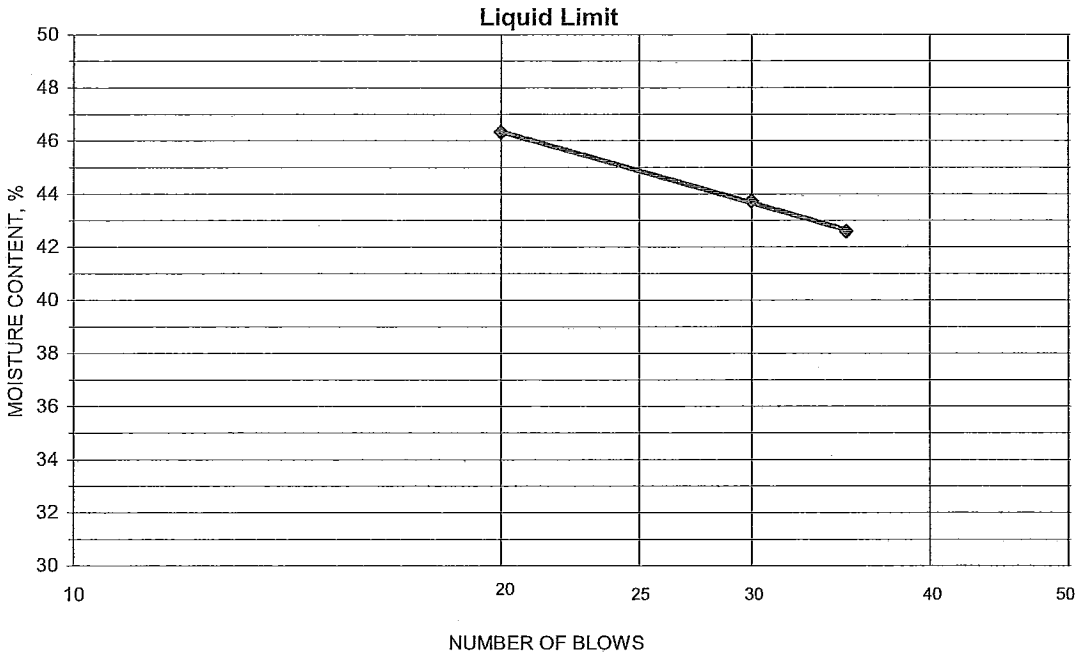
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-11, 5.0'-6.5'	Lab ID	105
		% + No. 40	9
Tested By	RHB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
13.70	10.91	4.36	35	42.6	
13.45	10.66	4.28	30	43.7	
12.87	10.16	4.31	20	46.3	45



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
12.00	10.89	4.32	16.9	17	28
11.98	10.89	4.36	16.7		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-11, 20.0'-21.5'	Lab ID	108
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 18.2

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	99.8
No. 10	2	99.3
No. 40	0.425	98.3
No. 200	0.075	92.6
	0.02	73.9
	0.005	47.2
	0.002	39.8
estimated	0.001	37.9

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.2	0.7
Coarse Sand	0.5	1.0
Medium Sand	1.0	---
Fine Sand	5.7	5.7
Silt	45.4	52.8
Clay	47.2	39.8

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 52
Plastic Limit: 15
Plasticity Index: 37
Activity Index: 0.93

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

Estimated

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CH
Group Name: Fat clay

AASHTO Classification: A-7-6 (36)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-11, 20.0'-21.5'
Lab ID: 108

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: JMB
Test Date: 01-28-2010
Date Received: 01-26-2010

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	99.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

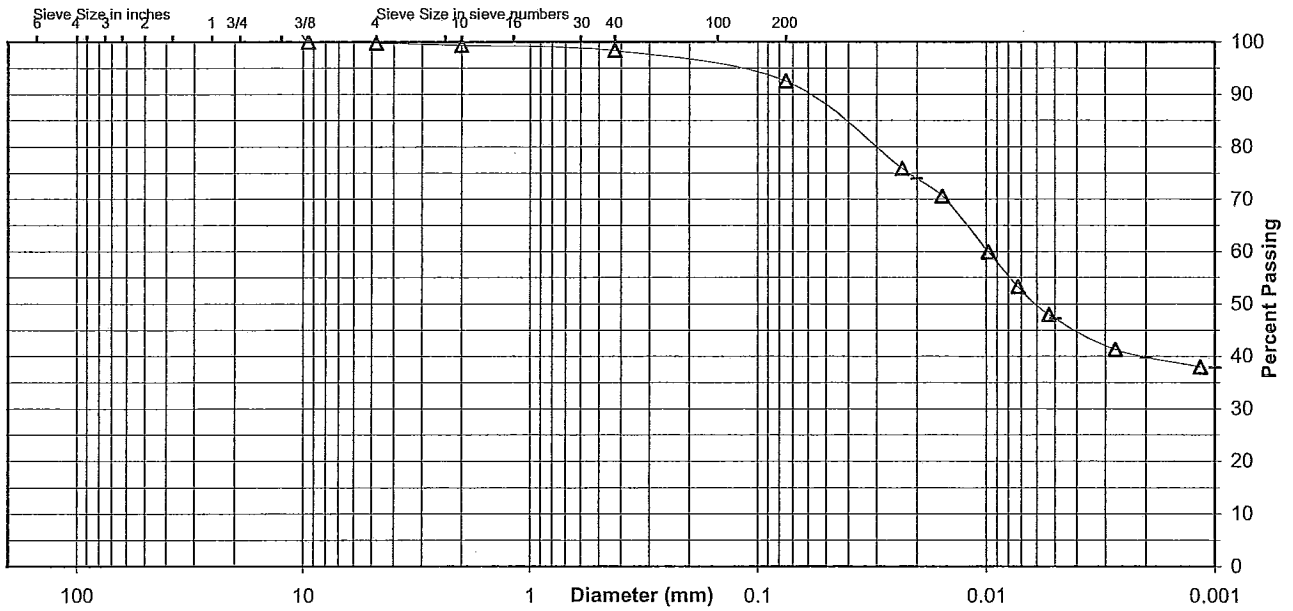
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.3
No. 200	92.6
0.02 mm	73.9
0.005 mm	47.2
0.002 mm	39.8
0.001 mm	37.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.2	0.5	1.0	5.7	45.4	47.2
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	0.7			1.0	5.7	52.8	39.8



Comments

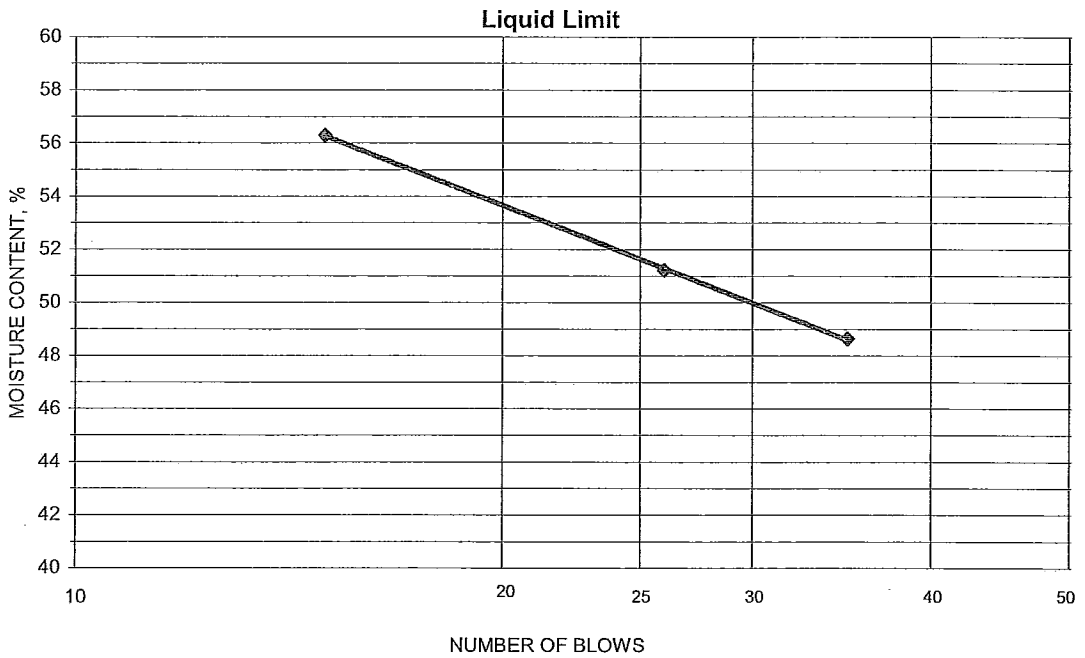
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA			Project No.	172679048
Source	DDC-11, 20.0'-21.5'			Lab ID	108
				% + No. 40	2
Tested By	JMB	Test Method	ASTM D 4318 Method A	Date Received	01-26-2010
Test Date	02-02-2010	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
12.58	9.89	4.36	35	48.6	
10.90	8.53	4.32	15	56.3	
11.79	9.26	4.32	26	51.2	52



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.16	9.41	4.39	14.9	15	37
9.84	9.14	4.35	14.6		

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-14, 5.0'-6.5'	Lab ID	134
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 15.3

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	100.0
3/8"	9.5	96.7
No. 4	4.75	93.2
No. 10	2	87.4
No. 40	0.425	83.9
No. 200	0.075	69.8
	0.02	54.6
	0.005	37.2
	0.002	31.8
estimated	0.001	30.2

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	6.8	12.6
Coarse Sand	5.8	3.5
Medium Sand	3.5	---
Fine Sand	14.1	14.1
Silt	32.6	38.0
Clay	37.2	31.8

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit:	47
Plastic Limit:	16
Plasticity Index:	31
Activity Index:	0.97

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

Estimated

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 (20)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-14, 5.0'-6.5'
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: Angular
Particle Hardness: Hard and Durable

Tested By: JMB
Test Date: 01-29-2010
Date Received: 01-26-2010

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	96.7
No. 4	93.2
No. 10	87.4

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

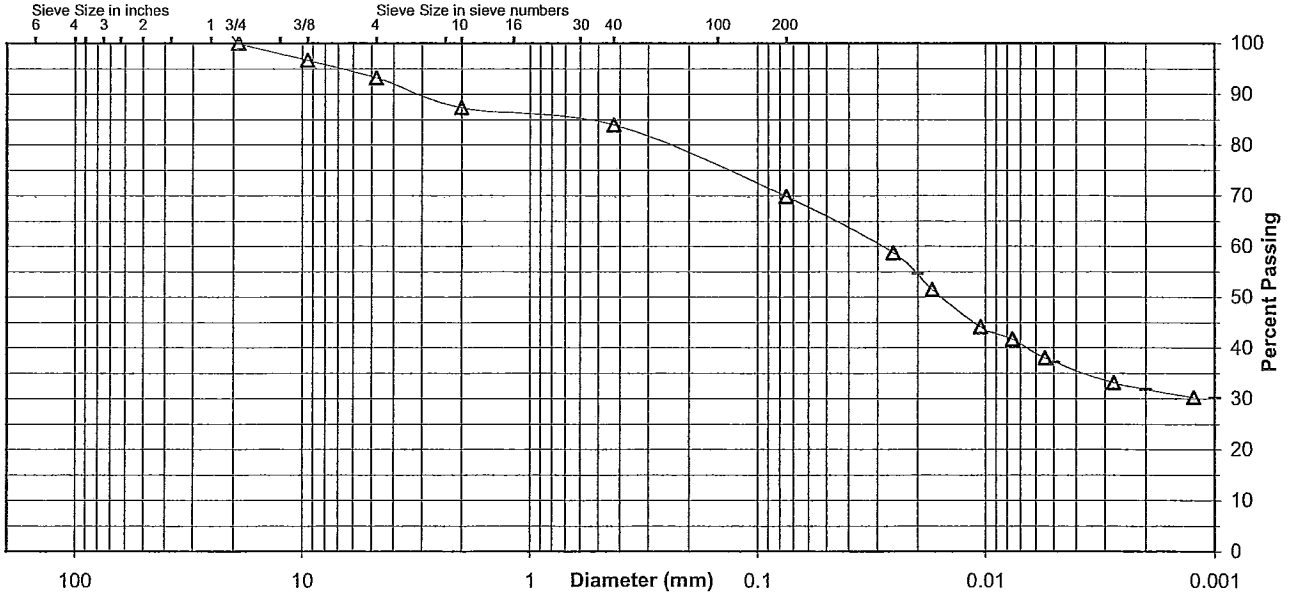
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	83.9
No. 200	69.8
0.02 mm	54.6
0.005 mm	37.2
0.002 mm	31.8
0.001 mm	30.2

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	6.8	5.8	3.5	14.1	32.6	37.2
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	12.6			3.5	14.1	38.0	31.8



Comments

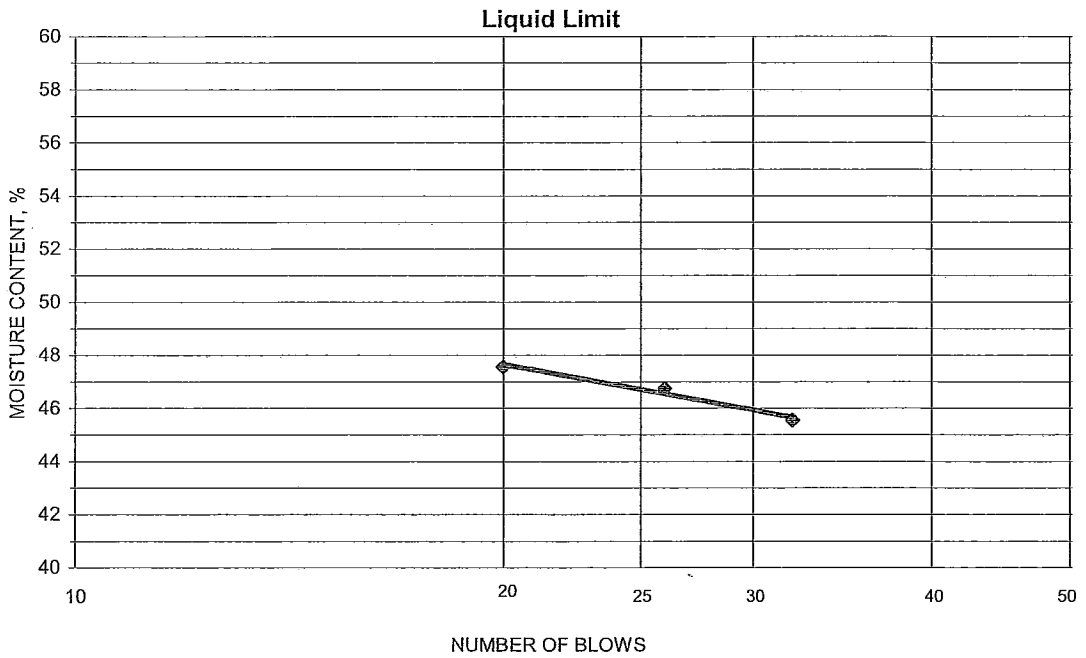
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-14, 5.0'-6.5'	Lab ID	134
		% + No. 40	16
Tested By	JMB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
11.53	9.28	4.34	32	45.5	
12.26	9.74	4.35	26	46.8	
11.91	9.47	4.34	20	47.6	47



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.87	9.95	4.35	16.4	16	31
11.41	10.43	4.35	16.1		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-14, 15.0'-16.5'	Lab ID	136
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 19.9

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	100.0
3/4"	19	94.5
3/8"	9.5	94.5
No. 4	4.75	93.2
No. 10	2	91.6
No. 40	0.425	89.2
No. 200	0.075	78.5
	0.02	54.4
	0.005	28.5
	0.002	22.2
estimated	0.001	20.9

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	6.8	8.4
Coarse Sand	1.6	2.4
Medium Sand	2.4	----
Fine Sand	10.7	10.7
Silt	50.0	56.3
Clay	28.5	22.2

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	35
Plastic Limit:	17
Plasticity Index:	18
Activity Index:	0.82

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

Estimated

Particle Size:	No. 10
Specific Gravity at 20° Celsius:	2.70

Classification

Unified Group Symbol: CL

Group Name: Lean clay with sand

AASHTO Classification: A-6 (13)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-14, 15.0'-16.5'
Lab ID: 136

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: JMB
Test Date: 02-01-2010
Date Received: 01-26-2010

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	94.5
3/8"	94.5
No. 4	93.2
No. 10	91.6

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

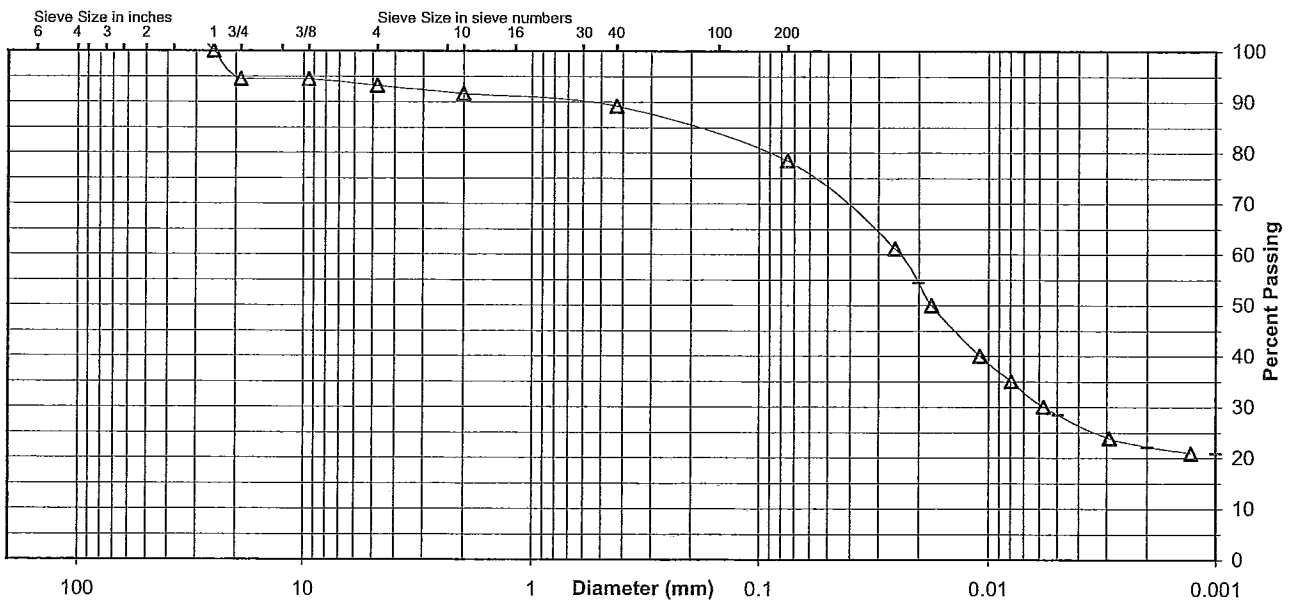
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	89.2
No. 200	78.5
0.02 mm	54.4
0.005 mm	28.5
0.002 mm	22.2
0.001 mm	20.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	5.5	1.3	1.6	2.4	10.7	50.0	28.5
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	8.4			2.4	10.7	56.3	22.2



Comments

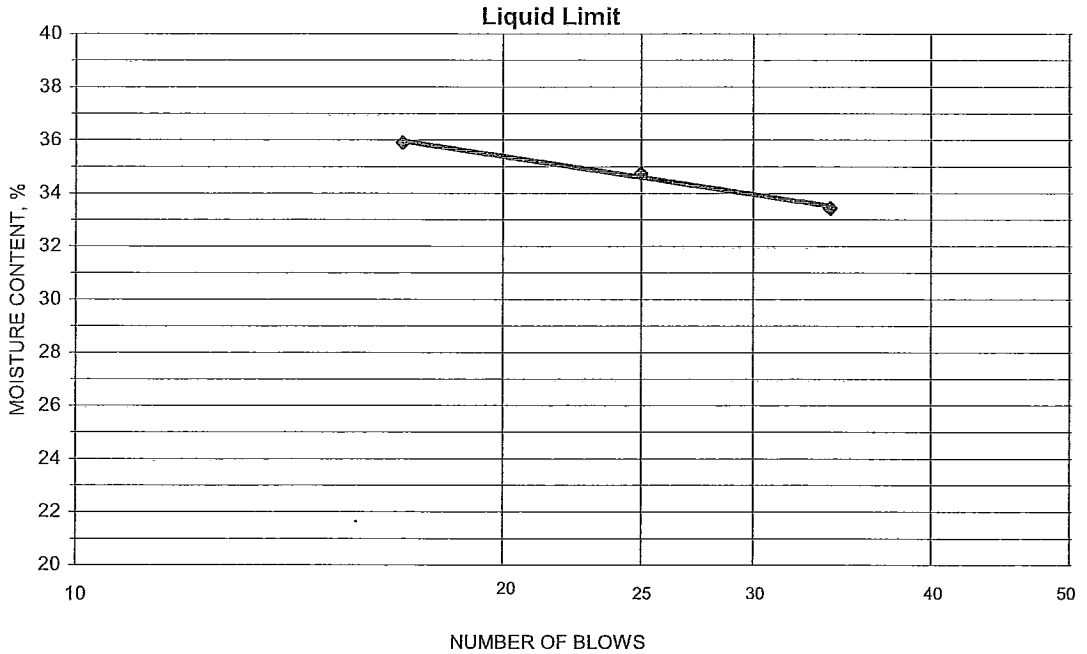
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-14, 15.0'-16.5'	Lab ID	136
		% + No. 40	11
Tested By	JMB	Test Method	ASTM D 4318 Method A
Test Date	02-02-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
13.45	11.16	4.31	34	33.4	
13.04	10.81	4.39	25	34.7	
10.69	9.01	4.33	17	35.9	35



