Geotechnical Base Line Report Port Access Road North Charleston, South Carolina S&ME Project No. 1131-08-554



Prepared for:
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Prepared by:
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July 21, 2015



July 21, 2015

SCDOT 955 Park Street Columbia, South Carolina

Attention: Mr. Trapp Harris, P.E.

Reference: Geotechnical Base Line Report

Port Access Road

North Charleston, South Carolina S&ME Project No. 1131-08-554

Dear Mr. Harris:

We have completed our geotechnical services for the Port Access Road project. Our services were performed in general accordance with our Agreement and Contract dated July 21, 2008. The purpose of our services was to explore the subsurface conditions along the proposed alignment and evaluate the subsurface conditions relative to the general support of embankments and bridges. This report presents an overview of the project information; describes the scope of our geotechnical exploration; presents a summary of the field testing, laboratory testing, and subsurface conditions; and presents a preliminary evaluation of geotechnical considerations.

We appreciate the opportunity to be of service to SCDOT for this important project. If you have any questions concerning this working draft report, please call.

Sincerely,

S&ME, Inc.

Kyle L. Murrell, P.E.

Project Engineer



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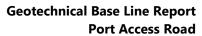
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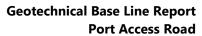




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Appendix I – Boring Coordinates and Elevations

Appendix II – Boring and Sounding Records

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Appendix III - Laboratory Test Data

Appendix IV – IDW Environmental Characterization Parameters; Charleston Naval Complex LUC Area Construction Permit; City of North Charleston Encroachment Permit

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Executive Summary

This summary is presented for the convenience of the reader and is not intended as a substitute for careful study of the data contained in this report.

- The objective of this exploration was to collect and summarize geotechnical data along the
 proposed Port Access Road alignment. The SCDOT will provide these data as part of the design
 build Request for Proposals to be issued at a later date. One boring was extended to a depth of
 800 ft to obtain downhole geologic seismic data.
- 2. The project site is an urban, industrial area that has been developed for many decades. Underground obstructions were encountered in some borings, and some project areas explored are previously or currently contaminated hazardous materials sites.
- 3. Field exploration consisted of 84 borings and soundings taken to depths from 30 to 120 ft with one of the borings drilled to a depth of 800 ft. Downhole and non-intrusive geophysical testing was also performed. Intrusive exploration and testing included standard penetration test soil borings, cone penetration test soundings, seismic cone penetration test soundings, Marchetti dilatometer soundings, gamma and spontaneous potential logging, and P-S suspension logging. Non-intrusive geophysical testing included Multi-Channel Analysis of Surface Waves and Microtremor Array Measurements at five test locations.
- 4. Soil samples recovered from the field exploration were subject to laboratory testing including basic and index property tests. Engineering property testing included consolidation, triaxial shear, direct shear, resonant column, and torsional shear testing.
- 5. The project site is located within the outer Atlantic Coastal Plain Physiographic province. The upper sediments are composed of Quaternary Period deposits of Recent to Pleistocene age and underlain by Tertiary Period marl deposits.
- 6. Sandy soils consisting of artificial fills, clean dune sands, and clayey or silty terrace sands lie at the surface over nearly all of the alignment. The sands are quite variable in thickness and composition. Within the former naval base and along portions of I-26, these soils are mostly less than 5-ft thick. Between Spruill Avenue and Shipyard Creek, the sands form nearly the entire profile down to the marl, approaching 40 ft in thickness. The lower portions of these soils are particularly variable, consisting in many cases of thinly to thickly interbedded loose sands, soft or very soft silts and clays, and shell. Substantial portions of the alignment, particularly east of Shipyard Creek within the grounds of the former naval base, are mostly underlain by very soft alluvial or marsh silts that reach thicknesses as great as 60 ft. Similar soils are present within the general area of the I-26 interchange. Elsewhere, these soft sediments appear to thin or become absent. Depth to the upper contact of the marl varied from about 40 ft to deeper than 60 ft along the alignment, with the deeper sections seeming to correspond to areas of deep, soft silts referenced above.
- **7.** Groundwater was encountered at a median depth of approximately 2 ft below the ground surface, which corresponds to a median elevation of 7 ft-NAVD88.
- **8.** The majority of the soils between the water table and the Cooper marl will be susceptible to shear strength loss under seismic loading.
- 9. The global stability analyses of the embankments along most of the ramps indicate a factor of safety (FOS) greater than 1.3 under static conditions. Most of the ramps have a FOS less than 1.1 under psuedo-static conditions. The yield acceleration ranged from 0.12 to 0.27g. Liquefaction

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stability analyses were beyond the scope of this project. Construction of Main Line 1D and the Tidewater Road Access on the former Navy Base site will pose significant challenges. A combination of staged construction, slope reinforcement, wick drains, and possibly other forms of ground improvement will be useful to reduce long-term settlement, bearing capacity failures, and global instability under embankments constructed on the former Navy Base.

- 10. Undercutting and subgrade reinforcement will help embankment construction along low-lying portions of the ramps, particularly where they cross existing or formerly filled marshy areas.
- 11. Depending on the construction settlement, a combination of wick drains and surcharging may be required for the bridge approach embankment at Ramp B near Station 58+20, Ramp C near Station 58+42, Ramp G near Station 57+89, and all of Main Line 1D east of Shipyard Creek on the former Navy Base to limit post-construction settlement to less than 5 in. Depending on the construction schedule, the bridge approach embankment on the former Navy Base may require some additional form of ground improvement to limit post-construction settlement.

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1.0 Introduction

1.1 Objectives of Exploration

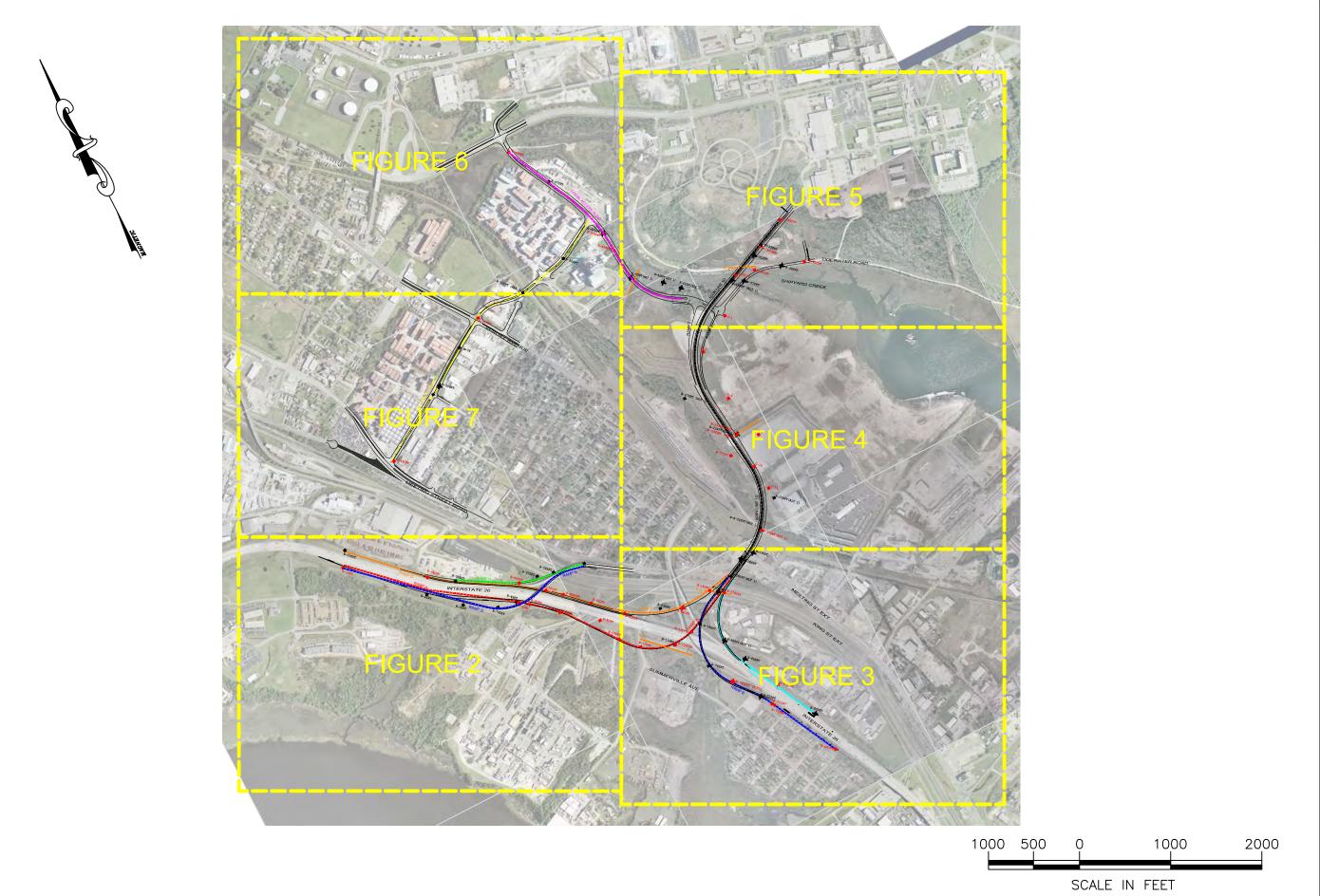
The objective of this exploration was to collect and summarize geotechnical data along the proposed Port Access Road alignment. The SCDOT will provide these data as part of the design build Request for Proposals to be issued at a later date. Included in the proposed exploration is one 800-ft deep geologic boring that will serve to improve the understanding of deeper geology in the Charleston area for geotechnical earthquake engineering.

1.2 Site Description and Proposed Development

Planning for the project is in the preliminary stages, and as of the date of this report, there are no definite distinctions between bridge and roadway sections. The proposed alignment was indicated on the map provided to us by SCDOT and shown on a reduced size plot of the Test Location Plan Details presented as Figure 1-1. The Test Location Plan is also presented full size in Appendix I. The alignment and test locations are also shown in Figure 1-2 through Figure 1-7. Plans for the proposed development are not final, though in discussions with Mr. Chris Gaskins of the SCDOT, we have developed the following general understanding of the project elements. In addition, we have reviewed the roadway feasibility study prepared by Parson Brinkerhoff and presented as part of the final project EIS in Appendix W ARFS and Supplemental Report. This information was downloaded from www.porteis.com.

The project is located in North Charleston, South Carolina. The proposed Port Access Road will provide direct access to the new container terminal under construction at the former Charleston Naval Base. The northern end of the project along I-26 is near the North Meeting Street exit and continues to approximately 1000 ft south of the Spruill Avenue exit. The proposed road will cross over North Meeting Street, King Street Extension, and Spruill Avenue. The alignment then turns north as it parallels the western boundary of the former Macalloy site and then crosses Shipyard Creek to connect to the former Naval Base. A local access road will connect Bainbridge Avenue to the main alignment and will follow a route along Shipyard Creek behind the Charleston Resource Recovery incinerator and behind a container storage area.

Much of the proposed road consists of elevated structure that crosses I-26, several urban streets, two rail lines, marsh areas, and Shipyard Creek. Although the final profile has not been established, we understand that embankments up to 20 ft high could be necessary in some areas. No major cut areas are planned at this time; therefore, off-site fill will be required to construct most embankments.



TEST LOCATION PLAN DETAILS PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA

-08-554

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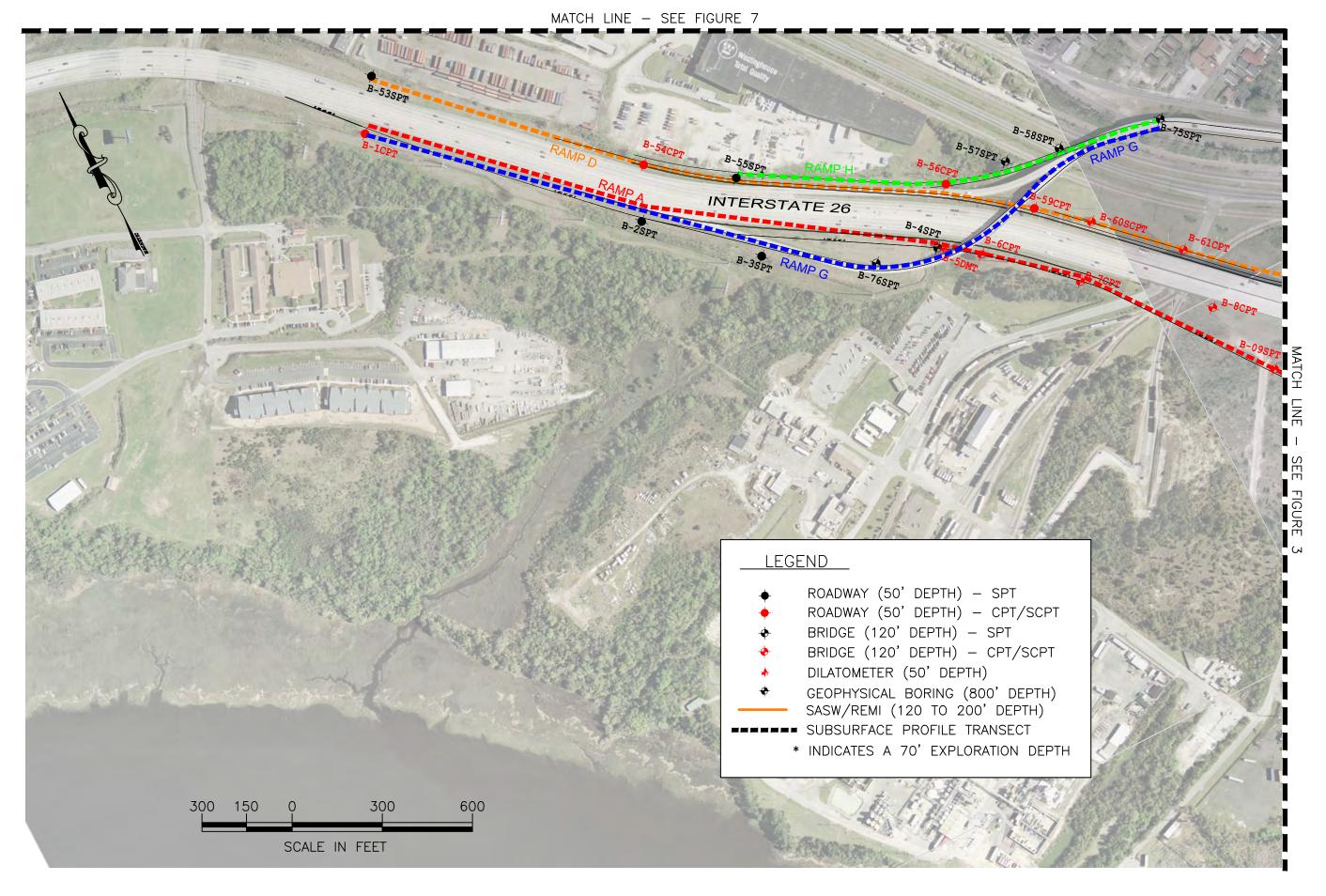
PROJECT NO.

S&ME

ENGINE TESTING FUNDONMENTAL SERVICES

SCALE:
AS SHOWN
PROJECT NO.
1131-08-554
DRAWN BY:
LAJ
APPROVED BY:
DWH
DATE:
4-07-09

FIGURE NO. 1-1



TEST LOCATION PLAN SOUTHWEST PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA

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PROJECT NO. 1131-08-554

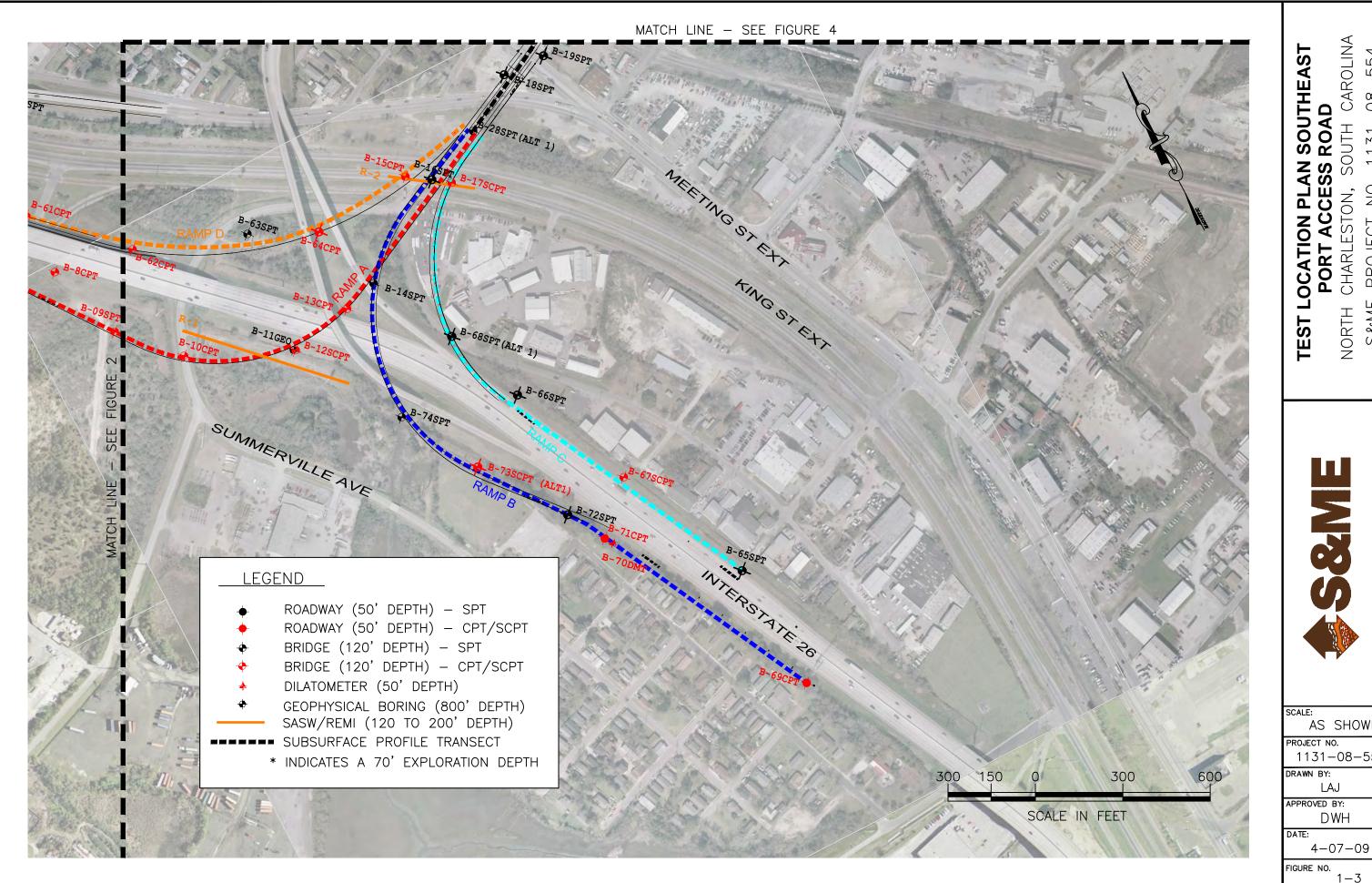
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DATE: 4-07-09

FIGURE NO.

1-2



CAROLINA TEST LOCATION PLAN SOUTHEAST PORT ACCESS ROAD SOUTH

9 CHARLESTON, **PROJECT** S&ME NORTH

554

-08

AS SHOWN PROJECT NO. 1131-08-554 DRAWN BY: LAJ APPROVED BY: DWH

FIGURE NO. 1 - 3

TEST LOCATION PLAN EAST PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA S&ME PROJECT NO. 1131-08-554

S&ME

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AS SHOWN
PROJECT NO.

PROJECT NO. 1131-08-554

DRAWN BY: LAJ

APPROVED BY:

ATE: 4-07-09

FIGURE NO.

TEST LOCATION PLAN NORTHEAST PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA

S&ME PROJECT NO. 1131—

SEME SEME

SCALE: AS SHOWN

PROJECT NO. 1131-08-554

DRAWN BY: LAJ

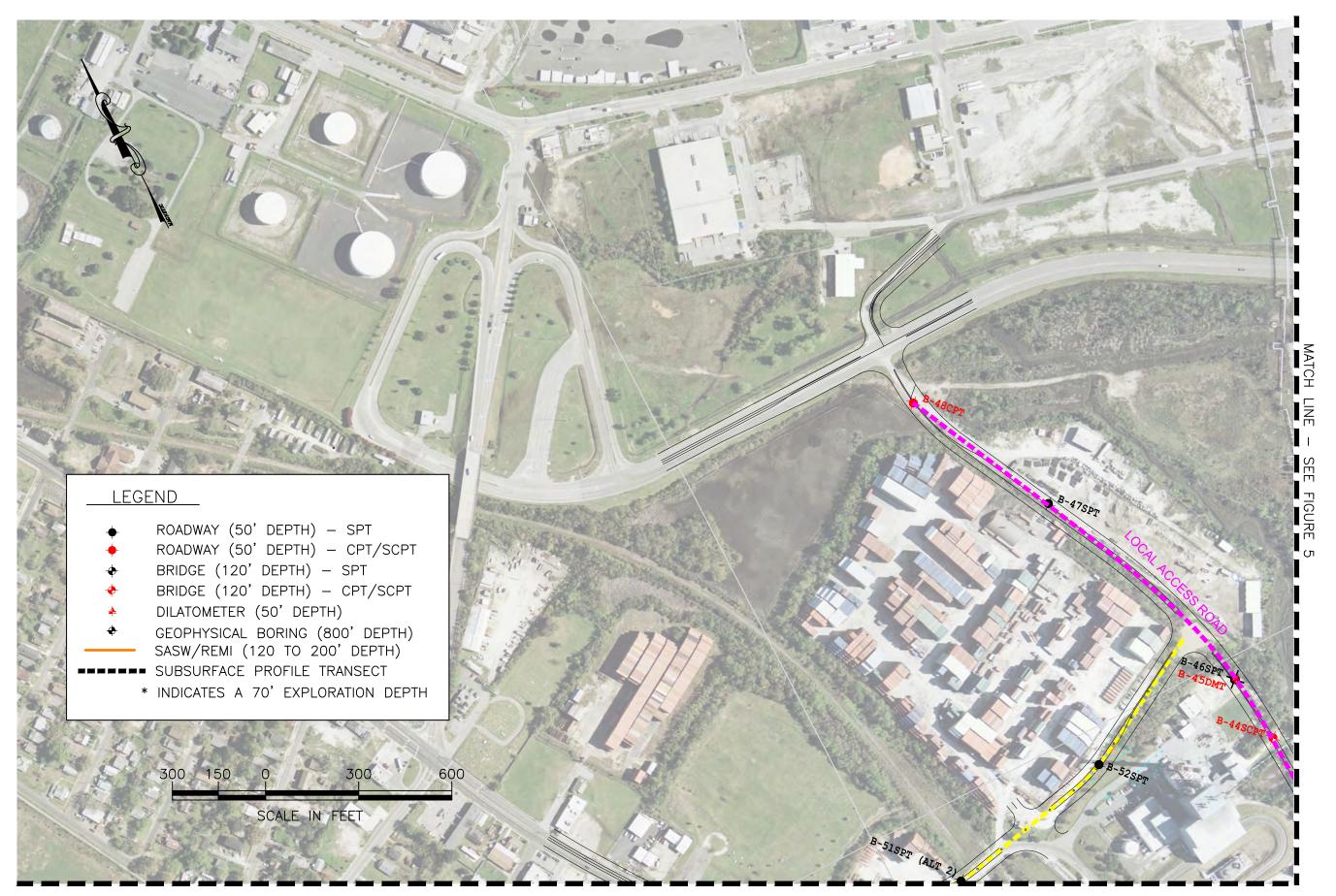
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JRE NO. 1—5

MATCH LINE - SEE FIGURE 4



CAROLINA TEST LOCATION PLAN NORTHWEST PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA CHARLESTON, NORTH

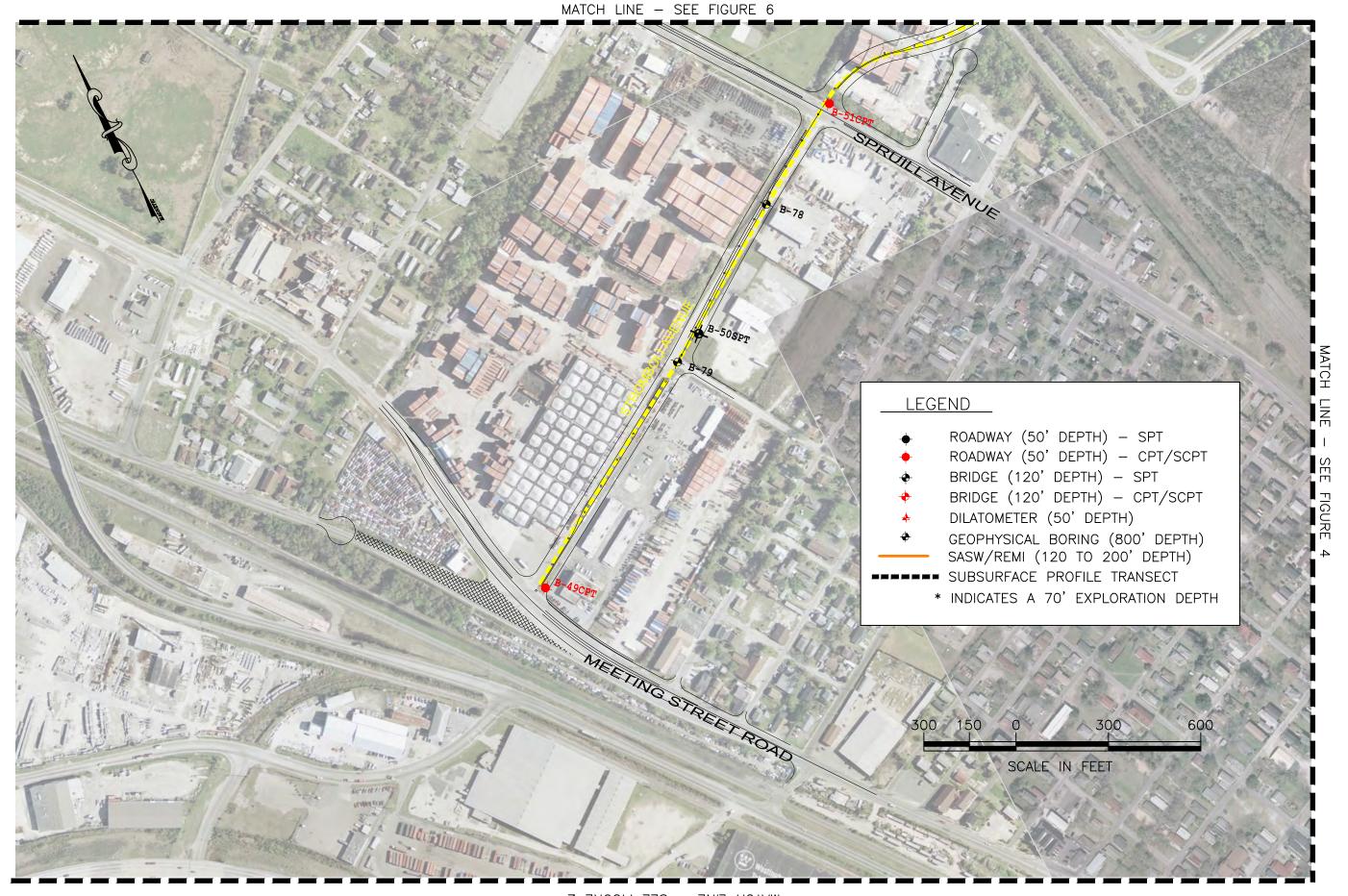
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PROJECT NO. 1131-08-554

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APPROVED BY: DWH

4-07-09



TEST LOCATION PLAN WEST
PORT ACCESS ROAD
NORTH CHARLESTON, SOUTH CAROLINA
S&ME PROJECT NO. 1131-08-554

S&ME

SCALE:
AS SHOWN
PROJECT NO.
11.31-08-554

1131-08-554 DRAWN BY:

LAJ
APPROVED BY:
DWH

DATE: 4-07-09

FIGURE NO. 1-7

MATCH LINE - SEE FIGURE 2



Geotechnical Base Line Report Port Access Road

North Charleston, South Carolina S&ME Project No. 1131-08-554

The proposed alignment described above falls within an urban, industrial area that has been developed for many decades. As such, currently or previously contaminated hazardous materials sites are located within or near the proposed alignment. Specific hazardous materials sites on which the geotechnical exploration was conducted included the former Naval Base, the Macalloy site, Solvay, and a former gas station. Special measures and procedures as described in Sections 2.2 and 2.8 were implemented when geotechnical explorations were conducted at the hazardous materials sites.

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2.0 Field Exploration

2.1 Summary

In addition to S&ME drill rigs, Soil Consultants, Inc. (SCI) of Charleston, South Carolina, and Mid-Atlantic Drilling, Inc. (MAD) of Carolina Beach, North Carolina, provided drillers and rigs to complete the road and bridge borings. A.E. Drilling, Inc. of Greenville, South Carolina, drilled the 800-ft deep geophysical boring. Procedures typically used by S&ME and our sub-contract drillers to conduct geotechnical explorations are outlined in the "Field Exploration Procedures" contained in Appendix II and further discussed in following sections.

Soil Test Borings (labeled with an "SPT" suffix), electronic cone penetrometer soundings (labeled with a "CPT" suffix), Marchetti dilatometer soundings (labeled with a "DMT" suffix), and bulk samples (labled Bulk 1 and 2) were performed during our exploration effort. Shear wave velocity measurements were made using Multichannel Analysis of Surface Waves (MASW), MAM (Microtremor Array Measurements) and seismic cone penetration tests (SCPT). The MASW arrays are labeled R-1 through R-5, and the SCPT soundings are designated as such.

Other specialized field tests described in our proposal were also conducted, consisting of Gamma, Spontaneous Potential, and Suspension logging. These specialized tests were only performed in boring B-11GEO and were performed to develop a better understanding of the site's deeper geologic and seismic response properties. S&ME performed the Gamma and Spontaneous Potential Logging. Geovision, Inc., performed the suspension logging.

In general, borings expected to be in embankment areas were extended to a depth of 50 ft, and borings expected to be in elevated structure areas were extended to a depth of 120 ft. The maximum depth of penetration achieved at any test location (other than B-11GEO) was 120 feet. Discussion of the subsurface conditions encountered is provided in subsequent sections of this report.

2.2 Field Engineering

The initial boring locations were chosen by SCDOT based on the proposed alignment and rig accessibility. The coordinates for the borings were determined using the Microstation drawing provided by SCDOT. The coordinates were confirmed by SCDOT, and then S&ME staked the borings in the field using a hand-held Global Positioning System (GPS) unit with sub-meter accuracy. Coordinates are presented in Table I-1 in Appendix I.

Prior to mobilizing drill rigs to the site, utility locate tickets were obtained for all of the boring locations. Staff engineers met utility locating personnel on-site as necessary. All borings were performed at least 3 ft from marked utilities. Overhead and underground utilities are present along much of the proposed alignment, including high-pressure natural gas and high-voltage overhead power lines.

Based on the initial boring locations chosen by the SCDOT, discussions with the SCDOT, and a review of readily-available information concerning the initial boring locations by the SCDOT and S&ME, it was determined that geotechnical exploration activities would be conducted at two sites (the former Naval Base and the Macalloy site) which would require the implementation of additional environmental and





health and safety measures. The means of implementing the additional environmental and health and safety measures are described below.

Prior to mobilizing drill rigs to the former Navy Base, the SCDOT obtained a "Charleston Naval Complex LUC Area Construction Permit" (Construction Permit) on June 23, 2008 from the US Navy for the geotechnical exploration. A copy of this permit is included in Appendix IV of this report. In addition, S&ME prepared and submitted to the SCDOT for review the Environmental Work Plan for Geotechnical Exploration – Charleston Naval Complex dated September 10, 2008 (EWP-CNC). This work plan provided background information concerning areas of the former Naval Base on which geotechnical explorations would occur (SWMU 9 and Building 661) and certain exploration methods such as procedures for decontamination of exploration equipment and the containment, characterization, and disposal procedures for cuttings/liquids excavated or generated during the geotechnical exploration, based on our understanding of the Construction Permit. A copy of the Construction Permit was attached to the EWP-CNC.

Prior to mobilizing drill rigs to Talluah Road on the Macalloy site, the SCDOT obtained City Encroachment Permit No. 0969 (Encroachment Permit) on August 14, 2008 from the City of North Charleston for the geotechnical exploration. A copy of this permit is included in Appendix IV of this report. In addition, S&ME prepared and submitted to the SCDOT for review the Environmental Work Plan for Geotechnical Exploration – Macalloy Site (Talluah Road) dated September 24, 2008 (EWP-Macalloy), which provided background information concerning the Macalloy site and certain exploration methods such as procedures for decontamination of exploration equipment and the containment, characterization, and disposal procedures for cuttings/liquids excavated or generated during the geotechnical exploration, based on our understanding of Encroachment Permit. A copy of the Encroachment Permit was attached to the EWP-Macalloy.

Prior to mobilizing to both the former Naval Base and to Talluah Road, S&ME prepared a Health and Safety Plan (HASP) for S&ME employees to follow while conducting the geotechnical exploration at the two sites. The HASP included a description of the known existing site conditions as they may affect health and safety, activities to be conducted at the sites, monitoring requirements, and levels of personal protective equipment (PPE). A strong petroleum odor was detected in the upper 5 ft of B-18SPT, which was located at a suspected former gas station outside of the two areas described above; therefore, the HASP was amended to include the former gas station. S&ME employees followed the HASP during geotechnical exploration at the former Naval Base, Talluah Road, and the former gas station.

S&ME staff professionals logged each of the SPT borings. During Phase 1 exploration from September 2008 through November 2008, SCDOT representatives met weekly on site with the S&ME field project manager to discuss the previous week's activity and plans for the following week's work. Draft boring logs were provided to SCDOT at each weekly progress meeting. One meeting was held with SCDOT representatives prior to Phase 2 exploration in February 2009.

2.3 Boring Access and Offsets

The borings were accessed using track, truck and rubber-tire ATV carriers, depending on the site conditions. Borings B-2SPT, B-3SPT, B-66SPT, B31-SPT and B-38CPT required matting to access the locations due to soft, wet ground. Boring B-34CPT was offset approximately 75 ft southwest because the planned location was in a large inaccessible marshy area. Borings B-37SPT, B-29SPT ALT 1, B-42SPT ALT 1





and B-43SPT ALT 2 were drilled using a barge-mounted rig in Shipyard Creek. Boring B-67SCPT was abandoned after multiple attempts to access the location failed due to very soft ground and standing water. Some other borings were offset minor distances (less than 5 ft) due to utilities, overhead trees, power lines or unlevel ground.

2.4 Boring and Sampling Procedures

The following sections outline procedures used in boring and sampling of the site. Additional detailed discussion of methods used follow in Appendix II.

Borings B-15CPT through B-18SPT, B-22SCPT through B-24DMT, and B-51-SPT ALT2 were all performed in either asphalt or concrete paved areas. These locations were cored using either a drill rig or a coring machine by S&ME, SCI, or a coring subcontractor. Upon completion the borings were first grouted, backfilled with rock and sand, and then patched using asphalt coldpatch or concrete. The remaining borings were performed in unpaved areas. The borings along I-26 were performed within existing SCDOT right-of-way.

Temporary casing was installed for the borings in Shipyard Creek and borings B-11GEO and B-18SPT. All of the borings were drilled using mud rotary wash procedures. Where possible, 24-hour ground water level measurements were recorded for the SPT borings. For site access or safety reasons some of the borings were grouted immediately upon completion, and 24-hour water levels were not recorded. The water level, if recorded, is indicated on the individual boring logs. The water level indicated on the CPT and DMT logs is the level recorded immediately after completion of the sounding, and in our experience is relatively close to static ground water level at the time of exploration.

2.4.1 Standard Penetration Test Borings

Thirty-eight soil test borings were drilled by AE Drilling, Soil Consultants, Inc. (SCI), S&ME, and Mid-Atlantic Drilling using a mud-rotary drilling procedure. The various rigs employed and their hammer type and efficiency are presented on the individual boring logs and in Section 2.4.7. Standard Penetration Test (SPT) testing and split-spoon sampling were performed every $2\frac{1}{2}$ ft in the upper 10 ft and 5-ft intervals thereafter. Continuous sampling was performed in borings B-23SPT and B-11GEO from the ground surface to an approximate Cooper Marl penetration of 10 ft to provide data for correlating CPT and DMT data to soil types. The SPT testing and split-spoon sampling was performed in general accordance with ASTM D 1586. Upon completion of the drilling, the soil samples were sealed in plastic jars and transported to laboratories for further classification and testing.

In split-spoon sampling, a standard 2-in. O.D. split steel tube is driven into undisturbed soil at a select depth using a 140-lb hammer falling a distance of 30 in. The number of blows required to advance the sampler the last 12 in. of the standard 18-in. "drive" is recorded as the Standard Penetration Resistance (N-value). The N-values are presented on the boring logs at the test depth, and provide an indication of the relative density of granular materials and the strength of cohesive materials. The results of the SPT borings are graphically presented on the boring logs in Appendix II.

In addition to the split-spoon samples, we obtained 41 undisturbed samples (Shelby-tube) (per ASTM D 1587) in selected cohesive strata. The Shelby-tube samples were collected in offset borings typically 3 ft from the original boring location. The offset borings have an "A" designation. In undisturbed sampling, a





thin-walled steel tube (i.e., a Shelby tube) with a sharp leading edge is pushed into undisturbed soil at a select depth in the borehole to obtain relatively undisturbed samples of cohesive soils. Piston-type samplers were used to recover the samples. The recovered undisturbed samples were cleaned at each end, sealed with wax, capped, taped, and transported to laboratories for testing. Table II-1 in Appendix II lists the borings where we collected Shelby tubes, the depth of the sample and recovery length, the soil unit where the sample was collected, and the N-value at the sample depth.

Upon completion of each land boring, a tremie pipe was lowered to the bottom of the borehole and the hole was grouted using a bentonite slurry. The barge-based, CME 550X, and D-50 borings used a Portland cement/bentonite slurry to grout those boreholes. A Portland cement/bentonite slurry was also used to grout boring B-11GEO. Grout logs for each boring are included in Appendix II.

2.4.2 Cone Penetration Test Soundings

We advanced 30 CPT soundings using truck or track-mounted rigs to hydraulically advance an electronically instrumented cone penetrometer. During penetration, the tip resistance, pore-water pressure, and sleeve friction were measured and recorded in general accordance with ASTM D 5778. The method produces a nearly continuous record of information on subsurface conditions.

Cones with tip areas of 1.55 in.² (10 cm²) and 2.33 in.² (15 cm²) were used for testing, which correspond to cone diameters of 1.44 in. and 1.75 in., respectively. For both cone sizes, pore-water pressure transducers and porous filter elements are located directly behind the cone tip (u2 position). In addition, the cones used for this exploration were instrumented with seismic sensors for measuring shear-wave velocity. A legend with the CPT soil classification system and the logs of the cone testing are included in Appendix II.

At select elevations within soft clay strata, the advance of the cone penetrometer was halted and the rate of pore-water pressure dissipation was measured. This dissipation test data can be correlated to the time rate of consolidation for clay soils. The results of the dissipation testing, (i.e., pore-water pressures as a function of time), are presented in Appendix II.

After each CPT sounding was completed, a tremie pipe was lowered to the depth of hole cave-in, and bentonite slurry was used to grout the hole.

2.4.3 Seismic Cone Penetration Test Sounding

We performed shear wave velocity measurements in CPT soundings B-12SCPT, B-17SCPT, B-22SCPT, B-34SCPT, B-60SCPT, B-67 SCPT, and B-73SCPT using a cone penetrometer instrumented with geophones. The seismic cone penetrometer test (SCPT) measures the travel times of vibrations generated by an impulsive force applied to the ground surface. For each measurement (at a depth interval of approximately 3 ft), the travel time of the first arrival was determined and corrected for the horizontal offset of the source. Interval velocities were calculated by dividing the distance between adjacent depths by the difference in travel times. The SCPT data, in the form of interval velocity as a function of depth, are presented in Appendix II.





2.4.4 Marchetti Dilatometer Test Sounding

We performed six DMT soundings using the CPT rig to advance a specially designed, instrumented blade (the dilatometer). During the DMT sounding, data (pressure measurements) were collected at 1 ft intervals. DMT measurements consist of determining the pressure required to expand a membrane into the surrounding soil. Dilatometer test measurements were performed in general accordance with ASTM D 6635. Soil samples are not collected in a DMT sounding; however, the dilatometer data is correlated to numerous soil properties, including undrained shear strength, friction angle, and a stiffness modulus. The DMT results and a legend of formulas and soil classification are presented in Appendix II.

2.4.5 Vane Shear Tests

S&ME conducted nine field vane shear (FVS) tests within Unit 2 (soft clay/silt) and 2A (marsh deposits on naval base) soils in borings B-3A, B34A and B-40A. Tests were completed using a 3.625-in.-diameter Acker tapered blade in a 4-in.-diameter borehole. Force readings were measured on a Dillon force gauge. FVS tests were completed in general accordance with ASTM D2573-94. The results of the tests were corrected using the chart and factors developed by Chandler (1988). FVS test results are provided in Appendix II.

2.4.6 Bulk Samples

As requested by SCDOT, we collected two bulk samples (identified as Bulk-1 and Bulk-2) from the embankment near boring B-55SPT. Approximately 1.4 cubic feet of soil was recovered for each sample. Standard proctor (ASTM D698) and consolidated undrained (CU) triaxial shear tests (ASTM D4767) were performed on the samples. We also collected bulk samples from two local borrow pits for compaction and direct shear testing. Samples were collected from Frazier Pit on Countyline Road and Austin Pit on Sandhill Road.

2.4.7 SPT Hammer Calibration

The efficiency of the SPT hammers on the drill rigs was measured. Ten drill rigs were used to perform the Standard Penetration Tests. Hammer energy transfer measurements were obtained in general accordance with ASTM D4633 with a model PAK or PAX Pile Driving AnalyzerTM (PDA) for all rigs. The PDA was used to record and interpret data from two piezoresistive or piezoelectric accelerometers which were bolted to a 2-ft long NWJ, AWJ, or BW drill rod internally instrumented with two strain transducers. The accelerometers and strain gages, which are mounted on opposing axes near the middle of the instrumented rod, monitor acceleration and strain for each hammer blow.

The analyzer converts the data to velocities and forces, computing the maximum transferred hammer energies and driving forces and stresses. All results are recorded and displayed in real time for each blow.

Nine of the ten drill rigs were manufactured by CME, and one was manufactured by Dietrich. All but two of the rigs used automatic hammers to obtain SPT N-values. The rigs without an automatic hammer were equipped with a safety hammer operated by a 7/8-in. hemp rope with two wraps over the top of the cathead. We were informed that the revolutions per minute (rpm) of the drill rig engines while operating the hydraulically powered automatic hammers was on the order of 1,800 rpm. In general, the total drill rod lengths were about 30 to 60 ft while obtaining energy measurements. However, there were several measurements obtained with drill rod lengths of about 90 to 110 ft. The N-values as observed S&ME personnel during testing ranged from about 2 to 17. Mud rotary drilling methods utilizing NWJ, AWJ, or

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BW drill rods were employed to advance the boreholes to the desired sample depths. Once the sample depth was reached, the drill rods and bit were removed from the borehole and the split-spoon and drill rods were lowered to the top of the sample depth interval.

The SPT hammer energy testing is summarized in the Table 2-1 below, and more detailed results for each rig and sampling depth are included in Appendix II on the SPT Energy Measurements Data Sheets. The EFV method was used to determine the energy transferred to the drill rod, and this value was used to compute the transfer efficiency.

Table 2-1. Summary of SPT Energy Measurements

Drill Rig	Boring	Date	Hammer Type / Rod Size	Average Efficiency
CME 550 (S&ME ATV)	B-23A	9-30-08	Automatic / AWJ	80%
CME 750 (AE ATV)	B-11	10-7-08	Automatic / NWJ	76%
CME 850 (SCI Track)	B-2	9-29-08	Automatic / BW	74%
CME 55 (SCI Truck)	B-68 Alt 1	9-22-08	Automatic / BW	56%
CME 55 (SCI Truck)	*	12-17-08	Automatic / BW	80%
CME 45 (SCI Gyrotrack)	*	12-17-08	Automatic / BW	76%
CME 550 (SCI ATV)	*	12-22-08	Safety @ 2 wraps / BW	65%
Dietrich 50	B-63	2-19-09	Automatic/ AWJ	60%
CME 550 X (S&ME ATV)	**	10-30-08	Automatic/ AWJ	80%
CME 45 (MAD Barge)	B-29 Alt 1	10/17/08	Safety @ 2 wraps/ AWJ	70%

^{*}SCI's CME 45 and 550 rigs were tested by SCI and reported to S&ME.

2.4.8 Refusal to Drilling Tools

The term "refusal" used in field notes and logs in this report means that the soils or underground obstructions resisted further penetration by the rotary drilling process. The term "refusal" was not applied to describe zero penetration by the split spoon sampler after 50 or more blows have been applied. The only SPT borings to encounter initial refusal were B-3 and B-52A. An unmarked, abandoned water line caused refusal of B-3. We suspect buried debris caused refusal of B-52A; however, we could not confirm this. Both borings were offset and completed as planned.

^{**}S&ME CME 550X was tested on SCDOT project US 378 RBO Lynches River.





CPT or DMT refusal occurred when the reaction weight of the CPT rig was exceeded by the thrust required to push the tip further into the ground. At that point the rig lifted off the ground. CPT sounding B-48CPT encountered shallow refusal on buried debris and was offset approximately 10 ft. This location is near a former Solid Waste Management Unit on the former Naval Base. After offsetting, B-48CPT reached its target depth of 50 ft. Sounding B-30CPT, performed between Tidewater Road and Shipyard Creek, encountered shallow refusal multiple times and was ultimately abandoned. We understand that Tidewater Road was constructed using rubble fill and rip rap. CPT soundings B-8CPT, B-10SCPT and B-60CPT encountered refusal at depths of 113 ft, 114 ft and 111 ft, respectively. These three CPT soundings all were terminated in the Cooper Marl and likely refused on a cemented sand lens or phosphate lens within the Marl.

The proposed alignment is within an urban, industrial area that has been developed for many decades. As with all previously developed sites, underground obstructions such as buried debris, old foundations, abandoned utilities, septic tanks, and other items will be encountered.

2.4.9 Surface Water Sampling

On December 3, 2008, S&ME collected four surface water samples (W#1 through W#4) from Shipyard Creek. Sample W#1 was collected approximately 3,400 ft southeast of where the proposed Access Road will cross Shipyard Creek. Samples W#2, W#3, and W#4 were collected where the proposed Access Road crosses Shipyard Creek. Each surface water sample was collected directly into laboratory-supplied containers. Upon collection, Aquatox Environmental Laboratory (Aquatox) analyzed each sample in the field for pH by EPA Method 150.1. The remaining portions of each sample were transported to Aquatox's facility for analysis of the following parameters:

- Chloride and Sulfate by EPA Method 300, and;
- Resistivity by Method SW846 EPA Test Method 9050.

The results of the surface water testing are included in the Laboratory Test Data Summary in Appendix II.

2.5 Surface Wave Surveys

2.5.1 *Methodology*

Shear wave velocity measurements can be obtained using either shear wave surveys such as crosshole and downhole tests or surface wave surveys such as SASW, MASW, MAM, or ReMi[™]. Analysis of surface waves (R-waves) can be used to determine shear-wave velocities (Vs) as surface waves are fundamentally similar in behavior to shear waves (S-waves). In addition, the surface waves propagate to depths that are proportional to their frequencies (i.e., dispersion). The surface waves are recorded at the ground surface along a spread of low-frequency geophones. Recorded surface waves are transformed from time domain into frequency domain, from which the phase characteristics of the surface waves can be determined. A dispersion curve (a.k.a., phase velocity curve or slowness curve) is developed allowing the phase velocity (Cf) of particular frequency waves to be calculated. The dispersion curve is then transformed into the shear-wave velocity profile through a complex inversion and iterative processing.

To measure shear-wave velocities, S&ME typically performs MASW (Multi-Channel Analysis of Surface Waves) and MAM (Microtremor Array Measurements) with non-linear array geometry, combining the





dispersion curves from both tests prior to the inversion process. Performing both MASW and MAM provides the greater depth of penetration associated with microtremor analyses (low frequency surface waves) without sacrificing resolution at shallower depths from MASW (higher frequency surface waves). In addition, our experience indicates using a combination of both methods to develop a shear wave velocity profile is more accurate than using Refraction Microtremor (ReMiTM) exclusively, particularly when the ReMiTM array geometry is linear.

Depth of penetration using surface wave methods is mainly controlled by the shear properties of the subsurface materials and frequency range of site surface waves (generated active or ambient passive). Generally, penetration depth is greater for stiffer profiles as the signal does not attenuate as rapidly. However, because very small strain is required to determine the shear properties, sometimes velocities of very stiff materials (competent igneous or metamorphic rock) are difficult to obtain using traditional active or ambient sources.

2.5.2 Field Testing

Both MASW and MAM were performed at five test locations (R-1 through R-5) on the site; however, only the MASW testing yielded a dispersion curve suitable for inversion at Test Location R-4. The poor coherence of the dispersion curves from MAM testing is likely a result of lower amplitude passive energy, surface wave attenuation due to shallow soft soils, and a high velocity contrast. Accordingly, only results of the MASW tests were used for velocity measurements at R-4.

The MASW and MAM tests were performed at the approximate locations shown on the Test Location Plans. The MASW and MAM testing were conducted using the 16-channel Geometrics ES3000 seismograph and 4.5 Hz vertical geophones. For the MASW testing, the geophones were spaced in a linear geometry at intervals of 5- and 10-feet and surface waves were generated by an 8-pound sledgehammer striking a metal plate. All 16 channels were utilized in the MASW survey. In MAM testing the source of the mirotremors cannot be accurately determined; therefore 2-dimensional array geometies are preferred. Due to site space constraints, MAM testing was conducted using a linear array at Test Locations R-1, R-2, R-3, and R-5. Therefore, a larger percentage of error is expected because a 1-dimensional array geometry was utilized. MAM testing was conducted using the "L-shaped" array geometry with geophone spacing of 30 feet at R-5; only 11 channels are utilized for this array. The analysis was conducted using the OYO Corporation's SeisImager/SW software (Pickwin v. 3.14 and WaveEg).

Velocity measurements were obtained to depths of approximately 150, 145, 230, 48 and 115 feet at test locations R-1, R-2, R-3, R-4 and R-5, respectively. At Test Location R-4, only the results of the active surface wave data are included. The passive measurements produced erroneous results. Based on our experience in the general vicinity of the site, velocity (and stiffness) increases with depth. The five separate velocity profiles developed at each of the test locations are included in Appendix II.

2.6 Deep Boring with Geophysical Logging

2.6.1 Drilling and Sampling

Boring B-11GEO was drilled to a depth of 800 ft for purposes of obtaining deep compression and shear wave data, as well as obtaining soil samples for resonant column and torsional shear testing. Beginning on





October 6, the boring was advanced using mud-rotary methods to a depth of 400 ft. The hole was continuously sampled to a depth of 58 ft using split spoons. The hole was then sampled every 5 ft starting at a depth of 58.5 ft to a depth of 120 ft. Between a depth of 120 ft and approximately 251.5 ft, split spoon samples were taken at 159.5 ft, 179.5 ft, 189.5 ft, 199.5 ft, 219.5 ft, 229.5 ft, and 239.5 ft. Undisturbed samples (obtained either using the Pitcher barrel or direct push with a Shelby tube) were taken at depths of approximately 129.5 ft, 169.5 ft, 209.5 ft, and 249.5 ft. After this depth, Pitcher barrel sampling continued on 20-ft centers to an approximate depth of 351.5 ft. Sampling with the Pitcher barrel was then performed at a depth of approximately 374.5 ft and then again at 400 ft. The hole was then cored using a wire-line soil coring system to a depth of 500 ft, and then drilled out to a uniform 6-in. diameter with mud rotary methods. Cores samples were generally stored in core boxes, although some samples were wrapped in cheesecloth, waxed and protected in split-PVC tubes in order to preserve the samples for further testing.

After the hole was completed to a depth of 500 ft on October 16th, Suspension Logging, Borehole Gamma logging, and Borehole Spontaneous Potential logging were performed on October 17 after the borehole was conditioned and the drilling tools were removed. Following review of the preliminary geophysical test results, SCDOT decided to advance the borehole an additional 300 ft for the purpose of obtaining deeper shear and compression wave velocity profiles. On December 8, 2008, mud-rotary drilling continued to extend the hole from 500 ft to 800 ft. No samples were recovered from this interval; however, the geophysical methods described above were used to log the hole on December 10. The geophysical data available are included in Appendix II.

2.6.2 Geophysical Testing

Borehole geophysical logging involves the measurement of physical properties of the material immediately adjacent to the drilled borehole. Probes that measure different properties are lowered into the borehole to collect continuous or point data that is graphically displayed as a geophysical log. In order to expedite data acquisition, a suite of logs are typically collected in each borehole. Specific interpretations can be made based on numerous combinations of responses observed in several different types of logs. For this project, borehole geophysics were used to obtain information primarily on lithology and dynamic soil properties.

Gamma logs record the amount of natural gamma radiation emitted by the material surrounding the borehole. The most significant naturally occurring sources of gamma radiation are potassium-40 and daughter products of the uranium- and thorium-decay series. Clay- and shale-bearing rocks commonly emit relatively high gamma radiation because they include weathering products of potassium feldspar and mica and tend to concentrate uranium and thorium by ion absorption and exchange.

Spontaneous potential logs record potentials or voltages developed between the borehole fluid and the surrounding rock and fluids. Spontaneous-potential logs can be used in the determination of lithology and water quality. Collection of spontaneous-potential logs is limited to water- or mud-filled open holes.

S&ME performed the Gamma and Spontaneous Potential logging with Mount Sopris Instruments geophysical logging equipment. The system consisted of a 4MXA-1000 winch and an MGX II logger system configured with a polygamma probe, which includes the gamma and SP tools. The tools were referenced from the top of casing, and then corrected for true ground surface. The results of the Gamma and SP logging of B-11GEO are included in Appendix II.





Shear and compression-wave velocity measurements were performed in Boring B-11GEO using suspension logging. This method uses a 7-meter probe containing a source and two receivers. The probe is lowered into the borehole, and at incremental depths, the source generates a pressure wave in the borehole fluid. The pressure wave is converted to seismic waves (P and S) at the borehole wall. Along the wall at each receiver location, the P and S waves are converted back to pressure waves in fluid. The pressure waves are received by the geophones, which send the data to the recorder at the surface. The elapsed time between arrivals of the waves at the receivers is used to determine the average wave velocity.

The suspension logging was performed by Geovision using the OYO P-S Suspension Logger. Additional details of the system, literature about suspension logging, and the results of the logging are included in Geovision's report in Appendix II.

2.7 Site Survey Control

After the drilling was complete, the boring locations were surveyed by a licensed surveyor using a Dual-Frequency GPS tied to the South Carolina Virtual Reference Station Network. The surveyed points have an accuracy of + 0.33 ft horizontal and +0.07 ft vertical. The vertical datum is NAVD 88. The coordinates and elevation of the borings are indicated on the individual logs and tabulated in Table I-1 in Appendix I. The coordinates are presented in both latitude/longitude and South Carolina State Plane northing/easting. The test locations shown on Figure 1-1 through Figure 1-7 are the surveyed as-drilled test locations.

2.8 Implementation of Environmental Work Plans

At the former Naval Base, Talluah Road (Macalloy site), and the former gas station, downhole exploration equipment was decontaminated and drilling mud generated from standard penetration test borings was contained in general accordance with the EWP-CNC and the EWP-Macalloy. The decontamination liquids and drilling mud (investigative-derived waste, or IDW) were contained in a total of 22 steel, 55-gallon drums; the drums were labeled and secured at each site. In coordination with Environmental Projects Group, Inc. (EPG), a waste management contractor, and Republic Services, Inc. (Republic), EPG's intended disposal contractor, S&ME collected representative samples of the IDW and submitted the samples to TestAmerica Laboratories, Inc. (TA) for analysis of various parameters (based on the site from which the IDW was generated) to characterize the IDW for proper disposal. For the former Naval Base, Talluah Road (Macalloy site), and the former gas station, summaries of the characterization samples collected, the parameters analyzed, and the laboratory analytical results from TA are presented below. The TA laboratory analytical reports are provided in Appendix IV. We will coordinate with the SCDOT and EPG to properly dispose the IDW. In accordance with the US Navy Construction Permit, the US Navy will be notified of the intended disposal of the IDW generated at the former Naval Base. We performed no environmental field assessments of the sites; only characterization of IDW contained in the drums.

2.8.1 Former Naval Base

Twelve drums of IDW were generated during the geotechnical exploration activities at the former Naval Base. Each drum was labeled indicating the contents and initially left in the area of the borings and soundings. Because some of the boring/sounding locations were in areas that periodically flood during high tides, S&ME moved the 12 drums to a paved area near Building 661.





On December 2, 2008, S&ME collected one grab sample of material from three drums of drilling mud and one grab sample of water from one drum of decontamination water (for a total of four grab samples). The grab samples were identified as CNC-CWS, CNC-661, CNC-TWR, and CNC-DECON-GRAB.

S&ME submitted the grab samples to TA for analysis of:

- Total Volatile Organic Compounds (VOCs) by EPA Method 8260B, including:
 - 1,1-dichloroethene
 - 1,2-dichloroethane
 - 1,2-dichloroethene (total)
 - Benzene
 - chlorobenzene
 - cis-1,2-dichloroethene
 - naphthalene
 - methylene chloride (dichloromethane)

- trichloroethene
- vinyl chloride
- 2-butanone
- carbon tetrachloride
- chloroform
- tetrachloroethene
- •
- VOCs by EPA Method 1311/8260B (Toxicity Characteristic Leaching Procedure, or TCLP), including:
 - 1,1-dichloroethene
 - 1,2-dichloroethane
 - Benzene
 - chlorobenzene
 - trichloroethene

- vinyl chloride
- 2-butanone
- carbon tetrachloride
- chloroform
- tetrachloroethene

On December 2, 2008, S&ME also collected one composite sample of drilling mud from the nine drums containing drilling mud and one composite sample of water from the three drums containing decontamination water (for a total of two composite samples). The composite samples were identified as CNC-MUD and CNC-DECON-COMP.

S&ME submitted the samples to TA for analysis of:

- Total Semivolatile Organic Compounds (SVOCs) by EPA Method 8270C, including:
 - 2,4-dimethylphenol
 - 2-chlorophenol
 - 2-methylnaphthalene
 - 2-methylphenol (o-cresol)
 - 4-methylphenol (p-cresol)
 - PAHs
 - 1,4-dichlorobenzene
 - 2,4-dinitrotoluene

- hexachlorobenzene
- hexachlorobutadiene
- hexachloroethane
- nitrobenzene
- pentachlorophenol
- pyridine
- 2,4,5-trichlorophenol
- 2,4,6-trichlorophenol
- SVOCs by 1311/8270C (TCLP), including:
 - Cresols
 - 1,4-dichlorobenzene

- nitrobenzene
- pentachlorophenol



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- 2,4-dinitrotoluene
- hexachlorobenzene
- hexachlorobutadiene
- Hexachloroethane

- pyridine
- 2,4,5-trichlorophenol
- 2,4,6-trichlorophenol
- Total Metals by 6010B/7471A, including:
 - Arsenic
 - Antimony
 - Barium
 - Cadmium
 - Chromium

- Lead
- Selenium
- Silver
- Mercury
- Metals by 1311/6010B/7471A (TCLP), including:
 - Arsenic
 - Barium
 - Cadmium
 - Chromium

- Lead
- Selenium
- Silver
- Mercury

The TA laboratory analytical report (Appendix IV) indicated that the concentrations of VOCs, SVOCs, and metals in samples analyzed by TCLP were below the maximum concentrations for contaminants for the toxicity characteristic listed in Table 1 of 40 CFR 261, indicating that drums did not contain waste material exhibiting characteristics of hazardous waste (by toxicity). However, because the TA laboratory analytical report indicated that the total concentrations of some parameters in the drilling mud samples exceeded risk-based screening values for soil, the SCDOT, in coordination with the US Navy and the property owner, may wish to dispose the waste material contained in the drums at a Subtitle D Landfill. Based on our coordination with EPG, Republic has approved the disposal of the drums at the Broadhurst Landfill in Georgia (Georgia EPD Permit No. 151-014D(SL). Because some of the drums contain water and drilling mud that may have a high water content, the contents of the drums may require amendment prior to disposal.

Other disposal options may be available for the contents of the drums following coordination with other parties, including, but not limited to, the US Navy, the property owner, the South Carolina Department of Health and Environmental Control (SCDHEC), the City of North Charleston, and the North Charleston Sewer District (NCSD). Following coordination with and permission from the parties listed above, other disposal options may include discharge of liquids into the NCSD's sanitary sewer system, discharge of liquids into the City of North Charleston's separate storm sewer system, or placement of the material near the locations of the borings/soundings. At the time of this report the drums remain on site.

2.8.2 Talluah Road (Macalloy site)

Four drums of IDW were generated during the geotechnical exploration activities at Talluah Road (on the Macalloy site). Each drum was labeled indicating the contents and left in the area of the borings and soundings (within the City of North Charleston right-of-way).

On December 2, 2008, S&ME collected a composite sample of material from the three drums containing drilling mud and a composite sample of water from the drum containing decontamination water (for a total of two composite samples). The composite samples were identified as MAC-MUD and MAC-DECON.



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S&ME submitted the samples to TA for analysis of:

- Total Metals by 6010B/7196A/7471A, including:
 - Arsenic
 - Antimony
 - Barium
 - Cadmium
 - Chromium
 - Hexavalent Chromium
 - Iron

- Lead
- Manganese
- Nickel
- Selenium
- Silver
- Mercury
- •
- Metals by 1311/6010B/7471A (TCLP), including:
 - Arsenic
 - Barium
 - Cadmium
 - Chromium

- Lead
- Selenium
- Silver
- Mercury

The TA laboratory analytical report (Appendix IV) indicated that the concentrations of metals in samples analyzed by TCLP were below the maximum concentrations for contaminants for the toxicity characteristic listed in Table 1 of 40 CFR 261, indicating that drums did not contain waste material exhibiting characteristics of hazardous waste (by toxicity). However, because the TA laboratory analytical report indicated that the total concentrations of some metals in the drilling mud samples exceeded risk-based screening values for soil, the SCDOT, in coordination with the City of North Charleston, may wish to dispose the waste material contained in the drums at a Subtitle D Landfill. Based on our coordination with EPG, Republic has approved the disposal of the drums at the Broadhurst Landfill in Georgia (Georgia EPD Permit No. 151-014D(SL). Because some of the drums contain water and drilling mud that may have a high water content, the contents of the drums may require amendment prior to disposal.