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
9.13	8.44	4.36	16.9	17	18
9.14	8.44	4.33	17.0		

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-14, 20.0'-21.5'	Lab ID	137
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 18.6

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	100.0
3/8"	9.5	97.5
No. 4	4.75	95.0
No. 10	2	90.8
No. 40	0.425	87.2
No. 200	0.075	66.7
	0.02	45.0
	0.005	24.2
	0.002	23.2
estimated	0.001	22.5

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	5.0	9.2
Coarse Sand	4.2	3.6
Medium Sand	3.6	---
Fine Sand	20.5	20.5
Silt	42.5	43.5
Clay	24.2	23.2

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 39
Plastic Limit: 15
Plasticity Index: 24
Activity Index: 1.04

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

Estimated

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 (14)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-14, 20.0'-21.5'
Lab ID: 137

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: JMB
Test Date: 01-29-2010
Date Received: 01-26-2010

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	95.0
No. 10	90.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

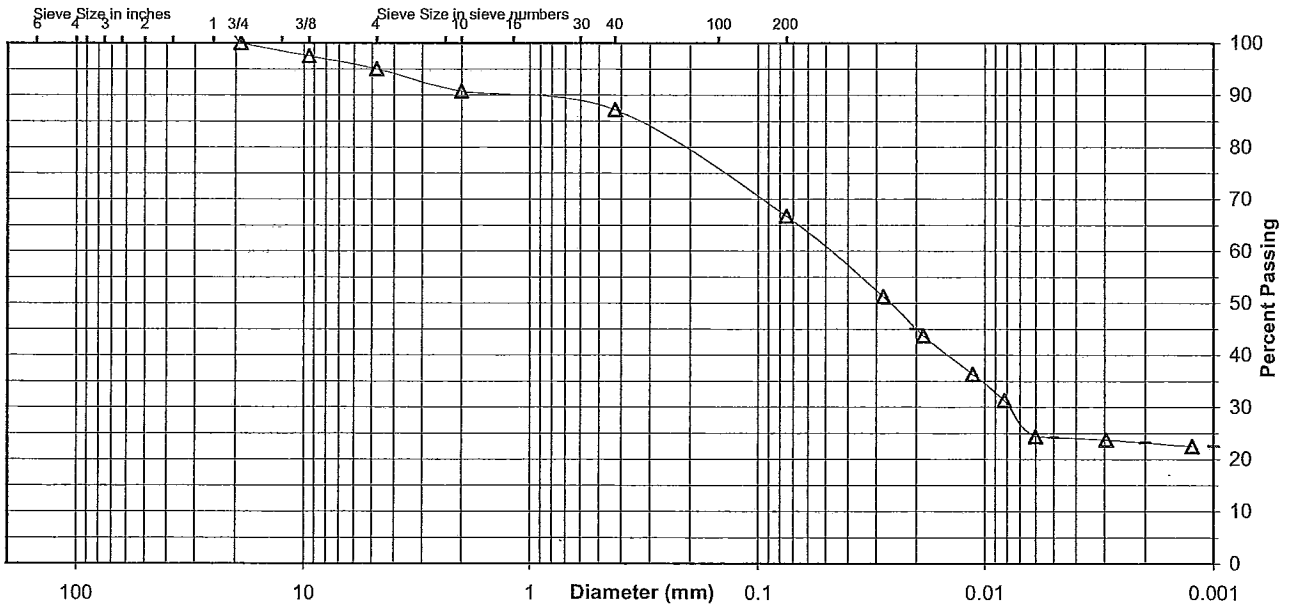
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	87.2
No. 200	66.7
0.02 mm	45.0
0.005 mm	24.2
0.002 mm	23.2
0.001 mm	22.5

Particle Size Distribution

	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
ASTM	0.0	5.0	4.2	3.6	20.5	42.5	24.2
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	9.2			3.6	20.5	43.5	23.2



Comments

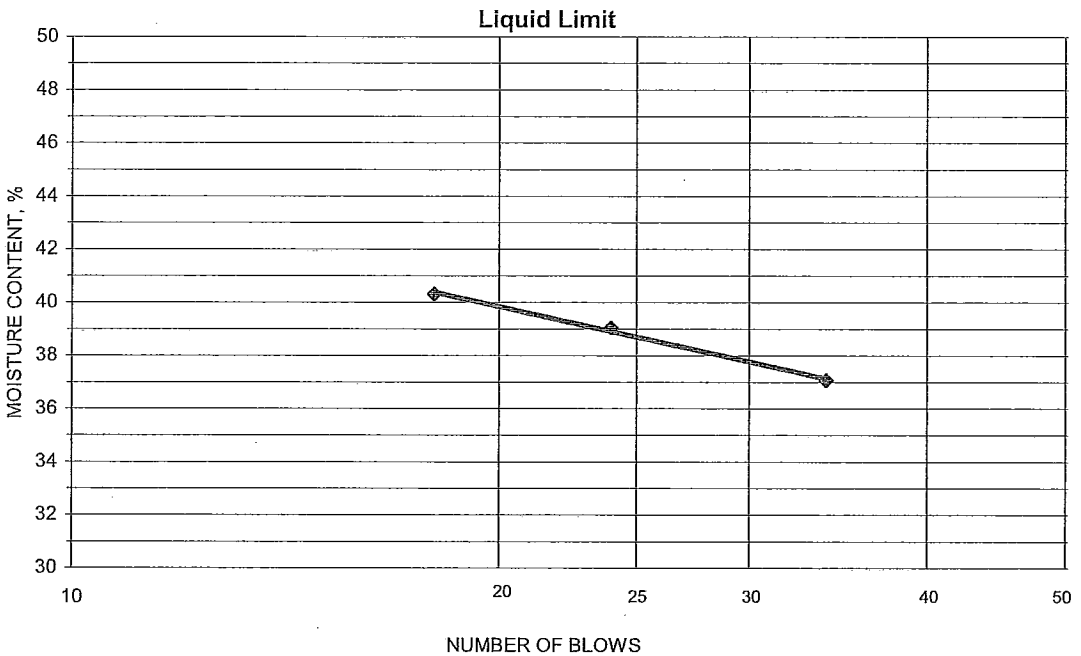
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-14, 20.0'-21.5'	Lab ID	137
		% + No. 40	13
Tested By	JMB	Test Method	ASTM D 4318 Method A
Test Date	02-01-2010	Prepared	Dry
		Date Received	01-26-2010

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
13.04	10.69	4.35	34	37.1	
10.51	8.78	4.35	24	39.1	
12.48	10.13	4.30	18	40.3	39



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.59	10.39	4.32	19.8	15	24
11.30	10.63	4.32	10.6		

Remarks: _____

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project Number	172679048
Source	DDC-16, 40.0'-40.5'	Lab ID	157
County	Humphreys Co, TN	Date Received	1-26-10
Sample Type	SPT	Date Reported	2-5-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 21.6

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	100.0
3/8"	9.5	96.4
No. 4	4.75	91.0
No. 10	2	80.0
No. 40	0.425	76.4
No. 200	0.075	65.4
	0.02	48.9
	0.005	25.4
	0.002	19.7
estimated	0.001	18.3

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

	ASTM	AASHTO
Range	(%)	(%)
Gravel	9.0	20.0
Coarse Sand	11.0	3.6
Medium Sand	3.6	---
Fine Sand	11.0	11.0
Silt	40.0	45.7
Clay	25.4	19.7

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 31
Plastic Limit: 15
Plasticity Index: 16
Activity Index: 0.80

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

Estimated

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 (8)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Dupont Dredge Cell, Johnsonville Fossil Plant, TVA
Project Number: 172679048
Source: DDC-16, 40.0'-40.5'
Lab ID: 157

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: JMB
Test Date: 01-29-2010
Date Received: 01-26-2010

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	91.0
No. 10	80.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

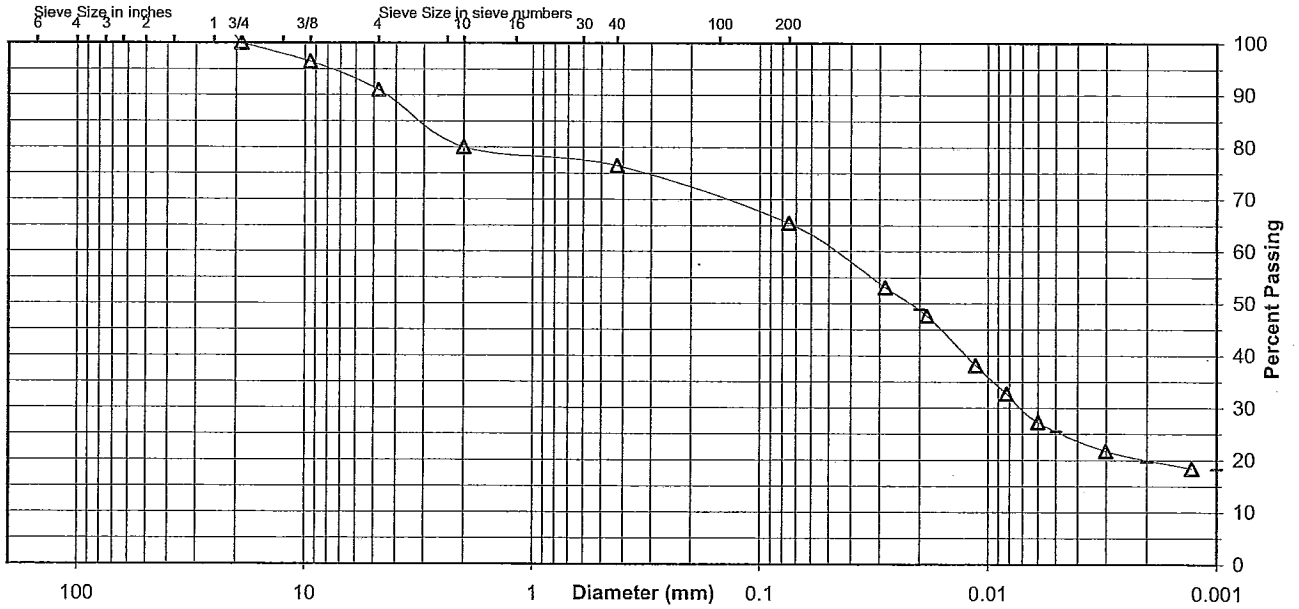
Specific Gravity: 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	76.4
No. 200	65.4
0.02 mm	48.9
0.005 mm	25.4
0.002 mm	19.7
0.001 mm	18.3

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	9.0	11.0	3.6	11.0	40.0	25.4
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	20.0			3.6	11.0	45.7	19.7



Comments

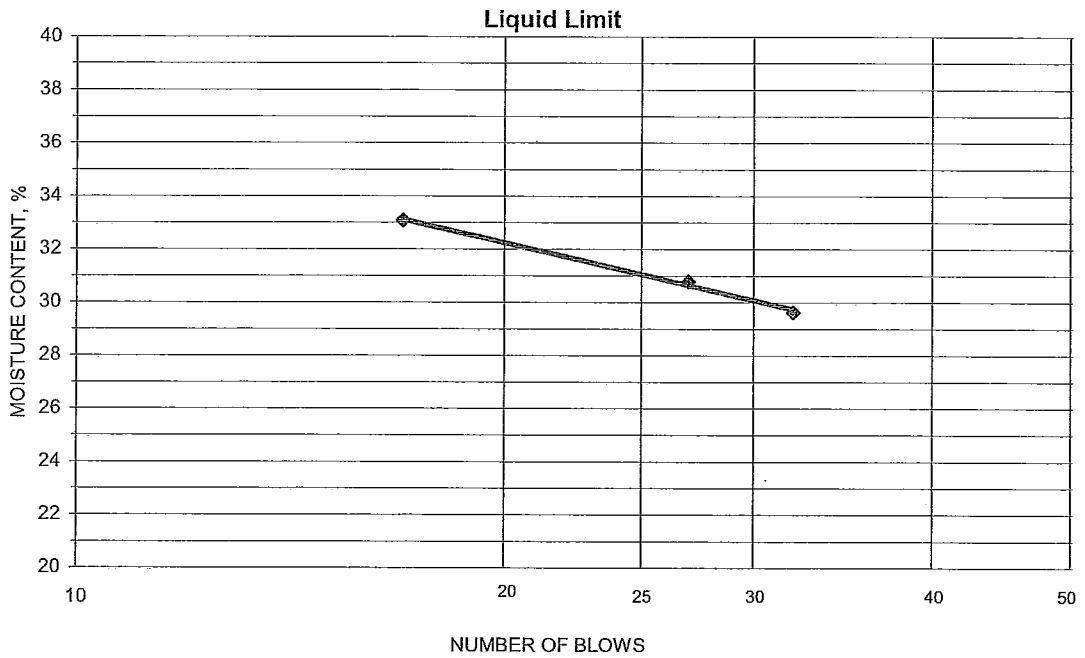
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Dupont Dredge Cell, Johnsonville Fossil Plant, TVA	Project No.	172679048
Source	DDC-16, 40.0'-40.5'	Lab ID	157
		% + No. 40	24
Tested By	RHB	Test Method ASTM D 4318 Method A	Date Received 01-26-2010
Test Date	02-04-2010	Prepared Dry	

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
13.52	11.41	4.29	32	29.6	
14.91	12.41	4.29	27	30.8	
14.71	12.12	4.29	17	33.1	31



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
9.33	8.67	4.29	15.1	15	16
9.80	9.08	4.30	15.1		

Remarks: _____

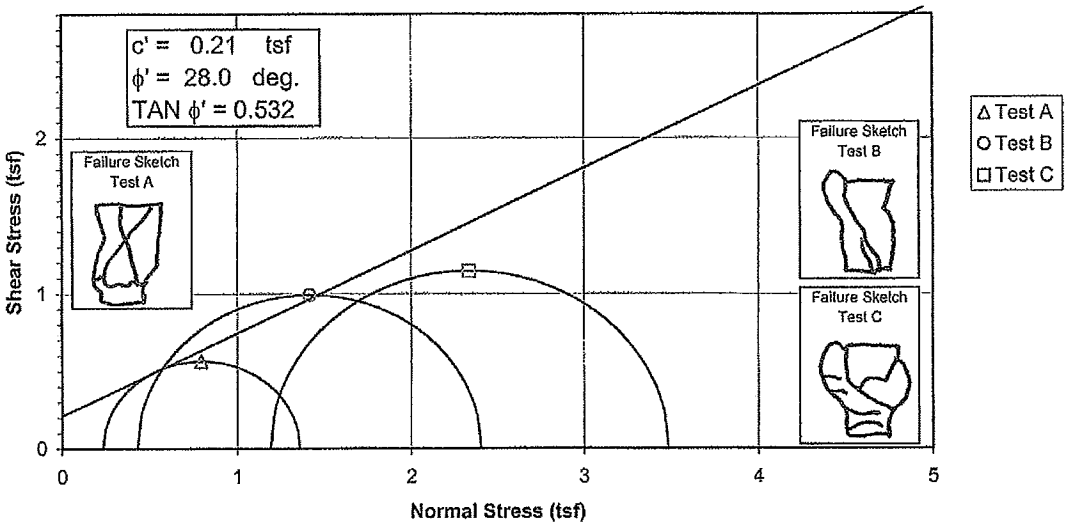
Reviewed By RHB

Consolidated Undrained Triaxial Testing

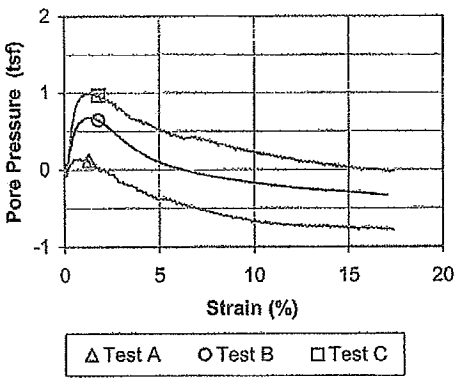
EM 1110-2-1906
Appendix X
30 Nov. 70

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	25.5	23.7	24.9	
	Dry Density PCF	γ_{d_o}	96.4	100.3	98.2	
	Saturation %	S_o	92.4	94.4	94.5	
	Void Ratio	e_o	0.743	0.674	0.710	
After Shear	Water content %	W_f	27.0	24.7	24.7	
	Dry Density PCF	γ_{d_f}	97.3	100.8	100.8	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.725	0.666	0.665	
	Final Back Pressure TSF	u_c	6.12	5.40	4.32	
Minor Principal Stress TSF @ failure		$\sigma_3'f$	0.23	0.43	1.19	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.12	1.97	2.29	
Time to $(\sigma 1'-\sigma 3')$max min.		t_f	71.7	31.5	98.8	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	2.22	
Initial Diameter, in.		D_o	2.899	2.894	2.888	
Initial Height, in.		H_o	6.050	6.018	6.024	

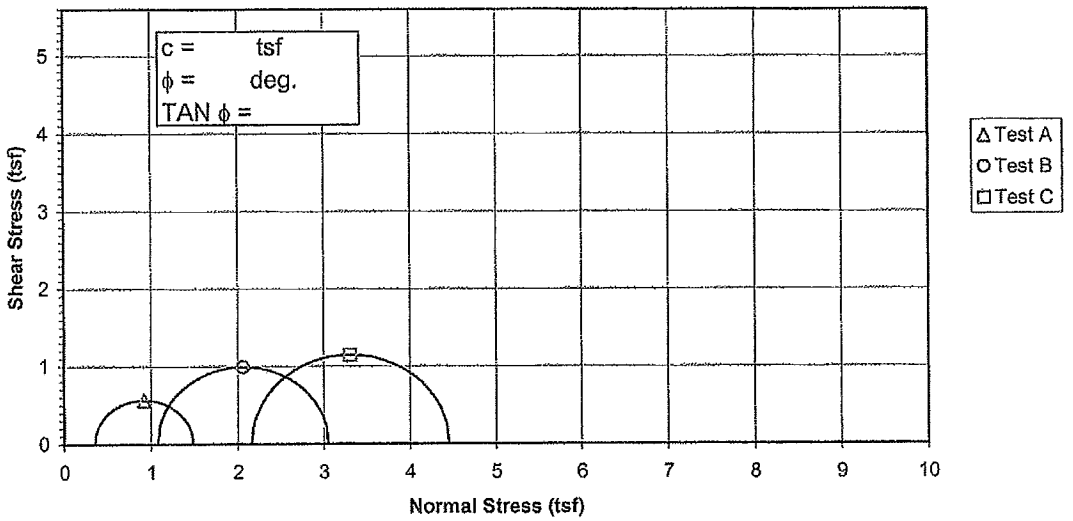
Controlled - Strain Test					
Description of Specimens	Lean Clay (CL), brown, moist, firm				
			Type of Specimen	Undisturbed	Type of test R
LL 39	PL 19	PI 20	Gs 2.69	Project	JOF-Dupont Dredge Cell
Remarks:					
			Boring No.	DC-4	Sample No. 1
			Depth Elev.	3.1'-3.6', 3.7'-4.2', 8.5'-9.0'	
			Laboratory	Stantec	Date 2-25-10
			TRIAXIAL COMPRESSION TEST REPORT		