Other disposal options may be available for the contents of the drums following coordination with other parties, including, but not limited to, the City of North Charleston, the SCDHEC, and the NCSD. Following coordination with and permission from the parties listed above, other disposal options may include discharge of liquids into the NCSD's sanitary sewer system, discharge of liquids into the City of North Charleston's separate storm sewer system, or placement of the material near the locations of the borings/soundings. At the time of this report the drums remain on site.

2.8.3 Former Gas Station

Two drums of IDW were generated during the initial geotechnical exploration activities at the former gas station. Each drum was labeled indicating the contents and left in the area of the borings and soundings.

On December 2, 2008, S&ME collected one grab sample of material from one of the drums of IDW. The grab sample was identified as GAS-MUD-GRAB.



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S&ME submitted the grab samples to TA for analysis of:

- VOCs by EPA Method 1311/8260B (TCLP), including:
 - 1,1-dichloroethene
 - 1,2-dichloroethane
 - Benzene
 - chlorobenzene
 - trichloroethene

- vinyl chloride
- 2-butanone
- carbon tetrachloride
- chloroform
- tetrachloroethene

On December 2, 2008, S&ME also collected one composite sample of drilling mud from the two drums containing IDW. The composite sample was identified as GAS-MUD-COMP.

S&ME submitted the composite sample to TA for analysis of:

- SVOCs by 1311/8270C (TCLP), including:
 - Cresols
 - 1,4-dichlorobenzene
 - 2,4-dinitrotoluene
 - hexachlorobenzene
 - hexachlorobutadiene
 - Hexachloroethane

- nitrobenzene
- pentachlorophenol
- pyridine
- 2,4,5-trichlorophenol
- 2,4,6-trichlorophenol
- .
- Metals by 1311/6010B/7471A (TCLP), including:
 - Arsenic
 - Barium
 - Cadmium
 - Chromium

- Lead
- Selenium
- Silver
- Mercury

Additional exploration activities were conducted at the former gas station after our collection of IDW characterization samples; four additional drums of IDW were generated. Each additional drum was labeled indicating the contents and left in the area of the borings and soundings.

The TA laboratory analytical report (Appendix IV) indicated that the concentrations of VOCs, SVOCs, and metals in samples analyzed by TCLP were below the maximum concentrations for contaminants for the toxicity characteristic listed in Table 1 of 40 CFR 261, indicating that the two drums generated during the initial exploration activities did not contain waste material exhibiting characteristics of hazardous waste (by toxicity). Because the subsequent exploration was performed at the same general location of the initial exploration, it is our opinion that the characterization of the two initial drums of IDW also adequately characterizes the four drums of IDW generated during the subsequent exploration activities. Based on the laboratory analytical results and the nature of the site (mostly paved), the SCDOT, in coordination with the property owner, may wish to dispose the waste material contained in the drums at a Subtitle D Landfill. Based on our coordination with EPG, Republic has approved the disposal of the drums at the Broadhurst Landfill in Georgia (Georgia EPD Permit No. 151-014D(SL). Because some of the drums contain water and drilling mud that may have a high water content, the contents of the drums may require amendment prior to disposal.



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Other disposal options may be available for the contents of the drums following additional characterization and coordination with other parties, including, but not limited to, the property owner, the City of North Charleston, the SCDHEC, and the NCSD. Following coordination with and permission from the parties listed above, other disposal options may include discharge of liquids into the NCSD's sanitary sewer system, discharge of liquids into the City of North Charleston's separate storm sewer system, or placement of the material near the locations of the borings/soundings (provided the material does not runoff the property during storm events). At the time of this report the drums remain on site.



3.0 Laboratory Testing

S&ME's AASHTO accredited laboratory in Mount Pleasant, South Carolina (S&ME-MP) performed laboratory testing on disturbed soil samples. Testing was performed to aid in the classification of soils encountered in the test borings and to provide an estimation of typical engineering parameters for encountered soils. In addition to the laboratory soil tests completed at the Mount Pleasant office, S&ME arranged for soil testing services at the following AASHTO accredited laboratories:

- ♦ S&ME Richmond, Virginia (S&ME-RIC)
- S&ME Spartanburg, South Carolina (S&ME-SPG)
- GeoTesting Express, Atlanta, Georgia (GTX)
- Soil Consultants, Inc., Charleston, South Carolina (SCI)

Testing was completed in general accordance with ASTM methodologies, where applicable. Table 3-1 summarizes the type and quantity of tests completed at each of the laboratories.

Table 3-1. Summary of Laboratory Test Quantity

		Tes	ting Laborat	Total Number of		
Laboratory Test	Procedure	S&ME-MP	S&ME- RIC	GTX	SCI	Tests
Natural Moisture	ASTM D 2216	162	37	12	17	228
Atterberg Limits	ASTM D 4318	121	32	12	17	182
Grain Size Analysis	ASTM D 2217	157	39	5	11	212
Wash 200	Wash 200 ASTM D 1140		5	10	6	21
Specific Gravity	ASTM D		5	7	7	19
Unit Weight			14	12	7	33
Standard Proctor	roctor ASTM D 698					2
Organic Content	ASTM D 2974	4		7	6	17
рН	ASTM D 4972	30				30
Resistivity	ASTM G 57	30				30
Electro Chemical	Various ²					30 ³
Consolidated Undrained (CU) Triaxial	ASTM D 4767		6	9	5	20



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Unconsolidated Undrained (UU) Triaxial	ASTM D 2850	 4	2		6
Direct Shear	ASTM D 3080	 		1	1
1-D Consolidation	ASTM D 2435	 6	9	7	22

¹ Test not completed by corresponding laboratory.

In general, the laboratory testing can be divided into two categories: Index and Basic Property tests and Engineering Property tests. Laboratory test results are provided in Appendix III. In addition to the Index and Engineering property testing described above, Resonant Column and Torsional Shear (RCTS) testing was performed on samples obtained from Boring B-11GEO. Further details on the types of tests performed are presented in the following sections.

3.1 Index and Basic Property Testing

Index Property testing consisted of Atterberg limits, particle-size distribution, and natural moisture content tests. When Atterberg limits and particle-size distribution tests were each performed on a sample, the sample was classified in accordance with the both the Unified Soil Classification System (USCS) and AASHTO. Basic Property testing consisted of specific gravity, unit weight, Standard Proctor compaction, organic content, and electro chemical testing. Index and Basic Property test results are provided on the Laboratory Summary Table in Appendix III.

3.1.1 Atterberg Limits

Atterberg limits tests were performed in general accordance with ASTM D 4318. The Atterberg limits test determines the Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI) of fine-grained soils. The plastic limit and liquid limit represent the moisture content at which a cohesive soil changes from a semi-solid to a plastic state and from a plastic state to a liquid state, respectively. The PI is the difference between the LL and PL. The LL for each sample tested was determined using either the multi-point liquid limit method (Method A) or the one-point method (Method B) per ASTM D 4318.

3.1.2 *Particle-Size Distribution*

Particle-size distribution was performed in general accordance with ASTM D 422 and D 1140. Soil samples were sieved to determine the grain size distribution and/or the percentage of material finer than the No. 200 sieve (i.e., silt and clay particles). For select samples, the material retained on the No. 200 sieve was sieved using a full set of standard sieve sizes that included the following: 1/2 inch, 3/8 inch, No. 4, No. 10, No. 20, No. 40, No. 60, No. 80, No. 100, No. 140, and No. 200.

² Electro Chemical testing consisted of pH (EPA Test Method 150.1), resistivity (SW846 EPA Method 9050), and sulfate and chloride content (EPA Test Method E300).

³ Electro Chemical testing completed by AquaTox of Summerville, South Carolina and CTL Group of Columbia, Maryland.





3.1.3 Natural Moisture Content

Natural moisture content tests were completed in general accordance with ASTM D 2216. The natural moisture content is defined as the ratio of the weight of water present in the soil to the dry weight of soil.

3.1.4 *Specific Gravity*

Specific gravity (G_s) tests were completed in accordance with ASTM D 854. The specific gravity of soil solids is defined as the ratio of the mass of a unit volume of soil solids to the mass of the same volume of gas-free distilled water at 20°C. S&ME-RIC and GTX performed specific gravity tests in accordance with Method A – Procedure for Moist Specimens per ASTM D 854. SCI performed specific gravity tests in general accordance with Method B – Procedure for Oven-Dry Specimens.

3.1.5 *Unit Weight Determination*

Unit weight measurements were obtained on soil samples that were extracted from Shelby tubes. In general, unit weights were determined by measuring the volume and weight of trimmed soil samples obtained for strength and consolidation testing. The natural moisture content was determined for each trimmed sample so that wet and dry unit weights could be calculated.

3.1.6 Standard Proctor Compaction

Standard Proctor compaction tests were performed in general accordance with ASTM D 698 Method A. The Standard Proctor compaction test is used to determine the relationship between water content and dry unit weight of compacted soils. Soils were compacted in a 4-inch mold with a 5.5-pound hammer dropped from a height of 12 inches producing a compactive effort of 12,400 ft-lbf/ft³.

3.1.7 *Organic Content*

Organic content tests were completed in general accordance with ASTM D 2974. The organic content is defined as the ratio of the weight of organic material present in the soil to the dry weight of soil (mineral matter).

3.1.8 Electro Chemical Classification

Electro chemical classification tests provide quantitative information related to the aggressiveness of the soil or water conditions and the potential for deterioration of a foundation material. Electro chemical tests include pH, resistivity, sulfate ion content and chloride ion content. AquaTox of Summerville, South Carolina and CTL Group of Columbia, Maryland completed electro chemical testing on soil samples collected from our test borings and water samples collected from Shipyard Creek. Electro chemical testing was performed in general accordance with the following test methods:

- ♦ pH EPA Test Method 150.1
- Resistivity SW846 EPA Method 9050
- Sulfate and Chloride content EPA Test Method E300



Additionally, S&ME-SPG completed pH and resistivity on select soil samples obtained from the test boring program in general accordance with ASTM D 4972 and G 57, respectively.

3.1.9 Geological Classification

Geologic classification testing was performed on 20 samples from Boring B-11 by Dr. Michael Katuna, formerly with the College of Charleston. Geologic classification was based on detailed sedimetological laboratory analysis and biostratigrahic analyses were not performed. Further details of the geologic classification methods and results are presented in the report included in Appendix II.

3.2 Engineering Property Testing

Engineering Property tests consisted of one-dimensional consolidation, Unconsolidated-Undrained triaxial, Consolidated-Undrained triaxial, and direct shear. Engineering Property test reports are provided in Appendix III. A summary of compressibility and strength tests results are provided in the following sections.

3.2.1 Consolidation Tests

One-dimensional consolidation tests were completed on samples trimmed from three-inch-diameter tube samples collected during the subsurface exploration. Testing was completed in general accordance with ASTM D 2435. Consolidation testing consists of loading an approximately 1-inch thick soil specimen confined in a rigid ring and measuring the resulting displacement as a function of time. Filter paper and machine deflection corrections were applied to the test data. This correction accounts for an increase in deflection at each load due to the compressibility of the filter paper and the machine. Compression Ratio (CR) was interpreted from the virgin compression portion of the strain versus log of effective stress plot. Recompression Ratio (RR) was interpreted from the final unload portion of the strain versus log of effective stress plot. The coefficient of consolidation, c_v, was interpreted using Taylor's method. The preconsolidation pressure was determined using Casagrande's method. A summary of compressibility parameters with respect to S&ME's interpreted subsurface soil units is provided in Table 3-2.

Table 3-2. Range of Compressibility Results

Soil Unit	No. of Tests	Compression Ratio, CR	Recompression Ratio, RR	Coefficient of Consolidation, c _v (ft²/yr)	Over Consolidation Ratio, OCR
1C	1	0.29	0.065	0.9 – 48.2	1.0
1B	6	0.25 – 0.48	0.035 – 0.074	0.3 – 1195	0.6 – 1.5
2B	1	0.095	0.003	8.5 – 85.5	3.6
2C	6	0.17 – 0.59	0.017 - 0.072	0.5 – 3865	1.0 – 5.4
3	1	0.24	0.059	0.5 – 1594	5.4
4	2	0.13 - 0.14	0.027 - 0.03	8.8 – 756.9	4.3 – 5.6
5	5	0.16 - 0.28	0.008 - 0.07	5.6 – 37204	3.5 – 10





1B

2C

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0

0

3.2.2 Unconsolidated-Undrained Triaxial Tests

Unconsolidated-Undrained (UU) triaxial shear tests were completed on samples trimmed from three-inch-diameter tube samples collected during the subsurface exploration. Testing was completed in general accordance with ASTM D 2850. A membrane correction was applied to the test data due to the relative softness of the clay compared to the membrane used. This correction accounts for an increase in deviator stress caused by the additional membrane confining pressure. The point of failure selected by S&ME for each specimen corresponds to the maximum principal stress difference (maximum deviator stress) attained during the performance of the test. S&ME interpreted a best-fit failure envelope using the Mohr stress circles at failure for the three specimens. A summary of total stress strength parameters with respect to S&ME's interpreted subsurface soil units is provided in Table 3-3.

Soil Unit

No. of Tests

Shear Strength, Su (psf)

Friction Angle, \$\phi\$ (degrees)

90 - 460

970 - 1130

Table 3-3. Range of Total Stress Strength Parameters

3.2.3 Consolidated-Undrained Triaxial Tests

4

2

Isotropically Consolidated-Undrained (ICU) triaxial shear tests with pore pressure measurements were performed in general accordance with ASTM D 4767. During the ICU test, the sample is back-pressure saturated during the consolidation stage prior to loading. This allows meaningful measurement of the pore pressure response during loading and results in effective stress strength parameters. Each test series consisted of testing three specimens (from the same Shelby tube) at three different consolidation stresses. As with the UU triaxial tests, a membrane correction was applied to the ICU test results for each of the samples. Filter strips were used by GTX, as needed, to decrease the time required for testing. A filter strip correction was not applied to the ICU tests, as the error in principal stress difference due to the strength of the filter-paper strips did not exceed 5%.

Generally, the point of failure selected by S&ME for each specimen corresponds to the maximum principal stress difference (maximum deviator stress, $\sigma_{D,MAX}$) attained during the performance of the test. In three cases we used limiting strain (ϵ_L) criteria to select the point of failure because the maximum deviator stress was observed at 15% strain. In most cases, S&ME interpreted a best-fit failure envelope using the Mohr stress circles at failure for the three specimens. A summary of effective stress strength parameters with respect to S&ME's interpreted subsurface soil units is provided in Table 3-4.

Table 3-4. Range of Effective Stress Strength Parameters

Soil Unit	No. of Tests	Apparent Cohesion, c' (psf)	Friction Angle, φ' (degrees)
1A	2	0	35 - 36
1B	5	0 - 2	18 - 34
2В	1	0	33
2C	3	0 – 4	22 - 35
3	1	0	34
4	3	0 – 5	23 – 36
5	5	0 – 6	36 – 38

3.2.4 Direct Shear

One direct shear test was completed on a bulk soil sample collected from the Frazier borrow pit off of County Line Road in Ravenel, South Carolina. The direct shear test was performed in general accordance with ASTM D 3080. The test consists of consolidating a sample within a square shearing box with a predetermined normal stress. After the sample is consolidated, one frame of the shearing box is displaced relative to the other frame at a constant rate. The direct shear test provides a relatively rapid determination of consolidated drained strength parameters. In general, test results indicate an apparent cohesion, c', of 0 psf and an effective friction angle, ϕ ', of 37 degrees.

3.3 Resonant Column and Torsional Shear Testing

Three undisturbed samples from Boring B-11GEO were subjected to RCTS testing. We arranged for Fugro Consultants, Inc. of Houston Texas to perform the testing. Tests were performed on samples form the following three depths:

- 131.8 ft, Ashley Formation of the Cooper Group
- 249.7 ft, Harleyville Formation of the Cooper Group
- 439.0 ft, Williamsburg Formation of the Black Mingo Group, Lower Bridge Member

Results of the testing are presented in the report from Fugro presented in Appendix II.



4.0 Site and Subsurface Conditions

4.1 Site Conditions

S&ME's assessment of the geotechnical conditions began with a reconnaissance of the topography and physical features of the site. The general shape and approximate plan dimensions of the site are indicated Figure 1-1 and described below. The setting of the site in terms of its location relative to the principal road or street in the site area and any secondary or cross streets is also described.

The northern end of the project along I-26 is near the North Meeting Street exit and continues to approximately 1000 ft south of the Spruill Avenue exit. The proposed road will turn east and cross over North Meeting Street, King Street Extension and Spruill Avenue. The alignment then turns north as it parallels the western boundary of the former Macalloy site and then crosses Shipyard Creek to connect to the former Naval Base. The site is located in developed urban and industrial areas. In addition to crossing several urban streets, the alignment also crosses two rail lines.

The Ashley River is located within a ½ mile of I-26 to the west, and several marshes from the Ashley River extend up to I-26. Some of these marshes were likely filled over during the construction of the interstate. Shipyard Creek, which connects to the Cooper River, lies between the former Naval Base and the former Macalloy site. The proposed alignment will cross Shipyard Creek where the channel is approximately 40 ft wide, with marshes to the east and west of the creek channel. Most of the alignment that falls within the former Naval Base is located in a marshy, soft ground area.

4.2 Regional Geology¹

The subject site is located within the Ashley-Cooper River Sub-Basin of the lower Atlantic Coastal Plain Physiographic Province. Coastal Plain deposits generally consist of poorly- to well-consolidated sediments which include gravel, sands, silts, clays, limestones and other sedimentary rocks. Due to regional tectonics, Oligocene and older deposits of the Coastal Plain form a wedge shape block that increases in thickness from an edge along its northwestern border, the Fall Line, to a thickness on the order of 2500 ft below land surface near Charleston. Pre-Cretaceous basement metamorphic rocks are overlain, in ascending order, by the Middendorf, Black Creek and PeeDee Formations of the late Cretaceous period, and the Black Mingo, Santee Limestone and Cooper groups of the Tertiary Period.

In the shallow subsurface, there are a series of Holocene- to Quaternary-age coastal terraces that parallel the Atlantic Ocean and mark temporary high stands of the ocean during long term recession of the sea level over the last several million years. Up to nine distinct terraces have been mapped in the South Carolina coastal plain on the basis of surface elevation. The Charleston area is dominated topographically by the three youngest terrace systems, ranging from recent to late Pleistocene in age. Transgressions of the Atlantic Ocean during the post-Oligocene have extensively reworked each previously deposited unit, producing a mosaic of small remnants of Miocene through Pleistocene-age units situated more commonly side-by-side than in superposition.

¹ Stohl, Norman F. and Owens, James P. "Cretaceous Stratigraphy of the Carolina Coastal Plain" in *Geology of the Carolinas*. Horton, J. Wright Jr. and Zullo, Victor A. Editors. University of Tennessee Press, 1991.





S&ME performed an 800-ft deep geologic boring (B-11GEO) near I-26 to provide information on the geologic column at the site. Recovered samples and geophysical data from the upper 500 feet of the boring were evaluated by Dr. Michael Katuna formerly of the Dept. of Geological Sciences at the College of Charleston. The geologic sequence revealed in the upper 500 feet of Boring B-11GEO extends through most of the Tertiary column and 50 ft into the Rhems Formation, the uppermost formation of the Black Mingo Group. Further evaluation of the geophysical indicates the Rhems Formation continues to the termination depth of the boring (800 ft).

4.2.1 Surface Sediments

Each terrace is comprised of barrier beach, backbarrier, marine shelf, and river terrace facies. These units were formed during interglacial periods where sea levels were much greater than at present due to melting of polar icecaps. The northern and western portions of the alignment, near I-26, has been mapped as the outcrop of the beach barrier facies of the Princess Anne terrace (Colquhoun²) or "Q2" terrace (McCarten³) laid down approximately 100,000 years ago. Areas to the south and east, including the naval base, are mapped as the Silver Bluff or "Q1" terrace, laid down between 30,000 and 70,000 years ago. In addition, large areas mapped as "Q1" by McCarten also consist of freshwater stream and swamp deposits (Holocene to Pleistocene -Wisconsinan glacial age); peat and muck accumulating along imponded stream courses; and made ground filled in during development of the Charleston metropolitan area and port since 1700.

Recovered soft clays encountered at depths of in Boring B-11GEO were evaluated by Dr. Katuna as part of the Wando Formation laid down approximately 70-130,000 years ago. The Wando Formation typically underlies the Princess Anne terrace surface at altitudes below 20 feet. The unit is up to 35 feet thick. Samples contain disseminated organic material and terrestrial vertebrate fossils which indicate formation in estuarine to fluvial environments. The dynamic nature of scouring and redeposition occurring during formation of this zone is apparent from frequent variations in composition from clays to sands to silts to highly-layered combinations of all three within short horizontal distances in the borings. In places these materials are covered by modern swamp deposits up to 10 feet thick. West of I-26 are remnants of younger Pleistocene terrace sands and clays which for purpose of this report been included with the discussion of the Wando Formation. The erosional contact between these soils and the underlying Cooper Group soils is often defined by several inches of coarse grained sand, black phosphate pebbles, and worn and rounded bones and sharks' teeth.

4.2.2 Cooper Group or Cooper Marl

Surface sediments are unconformably underlain by the formations composing the Cooper Group or Cooper Marl. These Tertiary-age marine sediments were laid down over several periods ranging from 20 million to 30 million years ago. On the basis of the 800-ft deep boring we drilled (B-11GEO), the total thickness of the Cooper Group at the project site is approximately 240 ft. As defined by Boring B-11GEO, the Cooper Group consists of, in descending order, approximately 120 feet identified as the Ashley

² Colquhoun, D. J. "Terrace Sediment Complexes in Central South Carolina," Atlantic Coastal Plain Geological Association Field Conference Guidebook, Columbia, SC, 1965.

³ McCarten, L., E. M. Lemon, Jr. and R. E. Weems, "Geology of the Area Between Charleston and Orangeburg, South Carolina," US Geological Survey Miscellaneous Investigations Series I-1472, 1984.





Formation (upper Oligocene) underlain by the Harleyville Formation (upper Eocene) also approximately 120 feet thick. An intermediate formation termed the Parkers Ferry Formation is considered to be absent at the location of Boring B-11GEO.

Local geologic mapping also describe thin erosional remnants of late-Oligocene to Miocene-age marl units termed the Chandler Bridge, Edisto, Marks Head or Goose Creek formations⁴. These sediments occur as erosional remnants of limited thickness and lateral extent on top of the Cooper Group. Similar in appearance to the Cooper Group, they are often inadvertently included as part of the Cooper Marl.

The different formations of the Cooper Group are associated with various depositional environments and were laid down at different times; however, for practical engineering purposes, all of the formations of the Cooper Group have been historically referred to as the Cooper Marl. Depth to marl within a given region often varies considerably, ranging from as shallow as 20 feet to as much as 120 feet or more below the surface, reflecting scouring of the upper surface of the marl and redeposition of new sediments in the scour channels over geologic time.

The Cooper Marl is described as a phosphatic limestone consisting of calcium carbonates (approximately 60-75%), quartz sand (app. 5-25%), clay (app. 10-30%), phosphatic sand and pebbles (app. 1-5%), and small amounts of glauconite, shell hash and mica. Its color ranges from pale green to yellowish-gray to olive brown, becoming lighter when dried. Geotechnically, the Cooper Marl typically classifies as a lightly-to moderately overconsolidated, high-plasticity, sandy silt or clay, but can also be classified as a silty sand.

4.2.3 *Santee Limestone*

Immediately underlying the Cooper Group is approximately 40 feet of fairly well consolidated, fine-grained clayey or cherty limestone termed the Cross Member of the Santee Limestone. The Cross Member extends between depths of 290 feet and 330 feet in Boring B-11GEO. The Cross Member of the Santee Limestone is a widespread unit in Dorchester, Berkeley, Charleston, and southern Orangeburg Counties. Conflicting biostratigraphic results have been reported; the Cross has been assigned both a middle Eocene age and a late Eocene age, laid down approximately 35-40 million years ago. An underlying formation termed the Moultrie Member is either absent or not identifiable.

4.2.4 Williamsburg Limestone

The Williamsburg Limestone consists of the Chicora Member from 330 feet to 395 feet and the Lower Bridge Member from 395 feet to 450 feet. The unit is relatively heterogeneous in composition. The Chicora Member consists of approximately 20 feet of gray, shelly limestone underlain by about 45 feet of light gray calcareous sandstone. The underlying Lower Bridge Member is a fossiliferous, sandy glauconic mudstone that is sometimes correlated to the underlying Rhems Formation. Both formations are Upper Paleocene in age laid down approximately 55 million years ago.

⁴ Weems, R. E., and Earl M. Lemon, Jr., "Geology of the Cainhoy, Charleston, Ft. Moultrie, and North Charleston Quadrangles, Charleston and Berkeley Counties, South Carolina," US Geological Survey Miscellaneous Investigations Series I-1935, 1993.





4.2.5 Rhems Formation – Black Mingo Group

The Rhems Formation of the Black Mingo Group consists of gray silty clays, muddy sands, mudstones, and minor calcite-cemented, shelly sands of marine origin. This formation was identified between depths of 450 and 800 feet in Boring B-11GEO, but may likely extend much deeper depending on interpretation of geophysical data. The Rhems Formation is is apparently the product of rapid sediment accumulation during a short period of time in the early Paleocene approximately 60-65 million years ago.

4.3 Stratigraphy

Recovered samples and field boring logs were reviewed in the laboratory by the geotechnical engineer. Finished SPT Boring Logs, CPT and DMT Logs and other field data are assembled in Appendix II. The borings and soundings generally encountered nine soil units and general characteristics if the units are summarized in Table 4-1:

- Unit 1A Artificial Fill
- Unit 1B Holocene Marsh Deposits East of Shipyard Creek
- Unit 1C Holocene Marsh Deposits West of I-26 Alignment
- Unit 2A Recent to Pleistocene "Barrier" Sands
- Unit 2B –Fossiliferous Shell Sand and Clay
- Unit 2C Pleistocene Clays and Silts
- Unit 3 Pleistocene Lower Sands and Clays
- Unit 4 Undifferentiated Miocene or Younger Marls
- Unit 5 Oligocene Ashley Formation (Cooper Group) Marl



Table 4-1. Summary of Soil Units

					SPT N		_		
Geologic Strata	Unit	Soil Description	Primary	Minor	OR CPT Q _T	Moisture	Dry Strength	Remolded Behavior	Remarks
Fill	1A	ARTIFICIAL FILL - Placed during previous site construction -typically no documentation of compaction or engineering control is available	Varies	Varies	Varies	Varies	Low to Moderate	Typically non- cohesive	In areas fills are believed to contain foreign objects and materials such as stone, gravel, slab and other debris.
Holocene Deposits	1B	HOLOCENE MARSH DEPOSITS – Located east of Shipyard Creek within the naval base. Max. depths 60 feet. Very soft, normally consolidated to underconsolidated silts.	MH ML	Lenses of SM and shell	WOR to WOH	Saturated	None to Low	Mucky	Low strength, highly compressible, impervious. Surcharging necessary to consolidate materials before construction. Secondary compression must be considered.
īC	HOLOCENE MARSH DEPOSITS – Generally west of I-26 and within gore area of interchange. Max. depths of about 10 feet.	MH ML	CL CH	WOR to	Saturated; organic	None to Low	Mucky	Highly compressible, impervious. May have been partially undercut during earlier construction in some areas.	
Pleistocene Coastal	2A	RECENT- PLEISTOCENE "BARRIER" SANDS - Sand barrier facies of the Wando Fm. & isolated areas of Silver Bluff Terrace.	SM, SP	ML CL	N >10 bpf Qc>30 tsf	Dry to wet	None	Cohesionless to sl cohesive	Mostly clean sands with an elastic modulus of 300 to 600 ksf. Soils underwent widespread liquefaction in 1886 Charleston earthquake.
Plain Terraces	2В	FOSSILIFEROUS SHELL SAND AND CLAY – thin, highly variable tidal or river deposited sediments	SM ML	MH SP	N ranges from 0 to 3 bpf	Typically Saturated	None to Low	Cohesionless to weakly cohesive	Relatively highly layered, rapidly draining with OCR 2.5 to 4. Some samples contain organic material and shell.

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Pleistocene Coastal Plain Terraces (cont.)	2C	PLEISTOCENE CLAYS AND SILTS – soft, fine grained soils of Wando Fm or younger but in place for sufficient time to have become slightly preconsolidated.	MH ML	СН	1-3	Saturated	Low	Slightly to moderately cohesive	Preconsolidated to 2.5 to 4 times present overburden stress. Typically can support light surface loads, moderately compressible to highly compressible under embankments.
	3	PLEISTOCENE LOWER SANDS AND CLAYS – Lower clay-sand to sand facies of Wando Formation, forms scouring surface on top of underlying marls. Color is dark gray, gray to gray-green	SM SC	CL CH	N ranges from 10 to 50 bpf.	Saturated	None to Low	Slightly to moderately cohesive	Contact with underlying marls consists of a layer of coarse sand, containing shell, phosphate nodules, fossilized bones and teeth.
Marl	4	UNDIFFERENTIATED MIOCENE OR YOUNGER MARLS - gray or gray- green, fine grained sands with little to some clayey fines.	SC	МН	Qc 10- 15 tsf	Saturated	Medium	Medium	Visual appearance similar to Cooper, but only preconsolidated to 8-14 ksf and are more compressible in the recompression range. Reach substantial thickness between King St. and Spruill Ave.
	5	COOPER MARL – Contain thin beds of sands and broken shell. Upper contact of bed may be shell limestone caprock with considerable phosphate, quartz pebbles and wood fragments. Typically reactive to HCI.	ML SM	SC MH	N ranges from 5 to 50 bpf	Dry to Moist	Tough, hard,	Cohesive Indurated,	Shear strength commonly exceeds 2000 psf. Soils are essentially impervious, heavily indurated, and preconsolidated to 20 ksf.

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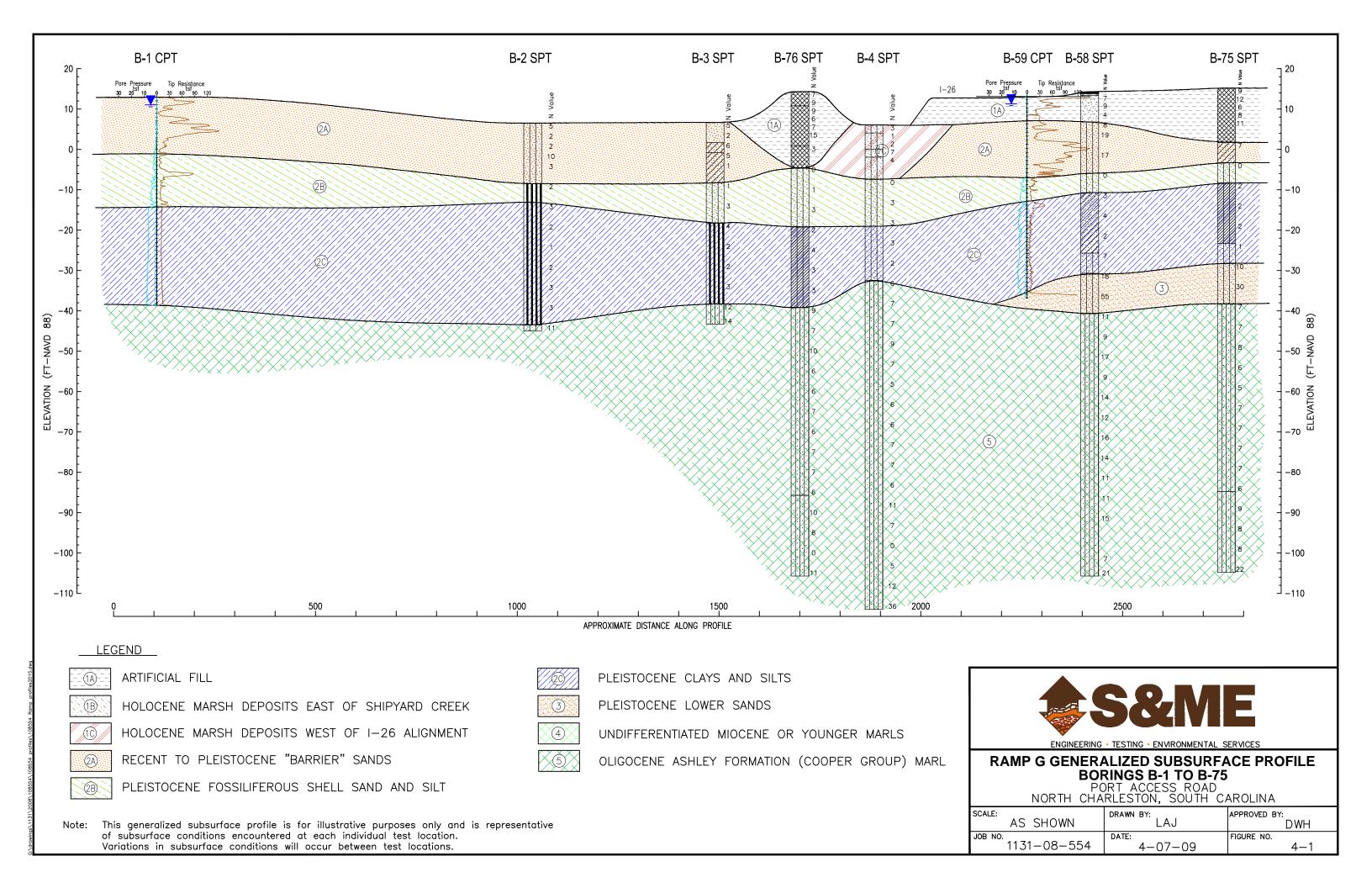


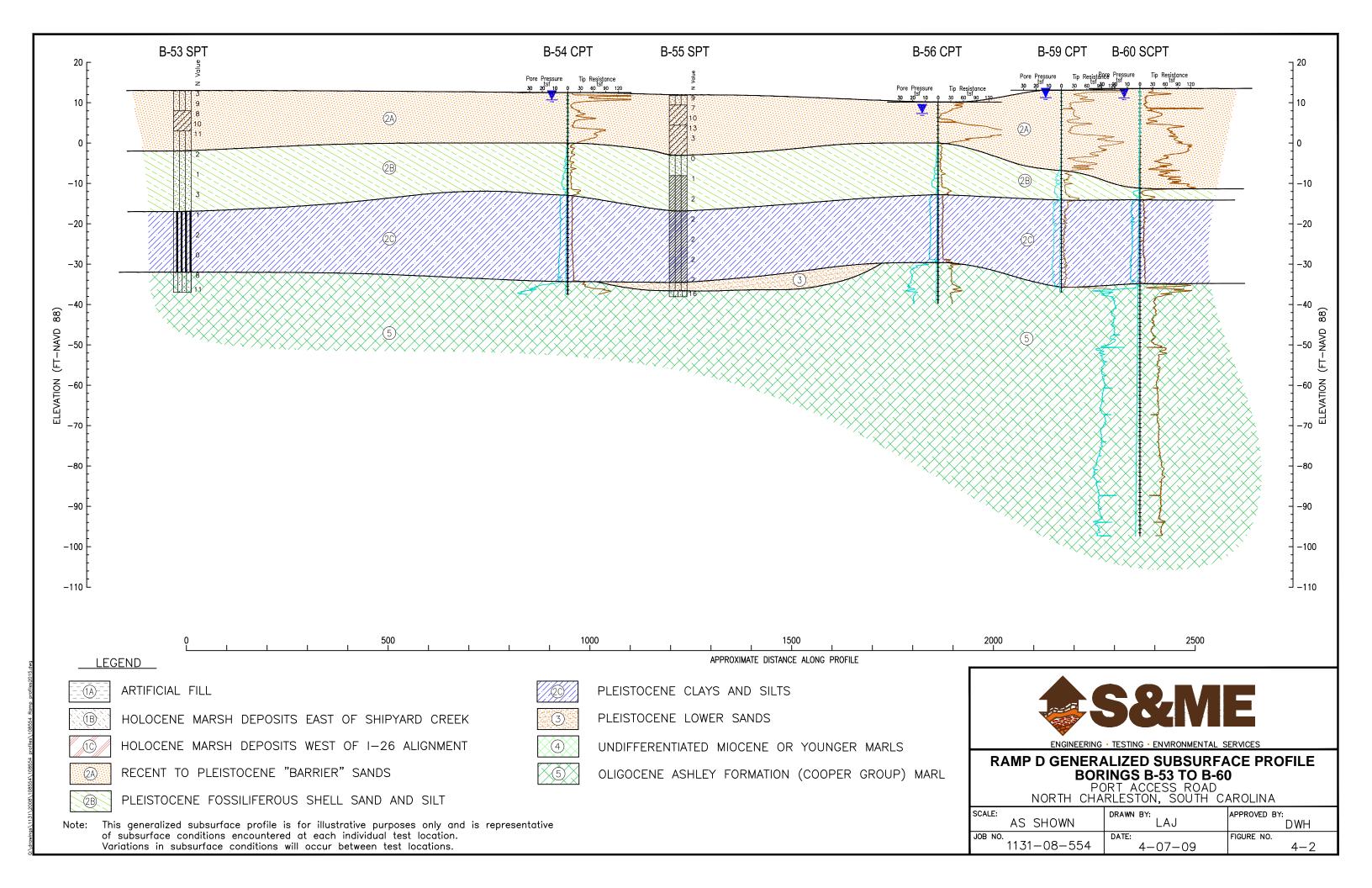
Geotechnical Base Line Report Port Access Road

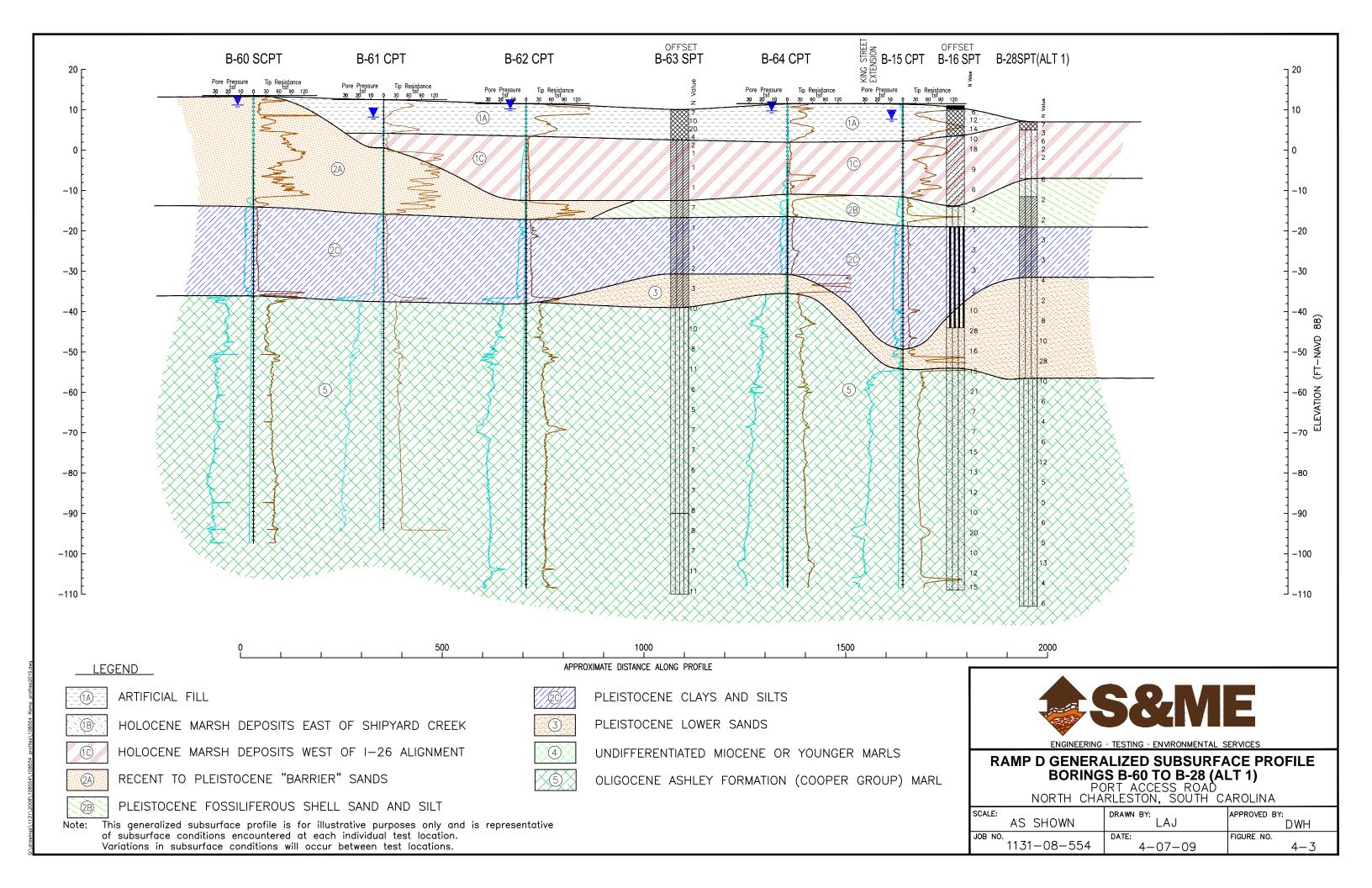
North Charleston, South Carolina S&ME Project No. 1131-08-554

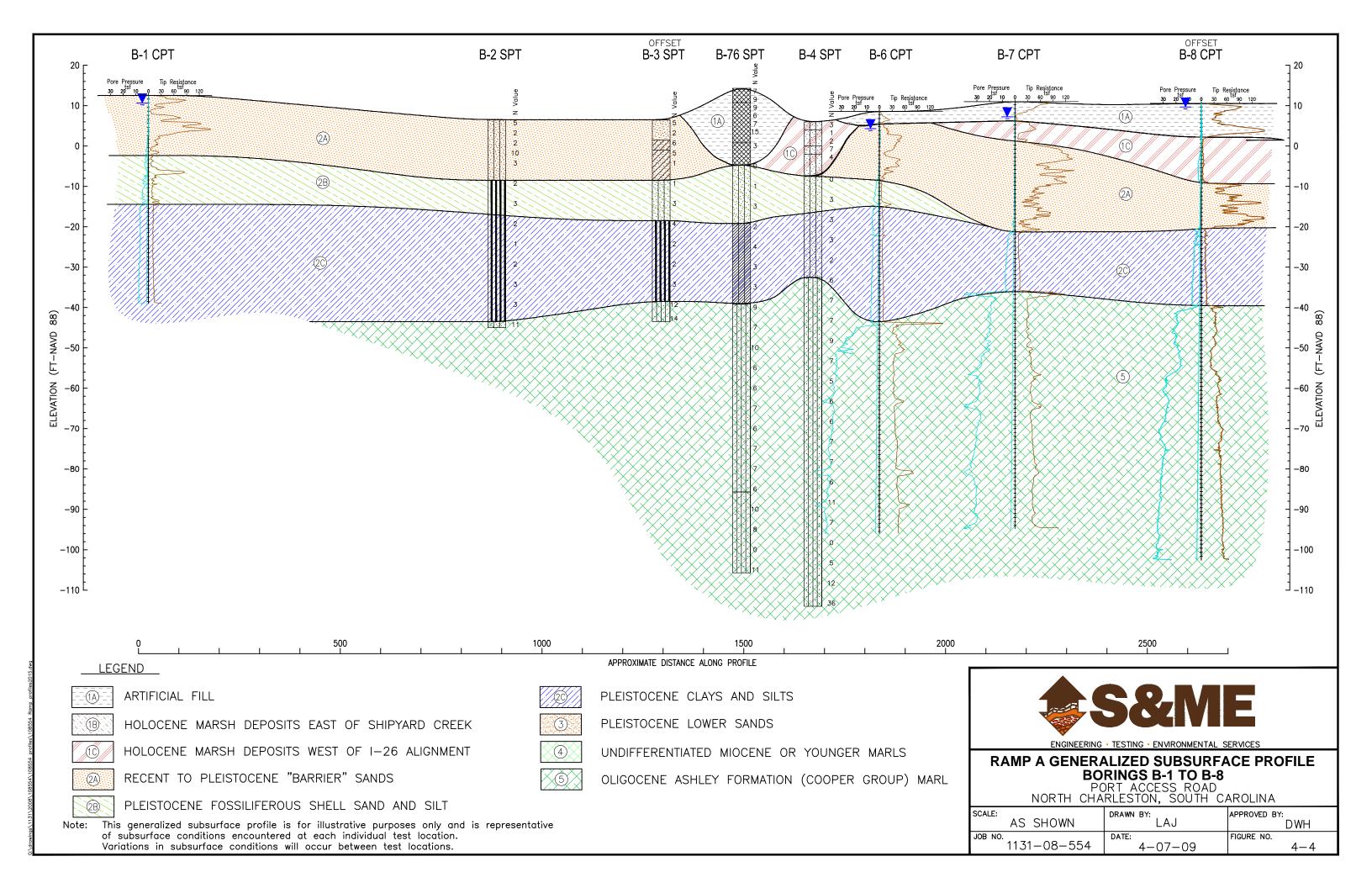
S&ME's interpreted subsurface stratification is indicated in the subsurface profiles presented as Figure 4-1 through Figure 4-12.

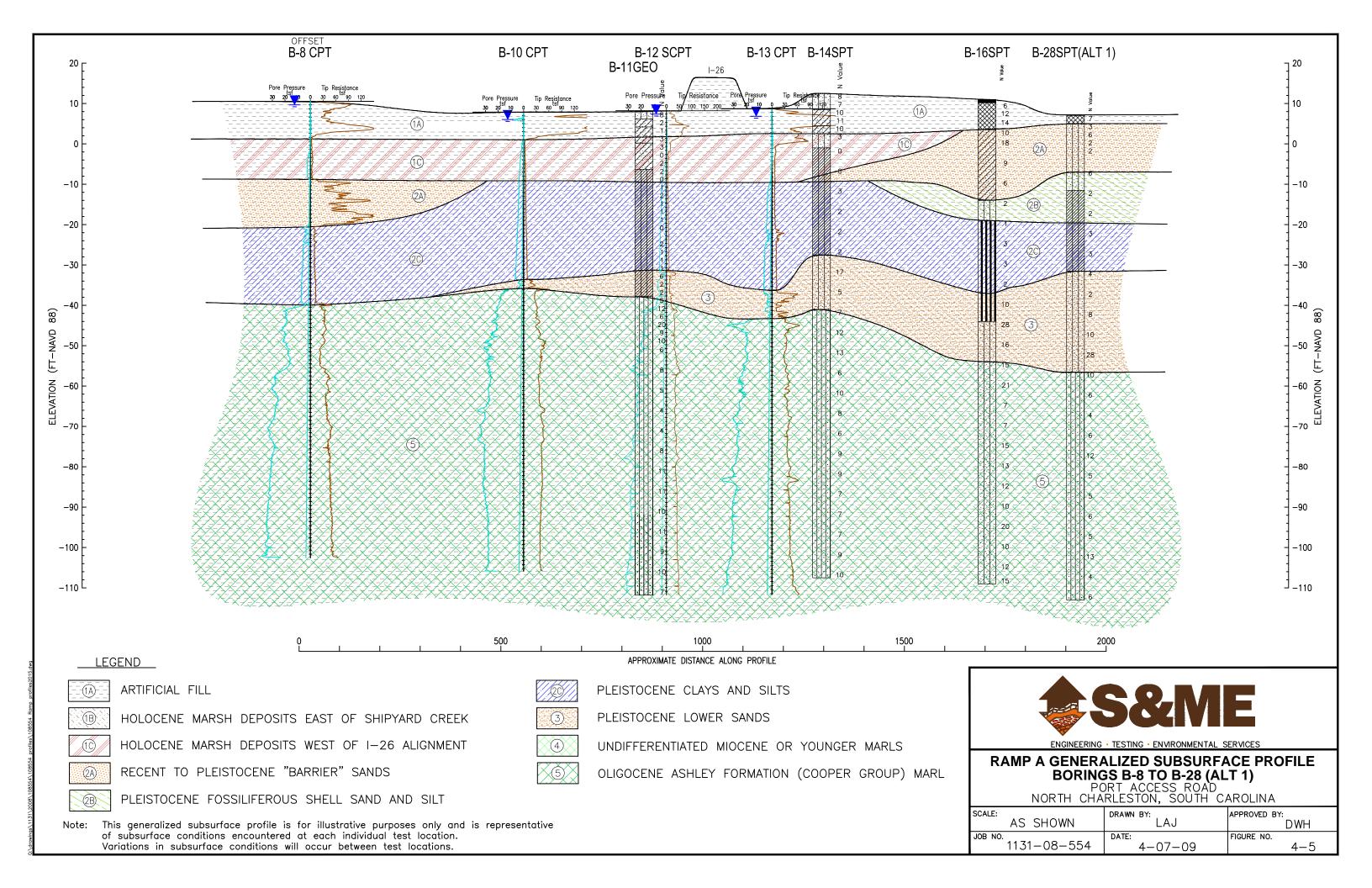
The depth and thickness of the subsurface strata indicated on the profiles and the SPT Boring Logs and on other field records were generalized from and interpolated between test locations. The transition between materials will be more or less gradual than indicated and may be abrupt. Information on actual subsurface conditions exists only at the specific boring locations and is relevant to the time the exploration was performed. The stratification lines were used for illustrative purposes and should not be used as the basis for design or construction cost estimates.