KDG

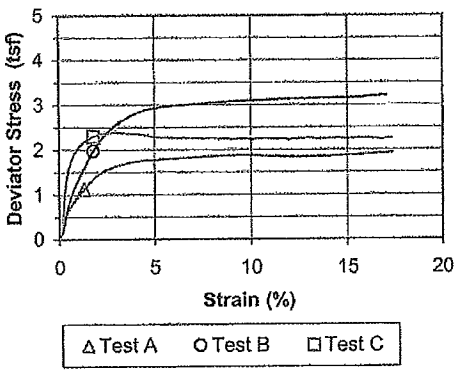
EM 1110-2-1906
Appendix X
30 Nov. 70

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	25.5	23.7	24.9	
	Dry Density PCF	γ_{d_o}	96.4	100.3	98.2	
	Saturation %	S_o	92.4	94.4	94.5	
	Void Ratio	e_o	0.743	0.674	0.710	
After Shear	Water content %	W_f	27.0	24.7	24.7	
	Dry Density PCF	γ_{d_f}	97.3	100.8	100.8	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.725	0.666	0.665	
	Final Back Pressure TSF	u_c	6.12	5.40	4.32	
Minor Principal Stress TSF		σ_3	0.36	1.08	2.16	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	1.12	1.97	2.29	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	71.7	31.5	98.8	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	2.22	
Initial Diameter, in.		D_o	2.899	2.894	2.888	
Initial Height, in.		H_o	6.050	6.018	6.024	

Controlled - Strain Test

Description of Specimens: Lean Clay (CL), brown, moist, firm

LL 39 | PL 19 | PI 20 | Gs 2.69

Remarks:

Type of Specimen: Undisturbed | Type of test: $\bar{R}$

Project: JOF-Dupont Dredge Cell

Boring No.: DC-4 | Sample No.: 1

Depth Elev.: 3.1'-3.6', 3.7'-4.2', 8.5'-9.0'

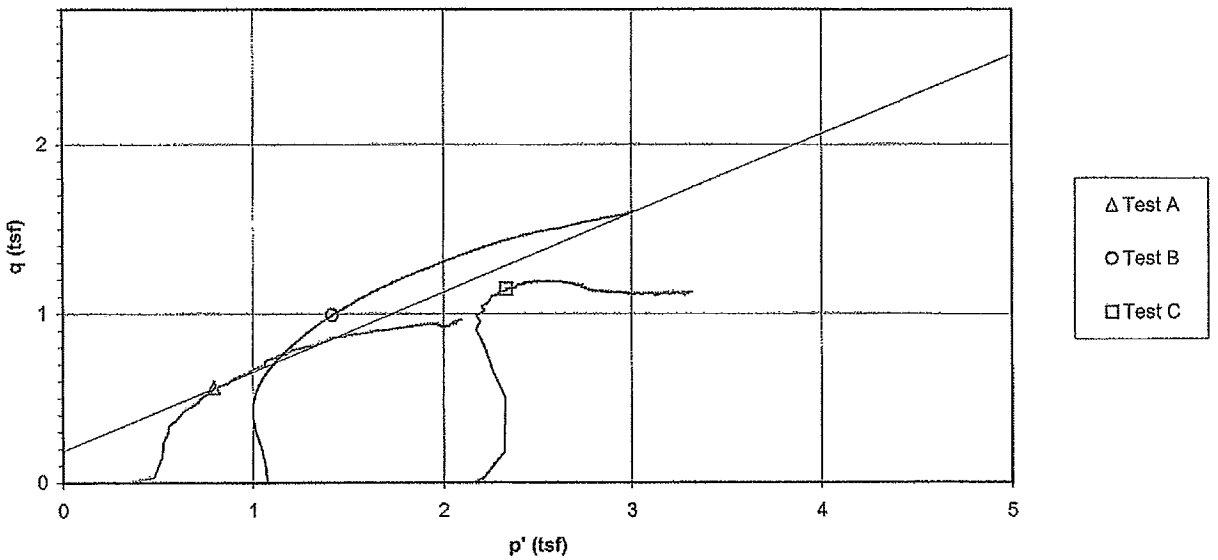
Laboratory: Stantec | Date: 2-25-10

TRIAXIAL COMPRESSION TEST REPORT

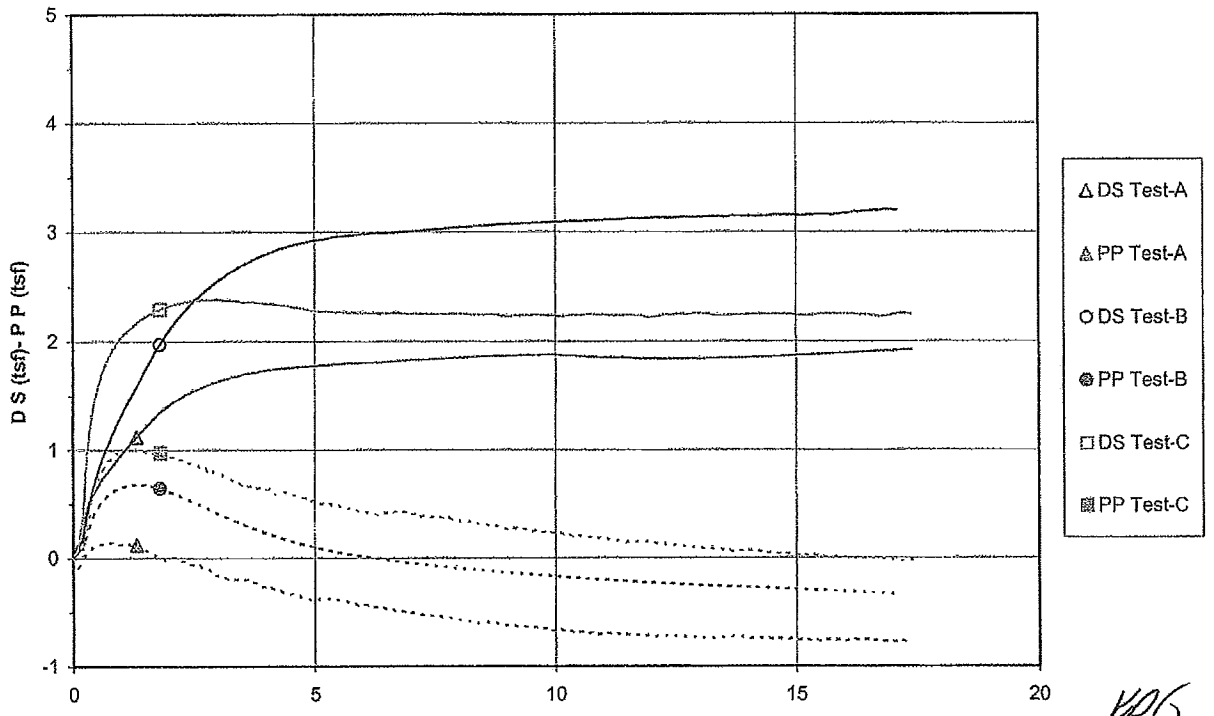
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Sample ID	DC-4, 3.1'-3.6' & DC-4, 3.7'-4.2' & DC-4, 8.5'-9.0'	Test Number	1
Failure Criterion:	Maximum Effective Principal Stress Ratio	ϕ' = 28.0 deg.	c' = 0.21 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



File: 172679048_cu_1 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Stantec

Consolidated Undrained Triaxial Test
ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-4, 3.1'-3.6'	Test Number	CU-1A
Visual Description	Lean Clay (CL), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-4, 3.0'-5.0'	Date	1-25-2010

Specific Gravity 2.69 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.911	1	6.062	Sample	39.9615 (V_o)	Wet Weight (g)	1267.80
Middle	2.896	2	6.040	Solids	22.9146 (VS_o)	Dry Weight (g)	1010.17
Bottom	2.893	3	6.037	Water	15.7208 (Vw_o)	Wet Unit Weight (pcf)	120.9
Avg.	2.9000 (D_o)	4	6.062	Voids	17.0468 (Vv_o)	Dry Unit Weight (pcf)	96.3
Area (in^2)	6.6052 (A_o)	Avg. (H_o)	6.0500	Degree of Saturation (%)	92.2 (S_o)		
Moisture Content (%)	25.5 Final Trimmings			Void Ratio	0.744		

Saturation

Set Up & Saturated: Wet xx Dry ____ Set up By KDG

Back Pressure Saturated to: 85 (psi) Final Pore Pressure Parameter B 0.97 Date 2-17-10

Panel Board Number A

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1258	Initial	15.89 (in.)	Initial	12.12 (in.)	Specimen Height (in.)	6.0518 (H_s)
Final	0.124	Final	10.65 (in.)	Final	9.55 (In.)	Area (in^2) Method A	6.6091 (A_s)
Change	0.0018 (ΔH_o)	Change	-5.24 (in.)	Change	-2.57 (in.)	Specimen Volume (in^3)	40.00 (Vs)

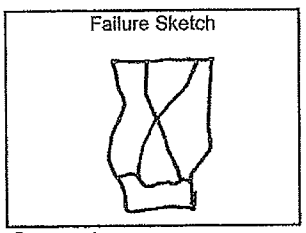
Consolidation

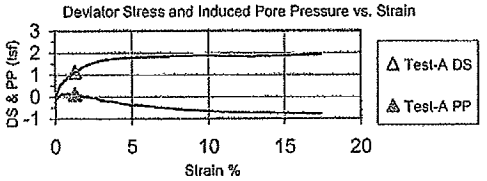
Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.121	Initial	1.54 (in.)	Initial	17.33 (in.)	Chamber	90
Final	0.1225	Final	2.17 (in.)	Final	16.62 (in.)	Back	85
Change	-0.0015 (ΔH_c)	Change	-0.63 (In.)	Change	-0.71 (in.)	Lateral	5 (σ_3)
Height (in.)	6.0503 (H_c)			Volume (in^3)	39.5373 (V_c)		
Area (in^3) Method B	6.5348 (A_c)			Volume - Water (in^3)	16.6227 (VWc)	t_{50} (min.)	5.1
Diameter (in.)	2.8845 (D_c)			Water Content (%)	27.0		
Dry Density (pcf)	97.3			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.725

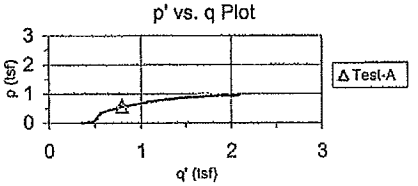
After Test

Final Measurements		Final Moisture Content		Stresses (membrane corrected) at Failure (psi)	
Maximum Diameter	3.42 (in.)	Wet Weight (g)	1282.58	Corrected Deviator	1.12 σ_d (tsf)
Wet weight (g)	1282.58 (WWf)	Dry Weight (g)	1010.17	Major Principal	1.36 $\sigma_1'_f$ (tsf)
Corrected Diameter	3.396 (In.)	Tare Weight (g)	0.00	Minor Principal	0.23 $\sigma_3'_f$ (tsf)
				Rate of Strain (% / min.)	0.018
Youngs Modulus for Membrane (psi)	200			Axial Strain at Failure (%)	1.30
Membrane Thickness (in.)	0.012			Failure Criterion: Maximum Effective Principal Stress Ratio	

Failure Sketch







Comments: KDG

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-4, 3.7'-4.2'	Test Number	CU-1B
Visual Description	Lean Clay (CL), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-4, 3.0'-5.0'	Date	1-25-2010

Specific Gravity 2.69 ASTM D854 Method A Liquid Limit 39 Plastic Limit 19 Plasticity Index 20

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in3)		Specimen	
Top	2.894	1	6.002	Sample	39.5858 (V_o)	Wet Weight (g)	1288.50
Middle	2.893	2	6.018	Solids	23.6361 (VS_o)	Dry Weight (g)	1041.97
Bottom	2.895	3	6.050	Water	15.0431 (Vw_o)	Wet Unit Weight (pcf)	124.0
Avg.	2.8940 (D_o)	4	6.002	Voids	15.9497 (Vv_o)	Dry Unit Weight (pcf)	100.3
Area (in^2)	6.5779 (A_o)	Avg. (H_o)	6.0180	Degree of Saturation (%)	94.3 (S_o)		
Moisture Content (%)	23.7 Final Trimmings			Void Ratio	0.675		

Saturation

Set Up & Saturated: Wet xx Dry

Back Pressure Saturated to: 75 (psi) Final Pore Pressure Parameter B 0.96 Set up By KDG Date 2-17-10 Panel Board Number F

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1173	Initial	16.13 (in.)	Initial	13.25 (in.)	Specimen Height (in.)	6.0203 (H_s)
Final	0.115	Final	11.07 (in.)	Final	10.43 (in.)	Area (in^2) Method A	6.5829 (A_s)
Change	0.0023 (ΔH_o)	Change	-5.06 (in.)	Change	-2.82 (in.)	Specimen Volume (in^3)	39.63 (V_s)

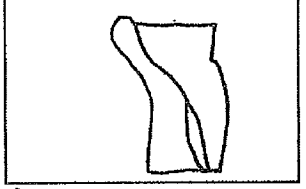
Consolidation

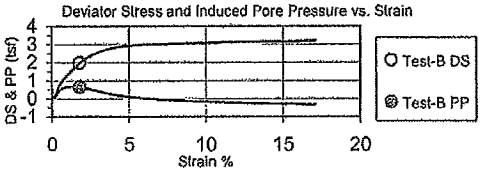
Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.115	Initial	1.57 (in.)	Initial	17.56 (in.)	Chamber	90
Final	0.1308	Final	4.36 (in.)	Final	14.96 (in.)	Back	75
Change	-0.0158 (ΔH_c)	Change	-2.79 (in.)	Change	-2.60 (in.)	Lateral	15 (σ_3)
Height (in.)	6.0045 (H_c)			Volume (in^3)	39.3694 (V_c)		
Area (in^3) Method B	6.5566 (A_c)			Volume - Water (in^3)	15.7333 (VWc)	t_{50} (min.)	1.804
Diameter (in.)	2.8893 (D_c)			Water Content (%)	24.7		
Dry Density (pcf)	100.8			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.666

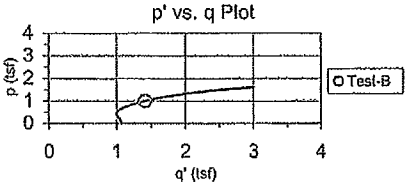
After Test

Final Measurements		Final Moisture Content		Stresses (membrane corrected) at Failure (psi)	
Maximum Diameter	3.275 (In.)	Wet Weight (g)	1299.81	Corrected Deviator	1.97 σ_d (tsf)
Wet weight (g)	1299.81 (WWf)	Dry Weight (g)	1041.97	Major Principal	2.41 $\sigma_1'_f$ (tsf)
Corrected Diameter	3.251 (in.)	Tare Weight (g)	0.00	Minor Principal	0.43 $\sigma_3'_f$ (tsf)
				Rate of Strain (% / min.)	0.059
Youngs Modulus for Membrane (psi)	200			Axial Strain at Failure (%)	1.80
Membrane Thickness (in.)	0.012			Failure Criterion: Maximum Effective Principal Stress Ratio	

Failure Sketch







Comments:

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-4, 8.5'-9.0'	Test Number	CU-1C
Visual Description	Lean Clay (CL), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-4, 8.0'-10.0'	Date	1-25-2010

Specific Gravity 2.69 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.889	1	6.023	Sample	39.4429 (V_o)	Wet Weight (g)	1270.8
Middle	2.890	2	6.029	Solids	23.0726 (VS_o)	Dry Weight (g)	1017.13
Bottom	2.883	3	6.021	Water	15.4789 (Vw_o)	Wet Unit Weight (pcf)	122.7
Avg.	2.8873 (D_o)	4	6.023	Voids	16.3703 (Vv_o)	Dry Unit Weight (pcf)	98.2
Area (in^2)	6.5476 (A_o)	Avg. (H_o)	6.0240	Degree of Saturation (%)	94.6 (S_o)		
Moisture Content (%)	24.9	Final Trimmings		Void Ratio	0.710		

Saturation

Set Up & Saturated: Wet xx Dry Set up By KDG

Back Pressure Saturated to: 60 (psi) Final Pore Pressure Parameter B 0.96 Date 2-19-10

Panel Board Number A

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1749	Initial	15.86 (in.)	Initial	12.16 (in.)	Specimen Height (in.)	6.0300 (H_s)
Final	0.1689	Final	12.63 (in.)	Final	10.87 (in.)	Area (in^2) Method A	6.5607 (A_s)
Change	0.0060 (ΔH_o)	Change	-3.23 (in.)	Change	-1.29 (in.)	Specimen Volume (in^3)	39.56 (V_s)

Consolidation

Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1689	Initial	1.53 (in.)	Initial	17.46 (in.)	Chamber	90
Final	0.2168	Final	5.73 (in.)	Final	13.16 (in.)	Back	60
Change	-0.0479 (ΔH_c)	Change	-4.20 (in.)	Change	-4.30 (in.)	Lateral	30 (σ_3)
Height (in.)	5.9821 (H_c)			Volume (in^3)	38.4246 (V_c)		
Area (in^3) Method B	6.4233 (A_c)			Volume - Water (in^3)	15.3520 (VWc)	t_{50} (min.)	101
Diameter (in.)	2.8598 (D_c)			Water Content (%)	24.7		
Dry Density (pcf)	100.8			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.665

After Test

Final Measurements		Final Moisture Content	
Maximum Diameter	3.406 (in.)	Wet Weight (g)	1268.72
Wet weight (g)	1268.72 (WWf)	Dry Weight (g)	1017.13
Corrected Diameter	3.382 (in.)	Tare Weight (g)	0.00

Stresses (membrane corrected) at Failure (psi)

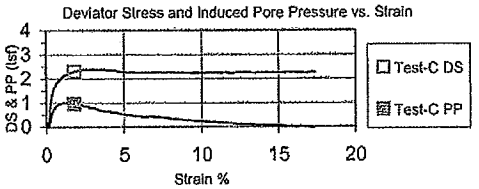
Corrected Deviator	2.29 σ_d (tsf)
Major Principal	3.48 $\sigma_1'_f$ (tsf)
Minor Principal	1.19 $\sigma_3'_f$ (tsf)
Rate of Strain (% / min.)	0.019
Axial Strain at Failure (%)	1.80

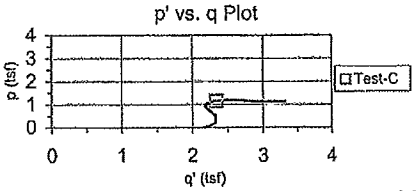
Youngs Modulus for Membrane (psi) 200

Membrane Thickness (in.) 0.012

Failure Criterion: Maximum Effective Principal Stress Ratio

Failure Sketch





Comments: One + 3/4" rock was found in the top of the specimen after testing.

KDG

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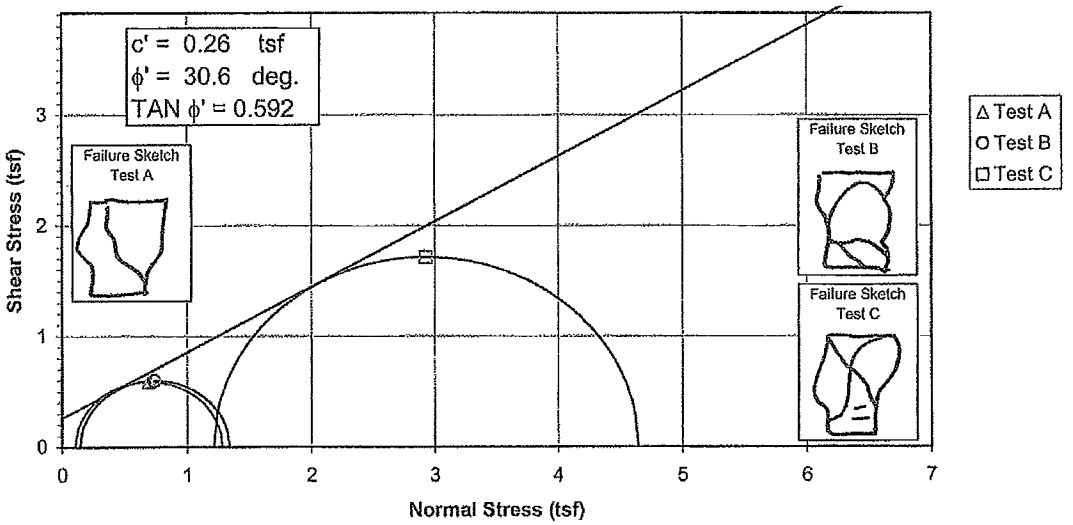
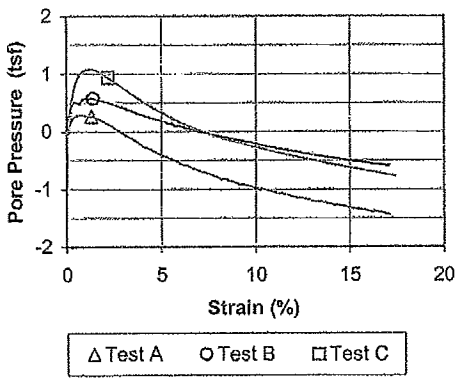
Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	18.7	19.3	18.5	
	Dry Density PCF	γ_{d_o}	108.8	108.2	107.4	
	Saturation %	S_o	91.9	93.4	87.6	
	Void Ratio	e_o	0.550	0.557	0.570	
After Shear	Water content %	W_f	19.5	20.3	19.3	
	Dry Density PCF	γ_{d_f}	110.4	109.0	110.9	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.526	0.547	0.520	
	Final Back Pressure TSF	u_c	6.12	5.76	4.32	
Minor Principal Stress TSF @ failure		$\sigma_3'f$	0.11	0.14	1.22	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.19	1.19	3.42	
Time to $(\sigma 1'-\sigma 3')$max min.		t_f	13.3	105.8	133.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.888	2.890	2.884	
Initial Height, in.		H_o	6.001	6.015	6.038	

Controlled - Strain Test

Description of Specimens: Lean Clay (CL), brown, moist, firm

LL 43 | PL 16 | PI 27 | Gs 2.7

Remarks:

Type of Specimen: Undisturbed | Type of test: $\bar{R}$

Project: JOF-Dupont Dredge Cell

Boring No.: DC-8, DC-15 | Sample No.: 3

Depth Elev.: 3.1'-3.6', 8.6'-9.1', 3.5'-4.0'

Laboratory: Stantec | Date: 3-3-10

TRIAXIAL COMPRESSION TEST REPORT

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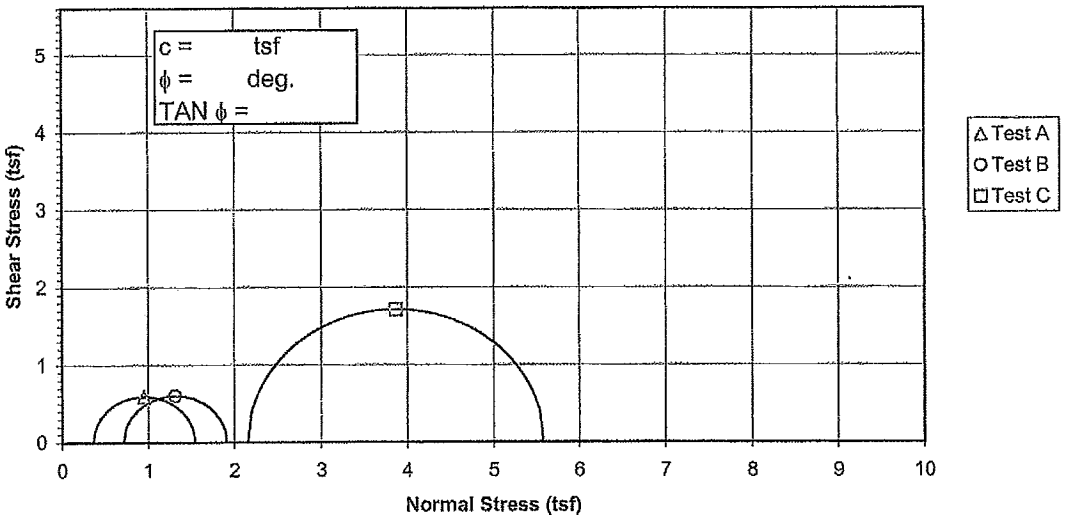
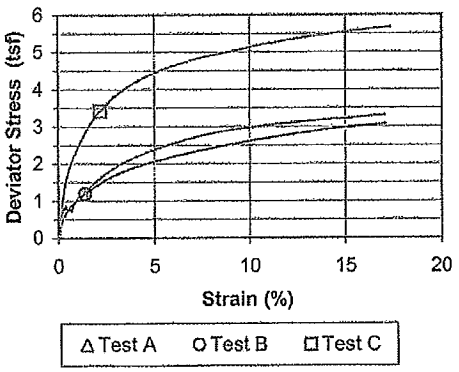
Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	18.7	19.3	18.5	
	Dry Density PCF	γ_{d_o}	108.8	108.2	107.4	
	Saturation %	S_o	91.9	93.4	87.6	
	Void Ratio	e_o	0.550	0.557	0.570	
After Shear	Water content %	W_f	19.5	20.3	19.3	
	Dry Density PCF	γ_{d_f}	110.4	109.0	110.9	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.526	0.547	0.520	
	Final Back Pressure TSF	u_c	6.12	5.76	4.32	
Minor Principal Stress TSF		σ_3	0.36	0.72	2.16	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	1.19	1.19	3.42	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	13.3	105.8	133.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.888	2.890	2.884	
Initial Height, in.		H_o	6.001	6.015	6.038	

Controlled - Strain Test

Description of Specimens: Lean Clay (CL), brown, moist, firm

LL 43 | PL 16 | PI 27 | Gs 2.7

Remarks:

Type of Specimen: Undisturbed | Type of test: R

Project: JOF-Dupont Dredge Cell

Boring No.: DC-8, DC-15 | Sample No.: 3

Depth Elev.: 3.1'-3.6', 8.6'-9.1', 3.5'-4.0'

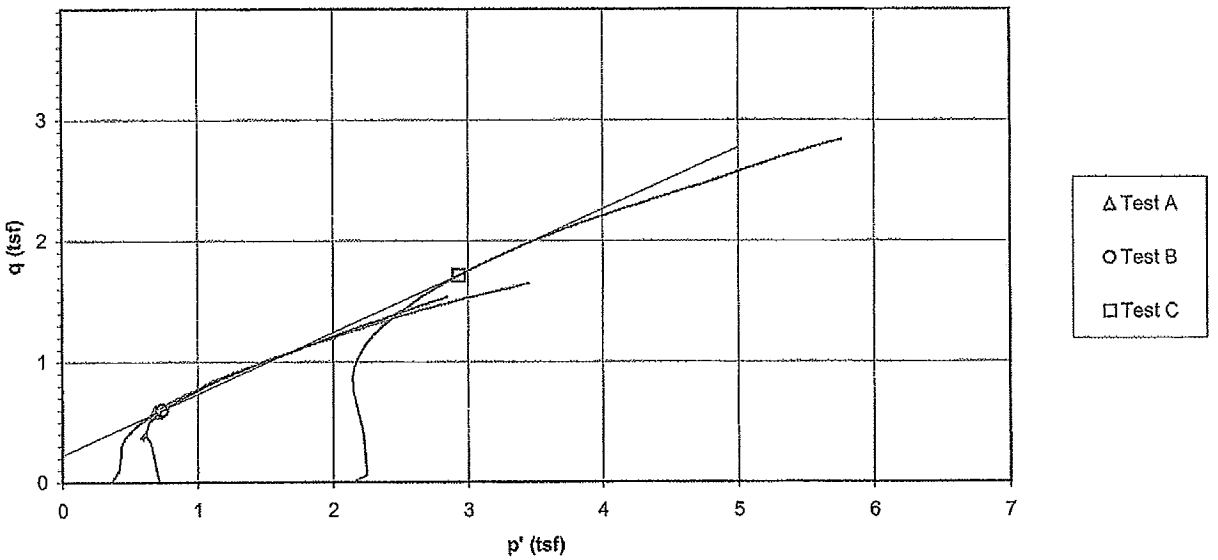
Laboratory: Stantec | Date: 3-3-10

TRIAXIAL COMPRESSION TEST REPORT

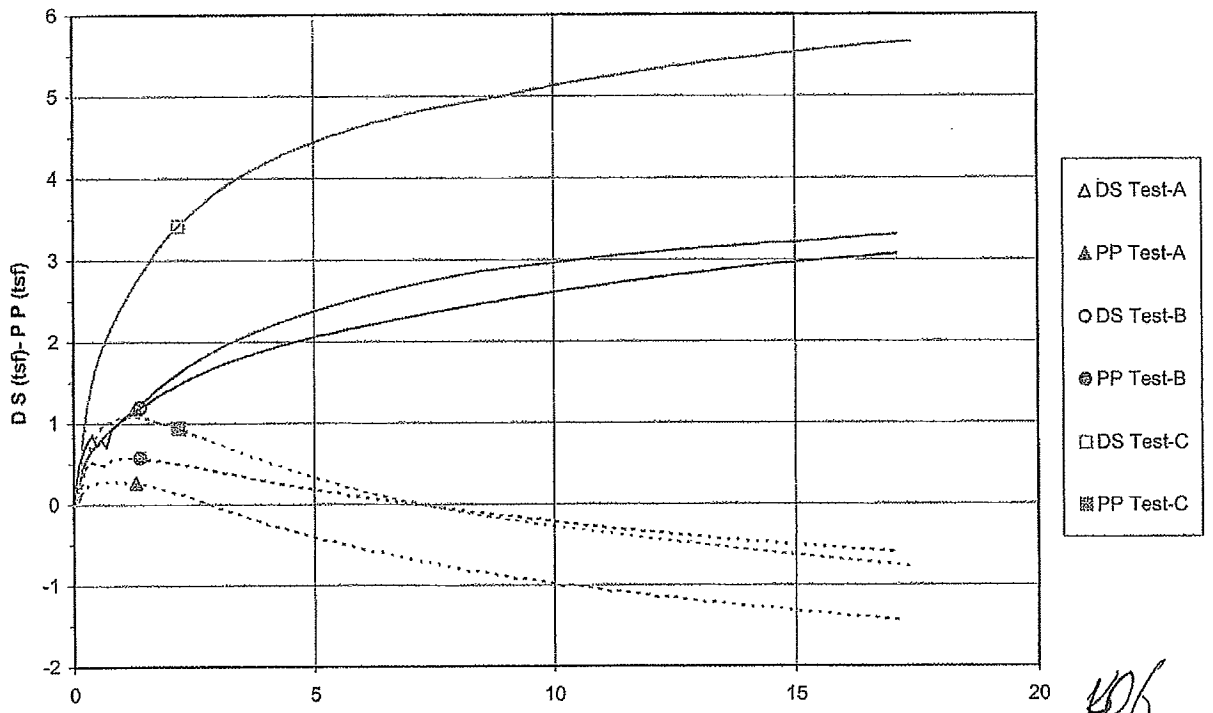
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Sample ID	DC-8, 3.1'-3.6' & DC-8, 8.6'-9.1' & DC-15, 3.5'-4.0'	Test Number	3
Failure Criterion:	Maximum Effective Principal Stress Ratio	ϕ' = 30.6 deg.	c' = 0.26 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



File: 172679048_cu_3 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-8, 3.1'-3.6'	Test Number	CU-3A
Visual Description	Lean Clay (CL), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-8, 3.0'-5.0'	Date	1-26-2010

Specific Gravity 2.70 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.880	1	6.002	Sample	39.2395 (V_o)	Wet Weight (g)	1332.10
Middle	2.895	2	5.997	Solids	25.3610 (VS_o)	Dry Weight (g)	1122.17
Bottom	2.881	3	6.004	Water	12.8101 (Vw_o)	Wet Unit Weight (pcf)	129.3
Avg.	2.8853 (D_o)	4	6.002	Voids	13.8785 (Vv_o)	Dry Unit Weight (pcf)	108.9
Area (in^2)	6.5386 (A_o)	Avg. (H_o)	6.0013	Degree of Saturation (%)	92.3 (S_o)		
Moisture Content (%)	18.7	Final Trimmings		Void Ratio	0.547		

Saturation

Set Up & Saturated: Wet xx Dry ____ Set up By KDG

Back Pressure Saturated to: 85 (psi) Final Pore Pressure Parameter B 0.97 Date 2-24-10

Panel Board Number D

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.12	Initial	15.87 (in.)	Initial	12.35 (in.)	Specimen Height (in.)	6.0080 (H_s)
Final	0.1133	Final	8.32 (in.)	Final	10.53 (in.)	Area (in^2) Method A	6.5531 (A_s)
Change	0.0067 (ΔH_o)	Change	-7.55 (in.)	Change	-1.82 (in.)	Specimen Volume (in^3)	39.37 (Vs)

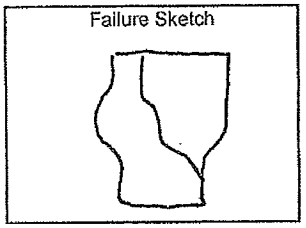
Consolidation

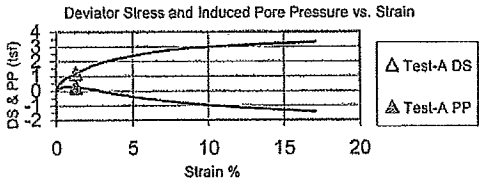
Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1133	Initial	1.86 (in.)	Initial	17.91 (in.)	Chamber	90
Final	0.12	Final	2.88 (in.)	Final	15.75 (in.)	Back	85
Change	-0.0067 (ΔH_c)	Change	-1.02 (in.)	Change	-2.16 (in.)	Lateral	5 (σ_3)
Height (in.)	6.0013 (H_c)			Volume (in^3)	38.7062 (V_c)		
Area (in^3) Method B	6.4497 (A_c)			Volume - Water (in^3)	13.3453 (VWc)	t_{50} (min.)	1.346
Diameter (in.)	2.8657 (D_c)			Water Content (%)	19.5		
Dry Density (pcf)	110.4			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.526

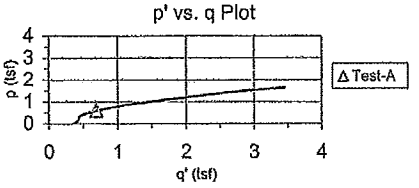
After Test

Final Measurements		Final Moisture Content		Stresses (membrane corrected) at Failure (psi)	
Maximum Diameter	3.343 (in.)	Wet Weight (g)	1340.87	Corrected Deviator	1.19 σ_d (tsf)
Wet weight (g)	1340.87 (WWf)	Dry Weight (g)	1122.17	Major Principal	1.28 $\sigma_1'_f$ (tsf)
Corrected Diameter	3.319 (in.)	Tare Weight (g)	0.00	Minor Principal	0.11 $\sigma_3'_f$ (tsf)
				Rate of Strain (% / min.)	0.099
Youngs Modulus for Membrane (psi)	200			Axial Strain at Failure (%)	1.30
Membrane Thickness (in.)	0.012			Failure Criterion: Maximum Effective Principal Stress Ratio	

Failure Sketch







Comments: 106

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-8, 8.6'-9.1'	Test Number	CU-3B
Visual Description	Lean Clay (CL), brown, moist, hard	Prepared By	CSM
Undisturbed	Source DC-8, 8.0'-10.0'	Date	1-26-2010

Specific Gravity 2.70 ASTM D854 Method A Liquid Limit 43 Plastic Limit 16 Plasticity Index 27

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in3)		Specimen	
Top	2.895	1	6.020	Sample	39.4626 (V_o)	Wet Weight (g)	1337.20
Middle	2.890	2	6.013	Solids	25.3366 (VS_o)	Dry Weight (g)	1121.09
Bottom	2.886	3	6.007	Water	13.1872 (Vw_o)	Wet Unit Weight (pcf)	129.1
Avg.	2.8903 (D_o)	4	6.020	Voids	14.1260 (Vv_o)	Dry Unit Weight (pcf)	108.2
Area (in^2)	6.5612 (A_o)	Avg. (H_o)	6.0145	Degree of Saturation (%)	93.4 (S_o)		
Moisture Content (%)	19.3 Final Trimmings			Void Ratio	0.558		

Saturation

Set Up & Saturated: Wet xx Dry

Back Pressure Saturated to: 80 (psi) Final Pore Pressure Parameter B 0.96

Set up By KDG

Date 2-25-10

Panel Board Number E

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1615	Initial	16.05 (in.)	Initial	12.63 (in.)	Specimen Height (in.)	6.0240 (H_s)
Final	0.152	Final	11.82 (in.)	Final	10.55 (in.)	Area (in^2) Method A	6.5819 (A_s)
Change	0.0095 (ΔH_o)	Change	-4.23 (in.)	Change	-2.08 (in.)	Specimen Volume (in^3)	39.65 (V_s)

Consolidation

Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.152	Initial	1.27 (in.)	Initial	17.72 (in.)	Chamber	90
Final	0.1561	Final	3.27 (in.)	Final	15.81 (in.)	Back	80
Change	-0.0041 (ΔH_c)	Change	-2.00 (in.)	Change	-1.91 (in.)	Lateral	10 (σ_3)
Height (in.)	6.0199 (H_c)			Volume (in^3)	39.1950 (V_c)		
Area (in^3) Method B	6.5109 (A_c)			Volume - Water (in^3)	13.8584 (VWc)	t_{50} (min.)	66
Diameter (in.)	2.8792 (D_c)			Water Content (%)	20.3		
Dry Density (pcf)	109.0			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.547

After Test

Final Measurements		Final Moisture Content	
Maximum Diameter	3.367 (in.)	Wet Weight (g)	1348.20
Wet weight (g)	1348.2 (WWf)	Dry Weight (g)	1121.09
Corrected Diameter	3.343 (in.)	Tare Weight (g)	0.00

Stresses (membrane corrected) at Failure (psi)

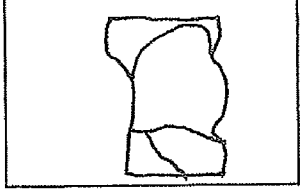
Corrected Deviator	1.19 σ_d (tsf)
Major Principal	1.34 $\sigma_1'_f$ (tsf)
Minor Principal	0.14 $\sigma_3'_f$ (tsf)
Rate of Strain (% / min.)	0.012
Axial Strain at Failure (%)	1.40

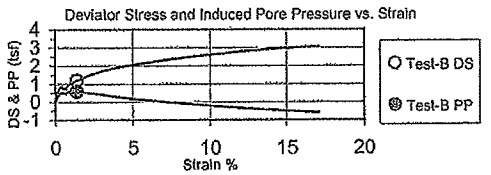
Youngs Modulus for Membrane (psi) 200

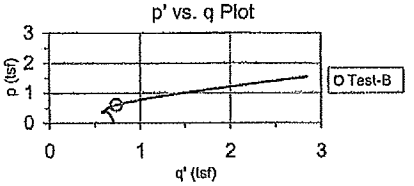
Membrane Thickness (in.) 0.012

Failure Criterion: Maximum Effective Principal Stress Ratio

Failure Sketch







Comments:

Stantec

Consolidated Undrained Triaxial Test
ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-15, 3.5'-4.0'	Test Number	CU-3C
Visual Description	Lean Clay (CL), brown, moist, hard	Prepared By	KDG
Undisturbed	Source DC-15, 3.0'-5.0'	Date	2-25-2010

Specific Gravity 2.70 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.879	1	6.044	Sample	39.4334 (V_o)	Wet Weight (g)	1316.9
Middle	2.883	2	6.023	Solids	25.1169 (VS_o)	Dry Weight (g)	1111.37
Bottom	2.889	3	6.041	Water	12.5416 (Vw_o)	Wet Unit Weight (pcf)	127.2
Avg.	2.8837 (D_o)	4	6.044	Voids	14.3165 (Vv_o)	Dry Unit Weight (pcf)	107.4
Area (in^2)	6.5310 (A_o)	Avg. (H_o)	6.0379	Degree of Saturation (%)	87.6 (S_o)		
Moisture Content (%)	18.5	Final Trimmings		Void Ratio	0.570		

Saturation

Set Up & Saturated: Wet xx Dry ____ Set up By KDG

Back Pressure Saturated to: 60 (psi) Final Pore Pressure Parameter B 0.97 Date 2-25-10

Panel Board Number C

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1683	Initial	16.65 (in.)	Initial	11.39 (in.)	Specimen Height (in.)	6.0425 (H_s)
Final	0.1637	Final	4.71 (in.)	Final	11.89 (in.)	Area (in^2) Method A	6.5409 (A_s)
Change	0.0046 (ΔH_o)	Change	-11.94 (in.)	Change	0.50 (in.)	Specimen Volume (in^3)	39.52 (V_s)

Consolidation

Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1637	Initial	1.61 (in.)	Initial	17.76 (in.)	Chamber	90
Final	0.2178	Final	7.29 (in.)	Final	11.13 (in.)	Back	60
Change	-0.0541 (ΔH_c)	Change	-5.68 (in.)	Change	-6.63 (in.)	Lateral	30 (σ_3)
Height (in.)	5.9884 (H_c)			Volume (in^3)	38.1814 (V_c)		
Area (in^3) Method B	6.3759 (A_c)			Volume - Water (in^3)	13.0645 (VWc)	t_{50} (min.)	8.9
Diameter (in.)	2.8492 (D_c)			Water Content (%)	19.3		
Dry Density (pcf)	110.9			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.520