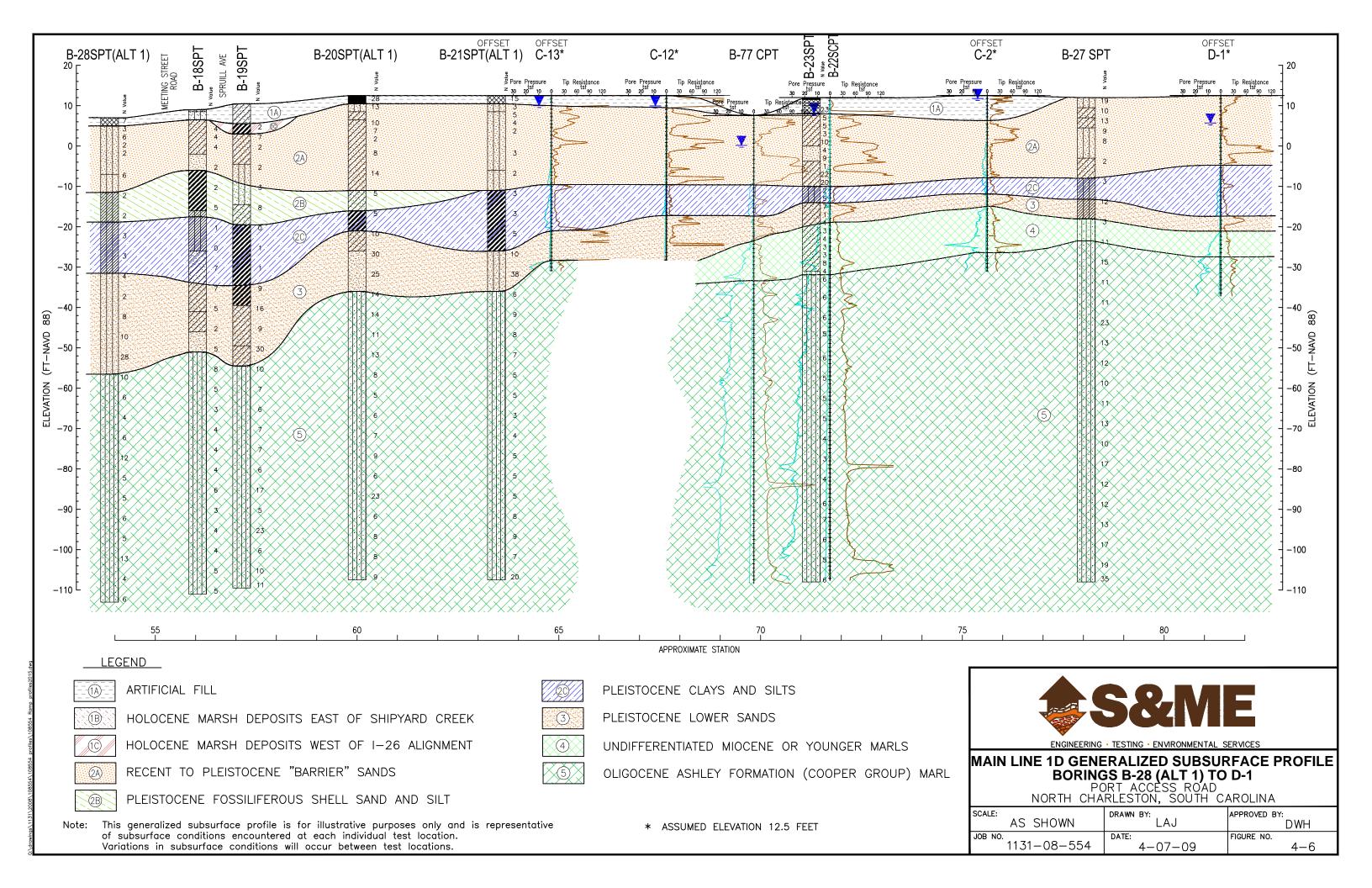


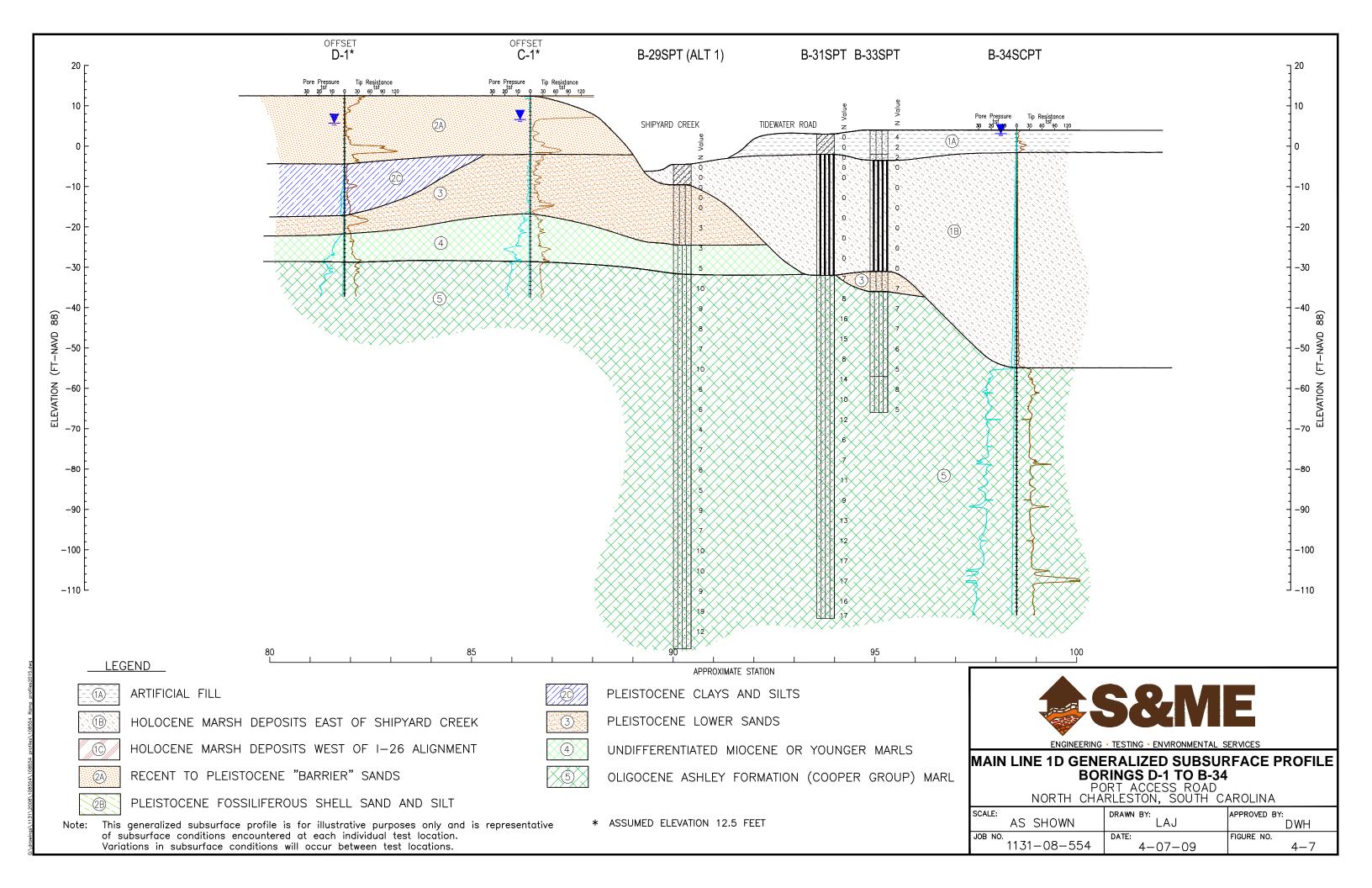


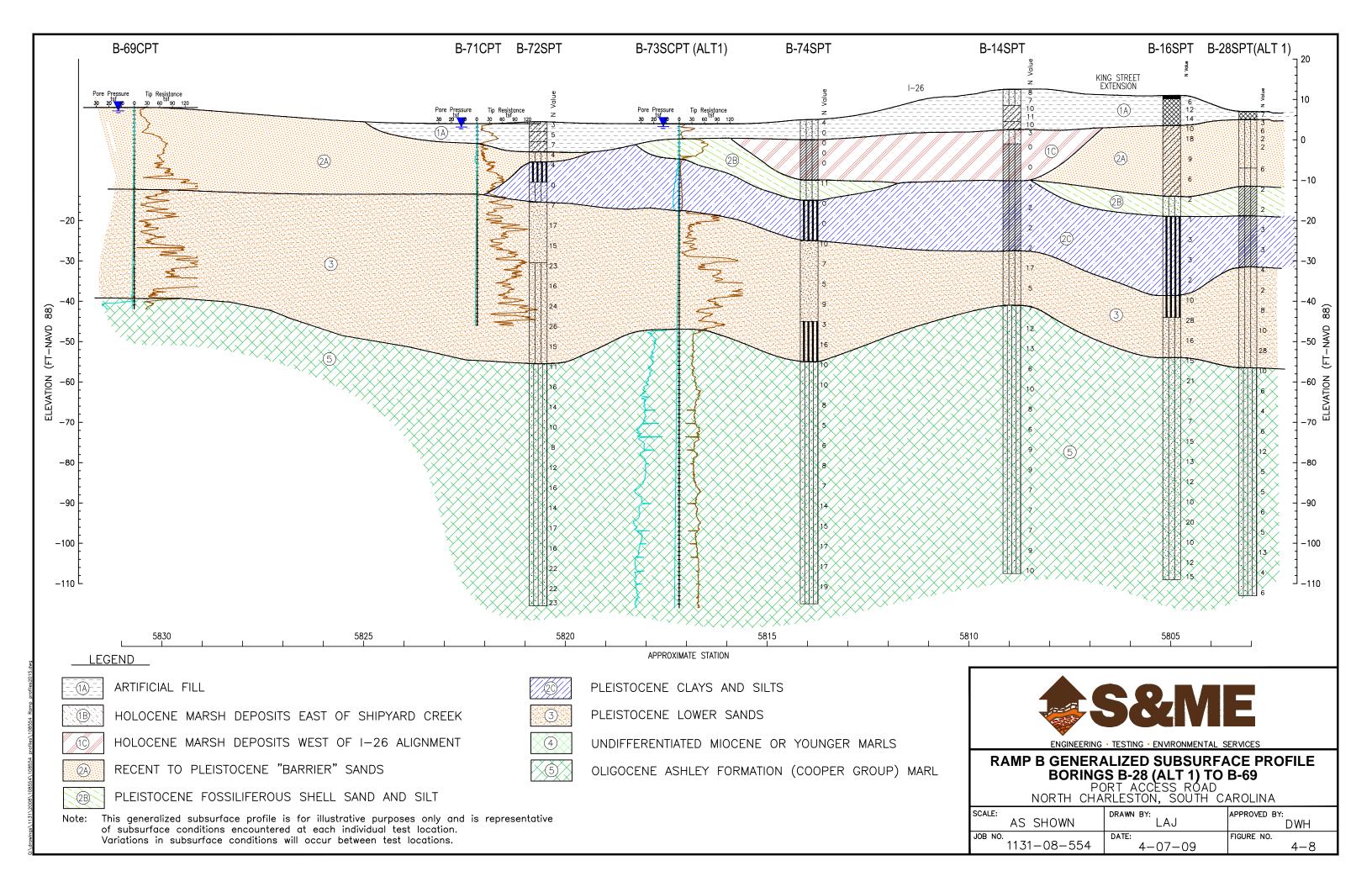


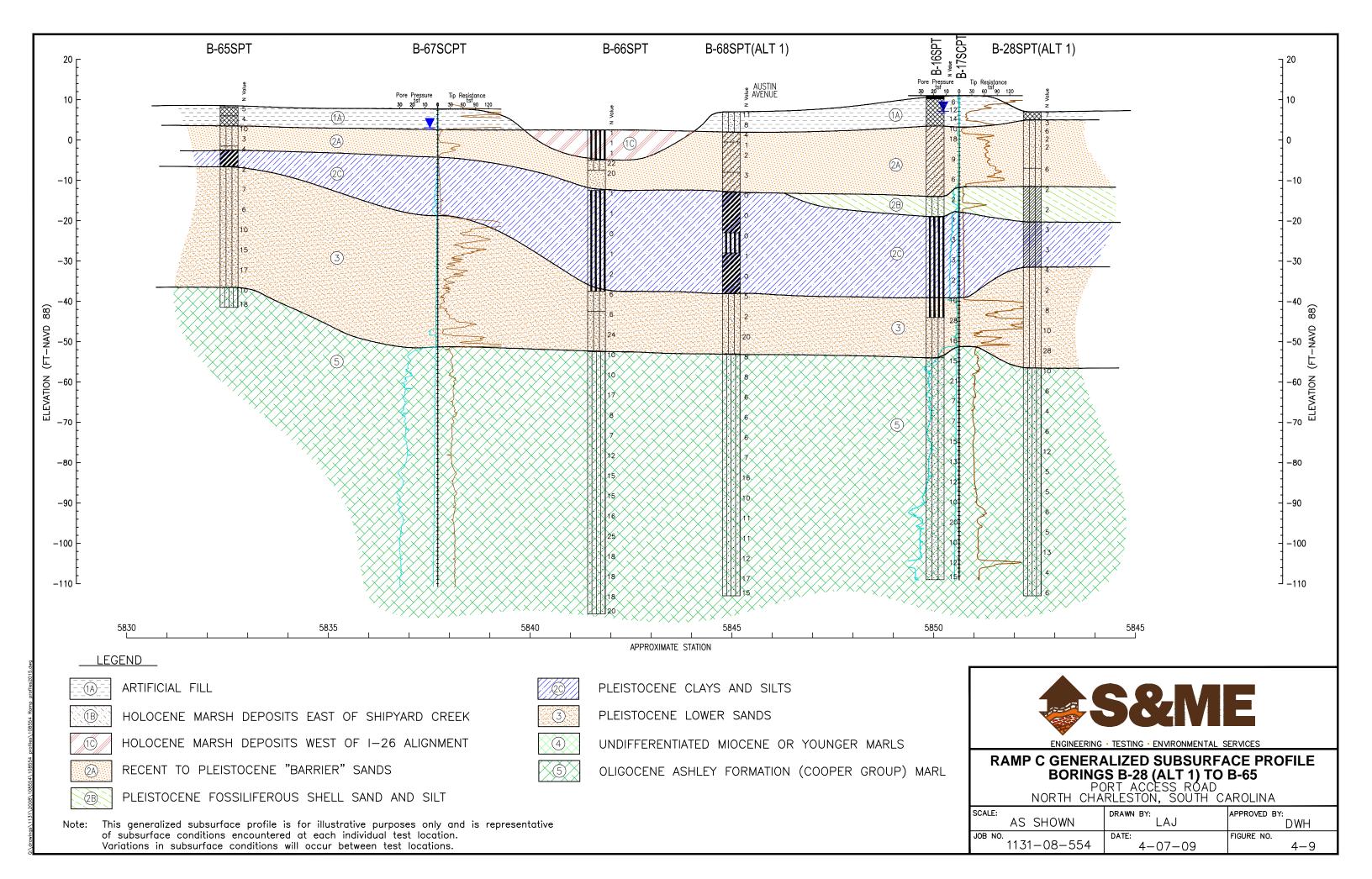


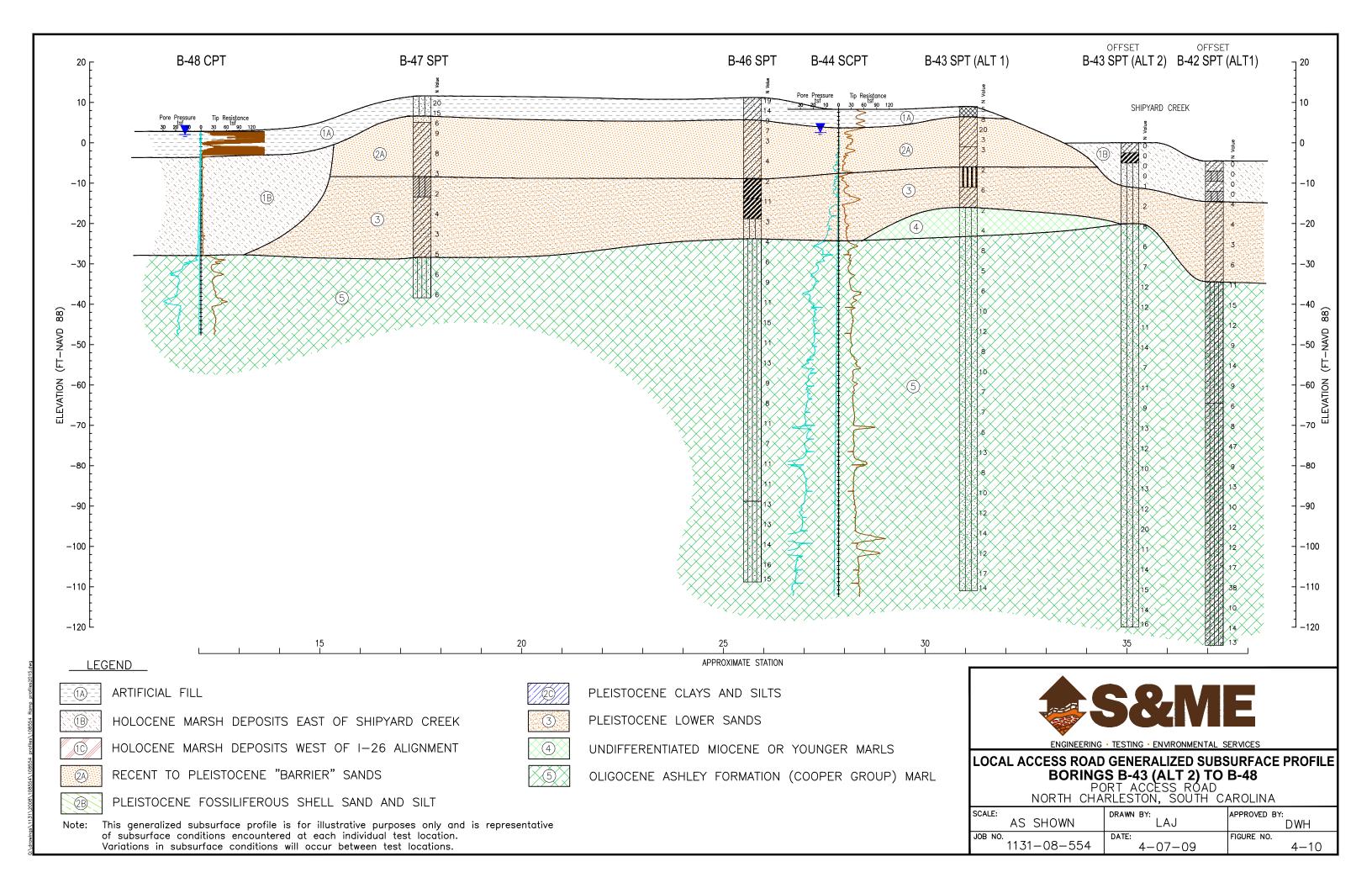


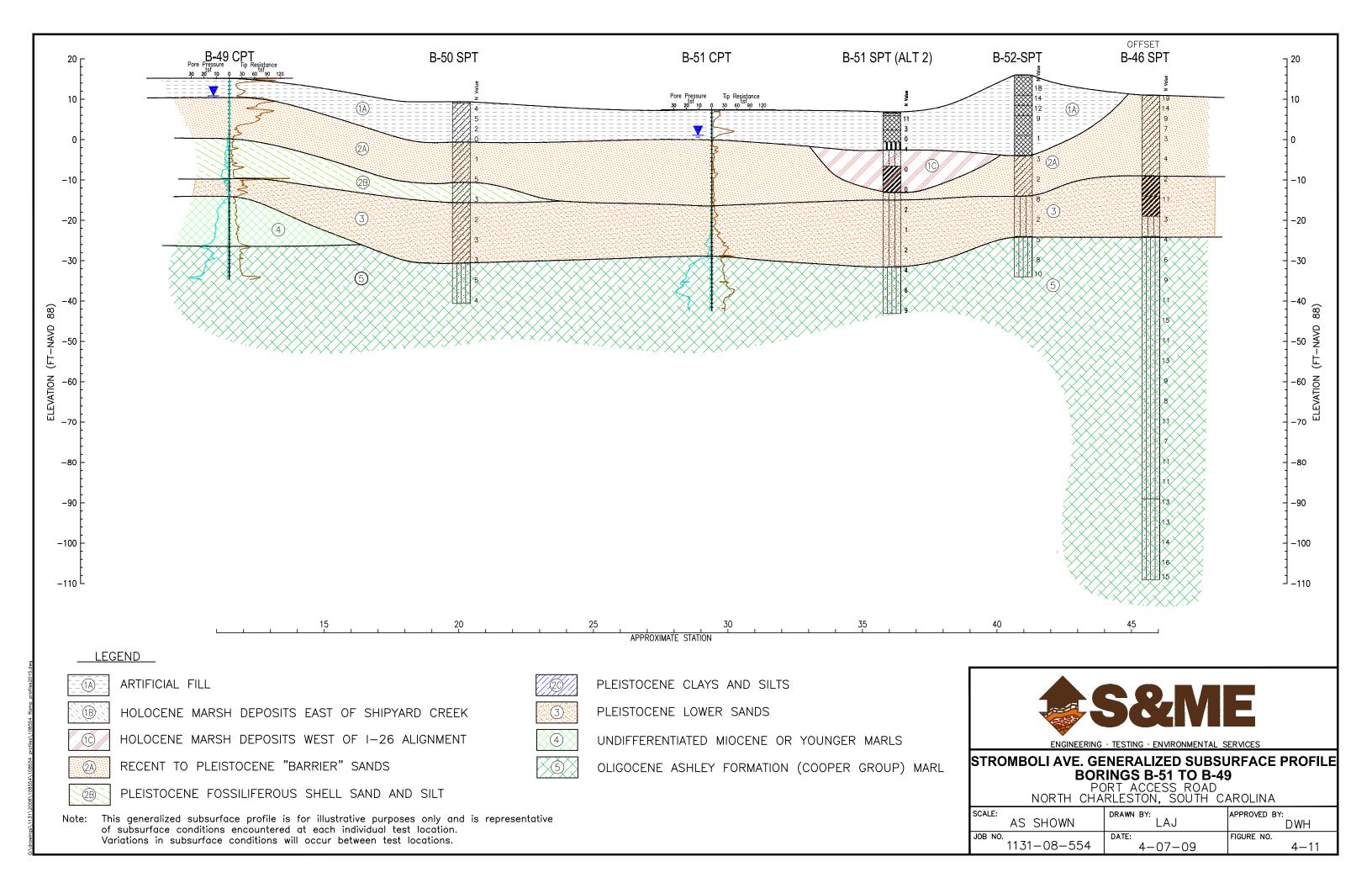


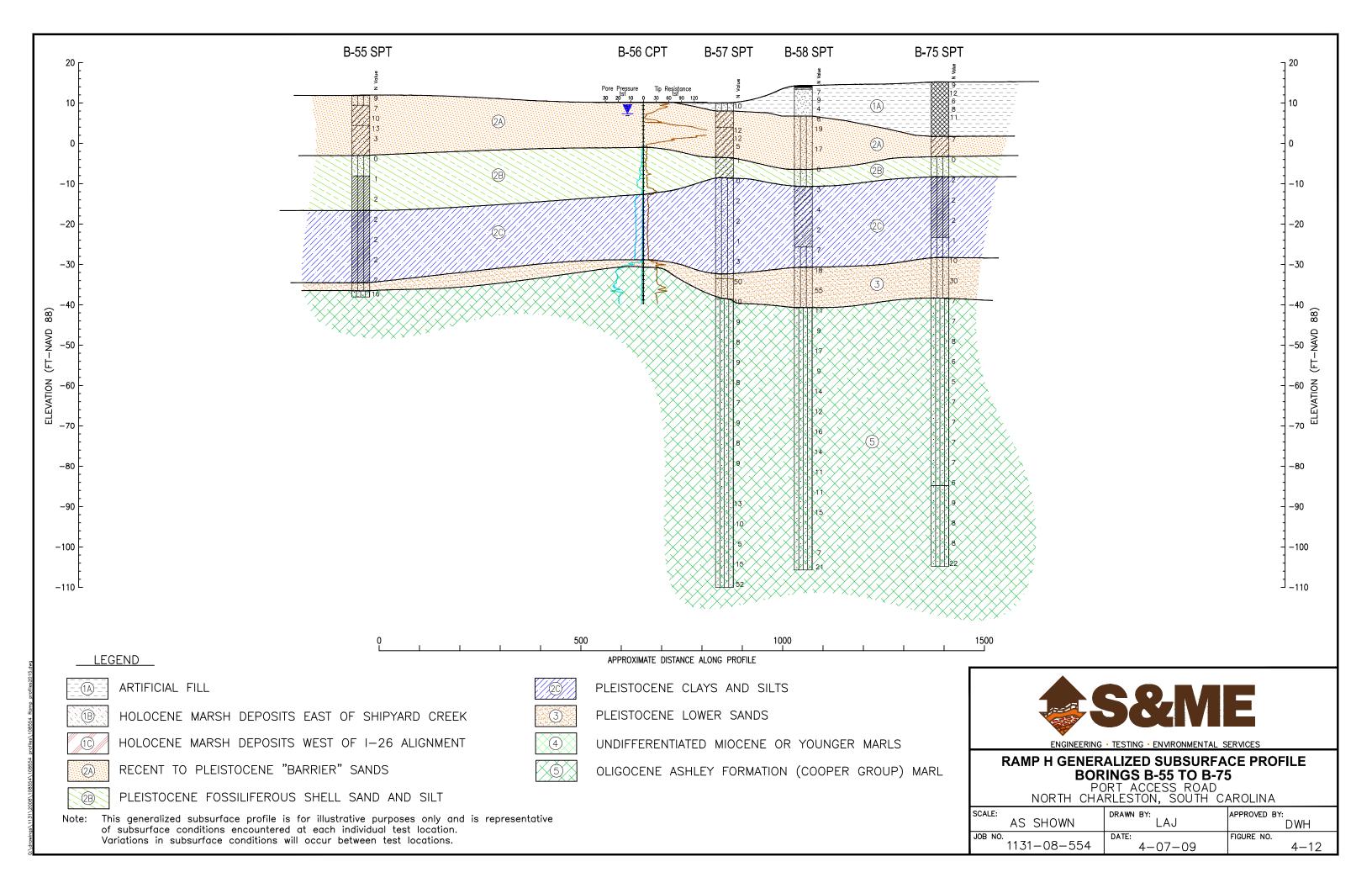
















4.3.1 Unit 1A: Artificial Fills and Embankments

Soils designated as "fill" include large areas of built up lands east of Shipyard Creek within the naval base. Large areas of filled land are also indicated on local geologic maps west of the I-26 alignment extending to the Ashley River. These areas were progressively filled in at various times during historical development of the Charleston metropolitan area.

Borings within the naval base and at other locations along the alignment penetrated soils evaluated as having been dumped or spoiled onto the original ground surface. The terms "dumped" or "spoiled" are used in this context to describe soils which were likely placed without apparent engineering control of either their composition or moisture content, or that appear to have been placed without compactive effort being applied or pushed out as a mass rather than placed systematically in thin lifts. Along the I-26 alignment fills were likely placed with engineering control and penetration observed in borings and soundings reflect substantially greater resistances. Boring access was limited in some areas, notably along I-26, sandy fill encountered in the borings and soundings likely do not extend very far beyond the right-of-way.

The thickness of apparent fill soils ranged from 3 ft to 5 ft east of Shipyard Creek and up to 8 ft in the vicinity of the I-26 interchange. Thickness of these materials elsewhere on the site or at locations intermediate between the borings likely varies from thicknesses noted at boring locations. In these locations the fills appeared to directly overlie soft cohesive soils of Unit 2 and natural sands do not appear to be present.

Most recovered samples evaluated as possibly fill consisted of relatively cohesionless to weakly cohesive sandy clays or clayey sands. Small discrete samples obtained in several of the borings appeared to contain some deleterious debris or organic material, but we could not make a definite judgment as to the composition of this material without exposing a larger area. The fill mass may include large organics, buried debris, or voids which could not be observed during our exploration or occur in areas not explored.

These soils will form the immediate subgrade for pavements or new embankments over much of the site. Most area fills include a relatively thin layer of sand, possibly including organics, rubble or debris pushed out over marshes or swamp. Over most of these areas fill thickness ranges from 3 to 8 feet, but fills appear to thin and become absent in the central portion of the site, between I-26 and Kings Street. Locally fill depths may be greater in thickness where material has been pushed or dumped into waterways or stream channels.

Filled areas also include built up roadway embankments or subgrades and overpasses along major highway and railroad arteries. Fills in these areas may include loose sands pushed or shoved over the original ground surface, possibly over soft surface deposits or marsh. In many areas fills exhibit relatively high apparent compaction immediately below pavements. These fills appear to consist almost entirely of sands. Maximum thickness in these areas may locally exceed 15 ft.

Recovered samples were narrowly graded fine/medium grained sands with trace to no discernable fines. Predominant classification by the Unified Soil Classification was either SM or SP based on laboratory tests and visual-manual classification procedure. Soil behavior based on CPT point resistance and friction ratio was typical of sands containing little to some silty fines. In most cases CPT penetration data imply a variable, stratified deposit consisting of moderately thick (6 in. to 12 in.) layers of alternating medium





dense sands with either loose sands or soft clays or silts. Samples or cuttings recovered in the fills adjacent to Shipyard Creek contained foreign objects including shell, gravel, and stone.

Moistened samples are typically gray to brown. Samples obtained below the immediate ground surface were generally moist, with samples becoming wet or saturated within a few feet of the water table. Three soil specimens selected from widely varying locations, washed over a No. 200 sieve, indicated approximately 30-35 percent clay or silt by weight. Samples manipulated by hand exhibited essentially nonplastic, cohesionless behavior

Standard penetration test values typically ranged from 8 to 10 blows per foot. Soil consistency was evaluated as loose to medium dense. However, soil strength and compressibility is likely to be highly variable due to the incremental nature of placement and typical lack of engineering control exercised in construction of these soils. Samples were typically granular in composition and most of the fills lie above the water table; therefore they will be only partially saturated. Primary consolidation will for that reason be very rapid and impossible to tell apart from immediate settlement. Secondary compression will be very small.

4.3.2 Unit 1B - Holocene Marsh Deposits East of Shipyard Creek

These very soft fine grained soils consist of Holocene marsh and swamp deposits located mostly east of Shipyard Creek, falling generally within the grounds of the former naval base. Ground surface elevation throughout this area is on average several feet lower than elsewhere along the alignment. For the most part these soils are masked by a surface layer of artificial fill. The upper sands which characterize the upper 10 to 30 feet of the soil profile on the Wando Terrace west of Shipyard Creek along the alignment appear to be absent.

CPT soundings performed east of Shipyard Creek penetrated these soils to depths of about 60 feet below a thin surface layer consisting of sandy fill. These soils appear only on the Mainline ID Profile in Figure 4-7. These soils will form the principal bearing strata for soil embankments in the area east of Shipyard Creek, and the resisting strata for laterally loaded deep foundations supporting proposed bridge structure.

The soft organic silty clays are geologically recent deposits formed primarily in marshlands and waterways, which east of Shipyard Creek do not appear to have been subsequently overlain by beach or dune sands. Recovered split spoon samples were low plasticity, silty fines with very little perceptible dry strength when remolded by hand.

Predominant classification by the Unified Soil Classification was MH based on laboratory plasticity tests. However, DMT material index (I_D) values obtained were mostly less than 0.2, typical of clays. Soil behavior based on the Robertson correlation using CPT point resistance and friction ratio was typical of highly organic soils or peats, or sensitive silts or clays which exhibit very great strength loss when disturbed. CPT penetration data imply a relatively thickly stratified deposit with only moderate variation of tip stress, sleeve friction, or pore pressure readings observed within this interval.

Samples recovered in the upper 10 ft of the deposit contained trace amounts of fibrous organic matter and exhibited a distinct organic odor, but the odor diminished with depth and was not noted to occur in the lower half of the strata. Consequently, these soils have for this study been classified as MH rather than OH. Samples within 5 to 10 ft of the base of the layer exhibited trace amounts of broken shell.





Samples were wet or saturated, laboratory moisture contents commonly exceeded 100 percent and were as high as 117 percent. Assuming full saturation, these water contents imply that soil void ratio would exceed 2.5. A limited number of specimens washed over a No. 200 sieve indicated 60 to as high as 100 percent clay or silt by weight. Minus No. 40 sieve sizes exhibited liquid limit values of 55 to 80 percent and plastic limit values ranging from 35 to 55 percent. Plasticity Index values thus ranged from 20 to 35 percent. Liquidity Index values determined by comparison of plasticity indices to in-place moisture content varied from 1 to 1.5. A plasticity chart is presented as Figure 4-13, with the Holocene soils indicated.

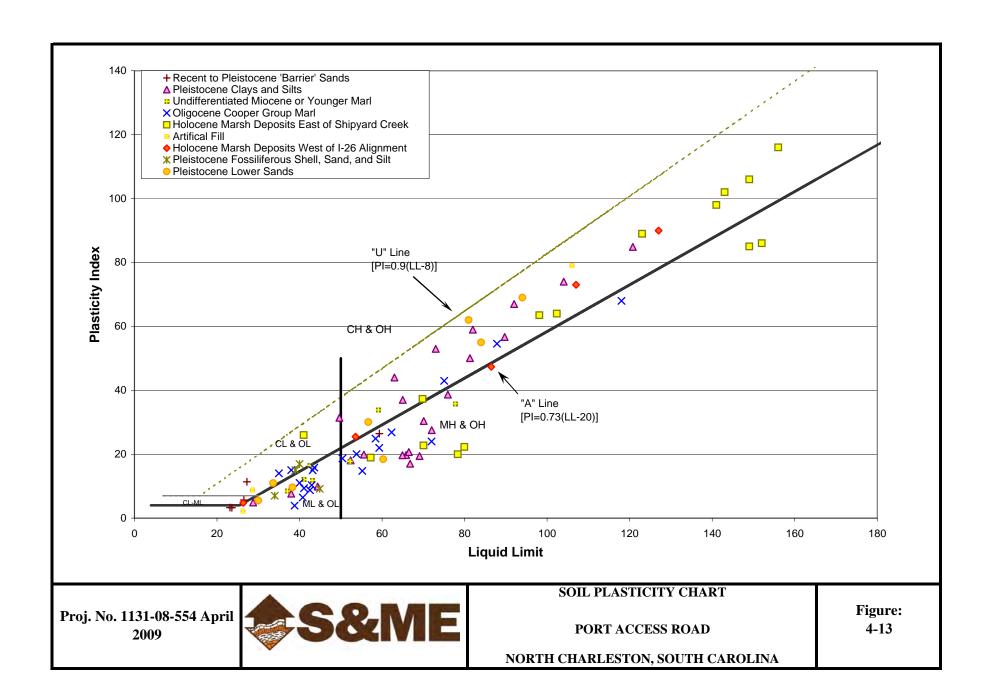
Soil consistency is typically very soft. Standard Penetration Test values recorded in soil test borings were almost uniformly "weight-of-hammer" or weight-of-rod," failing to register a recordable blow count per foot. Cone penetrometer tip resistances ranged from less than one to about 3 tons per square foot.

Undrained shear strength of the marsh deposits was estimated in sounding B-32DMT using the horizontal stress index K_D and the effective overburden stress using the relationship by Marchetti (1980). Horizontal stress index values of 3 to 4 where obtained to a depth of about 20 ft, decreasing to about 2 to 3 in the lower half of the Holocene sediments. These values imply undrained shear strength of 300 to 400 psf using the Marchetti relationship. An alternate relationship proposed by Schmertmann (1981) based on the corrected first reading and the pore pressure reading suggest undrained shear strength ranging from 200 to 300 psf. Field vane shear testing was conducted in borings B-34 and B-40 in general conformance with the procedures described by ASTM D 2573. After correction for soil plasticity, undrained shear strength values in the Holocene soils ranged from 144 to 300 psf.

Undrained shear strength values obtained in DMT soundings and vane shear tests imply a shear strength equal to about 0.4 to 0.6 times the effective overburden pressure to a depth of about 20 ft and about 0.24 to 0.30 times effective overburden stress below 20 ft. These values are consistent with very soft, slightly overconsolidated to normally consolidated cohesive soils.

Five representative undisturbed samples of the Holocene soils were sheared in triaxial compression under full saturation. Samples were obtained at depths of 15 to 40 ft below the surface. At these depths the soils would have been confined under effective stresses ranging from 800 to 2000 psf (5 to 14 psi). Two samples were sheared in compression using the UU or "Q" test method, without consolidation of the samples aned without allowing any drainage of the sample during shearing. Samples were sheared at confining stresses of 15, 25 and 35 lbs. per square inch. Sample confining stresses were selected to bracket anticipated final stresses applied at the sample depths.

Test output attached in the Appendix includes plots of deviator stress vs. applied strain for various load increments, induced pore pressure vs. applied strain, and maximum shear strength at various increments of confining stress. Peak strength values were 410 psf at a depth of 23 ft, and 460 psf at a depth of 38 ft. Both values were expressed as an undrained shear strength with zero angle of internal friction.







To evaluate strength parameters that would apply to long term static conditions after consolidation of the soils under applied embankment loads, three other undisturbed samples were isotropically consolidated under applied pressures of 5 to 30 psi with full drainage. Isotropically consolidating the samples allows testing to replicate a range of long term post-construction states of stress. Following consolidation, samples were then sheared in compression using the CU or "R" test method without allowing any further drainage. Failure of the specimens during the tests was defined as the maximum stress difference (deviator stress) attained at any point during the test.

Pore pressure measurements conducted during shearing of the samples were used to evaluate cohesion and angle of internal friction for drained conditions. Drained soil parameters were derived by a best common tangent trend through the failure points plotted on the Mohr Circle envelope for both peak and residual strength values. In each case the normal stress at each point of failure was adjusted on the Mohr Circle diagram for either positive or negative pore pressures measured in the specimen at failure. In all three tests, positive pore pressures developed within the samples during shearing increased with increasing deviator stress at a rate which approached or equaled incremental deviator stress loading up to the point of failure. This is characteristic of samples that are confined at stresses that considerably exceed preconsolidation stress of the soils, or in alluvial soils where the soil structure is honeycombed or flocculated. Failure of the sample as defined by the Mohr Circle envelope under these conditions were found to closely correspond to failure as defined by maximum deviator stress on the stress strain plot. Average effective stress values of cohesion and friction angle for peak strength were about 0 psf and 18 to 29 degrees.

We used three correlations to estimate undrained shear strength from the CPT data:

$$S_u$$
 = $(q_t - \sigma_{vo})/N_{kT}$ - where $10 \leq N_{kT} \leq 20$ (Aas et al, 1986) (1)

$$S_u = (u_2 - u_0)/N_u$$
 - where $7 \le N_u \le 9$ (Mayne & Holtz, 1988) (2)

$$S_u = 0.091(\sigma_{vo}')^{0.2}(q_t - \sigma_{vo})^{0.8}$$
 (Duncan & Wright, 2006) (3)

Correlations 1 and 2 include empirical factors: N_{kt} and N_u . We selected "global" values of N_{kt} and N_u that produced undrained shear strengths that were in reasonable agreement with the FVT results. Since CPT is much quicker and less expensive than FVT, the correlations are a valuable means of quickly and economically estimating strengths across a project site. Such extrapolation requires the selection of single empirical parameters that yield results that are generally in agreement, hence the selection of "global" values. We ultimately used an N_{kt} value of 20 and an N_u value of 9. Plots of undrained shear strength measured with FVT and CPT and UU triaxial tests (where available) are presented in Figure 4-14 and Figure 4-15 for boring B-40 and B-34SCPT, respectively.

These soils lie mostly below the water table at this site and most of these soils will be entirely saturated upon application of load. Consolidation is likely to be relatively slow since the soils appear to be stratified horizontally to only a limited degree and drainage paths will tend to be long. Immediate compression appears to form very small percentage of the total deformation of the sample at each load increment, and is unlikely to be distinct from primary consolidation. Primary consolidation will require a marked length of time to occur after load application. Secondary compression may also be significant.



Figure 4-14. B-40 Shear Strength Comparison



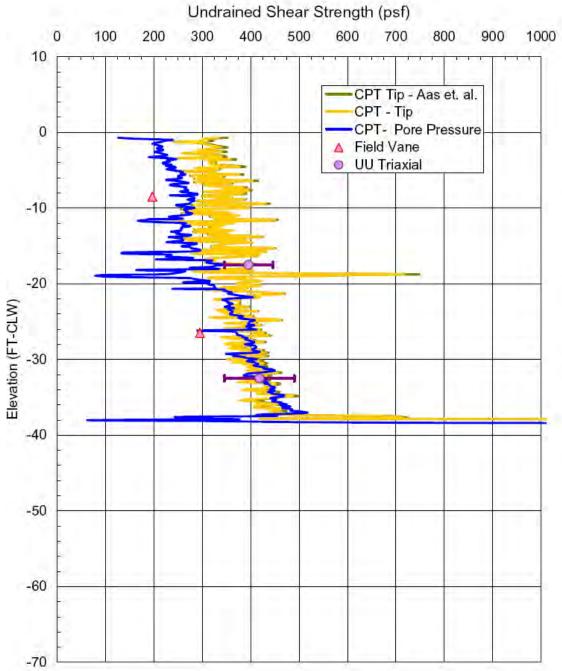
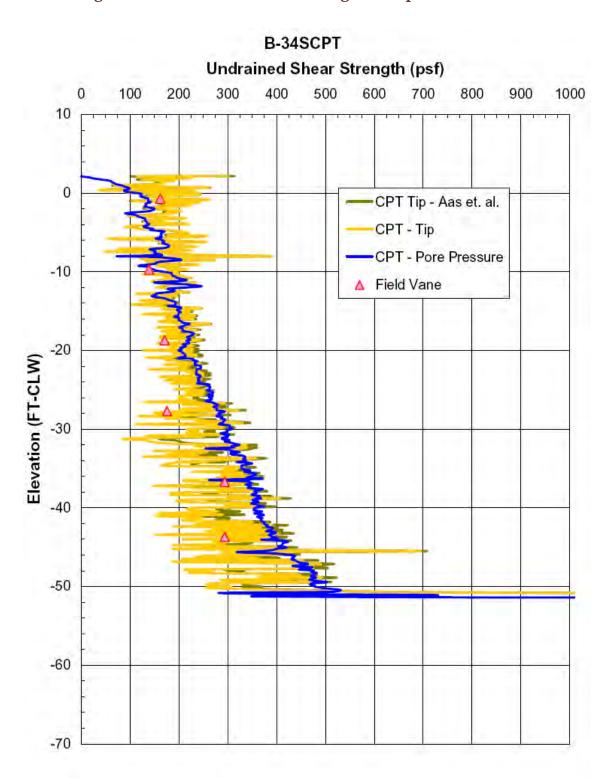




Figure 4-15. B-34SCPT Shear Strength Comparison





The compressibility of a fine-grained soil expressed as the vertical drained confined one-dimensional tangent (constrained) modulus M was determined in DMT sounding B-32DMT The constrained modulus M was estimated using the dilatometer modulus E_D , applying a proportionality constant R_M which is a function of the material index and horizontal stress index values. Estimated constrained modulus of the layer based on dilatometer readings ranged from 10 to 18 ksf.

One dimensional consolidation (oedometer) testing was conducted on five undisturbed samples of these soils recovered in borings B-33, B-34, B-39 and B-40 at depths varying from 16 to 31 ft. Samples were trimmed and seated as described by ASTM D 2435. The tests were conducted to maximum applied stresses of 16 to 32 ksf. Unload-reload cycles were not performed. From the maximum load level each sample was then unloaded to zero in five decrements. Plots of the consolodation curves for Holocene Soil are presented in Figure 4-16. Consolidation of the sample under each increment/decrement of load was computed using both log-time and Taylor's square root of time methods

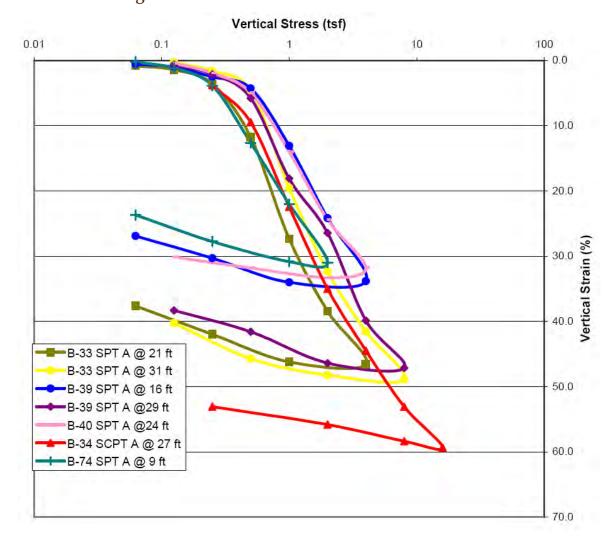


Figure 4-16. Holocene Soils Consolidation Curves





Graphical presentation of sample deformation at 100 percent consolidation vs. load expressed as percent strain is attached in the appendices. Effective vertical stress of the samples in place was estimated to be 0.6 to 1.0 ksf. Applying the Casagrande construction to the consolidation curve implies a preconsolidation stress of 1.0 ksf in four of five tests, or 0.8 to 1.0 times the vertical effective stress. Average compression ratio, obtained by comparing sample strain versus applied load above the preconsolidation stress was 0.36. This would equate to a a one-dimensional constrained modulus (M) value of 18 ksf, similar to DMT M-values obtained in Boring B-32DMT. Average recompression ratio taken from the unloading portion of the consolidation test curves was 0.055.