After Test

Final Measurements		Final Moisture Content	
Maximum Diameter	3.455 (in.)	Wet Weight (g)	1325.47
Wet weight (g)	1325.47 (WWf)	Dry Weight (g)	1111.37
Corrected Diameter	3.431 (in.)	Tare Weight (g)	0.00

Stresses (membrane corrected) at Failure (psi)

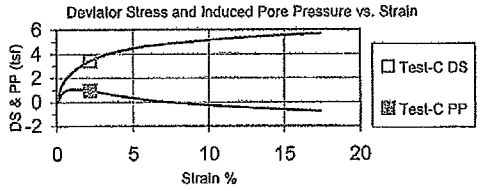
Corrected Deviator	3.42 σ_d (tsf)
Major Principal	4.64 $\sigma_1'_f$ (tsf)
Minor Principal	1.22 $\sigma_3'_f$ (tsf)
Rate of Strain (% / min.)	0.016
Axial Strain at Failure (%)	2.20

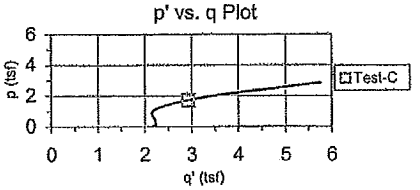
Youngs Modulus for Membrane (psi) 200

Membrane Thickness (in.) 0.012

Failure Criterion: Maximum Effective Principal Stress Ratio

Failure Sketch



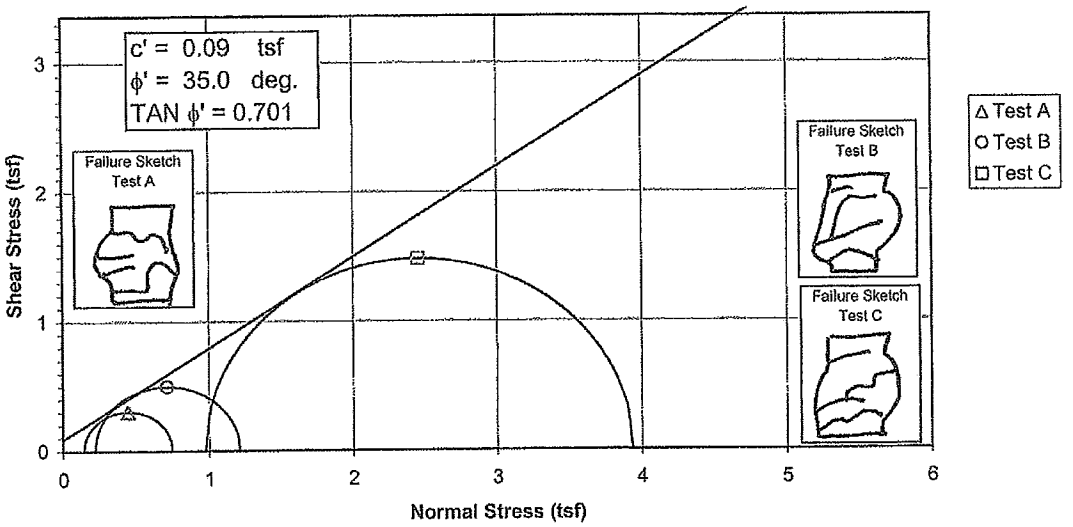


Comments: KDG

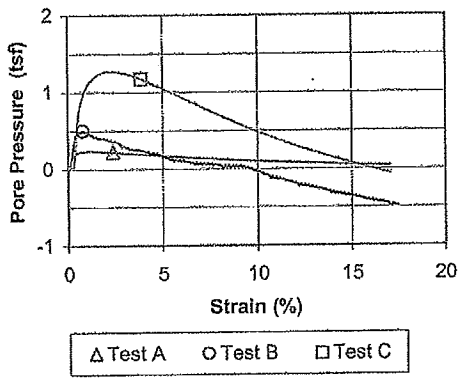
EM 1110-2-1906
Appendix X
30 Nov. 70

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	22.8	22.0	18.6	
	Dry Density PCF	γ_{d_o}	100.5	103.0	109.1	
	Saturation %	S_o	94.2	97.1	96.5	
	Void Ratio	e_o	0.640	0.599	0.510	
After Shear	Water content %	W_f	21.6	22.9	18.2	
	Dry Density PCF	γ_{d_f}	105.0	102.7	111.2	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.569	0.605	0.482	
	Final Back Pressure TSF	u_c	6.12	5.76	4.32	
Minor Principal Stress TSF @ failure		$\sigma_3'f$	0.14	0.22	0.98	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.61	0.99	2.95	
Time to $(\sigma 1'-\sigma 3')$max min.		t_f	57.7	36.9	186.3	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.881	2.886	2.887	
Initial Height, in.		H_o	6.035	6.041	5.972	

Controlled - Strain Test

Description of Specimens: Sandy Fat Clay with Gravel (CH), brown, moist, firm

LL	PL	PI	Gs
52	18	34	2.64

Remarks:

Type of Specimen: Undisturbed | Type of test: R

Project: JOF-Dupont Dredge Cell

Boring No.: DC-5 | Sample No.: 2

Depth Elev.: 3.1'-3.6', 3.7'-4.2', 8.1'-8.6'

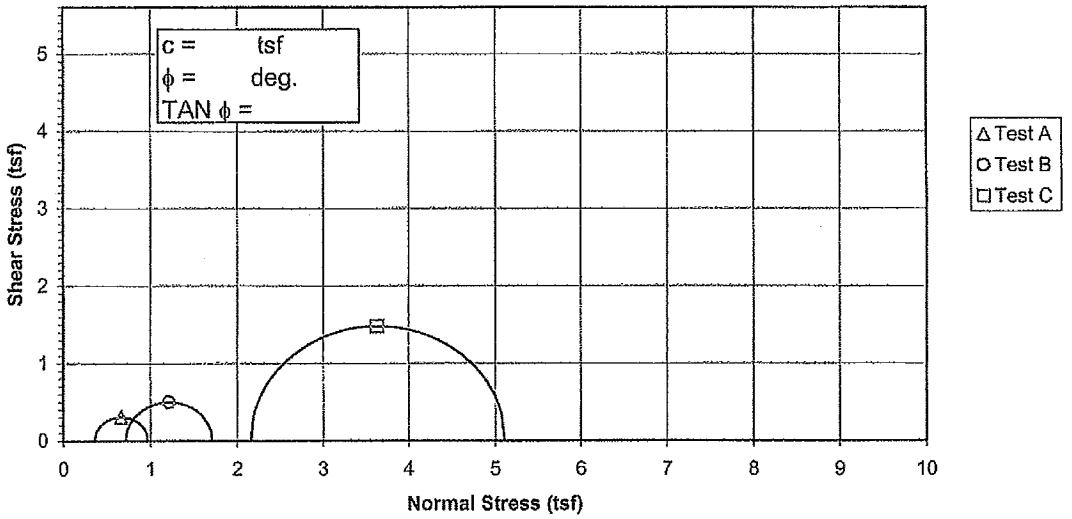
Laboratory: Stantec | Date: 3-4-10

TRIAXIAL COMPRESSION TEST REPORT

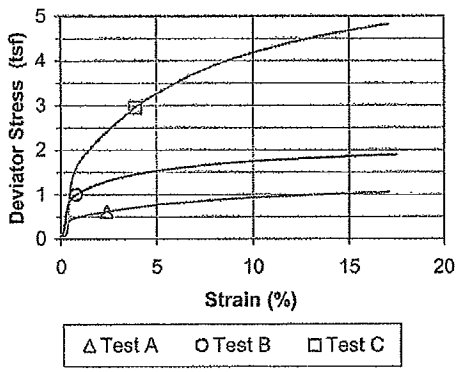
EM 1110-2-1906
Appendix X
30 Nov. 70

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



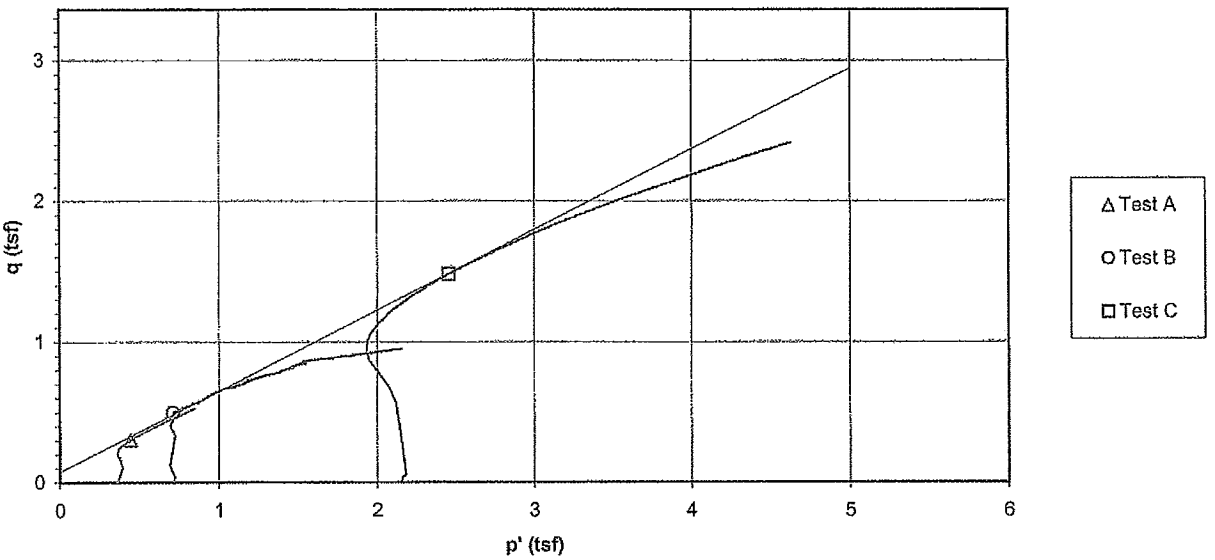
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	22.8	22.0	18.6	
	Dry Density PCF	γ_{d_o}	100.5	103.0	109.1	
	Saturation %	S_o	94.2	97.1	96.5	
	Void Ratio	e_o	0.640	0.599	0.510	
After Shear	Water content %	W_f	21.6	22.9	18.2	
	Dry Density PCF	γ_{d_f}	105.0	102.7	111.2	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.569	0.605	0.482	
	Final Back Pressure TSF	u_c	6.12	5.76	4.32	
Minor Principal Stress TSF		σ_3	0.36	0.72	2.16	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	0.61	0.99	2.95	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	57.7	36.9	186.3	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.881	2.886	2.887	
Initial Height, in.		H_o	6.035	6.041	5.972	

Controlled - Strain Test					
Description of Specimens	Sandy Fat Clay with Gravel (CH), brown, moist, firm				
		Type of Specimen	Undisturbed	Type of test	R
LL 52	PL 18	PI 34	Gs 2.64	Project	JOF-Dupont Dredge Cell
Remarks:					
		Boring No.	DC-5	Sample No.	2
		Depth Elev.	3.1'-3.6', 3.7'-4.2', 8.1'-8.6'		
		Laboratory	Stantec	Date	3-4-10
		TRIAXIAL COMPRESSION TEST REPORT			

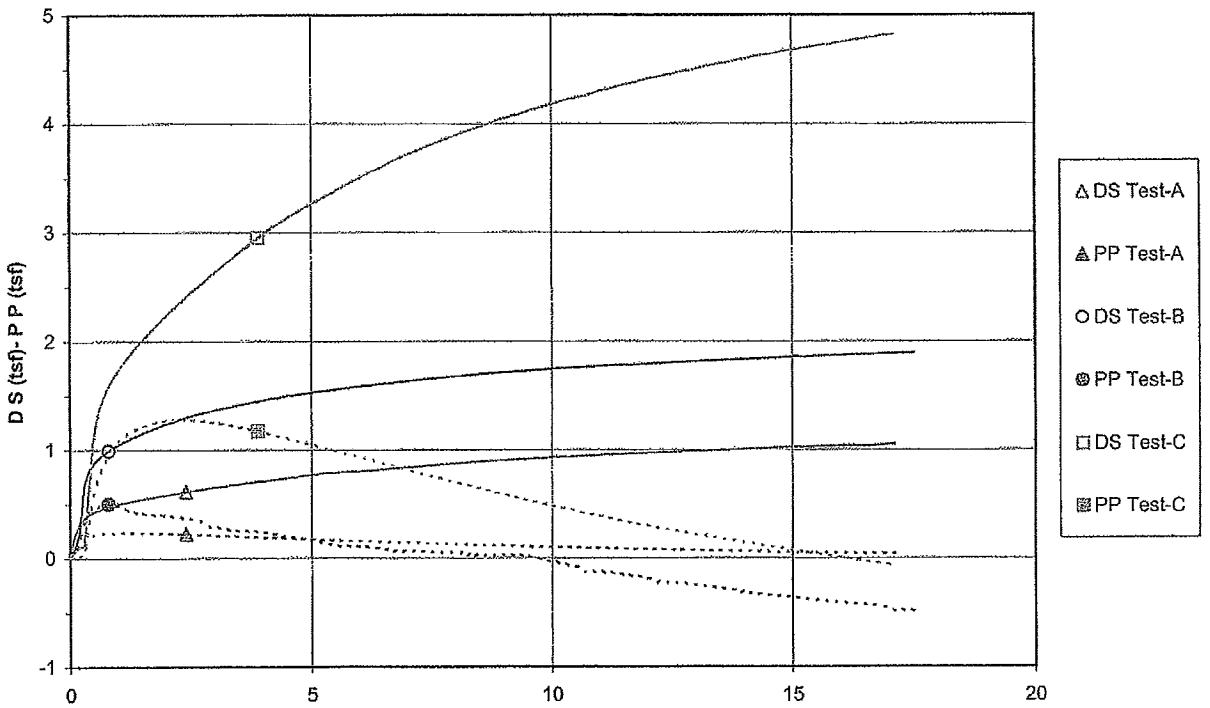
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	JOF-Dupont Dredge Cell	Project No.	172679048
Sample ID	DC-5, 3.1'-3.6' & DC-5, 3.7'-4.2' & C-5, 8.1'-8.6'	Test Number	2
Failure Criterion:	Maximum Effective Principal Stress Ratio	ϕ' = 35.0 deg.	c' = 0.09 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



File: 172679048_cu_2 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-5, 3.1'-3.6'	Test Number	CU-2A
Visual Description	Sandy Fat Clay with Gravel (CH), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-5, 3.0'-5.0'	Date	1-26-2010

Specific Gravity 2.64 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.879	1	6.049	Sample	39.3310 (V_o)	Wet Weight (g)	1274.20
Middle	2.880	2	6.036	Solids	23.9768 (VS_o)	Dry Weight (g)	1037.35
Bottom	2.883	3	6.005	Water	14.4529 (Vw_o)	Wet Unit Weight (pcf)	123.4
Avg.	2.8807 (D_o)	4	6.049	Voids	15.3542 (Vv_o)	Dry Unit Weight (pcf)	100.5
Area (in^2)	6.5174 (A_o)	Avg. (H_o)	6.0348	Degree of Saturation (%)	94.1 (S_o)		
Moisture Content (%)	22.8	Final Trimmings		Void Ratio	0.640		

Saturation

Set Up & Saturated: Wet xx Dry ____ Set up By KDG

Back Pressure Saturated to: 85 (psi) Final Pore Pressure Parameter B 0.98 Date 2-19-10

Panel Board Number F

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1146	Initial	16.24 (in.)	Initial	12.06 (in.)	Specimen Height (in.)	6.0311 (H_s)
Final	0.1183	Final	13.45 (in.)	Final	8.41 (in.)	Area (in^2) Method A	6.5094 (A_s)
Change	-0.0037 (ΔH_o)	Change	-2.79 (in.)	Change	-3.65 (in.)	Specimen Volume (in^3)	39.26 (Vs)

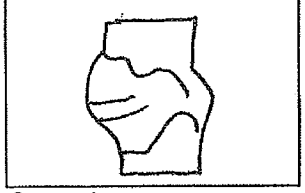
Consolidation

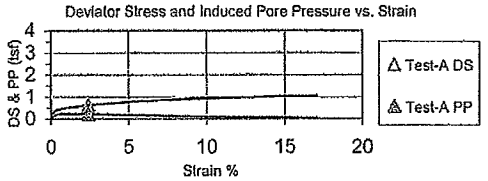
Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1183	Initial	1.47 (in.)	Initial	17.33 (in.)	Chamber	90
Final	0.14	Final	4.66 (in.)	Final	13.83 (in.)	Back	85
Change	-0.0217 (ΔH_c)	Change	-3.19 (in.)	Change	-3.50 (in.)	Lateral	5 (σ_3)
Height (in.)	6.0094 (H_c)			Volume (in^3)	37.6199 (V_c)		
Area (in^3) Method B	6.2602 (A_c)			Volume - Water (in^3)	13.6431 (VWc)	t_{50} (min.)	2.362
Diameter (in.)	2.8233 (D_c)			Water Content (%)	21.6		
Dry Density (pcf)	105.0			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.569

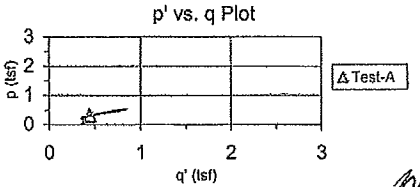
After Test

Final Measurements		Final Moisture Content		Stresses (membrane corrected) at Failure (psi)	
Maximum Diameter	3.403 (in.)	Wet Weight (g)	1260.93	Corrected Deviator	0.61 σ_d (tsf)
Wet weight (g)	1260.93 (WWf)	Dry Weight (g)	1037.35	Major Principal	0.75 $\sigma_1'_f$ (tsf)
Corrected Diameter	3.379 (in.)	Tare Weight (g)	0.00	Minor Principal	0.14 $\sigma_3'_f$ (tsf)
				Rate of Strain (% / min.)	0.047
Youngs Modulus for Membrane (psi)	200			Axial Strain at Failure (%)	2.40
Membrane Thickness (in.)	0.012			Failure Criterion:	Maximum Effective Principal Stress Ratio

Failure Sketch







Comments: ____

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	DC-5, 3.7'-4.2'	Test Number	CU-2B
Visual Description	Sandy Fat Clay with Gravel (CH), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-5, 3.0'-5.0'	Date	1-26-2010

Specific Gravity 2.64 ASTM D854 Method A | Liquid Limit 52 | Plastic Limit 18 | Plasticity Index 34

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in3)		Specimen	
Top	2.889	1	6.048	Sample	39.5169 (V_o)	Wet Weight (g)	1304.40
Middle	2.885	2	6.035	Solids	24.7029 (VS_o)	Dry Weight (g)	1068.76
Bottom	2.884	3	6.033	Water	14.3790 (Vw_o)	Wet Unit Weight (pcf)	125.7
Avg.	2.8860 (D_o)	4	6.048	Voids	14.8140 (Vv_o)	Dry Unit Weight (pcf)	103.0
Area (in^2)	6.5416 (A_o)	Avg. (H_o)	6.0409	Degree of Saturation (%)	97.1 (S_o)		
Moisture Content (%)	22.0	Final Trimmings		Void Ratio	0.600		

Saturation

Set Up & Saturated: Wet xx Dry

Back Pressure Saturated to: 80 (psi) | Final Pore Pressure Parameter B 0.98 | Set up By KDG | Date 2-24-10 | Panel Board Number A

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1584	Initial	15.78 (in.)	Initial	11.23 (in.)	Specimen Height (in.)	6.0440 (H_s)
Final	0.1553	Final	11.75 (in.)	Final	8.94 (in.)	Area (in^2) Method A	6.5483 (A_s)
Change	0.0031 (ΔH_o)	Change	-4.03 (in.)	Change	-2.29 (in.)	Specimen Volume (in^3)	39.58 (V_s)

Consolidation

Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1553	Initial	1.21 (in.)	Initial	17.46 (in.)	Chamber	90
Final	0.1702	Final	3.24 (in.)	Final	15.56 (in.)	Back	80
Change	-0.0149 (ΔH_c)	Change	-2.03 (in.)	Change	-1.90 (in.)	Lateral	10 (σ_3)
Height (in.)	6.0291 (H_c)			Volume (in^3)	39.6438 (V_c)		
Area (in^3) Method B	6.5754 (A_c)			Volume - Water (in^3)	14.9409 (VWc)	t_{50} (min.)	24
Diameter (in.)	2.8935 (D_c)			Water Content (%)	22.9		
Dry Density (pcf)	102.7			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.605

After Test

Final Measurements		Final Moisture Content	
Maximum Diameter	3.477 (in.)	Wet Weight (g)	1313.61
Wet weight (g)	1313.61 (WWf)	Dry Weight (g)	1068.76
Corrected Diameter	3.453 (in.)	Tare Weight (g)	0.00