Initial consolidation occurring immediately upon placement of each incremental load ranged from 5 percent to 10 percent of total settlement, for all load increments less than the preconsolidation stress. At the preconsolidation stress and at higher loads the percent initial consolidation decreased to about 5 percent. Time rate of consolidation as expressed by the coefficient of vertical consolidation was estimated to be 25 to 50 ft2/year below the preconsolidation stress in the consolidation tests, and 4 to 8 ft2/year during virgin compression.

4.3.3 Unit 1C - Holocene Marsh Deposits West of I-26

These very soft fine grained soils consist of Holocene marsh deposits located mostly west of the I-26 alignment. These soils are mapped at the surface adjacent to the Ashley River and tributary creeks leading into the project area. Ground surface elevation throughout this area is on average several feet lower than elsewhere along the alignment. In many areas these soils have been covered by artificial fills.

CPT soundings and soil test borings performed along I-26, particularly west of the current alignment, penetrated these soils to depths of about 10 ft below a thin surface layer consisting of sandy fill. These soils are present in some areas along ramps A and D and in one location (Boring B-4) along Ramp G. These soils appear to lie within a filled swale extending along the west side of the I-26 alignment and projecting eastward into the area between the connector alignment and I-26. There appears also to be a similar swale present along the I-26 alignment south of the Access Road interchange.

These soils appear to extend to far shallower depth than do similar soils encountered east of Shipyard Creek. Maximum depth of penetration was approximately elevation -10 feet.

The soft organic silty clays are geologically recent deposits formed primarily in marshlands and waterways, which outside of filled areas do not appear to have been subsequently overlain by beach or dune sands. Recovered split spoon samples were low plasticity, dark to blueish-gray silty fines with very little perceptible dry strength when remolded by hand. Some samples contained fibrous organic material consisting of marsh grasses.

Predominant classification by the Unified Soil Classification was ML or MH based on laboratory plasticity tests. DMT material index (ID) values in sounding B-5DMT obtained were 0.4 to 0.6, typical of clays to clay-silts. Soil behavior based on the Robertson correlation using CPT point resistance and friction ratio was typical of highly organic soils or peats, or sensitive silts or clays which exhibit very great strength loss when disturbed. CPT penetration data imply a relatively thickly stratified deposit with only moderate variation of tip stress, sleeve friction, or pore pressure readings observed within this interval.





Similar to soils east of Shipyard Creek, samples obtained west of I-26 were wet or saturated and contained considerable free moisture. Laboratory moisture contents commonly exceeded 100 percent and were as high as 124 percent. Assuming full saturation, these water contents imply that soil void ratio would exceed 3.0. Specimens washed over a No. 200 sieve indicated 80 to 100 percent clay or silt by weight. Minus No. 40 sieve sizes exhibited liquid limit values of 80 to 85 percent and plastic limit values ranging from 40 to 55 percent. Plasticity Index values thus ranged from 35 to 45 percent. Liquidity Index values determined by comparison of plasticity indices to in-place moisture content varied from 1 to 1.5.

Standard penetration test values typically ranged from WOH to 2 blows per foot, typically very soft consistency. Undrained shear strength was estimated using the horizontal stress index KD obtained in Sounding B-5DMT and the effective overburden stress using the relationship by Marchetti (1980). Horizontal stress index values of 4 to 5 in this zone at this location implies undrained shear strength of 180 to 200 psf.

Soil compressibility expressed as the vertical drained confined one-dimensional tangent (constrained) modulus M was estimated to range from 40 to 60 ksf. These values are roughly twice those obtained in similar materials east of Shipyard Creek, and may reflect some prior preconsolidation of the materials at the location of sounding B-5DMT by previous filling of the area. The ratio of the maximum prior applied vertical stress to the present vertical stress was estimated at Boring B-5DMT using the DMT horizontal stress index KD. The relationship proposed by Marchetti (1980) yields overconsolidation ratios of 2.7 to 4.2 considering horizontal stress index values of 3.8 to 5 in this layer. The maximum prior applied vertical stress likely ranges from 500 to about 1000 psf greater than the present vertical stress, which would equate to precompression of these soils by an additional 4 to 8 ft of material.

One dimensional consolidation (oedometer) testing was conducted on an undisturbed sample of these soils recovered in boring B-74A at a depth of 8 to 10 ft, after the sample was trimmed and seated as described by ASTM D 2435. The test was conducted to a maximum applied stress of 16 ksf using standard loading schedule A described in section 11.5 of ASTM 2435 similar to tests conducted on samples obtained east of Shipyard Creek. Effective vertical stress of the sample in place was estimated to be 400 psf. Applying the Casagrande construction to the consolidation curve implies a preconsolidation stress approximately equal to the existing vertical effective stress, implying little evident prior loading of these soils. Average compression ratio value obtained at stresses exceeding the preconsolidation stress was 0.29, slightly less than the average of the tests conducted east of Shipyard Creek. Expressed as a constrained modulus (M) value the slope of the virgin compression curve is approximately 22 ksf.

4.3.4 Unit 2A - Recent to Pleistocene "Barrier" Sands

Unit 2A includes a number of different layers which for convenience of discussion have been combined into a single layer for this data report. Unit 2A includes the sand barrier facies of the Wando Formation. In addition, Unit 2A also includes some isolated areas of recent to late Pleistocene terrace sands indicated on local geologic mapping as pre-Wando in origin, located generally west of I-26. These soils form the barrier facies of the Silver Bluff Terrace which have eroded and replaced the Wando barrier sands adjacent to the Ashley River.

Penetrated thickness of Unit 2A varies between 5 and about 15 ft west of Kings Street, where these soils directly overlie soft clayey soils of Unit 2. Between Kings Street and Shipyard Creek Unit 1 thickens to over 20 ft and forms most of the profile between the ground surface and the underlying Cooper Group.





Between Kings Street and Shipyard Creek these soils appear to directly overlay Pre-Pleistocene marls, with Unit 2B or 2C either absent or present only as thin inclusions or seams below Unit 2A.

Beach or dune deposited sands form the immediate ground surface in most areas where the surface elevation exceeds +10 ft. The thickness tends to increase with higher ground surface elevation, but appear to be greatest proceeding eastward from I-26 toward Shipyard Creek, and southward along I-26 from the interchange with the Port Connector. The natural soils near the surface were likely deposited as beach or dune sands during the retreat of the sea level near the end of the Pleistocene period, and the original ground surface likely took the form of the ridge and swale topography typical of dune areas. During development and urbanization of the local area the dunes would have been pushed over and the swales filled to form the currently flat surface.

In most cases these soils exhibit a rather poorly-developed weathering profile, consisting of a zone of relatively uniform fine sands containing less than about 5 percent fines, which extend to about 2 to 3 ft, underlain by a rather weak and erratic clay accumulation zone consisting of sandy clays or clayey sands about 3 ft thick. Soil consistency is typically loose to medium dense, with SPT values averaging 10 to 15 blows per foot and CPT tip resistances averaging 50 to 120 tsf.

The Wando Formation is considered to have been formed during a high stand in sea level which has not been exceeded since deposition. These soils would be considered to have never been prconsolidated by loads exceeding their own weight. The overconsolidation of sandy soils can be approximately estimated by comparing the dilatometer constrained modulus M to the CPT point stress value at a given depth, using the relationship proposed by Marchetti (2001). Adjacent CPT sounding B-70 and DMT sounding B-71 were compared and the constrained modulus appears to lie mainly within the range of about five times the CPT tip stress in this zone. For this range the sands would be considered to be normally consolidated.

A rough estimate of sand compressibility was made using uncorrected CPT tip resistance values. For the typical range of sand-sized grain sizes, elastic modulus of the soils is typically represented by a value equivalent to 2 to 4 times the tip resistance where the sands are considered as normally consolidated or uncemented. Using 3 as an average, tip resistances of 50 to 120 tons per square foot likely represent a material with an elastic modulus of 300 to 600 ksf.

4.3.5 *Unit* 2B – Fossiliferous Shell Sand and Clay

The middle portion of the Pleistocene terrace sequence along I-26 contains significant inclusions, seams or lenses of desiccated brown or orange silts and clays, soft blue-gray clays, loose gray silty or clayey sands and shell interbedded with seams of relatively clean medium dense sands. These highly variable soils are possibly tidal or river deposited sediments that were alternately covered by beach sands and compressed to some degree by migrating sand dunes, then scoured and redeposited on top of the underlying clays or marl deposits along the alignment, possibly multiple times. Typically these soils are thin, on the order of 5 ft, and they thin and become absent progressively eastward from the I-26/Port Access Road interchange and to the south along I-26 as the overlying barrier sands thicken. The contact between these soils and the underlying Unit 2C undulates across the alignment, reflecting scouring and redeposition of a pre-existing marsh.

Recovered split spoon samples from this interval were typically loose, brown or gray brown fine-grained sands with little to some clayey fines. Most borings encountered one or more seams of loose clean, gray





or gray brown fine to coarse sands embedded within this material. Recovered samples from the lower several feet of Unit 2B also contained one or more seams of very soft, shelly gray clayey silts or silty clays up to 5 ft thick, sometimes containing inclusions of phosphate, wood or organics. The upper portion of Unit 2B may also exhibit up to 3 ft of marsh or peat.

Soil behavior based on CPT point resistance and friction ratio was typical of mixtures of silty clays or clayey silts, interbedded with mixtures of silty sands to sandy silts. CPT penetration data imply a variable, stratified deposit consisting of moderately thick (6 in. to 12 in.) layers of alternating sands and clays or silts.

Soil specimens washed over a No. 200 sieve indicated 20 to 40 percent clay or silt by weight. The CPT soil index parameter Ic suggests a fines content of 20 to 55 percent using the relationship by Robertson and Fear (1998). Minus No. 40 sieve sizes exhibited a relatively narrow range of moisture content values between plastic and liquid behavior, plasticity index values averaging about 10 percent. Soil moisture content ranged from 22 percent to over 40 percent, averaging about 37 percent, for about 20 tests performed in this unit.

Void ratio estimated assuming soils to be fully saturated ranged from 0.6 to 1.4, averaging about 1.0. These values are substantially lower than the Holocene soils previously discussed or the underlying clays. Soil moisture content is typically slightly below liquid limit values, suggesting some prior surface loading or desiccation of the soils subsequent to deposition.

A single one-dimensional consolidation (oedometer) testing was conducted on an undisturbed sample of these soils recovered in boring B-55A at a depth of 24 ft. This sample had a moisture content of only 30 percent and a void ratio of 0.92. The test was conducted to a maximum applied stress of 16 ksf. From this maximum level the sample was then unloaded to 0.5 ksf in three decrements. Graphical presentation of sample deformation at 100 percent consolidation vs. load expressed as percent strain is attached in the appendices. Effective vertical stress of the sample in-place was estimated to be 1000 psf. Applying the Casagrande construction to the consolidation curve implies a preconsolidation stress of 3800 psf, or 3.8 times the vertical effective stress. Average compression ratio value obtained at stresses above the preconsolidation stress taken from the virgin compression curve was 0.095. Coefficient of consolidation above the preconsolidation stress was estimated to be 80 to 100 ft²/year.

Coefficient of Consolidation was estimated using the rate of decay of pore pressure with time after pausing penetration in soundings B-49, B-54, and B-56 at depths of 17 to 21 ft in this layer. The time required for 50 percent pore pressure dissipation was only 1 to 2 minutes in each test. The coefficient of horizontal consolidation was interpreted based on the time at 50 percent dissipation using the relationship by Robertson (1992). An approximate estimate of the coefficient of compression in the vertical direction was made using a ratio of horizontal to vertical permeability of 10, given by Jamiolkowski et. al. (1985) for clays with discontinuous lenses and layers of more permeable soils. This results in an approximate vertical coefficient of consolidation of about 300 ft²/year.

These soils lie mostly below the water table at this site and most of these soils will be entirely saturated upon application of load. But consolidation is still likely to be relatively rapid in this zone since the soils tend to be highly stratified horizontally and drainage paths from impervious layers tend to be very short. Primary consolidation of this layer may thus be to some degree hard to tell apart from immediate compression. Secondary compression will be very small.





4.3.6 *Unit 2C – Pleistocene Clays and Silts*

These generally soft, fine grained soils are differentiated from Units 1B and 1C described above by their position below significant thicknesses of the overlying Units 2A and/or 2B soils. These soils are likely somewhat younger than the Wando Formation, particularly west of I-26, but have been in place for sufficient time to have become slightly preconsolidated. These soils reached thicknesses of up to 30 ft at some sample points, particularly along I-26 in the vicinity of the King Street flyover, and average about 25 t along I-26 north of the King Street flyover and eastward along the alignment. Unit 2C becomes thin, discontinuous or absent in the portion of the site lying east of the Meeting Street Extension to Shipyard Creek. Unit 2C also thins and becomes absent progressively southward along I-26 south of the interchange with the Port Access Road.

Recovered samples were low to moderate plasticity, silty fines with some perceptible dry strength. Some samples contained trace amounts of fine sand or shell. Predominant classification by the Unified Soil Classification was MH based on laboratory tests and visual-manual procedure. Soil behavior based on CPT point resistance and friction ratio was typical of clays or silty clays which exhibit substantially undrained behavior. In most areas CPT penetration data imply a relatively thickly stratified deposit with only moderate variation of tip stress, sleeve friction, or pore pressure readings observed within this interval.

Moistened samples are bluish-gray, in some cases grading with depth into a greenish-gray color. Samples were wet or saturated and contained considerable free moisture. Moisture contents ranged from 70 to 80 percent to as high as 102 percent. Average moisture content for about 20 tests conducted in this unit was approximately 75 percent. Soil specimens washed over a No. 200 sieve indicated 85 to 95 percent clay or silt by weight. Minus No. 40 sieve sizes exhibited liquid limit values of 60 to 102 percent and plastic limit values ranging from 21 to 69 percent. Plasticity Index values averaged about 23 percent. Liquidity Index values determined by comparison of plasticity indices to in-place moisture content varied from 1 to 1.25.

Soils in this zone were slightly more resistant to penetration by our sampling tools than the Unit 1B or 1C soils of Holocene age. Standard penetration test values typically ranged from 1 to 3 blows per foot. Cone penetrometer tip resistances ranged from 2 to 8 tons per square foot. Both are consistent with very soft to soft cohesive soils.

Undrained shear strength was estimated in sounding B-5DMT using the horizontal stress index KD and the effective overburden stress using the relationship by Marchetti (1980). Horizontal stress index values of 5 to 8 imply undrained shear strength of 600 to 1500 psf using the Marchetti relationship. The relationship by Schmertmann (1981) based on the corrected first reading and the pore pressure reading suggest undrained shear strength ranging from 450 to 1050 psf. These values imply a shear strength equal to about 0.6 to 0.8 times the effective overburden pressure. These values are consistent with soft to firm, slightly overconsolidated cohesive soils.

Four representative undisturbed samples of the 2C soils were sheared in triaxial compression under full saturation. Samples were obtained at depths of 23 to 40 ft below the surface. At these depths the soils would have been confined under effective stresses ranging from 1000 to 1600 psf (7 to 11 psi). One sample was sheared in compression using the UU or "Q" test method, without consolidation of the samples and without allowing any drainage of the sample during shearing. Specimens were sheared at confining stresses of 10, 20 and 30 lbs. per square inch.





Test output attached in the Appendix includes plots of deviator stress vs. applied strain for various load increments, induced pore pressure vs. applied strain, and maximum shear strength at various increments of confining stress. Peak undrained shear strength obtained in the UU test was 970 psf at for a samples obtained at a depth of 32 ft. Deformation continued past the evident failure point represented by the peak deviator stress and continued until deviator stress remained essentially constant with increasing deformation. The residual strength obtained was approximately 800 psf, or about 80 percent of peak undrained shear strength.

To evaluate strength parameters that would apply to long term static conditions after consolidation of the soils under applied embankment loads, three other undisturbed samples were isotropically consolidated under applied pressures of 7 to 30 psi with full drainage. Following consolidation, samples were then sheared in compression using the CU or "R" test method without allowing any further drainage. Failure of the specimens during the tests was defined as the maximum stress difference (deviator stress) attained at any point during the test. Average effective stress values of cohesion and friction angle for peak strength were about 0 psf cohesion and 22 to 35 degrees angle of internal friction.

In all three tests, positive pore pressures developed within the samples during shear. Specimens confined at stresses exceeding 20 psi (2880 psf) exhibited a positive pore pressure increase with increasing deviator stress but at a rate which approached the incremental deviator stress loading. This is characteristic of soils that are confined at pressures exceeding the overconsolidation stress. In contrast, pore pressure development within the samples confined at pressures of 10 to 15 psi (1440-2160 psf) was more characteristic of a dense saturated sand or overconsolidated soil. These samples tend to dilate when loaded to failure in undrained shear. Positive pore pressures increase with increasing deviator stress during initial stages of loading but pore pressures then decrease and became negative as the applied deviator stress approach the failure point.

The tendency for samples to dilate when confined as low confining pressures relative to sample preconsolidation creates a "hump" in the Mohr Circle envelope at low confining stresses and an unreasonably high cohesion value. A linear projection of the Mohr Circle envelope from the origin and extended tangent to the circles representing samples confined at stresses above the evident preconsolidation stress yields an effective stress angle of internal friction of 29 degrees for all three tests.

These soils are considerably less compressive than the overlying Holocene silts and clays at low stresses due to some evident preconsolidation of the strata. Where penetrated by dilatometer sounding B-5DMT, the compressibility expressed as the vertical drained confined one-dimensional tangent (constrained) modulus M averages about 250 ksf between depths of 13 and 38 ft at current in-situ stresses. SPT N-values obtained in this interval in the adjacent boring B-3 range from 2 to 3 blows per foot, fairly typical for this unit.

The ratio of the maximum prior applied vertical stress to the present vertical stress was estimated using the DMT horizontal stress index KD using the relationship proposed by Marchetti (1980). For horizontal stress index values of 5 to 8 in this layer, the maximum prior applied vertical stress likely ranges from 4 to 6 times the present vertical stress. The procedure by Mayne (1995) based on corrected first reading and pore pressure reading values would suggest a maximum prior applied vertical stress of about 2.5 to 4 times the current vertical stress. Interpolation of these data would indicate a maximum prior applied vertical stress on the order of 2.2 to 4.4 ksf. Since current in-situ stresses are lower, DMT modulus values





may be expected to underestimate deformation of the soils under loads which exceed the preconsolidation stress.

One dimensional consolidation (oedometer) testing was conducted on six undisturbed samples of these soils recovered in borings B-2A, B-3A, B-53A, and B-55B at depths varying from 24 to 40 ft. The tests were conducted to maximum applied stresses of 16 to 32 ksf. From the maximum load level each sample was then unloaded to 0.5 ksf in three decrements. Graphical presentation of sample deformation at 100 percent consolidation vs. load expressed as percent strain is attached in the appendices.

Effective vertical stress of the samples in place was estimated to be 1.0 to 1.6 ksf. The Casagrande construction implies a preconsolidation stress of 2.8 to 3.8 ksf in five of six tests, or 1.9 to 3.5 times the vertical effective stress. At applied stresses below the preconsolidation stress, taken as the average of the increments immediately above and below the current overburden stress, average constrained modulus obtained was 125 ksf. Discarding two outliers, the upper range of M values obtained in the preconsolidation range vary from 170 to 344 ksf, which are similar to DMT M-values obtained in Boring B-32DMT. Average compression ratio obtained above the preconsolidation stress was 0.42. This would equate to a one-dimensional constrained modulus (M) value of only 28 to 40 ksf. Average recompression ratio taken from the unloading portion of the consolidation test curves was 0.06.

Initial consolidation occurring immediately upon placement of each incremental load ranged from 5 percent to 10 percent of total settlement, for all load increments less than the preconsolidation stress. At the preconsolidation stress and at higher loads the percent initial consolidation decreased to about 5 percent. Time rate of consolidation as expressed by the coefficient of vertical consolidation was estimated to be 200 to 300 ft²/year below the preconsolidation stress in the consolidation tests, and about 6 ft²/year during virgin compression.

4.3.7 *Unit 3 – Pleistocene Lower Sands and Clays*

These sands and sandy clays occur between the overlying units 2A, 2B or 2C, and the underlying marls of the Oligocene Cooper Group or the younger marls. These soils typically comprise the lower portion of the Wando Formation and contain interlayered clayey sands, clays and dense clean sands. All of these soils are grouped together for the purpose of this discussion. Unit 3 appears to be present over wide areas, but the soils are largely confined to about 5 to 10 ft of thickness in the vicinity of King Street Extension, Spruill Avenue and Meeting Street Extension. In these areas Unit 3 appears to have been deposited in troughs or channels eroded into the top of the marl. Unit 3 becomes thicker and approaches 20 feet or more in thickness east of the railroad alignment and along I-26 south of the Port Access Road interchange.

The sand facies appears more common in the project area. Sand consistency ranges from very loose to dense. Predominant gradation appears to be within the fine to medium sand grain range. Soil classification based on the unified system was SC, SP-SM, SP, or SM depending on location. The contact between these soils and the underlying marls commonly consists of a layer of coarse sand, containing shell, phosphate nodules, fossilized bones and teeth. Moistened color ranges from dark gray, gray to gray-green. SPT penetration resistances range from less than 10 to over 50 blows per foot.

A single one dimensional consolidation test was conducted on an undisturbed sample of clays occurring within this unit at a depth of 24 ft in boring B-47A. The test was conducted to a maximum applied stresses of 16 ksf. Effective vertical stress of the sample in place was estimated to be 1.2 ksf. The Casagrande





construction implies a preconsolidation stress of 6.6 ksf, or 5.4 times the vertical effective stress. At applied stresses below the preconsolidation stress, taken as the average of the increments immediately above and below the current overburden stress, average constrained modulus obtained was 125 to 250 ksf. Average compression ratio obtained above the preconsolidation stress was 0.24. This would equate to a one-dimensional constrained modulus (M) value of only 96 ksf. Average recompression ratio taken from the unloading portion of the consolidation test curves was 0.06.

Time rate of consolidation as expressed by the coefficient of vertical consolidation was estimated to be 150 to 450 ft²/year below the preconsolidation stress in the consolidation tests, and about 10 ft²/year during virgin compression.

An undisturbed sample was isotropically consolidated under applied pressures of 9 to 30 psi with full drainage. Following consolidation, each specimen was then sheared in compression using the CU or "R" test method without allowing any further drainage. Failure of the specimens during the tests was defined as the maximum stress difference (deviator stress) attained at any point during the test. Average effective stress values of cohesion and friction angle for peak strength were zero cohesion and 35 degrees angle of internal friction.

4.3.8 Unit 4 - Undifferentiated Miocene or Younger Marls

Unit 4 is differentiated from the underlying Cooper Group or Cooper Marl (Unit 5) based generally lower penetration resistance, and relatively lower dynamic pore pressures during CPT penetration exhibited in this zone. Occurrence of these materials appears limited to the eastern portion of the alignment extending to Shipyard Creek, where the unit reaches thicknesses as great as 15 ft. There are some very limited occurrences of this material also near I-26. Elsewhere these materials appear to have been eroded and replaced by the fine grained deposits of units 1 or 2 or the sands of Unit 3.

Recovered samples consisted of gray or gray-green, fine grained sands with little to some clayey fines. Unified soil classification based on visual manual procedure was SC or MH. Soil behavior based on CPT point resistance and friction ratio was typical of mixtures of silty sands to sandy silts. Fines content determined in the laboratory was approximately 25 percent. The CPT soil index parameter Ic suggests a fines content of 35 to 40 percent.

Soils penetrated by the CPT were assigned to Unit 4 where CPT dynamic pore pressures did not exceed 15 tsf. Cone penetrometer tip resistances ranged from 10 to 15 tsf. SPT penetration resistances obtained within this zone ranged from weight-of-hammer to about 5 to 6 blows per foot.

Four representative undisturbed samples of the marl encountered just below the apparent contact between the Wando Formation and the underlying Cooper Group soils were obtained at locations where apparent marl consistency, based on SPT values, was lower than in other locations sampled in an attempt to determine whether this lower-consistency marl exhibited significantly lower long-term strength. Samples were sheared in triaxial compression under full saturation.

Samples were obtained at depths of 34 to as great as 75 ft below the surface, ranging from 2 to 15 ft below the upper marl contact. At these depths the soils would have been confined under effective stresses ranging from 1600 to 3400 psf (12 to 24 psi). Test output attached in the Appendix includes plots of deviator stress vs. applied strain for various load increments, induced pore pressure vs. applied strain,





and maximum shear strength at various increments of confining stress. Average effective stress values of cohesion and friction angle for peak strength obtained from the test data, were zero cohesion and 35 to 38 degrees angle of internal friction. These effective stress strength values are not materially different from the underlying Unit 5 materials.

One dimensional consolidation (oedometer) testing was conducted on four undisturbed samples of these soils recovered in borings B-18A, B-27Alt 1, B-33A and B-77B. The tests were conducted to maximum applied stresses of 64 ksf. From the maximum load level each sample was then unloaded to 0.5 ksf in three to four decrements. Graphical presentation of sample deformation at 100 percent consolidation vs. load expressed as percent strain is attached in the appendices. Effective vertical stress of the samples in place was estimated to be 2.0 ksf. The Casagrande construction implies a preconsolidation stress as low as 8 ksf in one sample (B-27 Alt 1A at 33 feet) and 11.8 ksf in another (B-77B at 37 ft). The remaining two samples exhibited preconsolidation stresses of about 14 ksf.

The lower-consistency marl appears relatively compressible compared to underlying stiffer marl. At applied stresses below the preconsolidation stress, taken as the average of the increments immediately above and below the current overburden stress, average constrained modulus obtained was 120 to 220 ksf. Average compression ratio obtained above the preconsolidation stress was 0.24 to 0.28. This would equate to a one-dimensional constrained modulus (M) value of only about 30 ksf. Average recompression ratio taken from the unloading portion of the consolidation test curves was 0.07.

Preconsolidation of the upper lower-consistency marl appears marginally lower that preconsolidation stress values obtained in undisturbed samples obtained at greater depths of penetration into the marl at other locations. This observation is also mirrored by evident lower penetration resistances as well as lower excess pore pressure development in the CPT soundings.

4.3.9 Unit 5 – Oligocene Ashley Formation (Cooper Group) Marl

Nearly all borings and soundings terminated in the "basement" stratum of the Ashley Formation of the Cooper Group. These soils will likely form the principal bearing strata for deep foundations supporting the proposed structures. Depth to Unit 5 below the ground surface varied somewhat along the alignment, reflecting scouring or erosion of the upper surface of the unit subsequent to deposition. Overall the upper contact of this unit is to some degree undulating and depths to the upper contact likely vary substantially in areas not explored.

At the east end of the alignment within the naval base, Unit 5 appears to have been eroded and was encountered approximately 60 ft below the surface, lying immediately below deep very soft clay deposits of Unit 1B. Substantially deeper scouring of the Cooper marl has occurred elsewhere within the naval base (80 ft or deeper), though borings along the alignment did not encounter scour holes that deep. Unit 5 also occurs at a depth of about 65 ft near Spruill Avenue to Meeting Street, where the eroded marl appears to have been replaced by Unit 3 sands. At other locations explored Unit 5 appears to occur between 40 and 45 ft below the surface.

Where penetrated by the borings, these materials consist of firm to stiff, sandy, olive green silts or silty clays. "Marl" or calcarenite, underlying the Pleistocene deposits of Units 2 and 3, is commonly identified on the basis of a distinct olive-greenish color, brittle soil fabric or stiff to very stiff consistency. As distinct





from the overlying Unit 4 materials, most samples from Unit 5 behaved as cohesive lumps when remolded by hand.

Predominant classification of these soils based on visual examination was ML with a considerable number of samples classified as SM. Fines content determined in the laboratory averaged from just below to just over 50 percent, with some scattered samples as high as 80 percent. Fines content appeared to increase with depth. Recovered samples were generally moist. Moisture contents ranged from 45 percent to as high as 75 percent oven-dried. Void ratio was typically 1.0 to 1.2.

In CPT soundings the Cooper Marl is evidenced by occurrence of very high excess pore pressures, reflecting a highly impervious character due to relatively great age, the presence of calcium carbonate cementation and high degree of consolidation relative to the overlying soils. Soil behavior based on CPT point resistance and friction ratio was typical of mixtures of sandy silts or silty sands. These deposits are evident in the CPT soundings by an increase in excess pore pressure measurements to values exceeding 15 tsf ranging as high as 30 tsf. Standard penetration resistances generally varying between 8 and 12 blows per foot, and CPT tip resistances of 25 to 35 tsf are typical of very stiff consistency for cohesive soils. Cooper Marl soils react to hydrochloric acid due to the presence of calcium carbonate.

A total of seven representative undisturbed samples of the Cooper Group soils were sheared in triaxial compression under full saturation. Several samples were obtained at locations where apparent marl consistency, based on SPT values, was lower than in other locations sampled in an attempt to determine whether lower-consistency marl exhibited significantly lower long-term strength.

Samples were obtained at depths of 32 to 102 ft below the surface. At these depths the soils would have been confined under effective stresses ranging from 1600 to over 5000 psf (12 to 35 psi). Test output attached in the Appendix includes plots of deviator stress vs. applied strain for various load increments, induced pore pressure vs. applied strain, and maximum shear strength at various increments of confining stress.

All samples were isotropically consolidated under applied pressures of 15 to 55 psi with full drainage. Following consolidation, samples were then sheared in compression using the CU or "R" test method without allowing any further drainage. Failure of the specimens during the tests was defined as the maximum stress difference (deviator stress) attained at any point during the test. Average effective stress values of cohesion and friction angle for peak strength obtained from the test data, were zero cohesion and 34 to 38 degrees angle of internal friction.

One dimensional consolidation (oedometer) testing was conducted on four undisturbed samples of these soils recovered in borings B-23 Alt 1, and B-76A at depths varying from 50 to 75 ft. The tests were conducted to maximum applied stresses of 32 to 64 ksf. From the maximum load level each sample was then unloaded to 0.5 ksf in three to four decrements. Graphical presentation of sample deformation at 100 percent consolidation vs. load expressed as percent strain is attached in the appendices.

Effective vertical stress of the samples in place was estimated to be 2.0 to 3.2 ksf. The Casagrande construction implies a preconsolidation stress of 20 ksf to as high as 22.5 ksf. Compared to present overburden stresses, overconsolidation ratio values ranged from as great as 10 to as low as 6.3. At applied stresses below the preconsolidation stress, taken as the average of the increments immediately above and below the current overburden stress, average constrained modulus obtained was 450 to 750 ksf. Average





compression ratio obtained above the preconsolidation stress was 0.16 to 0.17. This would equate to a one-dimensional constrained modulus (M) value of only 220 ksf at very high stresses. Average recompression ratio taken from the unloading portion of the consolidation test curves was 0.017.