Stresses (membrane corrected) at Failure (psi)

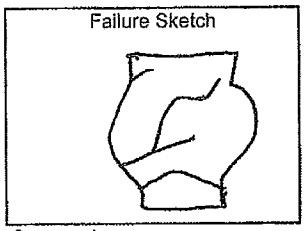
Corrected Deviator	0.99 σ_d (tsf)
Major Principal	1.21 $\sigma_1'_f$ (tsf)
Minor Principal	0.22 $\sigma_3'_f$ (tsf)
Rate of Strain (% / min.)	0.021
Axial Strain at Failure (%)	0.80

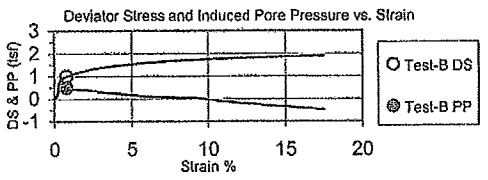
Youngs Modulus for Membrane (psi) 200

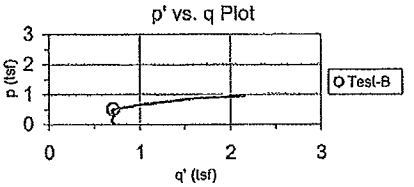
Membrane Thickness (in.) 0.012

Failure Criterion: Maximum Effective Principal Stress Ratio

Failure Sketch







Comments:

Consolidated Undrained Triaxial Test

ASTM D4767-04

Project Name	JOF-Dupont Dredge Cell	Project Number	172679048
Sample Identification	C-5, 8.1'-8.6'	Test Number	CU-2C
Visual Description	Lean Clay (CL), brown, moist, firm	Prepared By	CSM
Undisturbed	Source DC-5, 8.0'-10.0'	Date	1-26-2010

Specific Gravity 2.64 ASTM D854 Method A Liquid Limit N/A Plastic Limit N/A Plasticity Index N/A

Initial Specimen Data

Specimen Diameter (in.)		Specimen Height (in.)		Volumes (in^3)		Specimen	
Top	2.880	1	5.975	Sample	39.0729 (V_o)	Wet Weight (g)	1328.5
Middle	2.889	2	5.983	Solids	25.8803 (VS_o)	Dry Weight (g)	1119.70
Bottom	2.890	3	5.954	Water	12.7410 (Vw_o)	Wet Unit Weight (pcf)	129.5
Avg.	2.8863 (D_o)	4	5.975	Voids	13.1926 (Vv_o)	Dry Unit Weight (pcf)	109.2
Area (in^2)	6.5431 (A_o)	Avg. (H_o)	5.9716	Degree of Saturation (%)	96.6 (S_o)		
Moisture Content (%)	18.6	Final Trimmings		Void Ratio	0.510		

Saturation

Set Up & Saturated: Wet xx Dry ____ Set up By KDG

Back Pressure Saturated to: 60 (psi) Final Pore Pressure Parameter B 0.95 Date 2-24-10

Panel Board Number F

Height Readings (in.)		Back Pressure Burette		Chamber Burette			
Initial	0.1151	Initial	15.83 (in.)	Initial	12.26 (in.)	Specimen Height (in.)	5.9704 (H_s)
Final	0.1163	Final	12.96 (in.)	Final	10.17 (in.)	Area (in^2) Method A	6.5405 (A_s)
Change	-0.0012 (ΔH_o)	Change	-2.87 (in.)	Change	-2.09 (in.)	Specimen Volume (in^3)	39.05 (V_s)

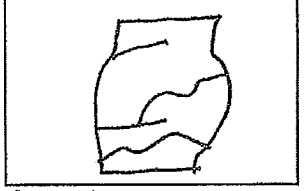
Consolidation

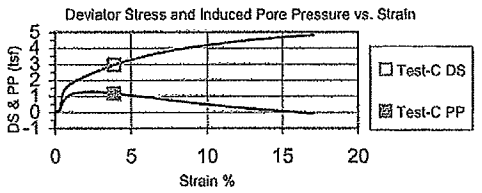
Height Readings (in.)		Back Pressure Burette Readings		Chamber Burette Readings		Pressures (psi)	
Initial	0.1163	Initial	1.42 (in.)	Initial	17.39 (in.)	Chamber	90
Final	0.1739	Final	9.29 (in.)	Final	8.44 (in.)	Back	60
Change	-0.0576 (ΔH_c)	Change	-7.87 (in.)	Change	-8.95 (in.)	Lateral	30 (σ_3)
Height (in.)	5.9128 (H_c)			Volume (in^3)	38.3431 (V_c)		
Area (in^3) Method B	6.4847 (A_c)			Volume - Water (in^3)	12.4628 (VWc)	t_{50} (min.)	77
Diameter (in.)	2.8734 (D_c)			Water Content (%)	18.2		
Dry Density (pcf)	111.2			Degree of Saturation (%)	100.0 (S_c)	Void Ratio	0.482

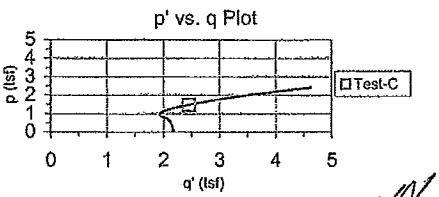
After Test

Final Measurements		Final Moisture Content		Stresses (membrane corrected) at Failure (psi)	
Maximum Diameter	3.323 (in.)	Wet Weight (g)	1323.94	Corrected Deviator	2.95 σ_d (tsf)
Wet weight (g)	1323.94 (WWf)	Dry Weight (g)	1119.70	Major Principal	3.94 $\sigma_1'_f$ (tsf)
Corrected Diameter	3.299 (in.)	Tare Weight (g)	0.00	Minor Principal	0.98 $\sigma_3'_f$ (tsf)
				Rate of Strain (% / min.)	0.020
Youngs Modulus for Membrane (psi)	200			Axial Strain at Failure (%)	3.90
Membrane Thickness (in.)	0.012			Failure Criterion: Maximum Effective Principal Stress Ratio	

Failure Sketch







Comments: ____

Appendix E

Results of Slope Stability

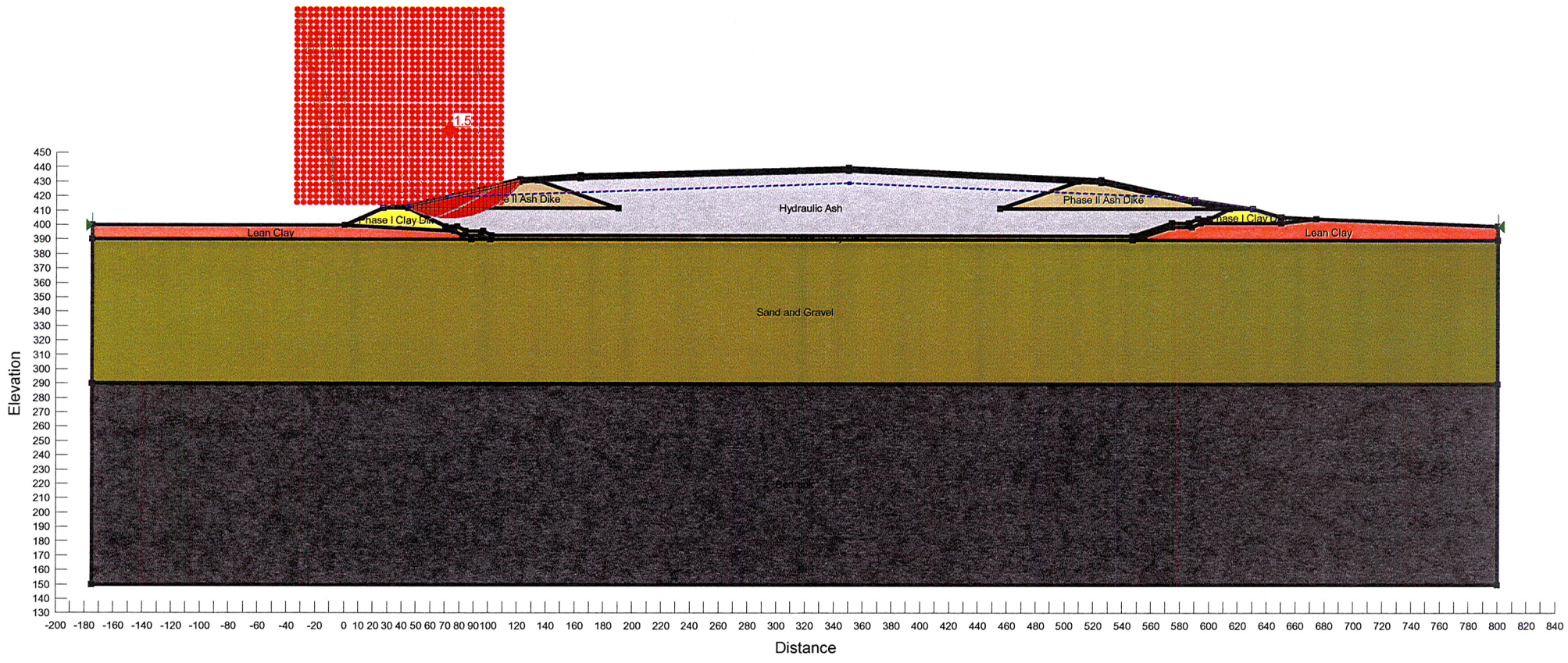
- Cross-Section A-A’
- Cross-Section B-B’

Cross Section A-A’
Existing Conditions

Stability Analysis at Section A-A' WS DF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

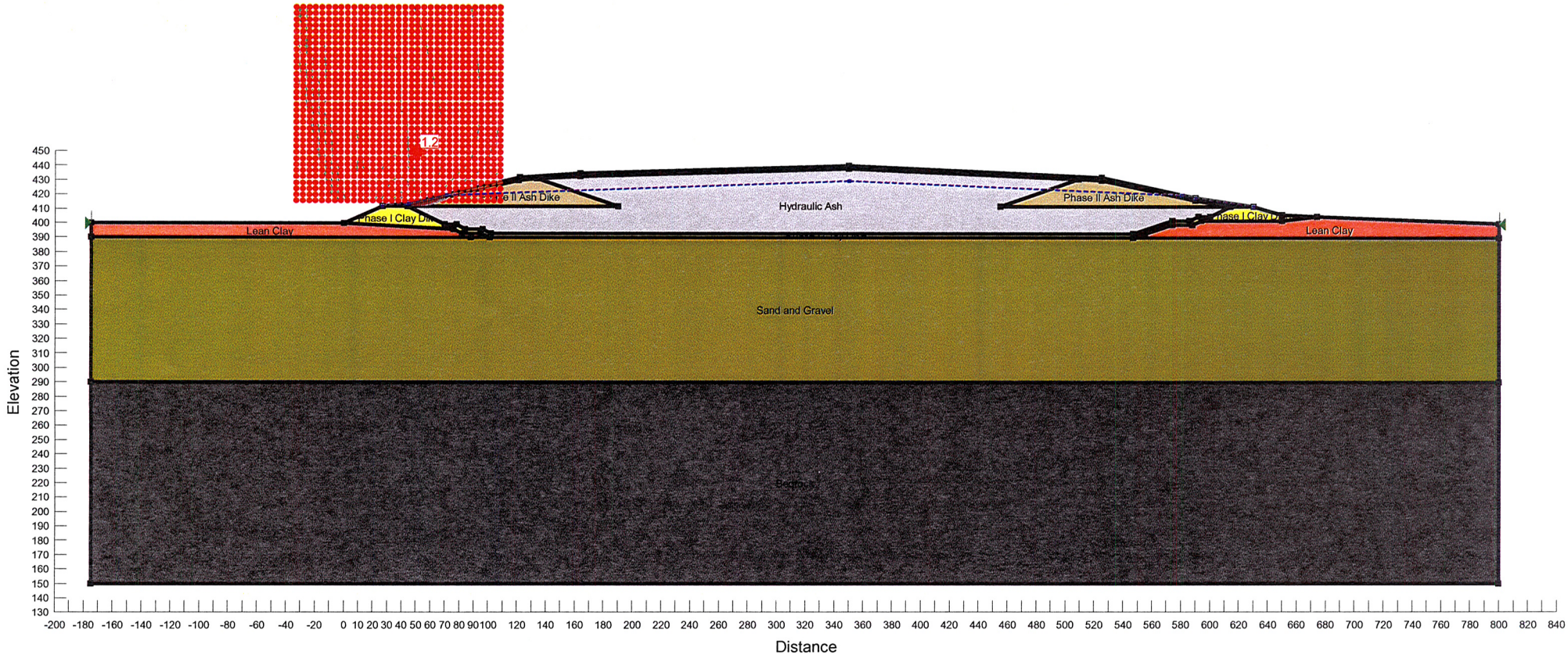
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' WS SF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

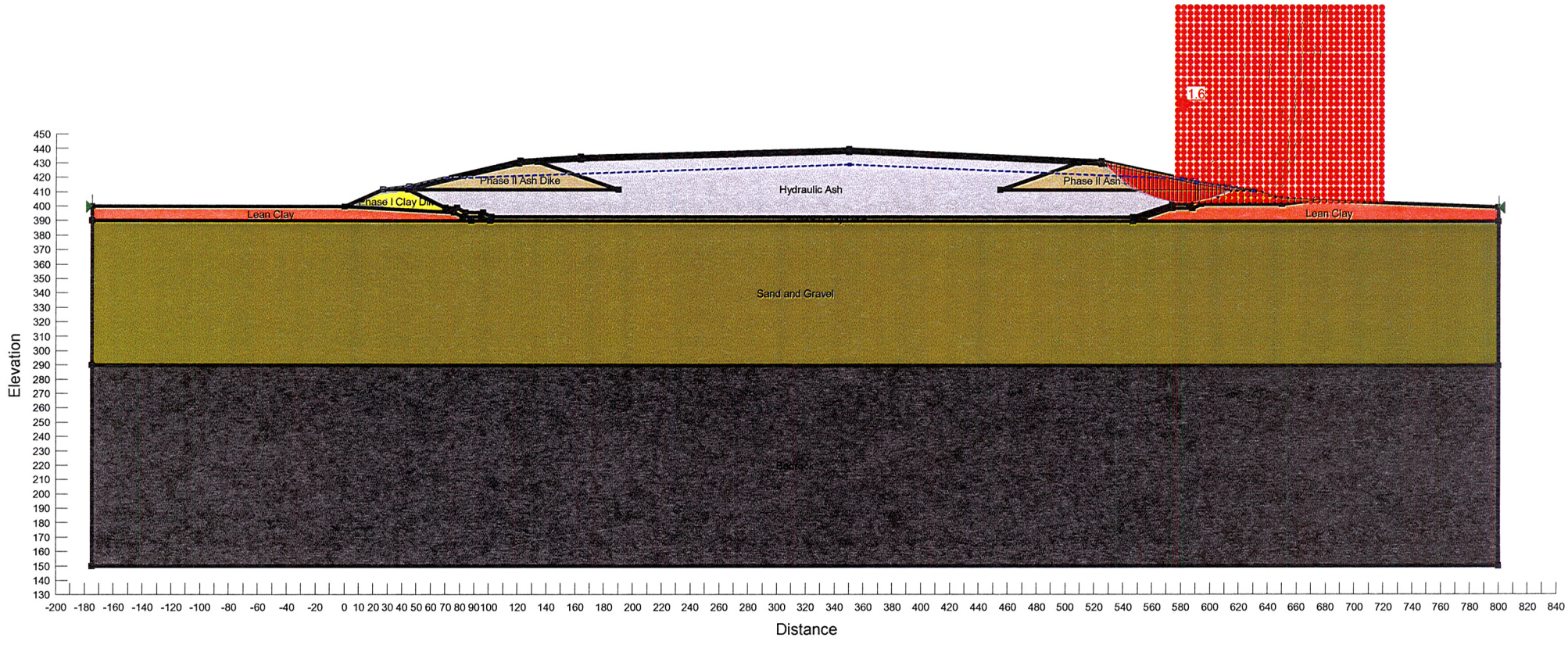
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' ES DF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

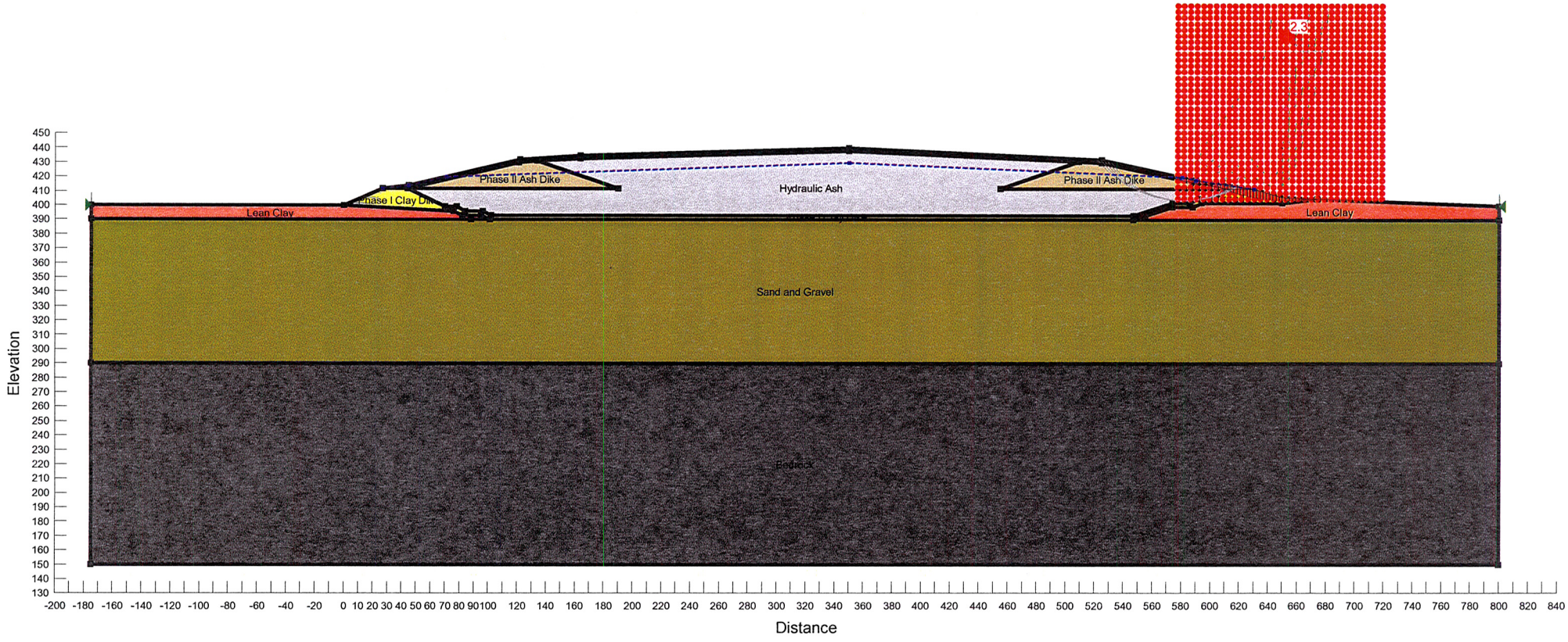
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' ES SF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

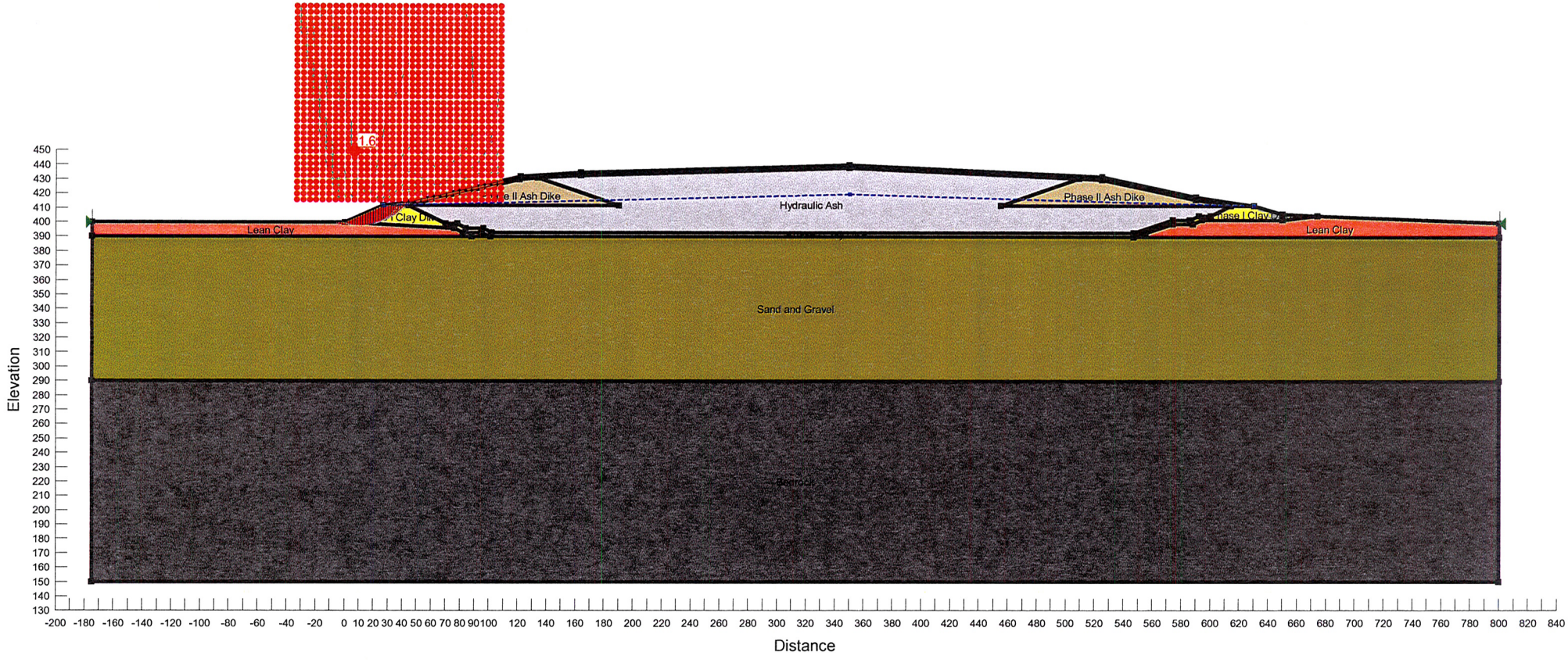
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' WS DF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

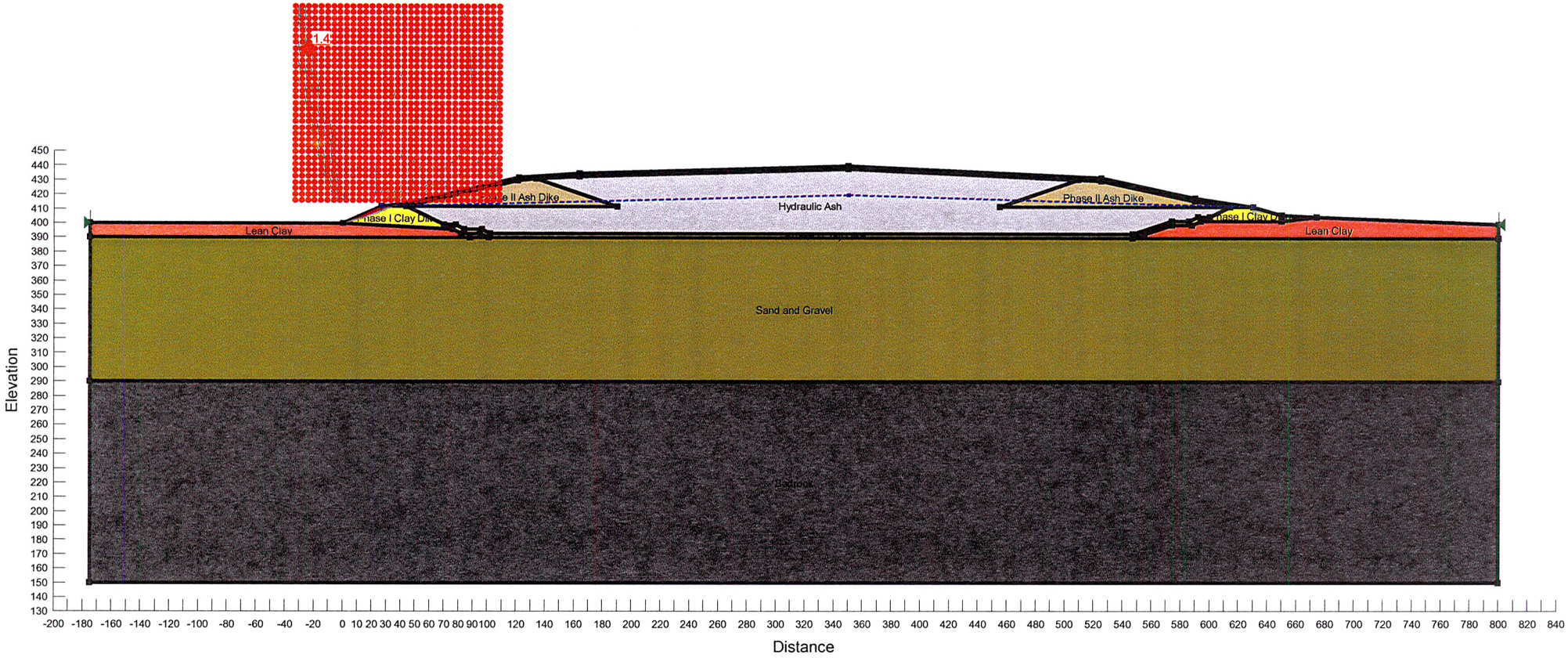
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' WS SF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

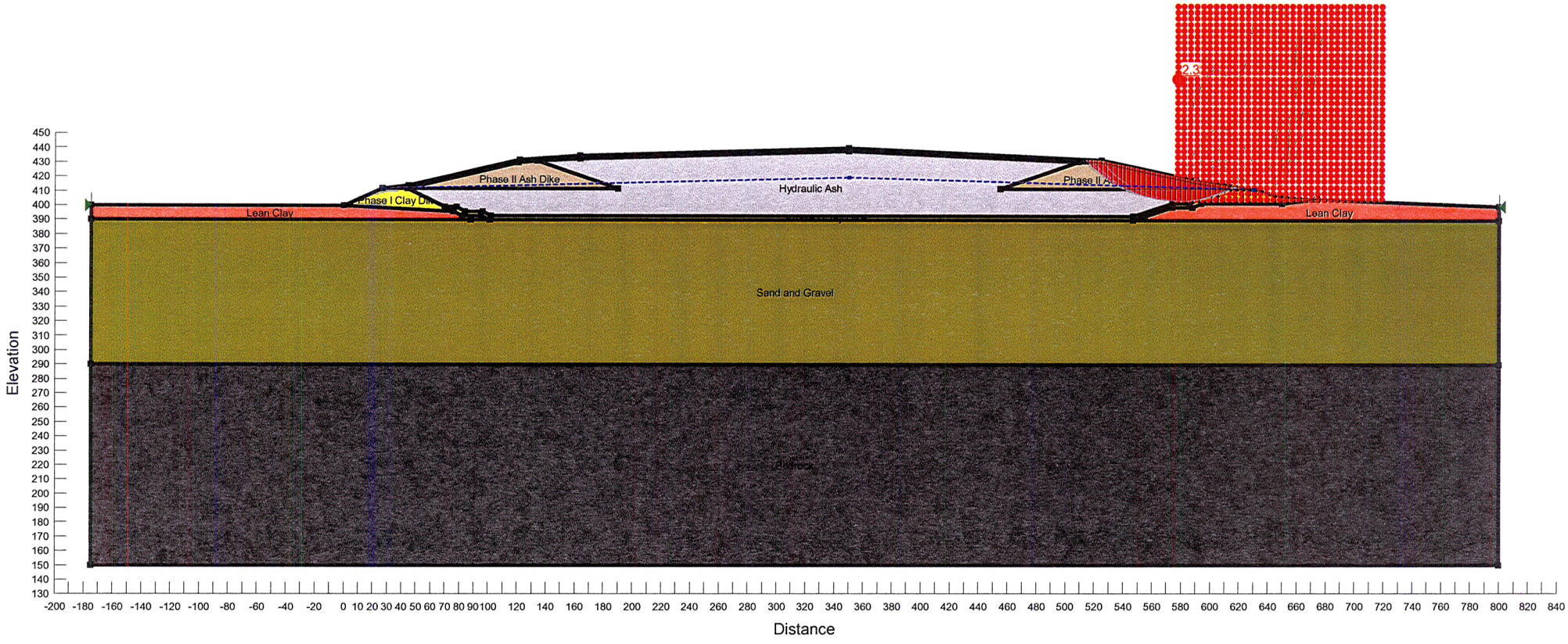
Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' ES DF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

Note:
The results of this analysis are based on available subsurface information, field and laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Sat. Unit Wt.	Cohesion	Friction Angle
Phase I Clay Dike	125 pcf	0 psf	30 °
Phase II Ash Dike	110 pcf	0 psf	27 °
Hydraulic Ash	105 pcf	0 psf	25 °
Lean Clay	120 pcf	0 psf	28 °
Sand and Gravel	130 pcf	0 psf	35 °
Clay Cap	115 pcf	0 psf	28 °



Stability Analysis at Section A-A' ES SF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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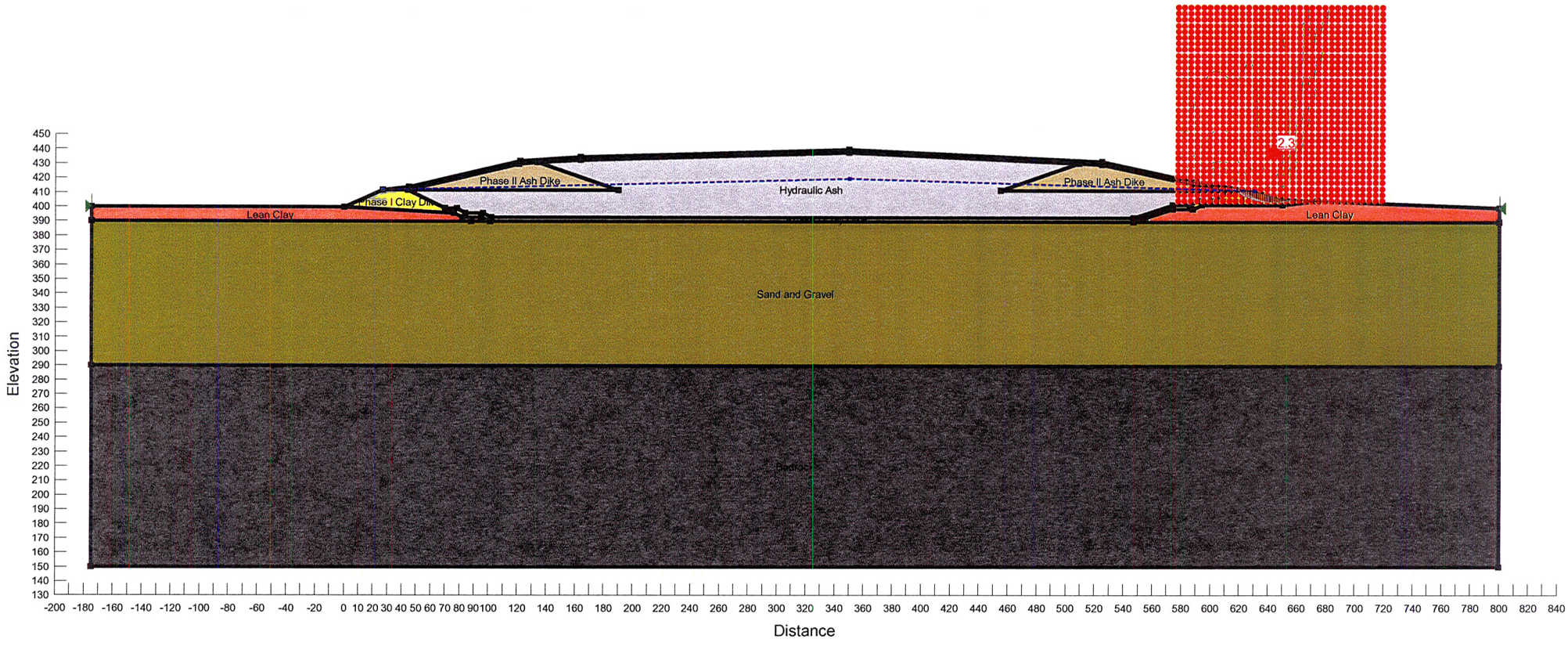

Cross Section B-B’
Existing Conditions

Slope Stability Analysis at Section B-B' DF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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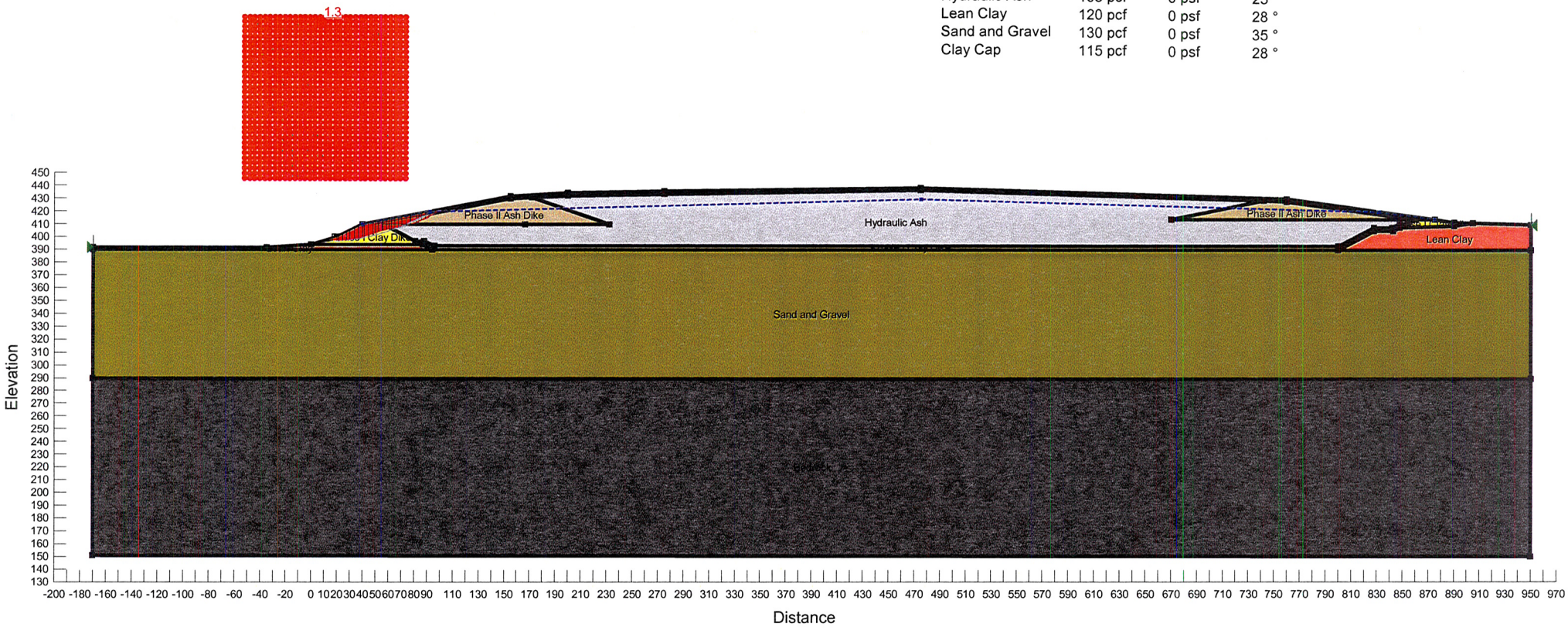

Slope Stability Analysis at Section B-B' SF
At High Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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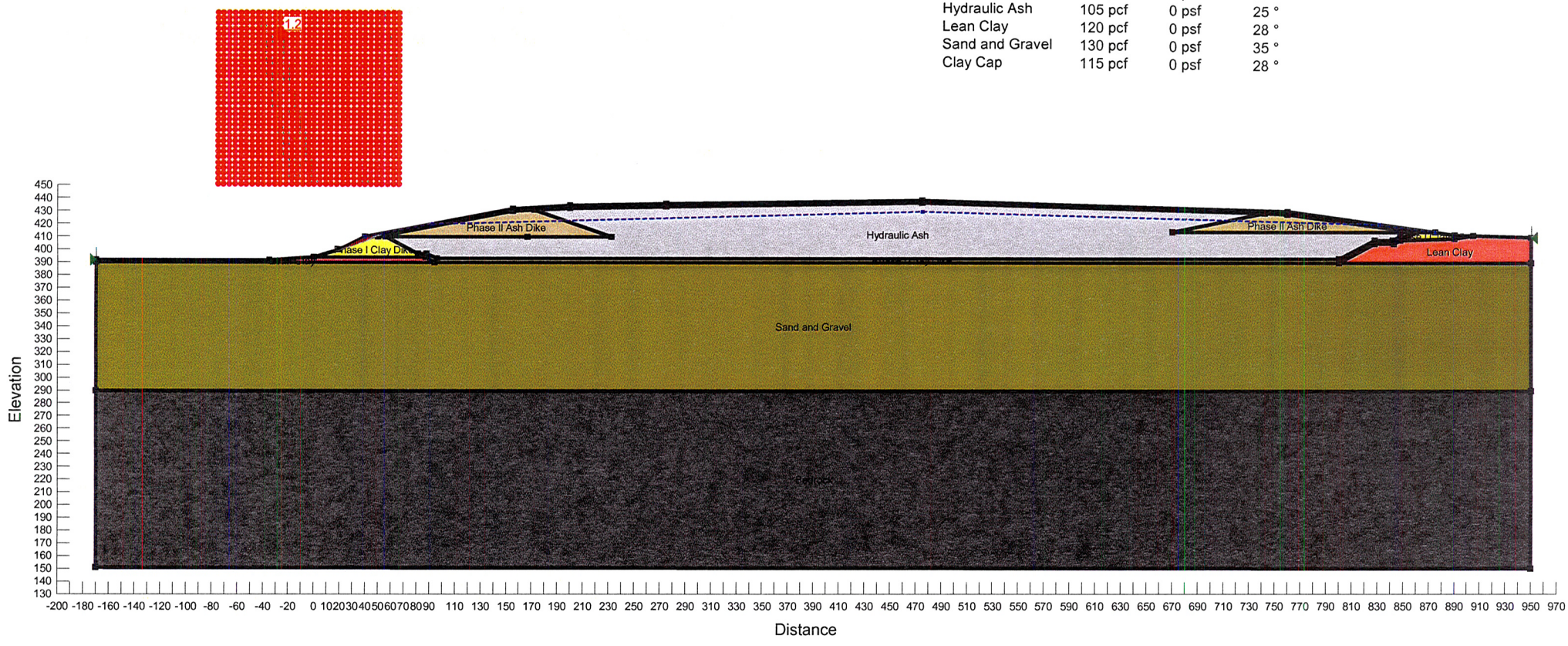

Slope Stability Analysis at Section B-B' DF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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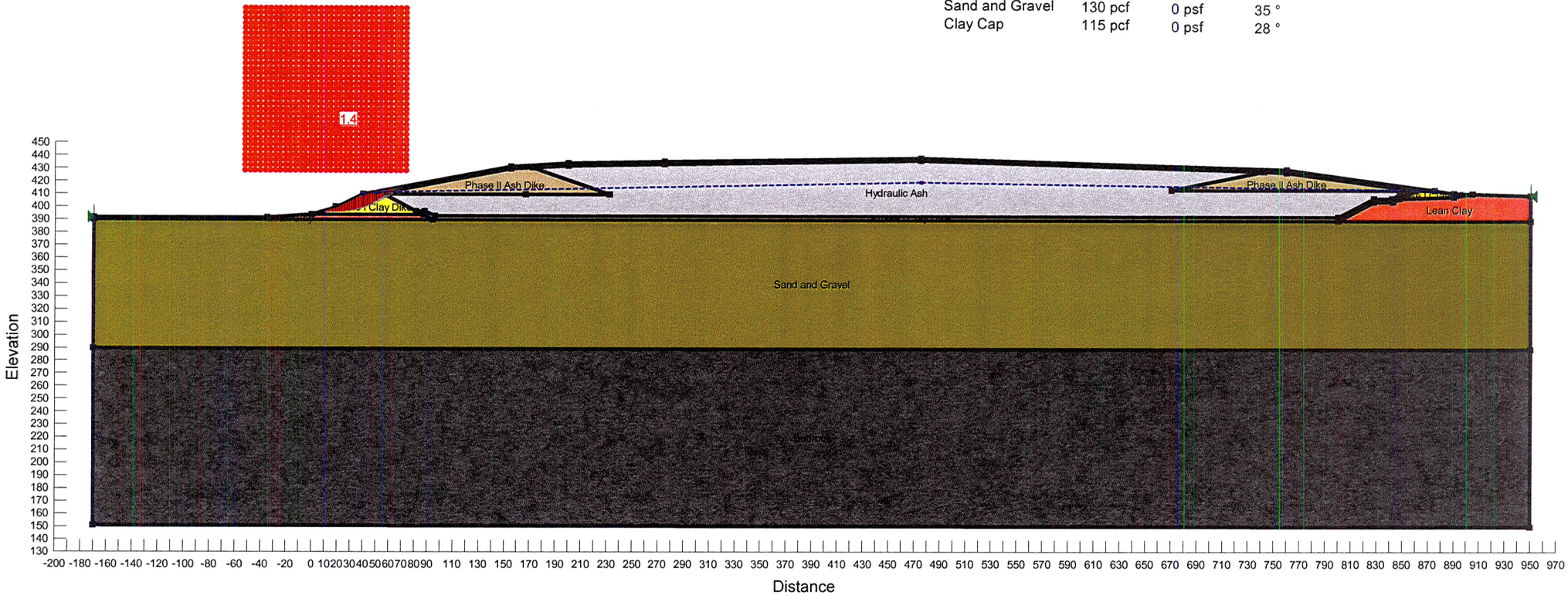