Since this layer is moderately to heavily overconsolidated, compression due to deformation of soil grains will occur almost immediately after load application. Time-dependent compression due to primary consolidation and secondary compression will be very small.

4.4 Groundwater

As discussed in Section 2.4, 24-hour ground water levels were not recorded in some of the soil borings. Groundwater level was measured immediately following the completion of the CPT and DMT soundings. The groundwater levels are presented on the boring and sounding logs, where available, and the subsurface profiles. Groundwater was encountered at a median depth of 2 ft below the ground surface, corresponding to a median groundwater elevation of 7 ft NAVD 88. Groundwater levels are expected to fluctuate with climatic, seasonal and tidal changes, as well as with construction activity at the site. Groundwater measurements made at different times than our exploration may indicate groundwater levels substantially different than indicated on the boring logs in the Appendix.





5.0 Geotechnical Design Considerations

The analyses and results presented herein were completed prior to adoption of the current Geotechnical Design Manual (GDM); therefore, the methods and results may not be in full compliance with the GDM and are provided only for information. Furthermore, the environment issues associated with some of the construction methods presented are not discussed in this report, and the inclusion of any methods in this report is not an endorsement of feasibility. The analyses presented herein are based, in part, upon data obtained from our subsurface exploration. Since portions of the project site were previously developed, obstructions which were not evident at the time of our exploration (i.e., buried debris, old fill, etc.) will be encountered during construction. In addition, variations in the subsurface conditions will not become evident until construction.

5.1 General Discussion

Due to the variations in the subsurface conditions, design and construction considerations for each ramp and the main line will be addressed separately. The considerations and discussion below are based on preliminary analyses of the collected data and provided profiles. Final design recommendations should be based on additional detailed analyses and the final embankment and bridge requirements.

5.1.1 Static Settlement

From a geotechnical engineering perspective, the marsh deposits and clays and silts overlying the Cooper Marl, particularly the Holocene age deposits will likely pose the greatest challenge. Based on the laboratory data, the Unit 2C clays and silts appear to be overconsolidated enough that they will not experience virgin compression under low to moderate (i.e., 5 to 12 ft) fill height loads. At bridge abutments, where fill heights tend to be high and settlement tolerances low, compression of this layer may require preloading, wick drains and surcharging, or some combination of approaches to mitigate long-term settlement.

The main interchange is located in an area where the softer shallow marsh deposits were encountered as well. Ramps B and C have embankment bridge abutments in this area and may require some form of treatment to meet normal SCDOT settlement criteria. More substantial ground improvement methods such as pile or column supported embankments may be required if project schedules preclude long surcharging periods.

The portion of the alignment on the former Navy Base contains the poorest soils encountered over the entire alignment. The very soft clays and silts (Unit 1B) overlying the Cooper Marl are very weak and compressible. The ground improvement methods mentioned above will almost certainly be necessary for any grade-supported embankments on the former Navy Base, and staged filling cycles may have to be implemented to prevent overstressing the soils and causing bearing capacity failures of the embankment during construction. Tidewater Road, which runs parallel to Shipyard Creek, was constructed from rubble fill. Deep foundation excavations along and adjacent to Tidewater Road would likely encounter rubble overlying the very weak soils.





5.1.2 Shear Strength Loss Screening

The soils encountered in the borings and soundings were evaluated for Shear Strength Loss (SSL) based on laboratory soil shear strength testing, SPT and CPT testing, laboratory index testing, and the depth to the water table. The evaluation indicates Sand-Like soils, Normally Sensitive (NS) Clay-Like soils, and Highly Sensitive (HS) Clay-Like soils between the water table and the Cooper Marl are susceptible to SSL. Liquefaction triggering evaluations should be performed on these soils during design. The Cooper Marl and soils below the Cooper Marl are not susceptible to SSL.

5.1.3 Buried Debris

Buried debris was encountered along the proposed Local Access Road alignment near Bainbridge Avenue. Although no other large deposits of buried debris were encountered, based on our knowledge of the site history, debris and uncontrolled fill would likely be encountered during a more complete site exploration where access to all portions of the alignment was available. Due to property owners' site access restrictions, we were not able to explore areas along the alignment of the Local Access Road and Stromboli Avenue. Closed, former landfills are known to exist in this area within and very close to the proposed alignment. Most of the area of North Charleston where the alignment is located has been developed commercially or by heavy industry for many decades. The legacy of this type of development frequently includes buried debris, uncontrolled fill, and environmental contamination. Undercutting and/or special considerations (e.g., predrilling) may be necessary for grading, ground improvement, and foundation installation operations.

5.2 Ramp A

Based on our understanding of the alignment profile drawings in the provided Environmental Impact Statement, Ramp A begins along I-26 eastbound approximately 1200 ft west of the North Meeting Street exit and crosses over I-26 approximately 500 ft east of the Rhodia (a.k.a. Solvay) plant. The ramp then crosses Summerville Avenue and King Street Extension before joining Ramps B, C and D at the beginning of Main Line 1D immediately west of Meeting Street Extension.

Based on the site conditions and review of aerial photographs, it appears areas of Ramp A near the North Meeting Street exit and near Summerville Avenue lie within or near tidal marsh areas of the Ashley River.

The borings along Ramp A generally encountered very loose to dense sands overlying very soft to firm clays. The sand stratum averaged about 8 to 10 ft thick, but thickened to about 30 ft in the vicinity of the North Meeting Street exit ramp. An approximately 10 ft thick layer of medium dense sand was encountered in the middle of the clay stratum in a boring near the Rhodia plant. The clay stratum extended from below the sand to the top of the Cooper marl, except near the southern end of the ramp where the interchange with I-26 is located. A lower sand stratum directly overlying the marl was encountered in the borings in this area. The top-of-marl elevation was generally around elevation -40 ft-NAVD 88 over most of the ramp; however, the top-of-marl elevation dropped abruptly in the vicinity of King Street Extension to an elevation of about -53 ft. Figure 4-4 and Figure 4-5 illustrate our interpretation of the subsurface profile based on the borings, and depict the soil units encountered.





5.2.1 Static Settlement

Based on the ramp profile, it appears that approximately 4 to 6 ft of fill will be placed along most of Ramp A. The fill height at the bridge abutment near Station 5792+25 will approach 11 ft. Settlements from the weight of the new fill are primarily expected due to compression of the upper sandy soils, with some minor compression of the soft to firm clays overlying the Cooper Group. Based on the laboratory and CPT data, the clays have an OCR of at least 2. With a maximum fill height of 11 ft, settlements should be on the order of 1 to 2 in.

We estimate that approximately 50% of the predicted settlement will occur within 90 days following fill placement, and that long term settlement will be less than SCDOT typical maximum allowable limits of 5 in. for roadways and 2 in. for bridge abutments. Settlements were estimated using the program Settle 3D[©] with primary consolidation theory. Figure 5-1 and Figure 5-2 show cross sections of the proposed embankments at Station 5792 and Stations 5770 to 5780. The total settlement shown in the upper right-hand corner is the settlement calculated at the point labeled "1" on the left-hand plan view, and is the point where the maximum settlement was calculated.

5.2.2 Embankment Global Stability

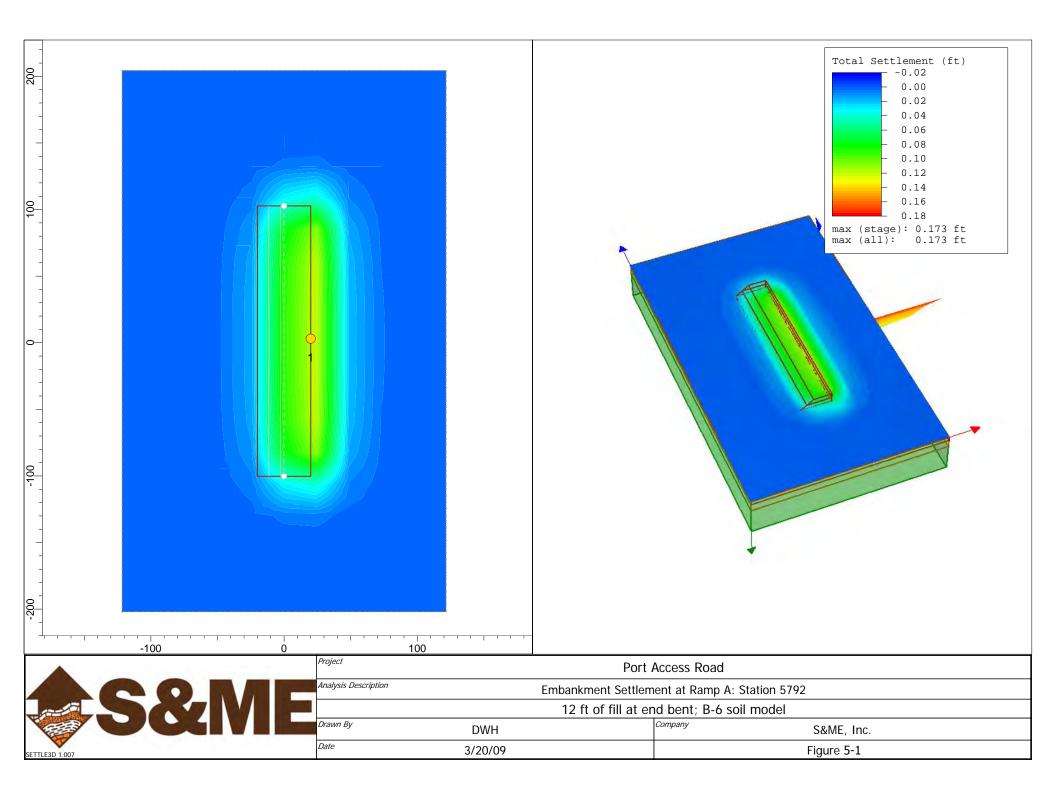
We performed static slope (global external) stability analysis for the embankment along Ramp A using limit equilibrium methods. Representative sections were modeled at Stations 5772+00 and 5792+25 because these areas are where the highest fill heights occur. SLIDE Version 5.024 was used for these analyses. The results of our analyses indicate that the embankment configuration shown in our analyses will be stable during and following construction with a factor of safety (FOS) greater than 1.4 under static conditions.

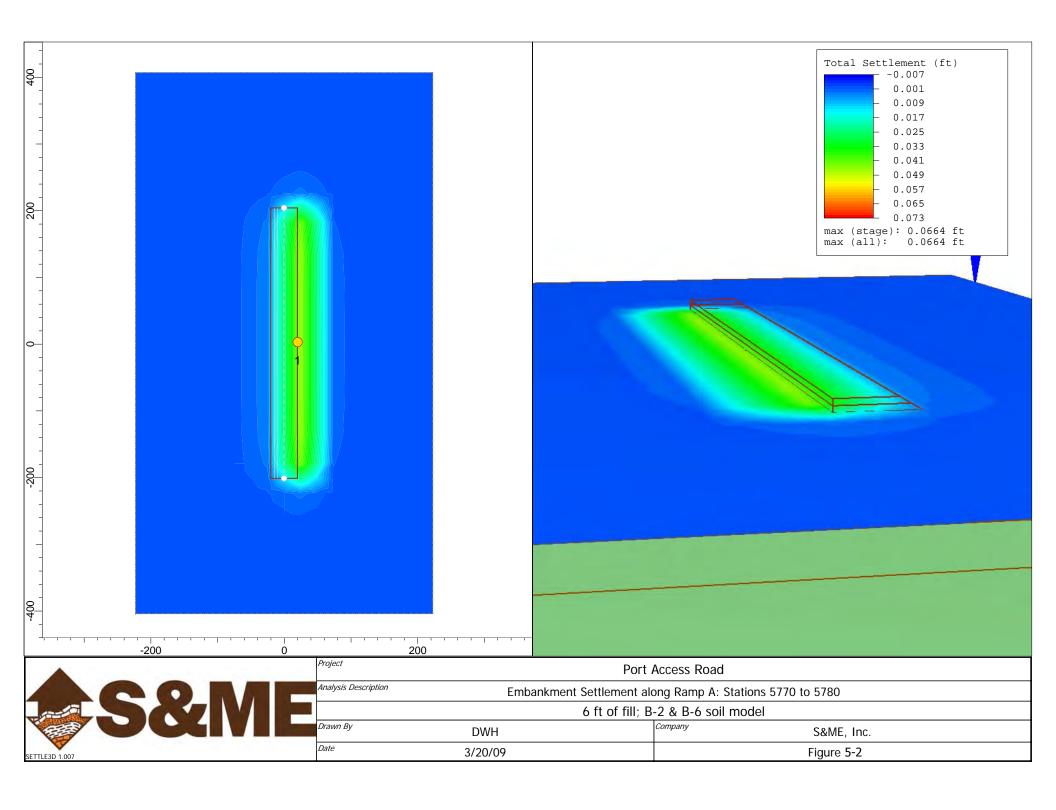
To evaluate the seismic response of the proposed embankments, we performed pseudo-static analyses based on the provided slope configuration according to the unified methodology described by the FHWA⁵. In summary, the unified methodology includes an equivalent horizontal (static) force in the slope stability calculations to represent the seismically-induced inertial force (as a percentage of gravity). A pseudo-static seismic coefficient of 0.27g (which is ½ the SEE peak ground acceleration) was used in our evaluation. Although a Site Specific Seismic Study was beyond the scope of this project, we estimated the seismic coefficient based on our local experience for the purpose of this preliminary evaluation. The FOS for the representative embankment sections are less than 1.1 for pseudo static seismic conditions using an acceleration of 0.27g. Yield accelerations ranged from 0.16g to 0.18g. Liquefaction global stability and detailed deformation analyses were beyond the scope of this project; however, based on the yield accelerations, deformations should be relatively small (less than 3 in.). Figure 5-3 through Figure 5-6 show a representative cross section at Stations 5772+00 and 5792+25, respectively, under static and pseudo-static conditions.

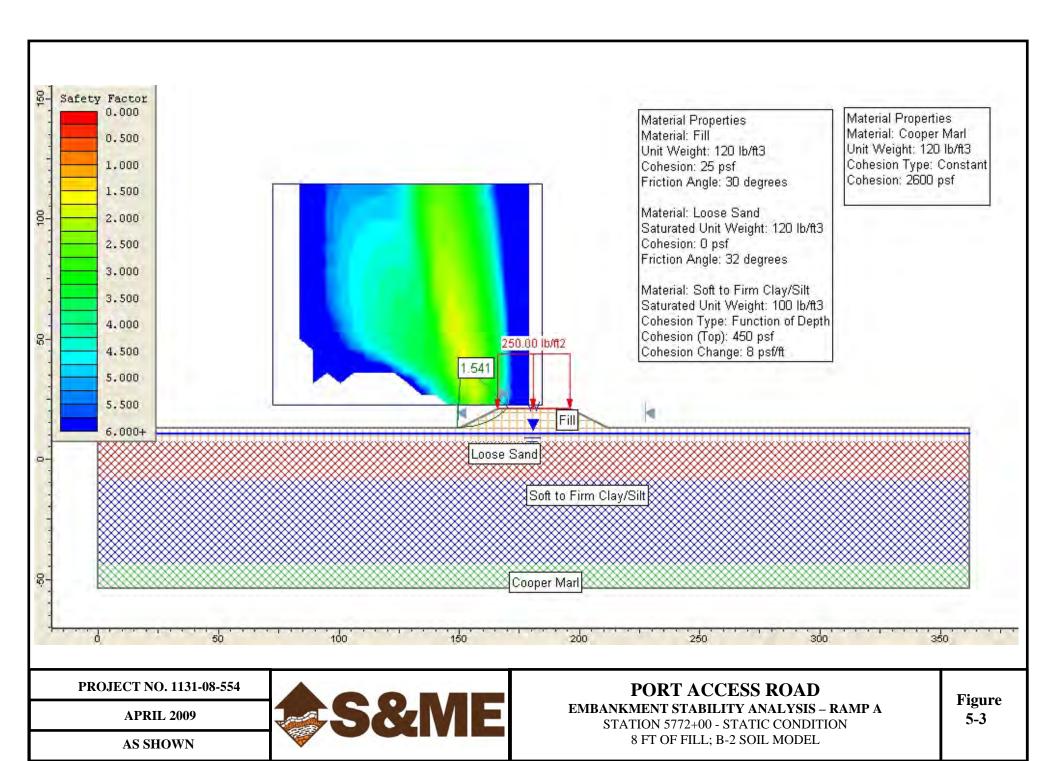
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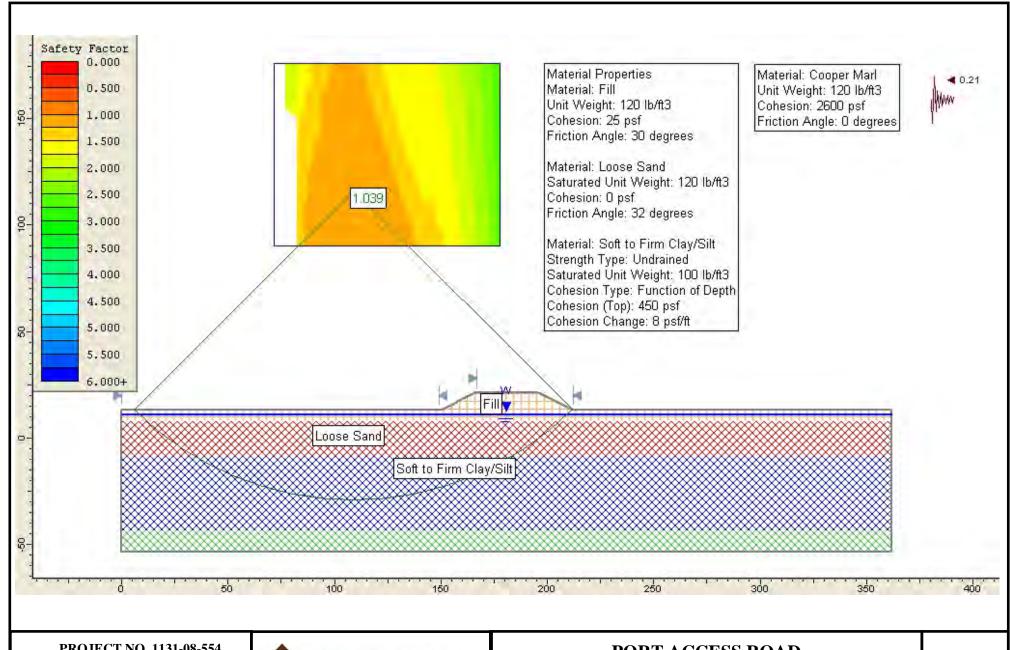
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⁵ FHWA Geotechnical Earthquake Engineering Manual, Vol. FHWAH1-99-012, Chapter 7.4. December, 1998.









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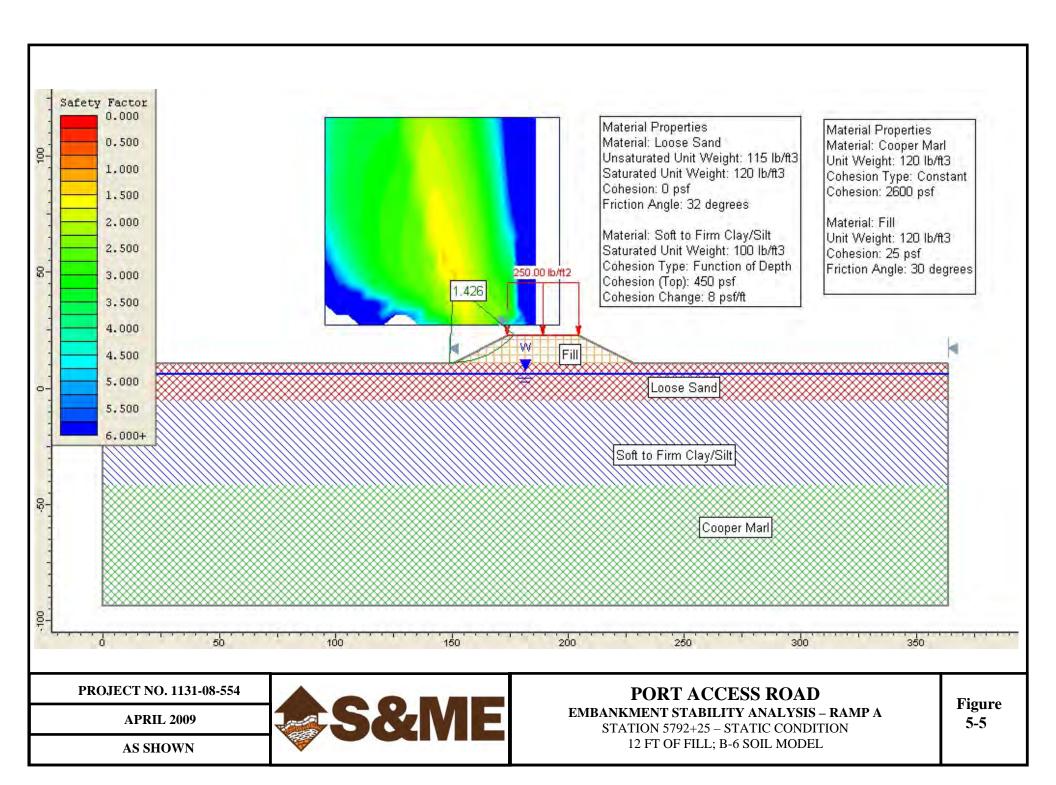
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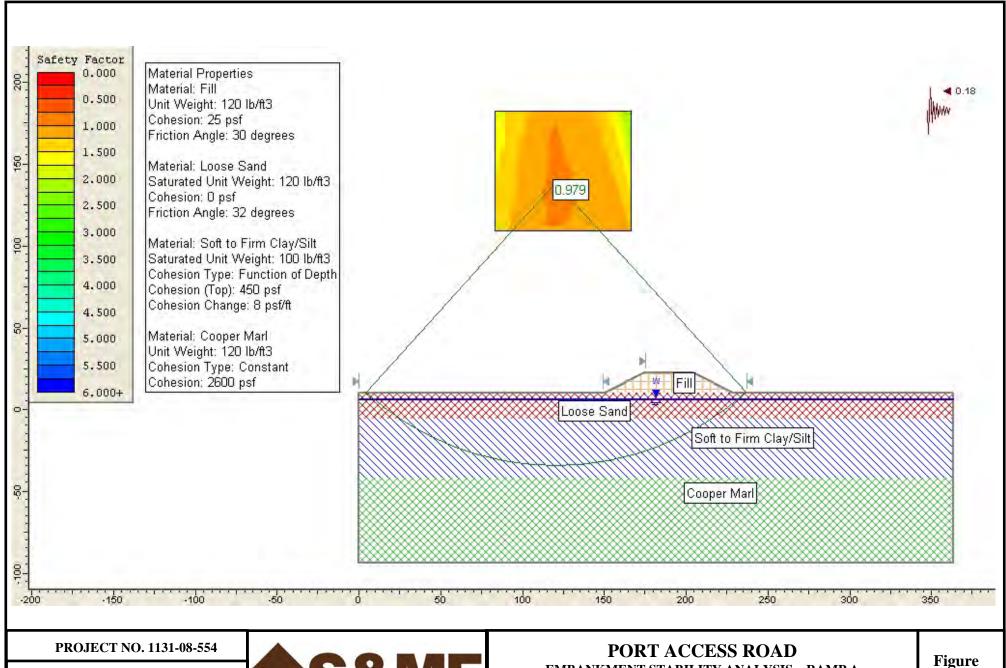
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EMBANKMENT STABILITY ANALYSIS – RAMP A STATION 5772+00 – PSEUDO-STATIC CONDITION 8 FT OF FILL; B-2 SOIL MODEL





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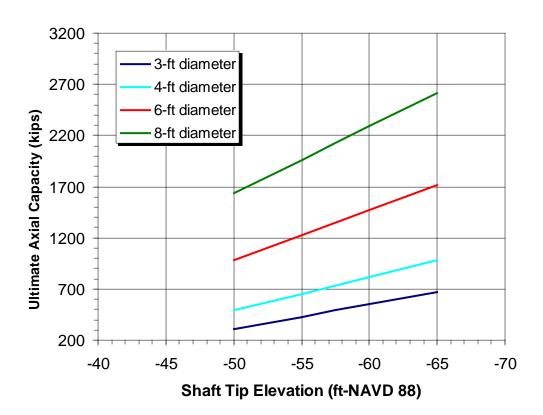
EMBANKMENT STABILITY ANALYSIS – RAMP A STATION 5792+25 – PSEUDO-STATIC CONDITION 12 FT OF FILL; B-6 SOIL MODEL Figur 5-6



5.2.3 Deep Foundations

We assume most of the bridges will be supported on drilled shafts or driven pre-stressed concrete (PSC) piles bearing in the Cooper marl. For our preliminary deep foundation analyses, we have neglected the contribution or potential downdrag of the overburden soils. A unit side friction value of 3.0 ksf and unit end bearing value of 30 ksf was used for drilled shafts bearing in the Cooper marl. Unit values of 2.6 ksf and 26 ksf were used for driven piles. The unit values are based upon laboratory testing and our local experience with load test results on drilled shafts and driven piles. Figure 5-7 and Figure 5-8 below present the estimated axial capacity for 3-ft, 4-ft, 6-ft and 8-ft diameter drilled shafts bearing in the Cooper marl, as well as 20-in. square and 24-in. square PSC piles bearing in the marl. A top-of-marl elevation for Ramp A of -45 ft-NAVD 88 was used. Based on the subsurface profile, this is an appropriate top-of-marl elevation for most of Ramp A; however, it should be noted that the marl dips to an elevation of about -52 ft in the borings along King Street Extension where Ramps A through D converge. Shafts would have to be longer at King Street Extension and possibly further from King Street Extension for a corresponding axial capacity, depending on the actual top-of-marl elevation at each bent location.

Figure 5-7. Ramp A Ultimate Drilled Shaft Capacity vs. Tip Elevation





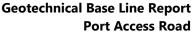
1000 900 20-in. PSC 24-in. PSC 800 **JItimate Axial Capacity (kips)** 700 600 500 400 300 200 -50.0 -55.0 -60.0 -65.0 -70.0 -75.0 -80.0Pile Tip Elevation (ft-NAVD 88)

Figure 5-8. Ramp A Ultimate Driven PSC Pile Capacity vs. Tip Elevation

5.3 Ramp B

Ramp B begins at Spruill Avenue and heads west, crossing King Street Extension, the CSX Railroad, Summerville Avenue, the Spruill Avenue exit ramp from I-26 westbound, and the on-ramp to I-26 eastbound from Meeting Street Extension. It diverges from Ramps A, C and D near King Street Extension. Portions of Ramp B also appear to lie within tidal marsh areas of the Ashley River, particularly near where Ramp B crosses I-26.

The subsurface conditions change significantly from south to north. At the southern end of the ramp along I-26, the borings encountered loose to dense sands from the ground surface to the top of the Cooper. As the ramp approaches the marshy tidal area near the existing I-26 on-ramp from Meeting Street Extension, a layer of soft clay and silt was encountered that becomes thicker as the ramp approaches the Main Line. A consolidation test performed on an undisturbed sample of the weight-of-hammer silt near the bridge abutment indicated a Compression Ratio (Cr) of 0.29, an Overconsolidation Ratio (OCR) of 1 and a Coefficient of Consolidation (Cv) of 0.01 ft2/day. Figure 4-8 shows the subsurface profile along Ramp B.



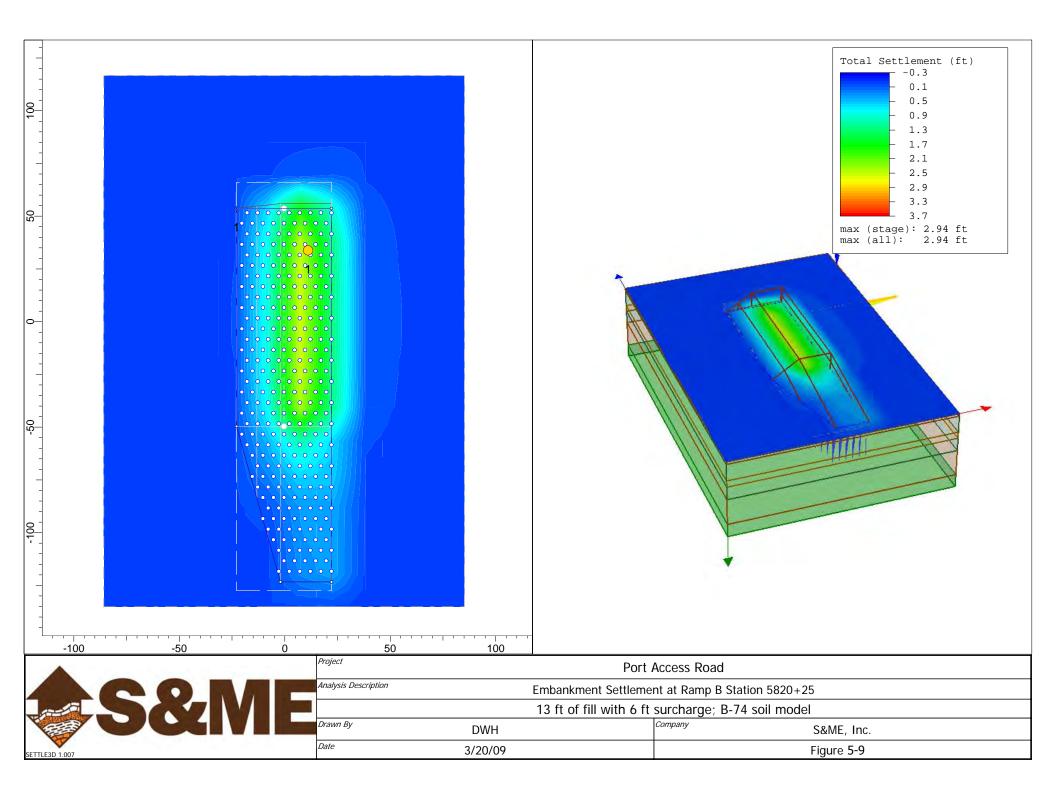


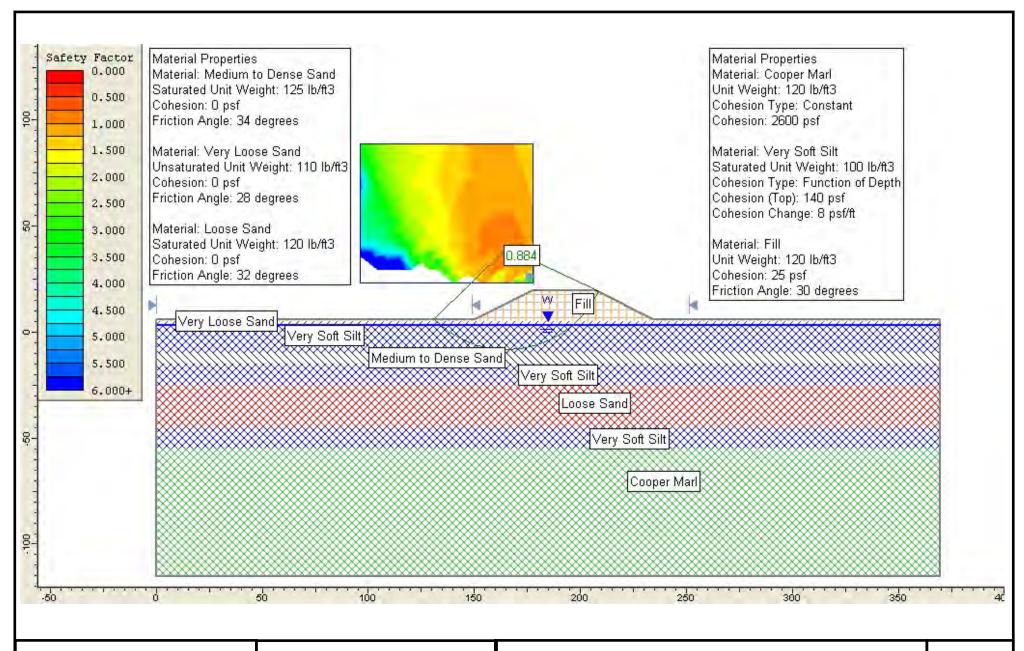
5.3.1 Static Settlement

Based on the ramp profile, we estimate up to 13 ft of fill will be placed near Station 5820+50 on Ramp B. This is the area where the very soft clay is relatively thick (about 25 ft). Settlements from the weight of the new fill are primarily expected due to compression of this soft layer. With a maximum fill height of 13 ft, settlements could be on the order of 3 ft and would occur slowly. Due to the magnitude and settlement rate, some form of ground improvement will likely be required at this bridge abutment. Based on our analyses, a combination of wick drains on a 5-ft triangular spacing and a 6 to 8 ft surcharge can reduce settlements to typically acceptable SCDOT limits in a reasonable amount of time. We estimate that at least a 1 yr surcharge period would be required. Other forms of ground improvement may be necessary if schedule limitations preclude long surcharge periods. Figure 5-9 shows a representative cross section of the embankment with the calculated settlement at the point shown on the plan view. The wick drains used in the analysis are shown as a group of thin blue lines extending from the ground surface through the soft strata into underlying sands.