Slope Stability Analysis at Section B-B' SF
At Low Water Level
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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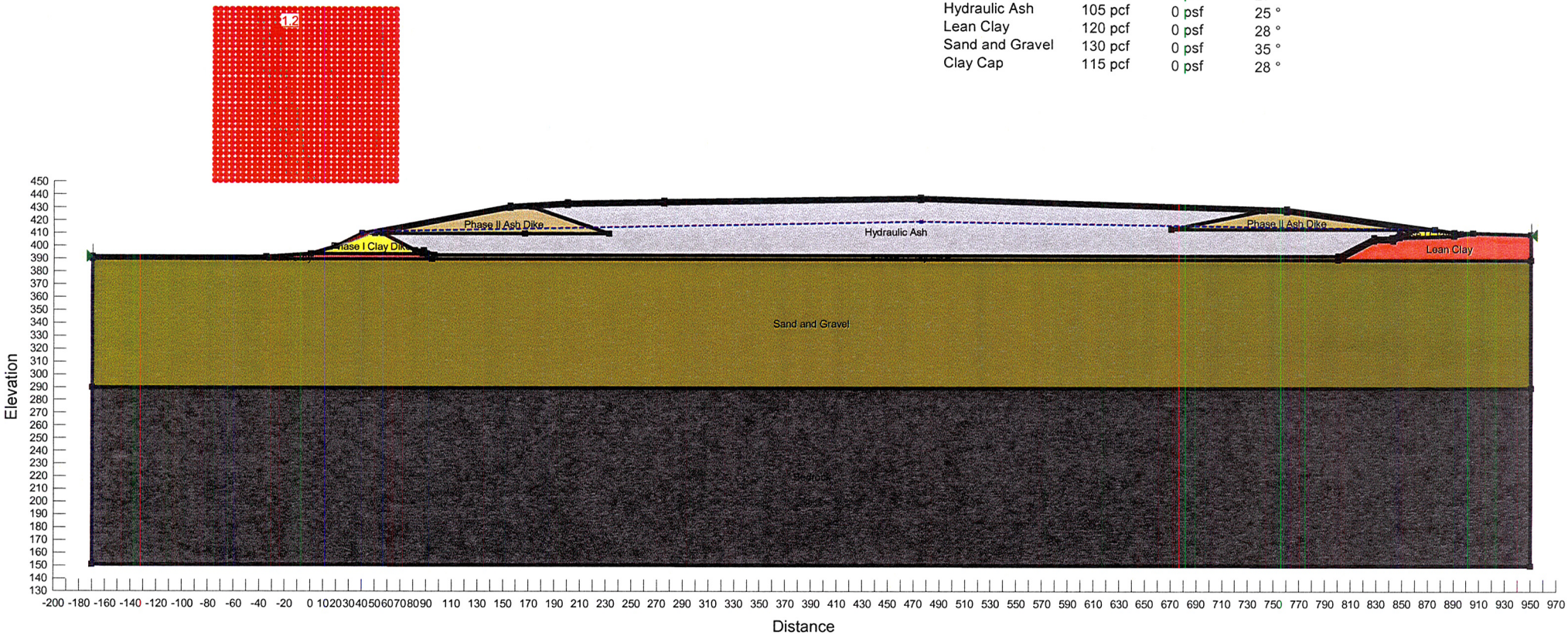

Cross Section A-A’
With Improved Cap

Stability Analysis at Section A-A' WS DF
With Improved Cap
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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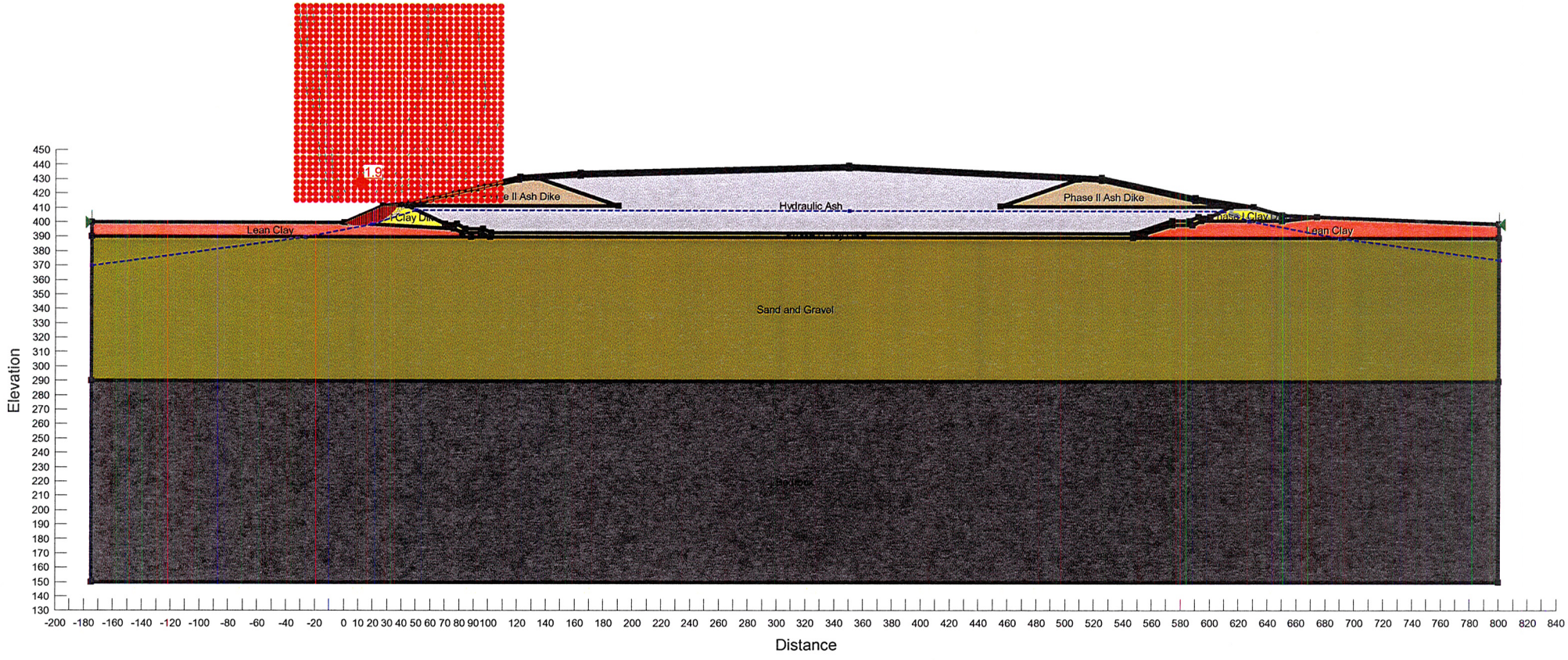

Stability Analysis at Section A-A' WS SF
With Improved Cap
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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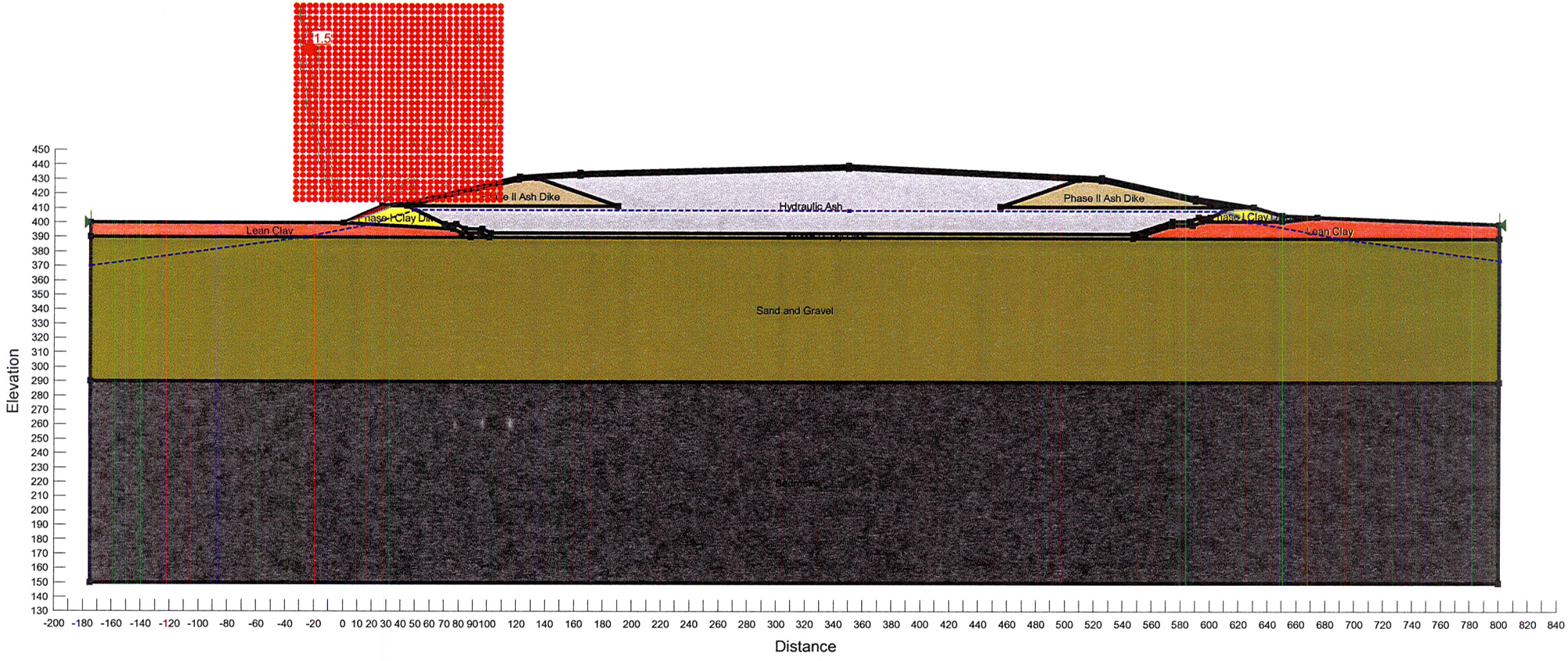

Stability Analysis at Section A-A' ES DF
With Improved Cap
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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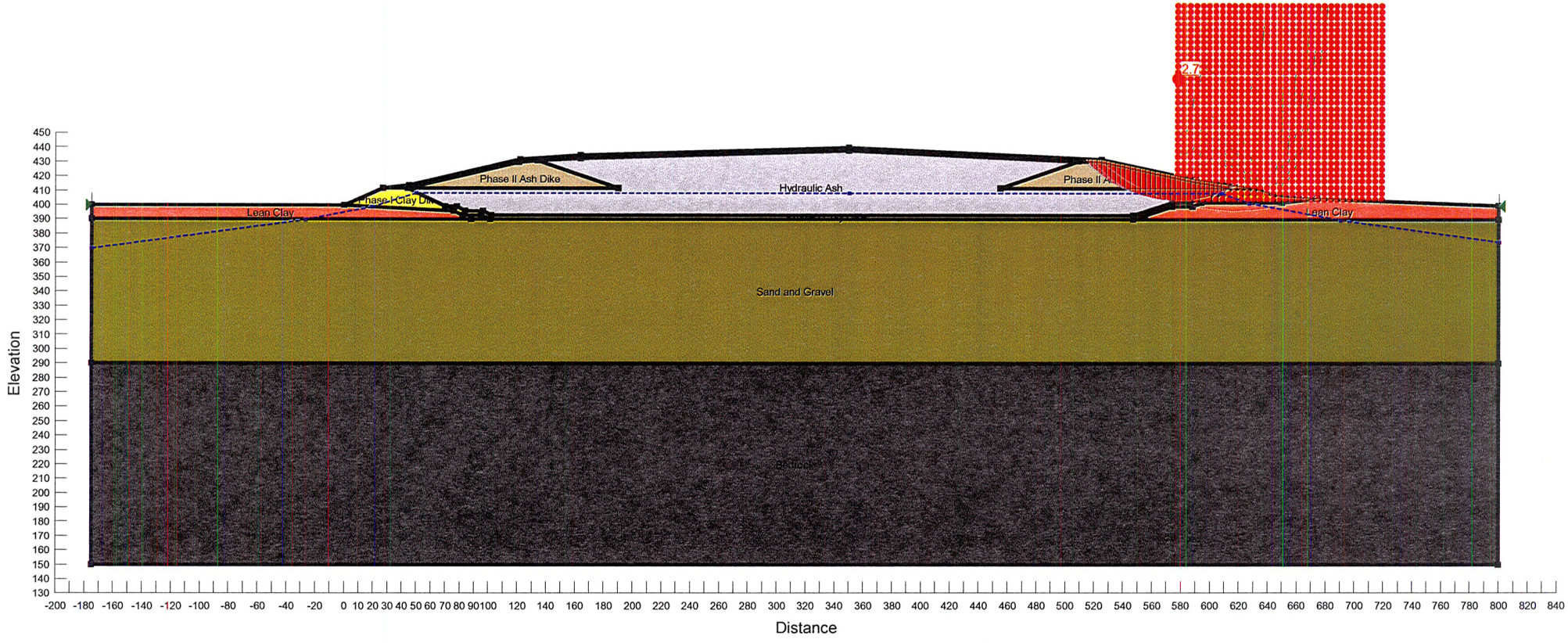

Stability Analysis at Section A-A' ES SF
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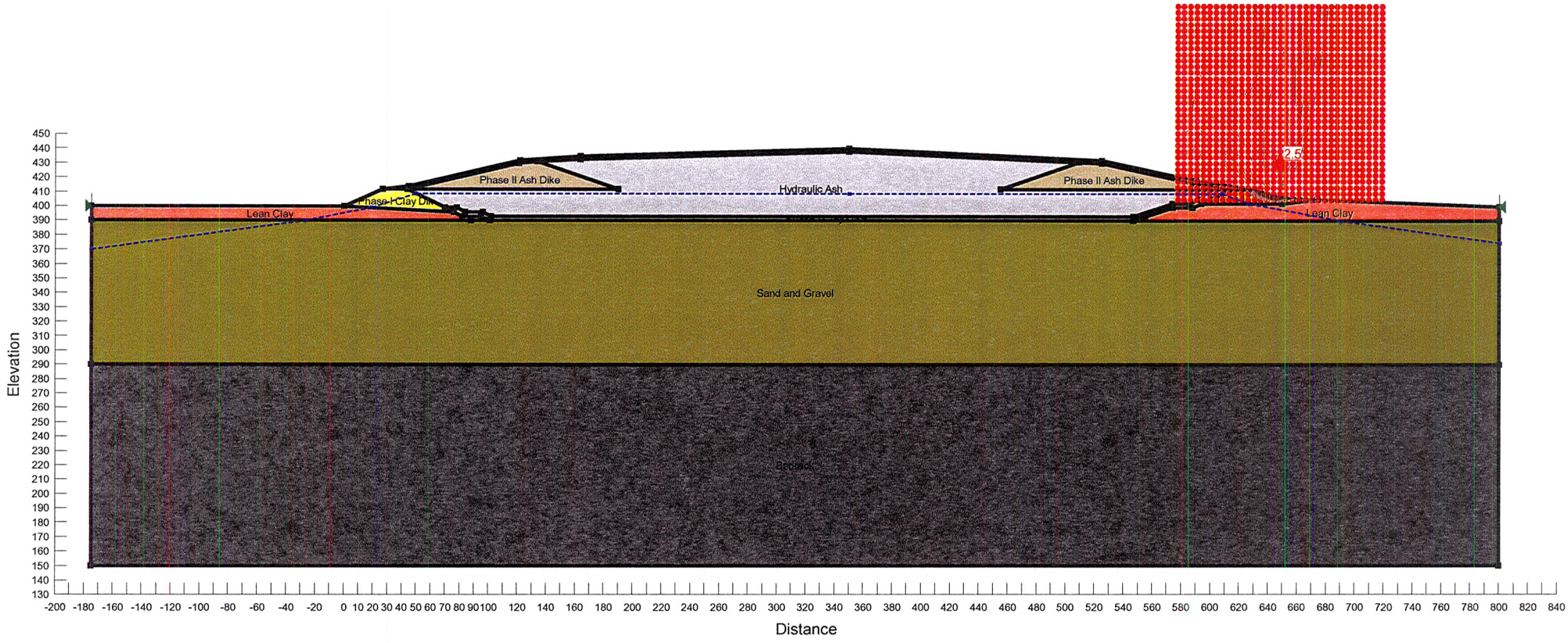

Cross Section B-B’
With Improved Cap

Slope Stability Analysis at Section B-B' DF
With Improved Cap
DuPont Road Dredge Cell
Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

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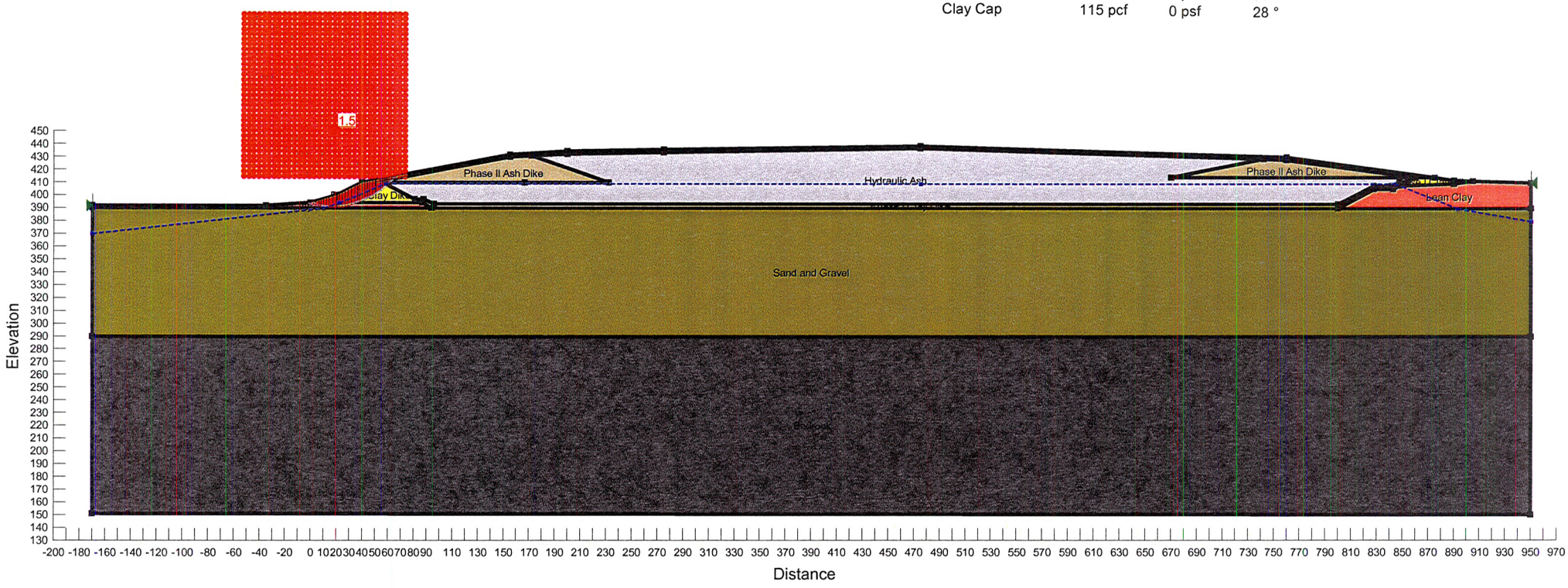

Slope Stability Analysis at Section B-B' SF
With Improved Cap
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