5.3.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.4 under static conditions. The FOS for the representative embankment section is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield acceleration is 0.18g. Figure 5-10 through Figure 5-12 show a representative cross section at Station 5820+46 under static and pseudo-static conditions.





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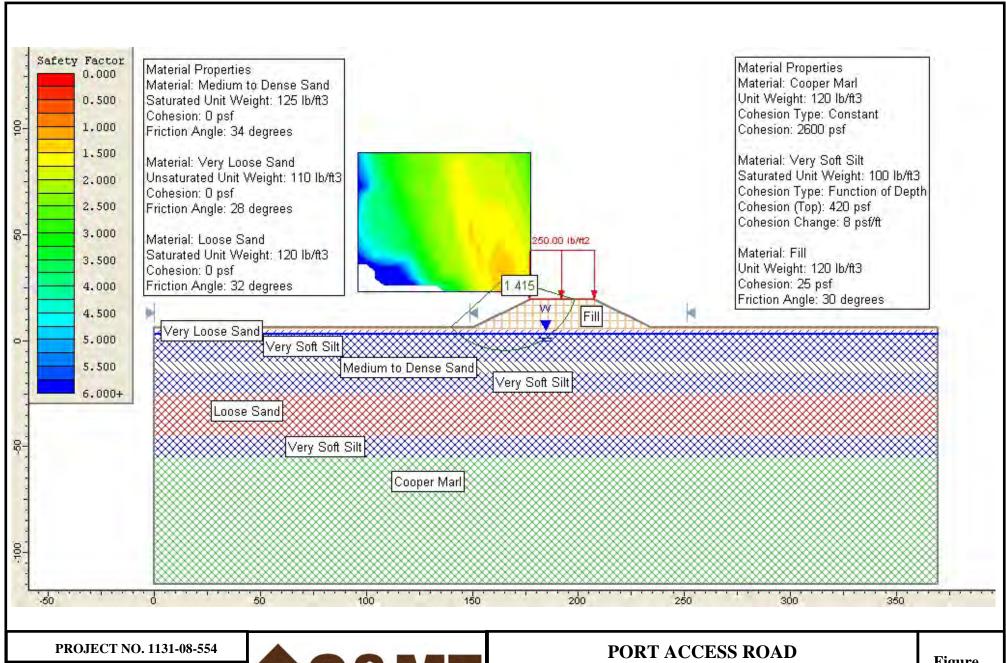
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EMBANKMENT STABILITY ANALYSIS – RAMP B

STATION 5820+46 – STATIC CONDITION (AFTER CONSTRUCTION) 13.5 FT OF FILL; B-74 SOIL MODEL

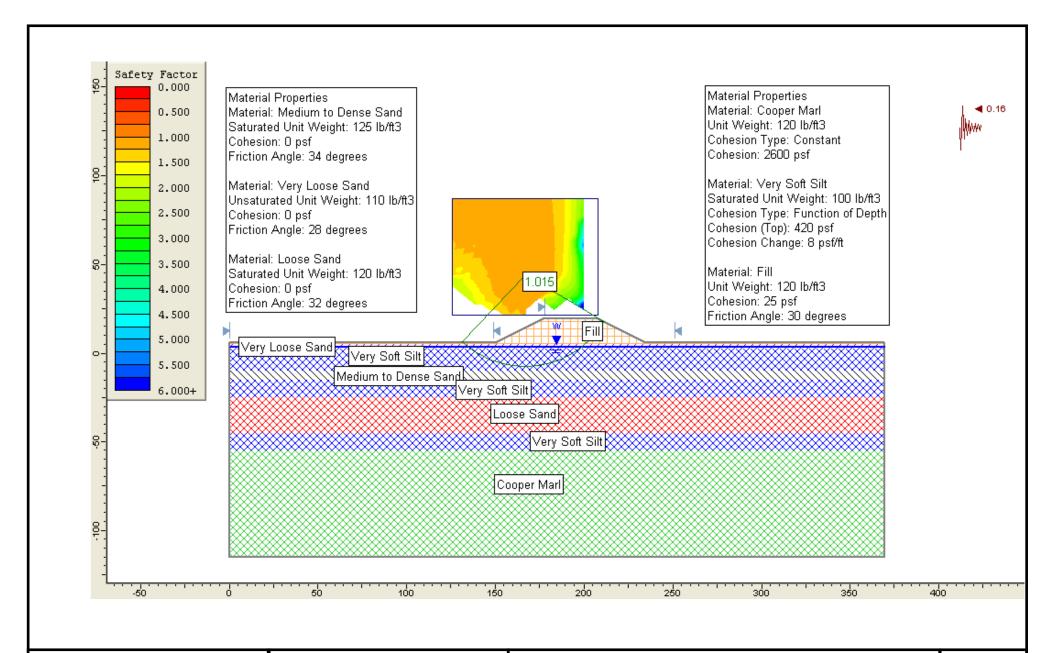


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EMBANKMENT STABILITY ANALYSIS – RAMP B STATION 5820+46 – STATIC CONDITION (LONG TERM) 13.5 FT OF FILL; B-74 SOIL MODEL



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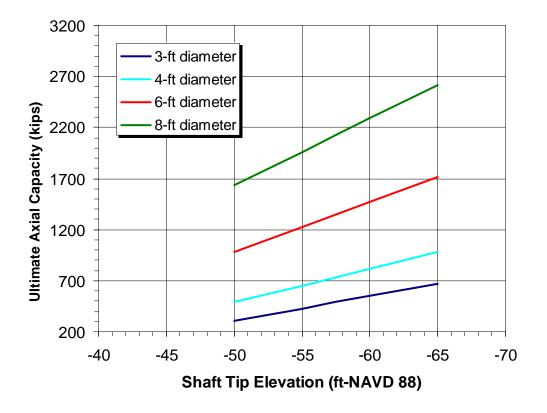
EMBANKMENT STABILITY ANALYSIS – RAMP B STATION 5820+46 – PSEUDO-STATIC CONDITION 13.5 FT OF FILL; B-74 SOIL MODEL



5.3.3 Deep Foundations

Figure 5-13 and Figure 5-14 present the estimated axial capacity for drilled shafts and driven, square PSC piles bearing in the Cooper marl. A top-of-marl elevation for Ramp B of -45 ft-NAVD 88 was used. Based on the subsurface profile, this is an appropriate top-of-marl elevation for most of Ramp B. Ramp B converges with Ramps A, C and D at King Street Extension where the marl dips to an elevation of about -52 ft; therefore shaft lengths might be longer in the vicinity of King Street Extension.

Figure 5-13. Ramp B Ultimate Drilled Shaft Capacity vs. Tip Elevation





1000 900 20-in. PSC 24-in. PSC 800 **JItimate Axial Capacity (kips)** 700 600 500 400 300 200 -50.0 -55.0 -60.0 -65.0 -70.0 -75.0 -80.0 Pile Tip Elevation (ft-NAVD 88)

Figure 5-14. Ramp B Ultimate Driven PSC Pile Capacity vs. Tip Elevation

5.4 Ramp C

Ramp C begins along I-26 westbound approximately 1400 ft east of the Spruill Avenue exit, veers east and crosses the Southern Lumber plant parking lot. It then crosses King Street Extension and joins Ramps A, B and D at the beginning of Main Line 1D. The area where Ramp C veers away from I-26 is low-lying, marshy, and appears to be tidally influenced. We encountered very soft, wet soils at the ground surface when drilling in this area.

The subsurface conditions along Ramp C are similar to those encountered along Ramp B; however, the soft clay and silt strata was encountered further south along Ramp C. The top-of-marl elevation dips slightly from south to north as well. Figure 4-9 shows the subsurface profile along Ramp C.

5.4.1 Static Settlement

Based on the ramp profile, we estimate up to 15 ft of fill will be placed near Station 5842+50 on Ramp C. This is the area where the very soft clay is relatively thick (about 25 ft). Settlements from the weight of the new fill are primarily expected due to compression of this soft layer. Similar to Ramp B, settlements could be on the order of 3 ft and would occur slowly. A combination of surcharging and wick drains will likely be required, as a minimum. As with Ramp B, other forms of ground improvement may be necessary if schedule limitations preclude long surcharge periods.



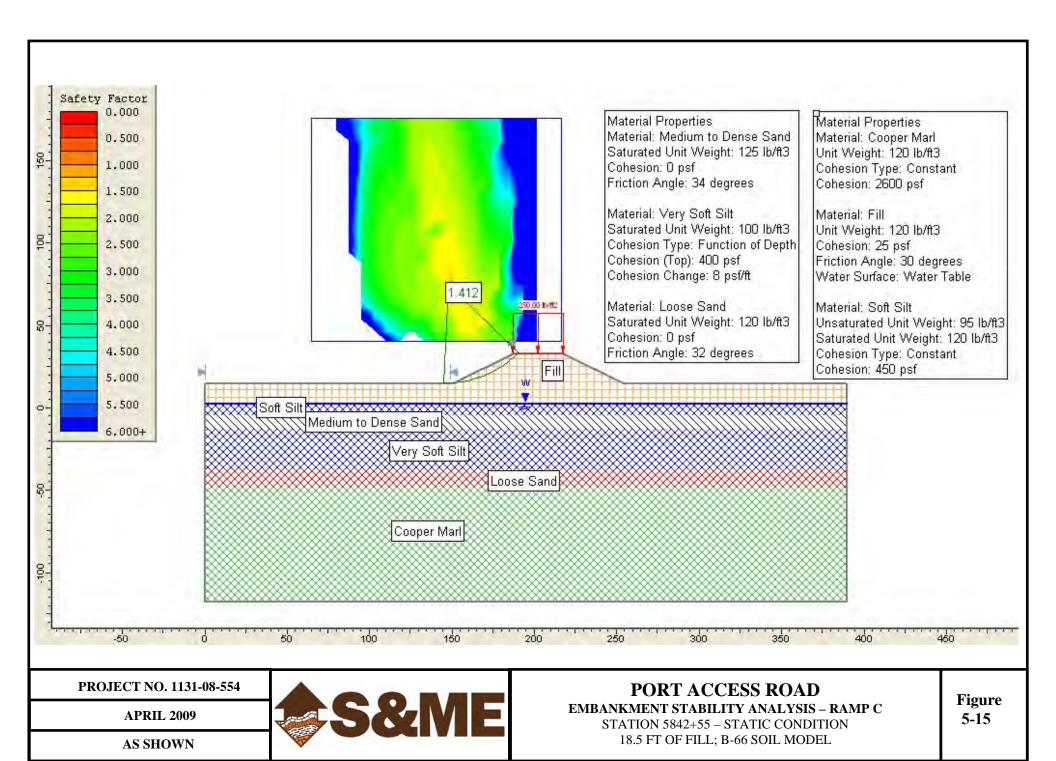
Geotechnical Base Line Report Port Access Road

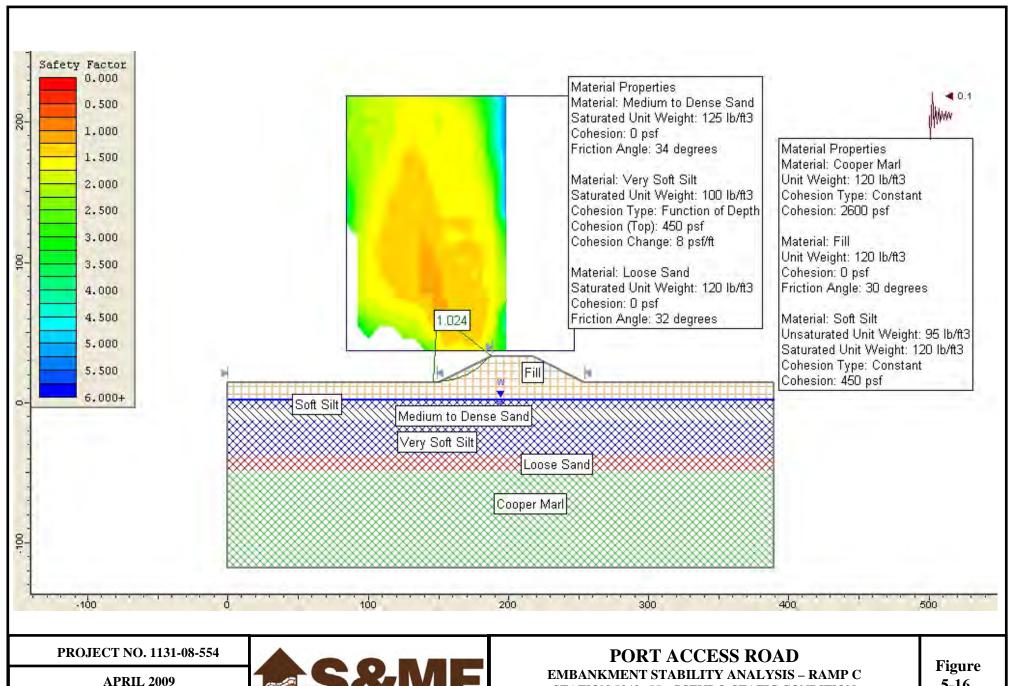
North Charleston, South Carolina S&ME Project No. 1131-08-554

5.4.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.4 under static conditions. The FOS for the representative embankment section is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield acceleration is 0.10g. Figure 5-15 and Figure 5-16 show representative cross sections at Station 5842+55, under static and pseudo-static conditions.

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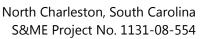




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STATION 5842+55 – PSEUDO-STATIC CONDITION 18.5 FT OF FILL; B-66 SOIL MODEL

5-16

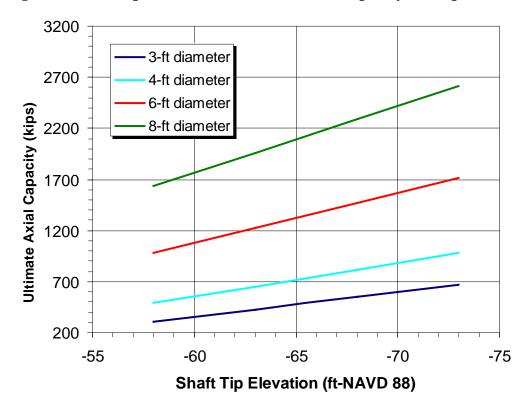




5.4.3 Deep Foundations

Figure 5-17 and Figure 5-18 present the estimated axial capacity for drilled shafts and driven, square PSC piles, respectively, bearing in the Cooper marl. A top-of-marl elevation for Ramp C of -53 ft-NAVD 88 was used. Based on the subsurface profile, this is an appropriate top-of-Cooper elevation for most of Ramp C. Similar to Ramps A, B and D, shafts for Ramp C in the vicinity of King Street Extension would need to be longer for a comparable capacity.

Figure 5-17. Ramp C Ultimate Drilled Shaft Capacity vs. Tip Elevation





1000 900 20-in. PSC 24-in, PSC 800 Ultimate Axial Capacity (kips) 700 600 500 400 300 200 -60.0-65.0-70.0 -75.0 -80.0 -85.0 -90.0 Pile Tip Elevation (ft-NAVD 88)

Figure 5-18. Ramp C Ultimate Driven PSC Pile Capacity vs. Tip Elevation

5.5 Ramp D

Ramp D begins along I-26 westbound north of the North Meeting Street flyover. It crosses under the flyover and follows I-26 westbound to Summerville Avenue. It then crosses Summerville Avenue, the I-26 eastbound entrance ramp, the Spruill Avenue exit ramp and King Street Extension before terminating along with Ramps A, B and C at the beginning of Main Line 1D.

The subsurface conditions generally consist of approximately 10 to 30 ft of loose to dense sands overlying soft to firm clays and silts. The clay/silt stratum varies in thickness and depth along the ramp. It reaches a thickness of nearly 40 ft in the vicinity of Summerville Avenue, where it is also closest to the surface. Along the portion of Ramp D where embankments are currently proposed, the clay/silt stratum was encountered from about elevation -4 ft to -32 ft. The CPT data and laboratory data from Ramp G nearby indicates the Unit 2C clay is slightly overconsolidated. Figure 4-2 and Figure 4-3 show the subsurface profile along Ramp D.

5.5.1 Static Settlement

Based on the ramp profile, we estimate up to 15 ft of fill will be placed near Station 5772+50 on Ramp D. Settlements from the weight of the new fill are expected due to compression of the upper sands and to a lesser degree the underlying clay stratum. With a maximum fill height of 15 ft, we expect settlement could be on the order of 6 to 8 in. Most of the settlement would occur relatively quickly during construction. Wick drains should not be required for Ramp D.



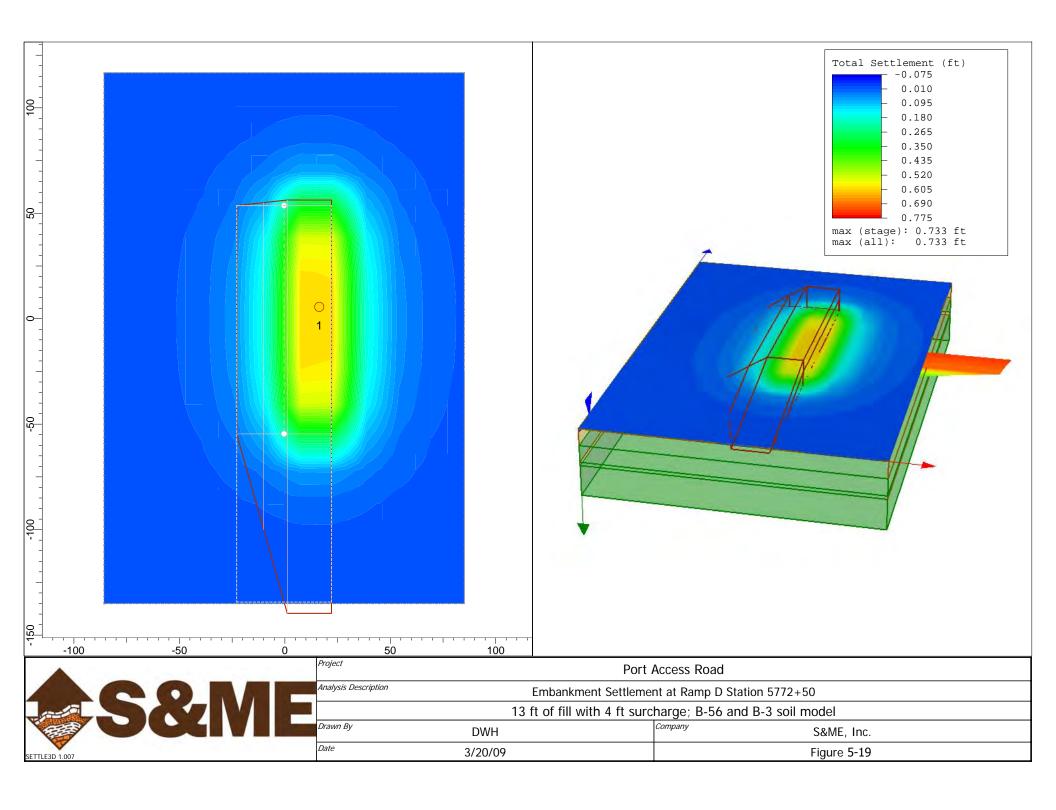
Geotechnical Base Line Report Port Access Road

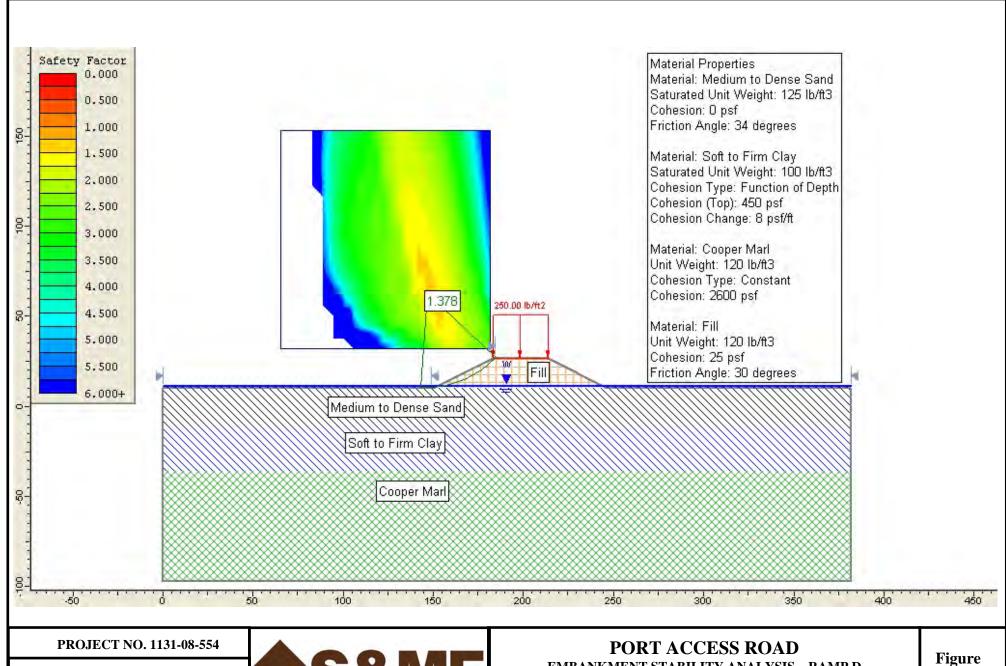
North Charleston, South Carolina S&ME Project No. 1131-08-554

Figure 5-19 shows a representative cross section of the embankment with the calculated settlement at the point shown on the plan view.

5.5.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.3 under static conditions. The FOS for the representative embankment section is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield acceleration ranged from 0.16g to 0.20g. Figure 5-20 and Figure 5-21 show a representative cross section at Station 5772+50.



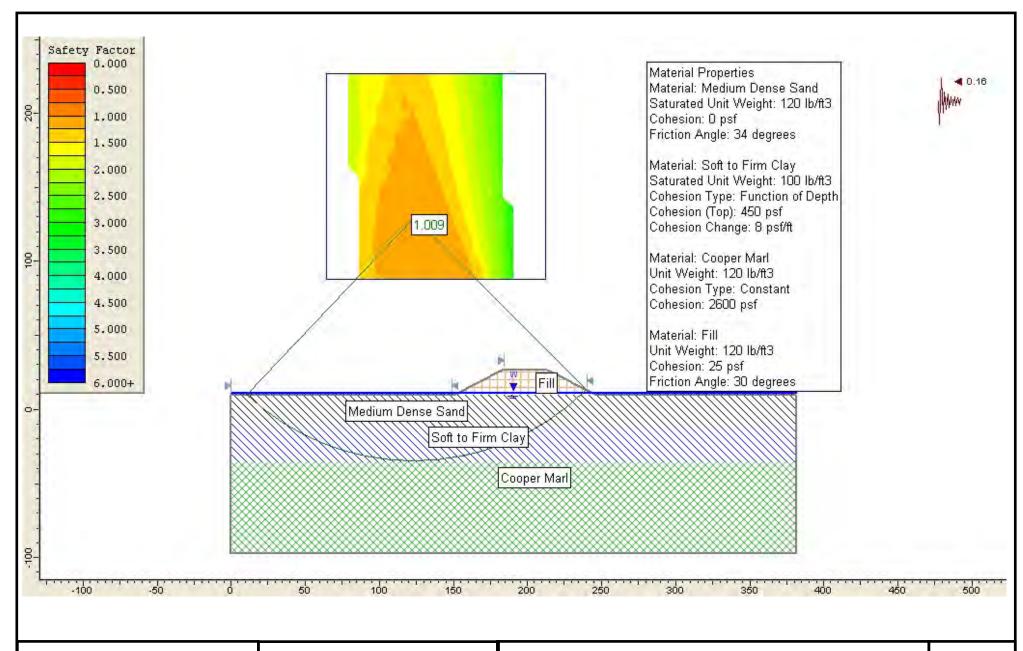


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EMBANKMENT STABILITY ANALYSIS – RAMP D STATION 5772+50 – STATIC CONDITION 16.5 FT OF FILL; B-60 SOIL MODEL Figur 5-20



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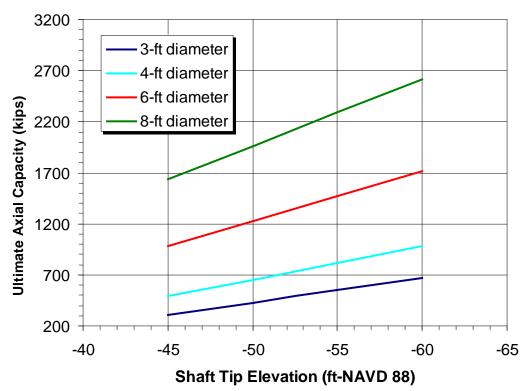
EMBANKMENT STABILITY ANALYSIS – RAMP D STATION 5772+34 – PSEUDO-STATIC CONDITION 16.5 FT OF FILL; B-60 SOIL MODEL



5.5.3 Deep Foundations

Figure 5-22 below present the estimated axial capacity for drilled shafts and driven, square PSC piles bearing in the Cooper marl. A top-of-Cooper elevation for Ramp D of -40 ft-NAVD 88 was used. Based on the subsurface profile, this is an appropriate top-of-marl elevation for most of Ramp D. Ramp D converges with Ramps A through C at King Street Extension where the marl dips to an elevation of about -52 ft; therefore shaft lengths might be longer as the ramp approaches King Street Extension.

Figure 5-22. Ramp D Ultimate Drilled Shaft Capacity vs. Tip Elevation





1000 900 20-in. PSC 800 24-in, PSC JItimate Axial Capacity (kips) 700 600 500 400 300 200 -45.0 -55.0 -50.0 -60.0 -65.0-70.0 -75.0 Pile Tip Elevation (ft-NAVD 88)

Figure 5-23. Ramp D Ultimate Driven PSC Pile Capacity vs. Tip Elevation

5.6 Main Line 1D

The Main Line 1D begins between Spruill Avenue and Meeting Street Extension. It crosses Meeting Street Extension and two sets of railroad tracks before turning north near the Sonoco Facility on the former Macalloy site. It follows the western edge of the Macalloy site for approximately 1500 ft before turning east and heading toward the former Naval Base. It crosses Shipyard Creek and Tidewater Road near the northeast corner of the Macalloy site.

On the former Naval Base side of Shipyard Creek, the alignment crosses very soft subgrade and deeper soils, and crosses over an abandoned building before terminating at the new port site. The ground surface is subject to tidal flooding. The area immediately surrounding the abandoned building has been filled. Visual evidence of significant settlement is apparent on the building and its sidewalks and parking lot.

Along the portion of the alignment from Spruill Avenue and through the Macalloy site, the borings generally encountered interbedded layers of very loose to medium dense sands and very soft to firm clays and silts. The soft clay layers encountered were thicker near the western end of Main Line 1D, and became thinner and generally more sandy to the east. A fairly abrupt change in the top-of-marl elevation occurred between Meeting Street Extension and the railroad tracks, which is a distance of less than 250 ft. The top-of-marl elevation rose from about -54 ft at Spruill Avenue and Meeting Street Extension to about -36 ft at the railroad tracks. The Macalloy site was the only area where the Miocene "young" marl was encountered with any significant thickness. The young marl was encountered in the borings near the mid-point of the Main Line 1D alignment and pinched out just east of Shipyard Creek.



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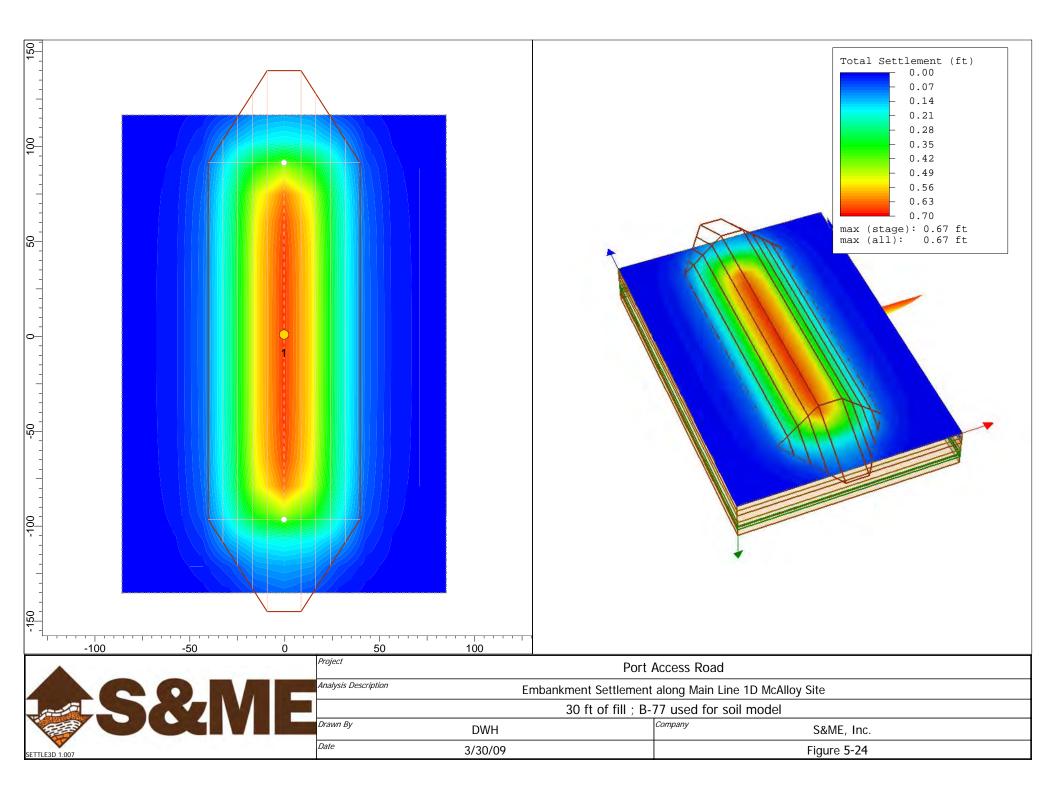
A portion of the Macalloy site was remediated, and we understand that in some areas the remediation involved the removal of up to 20 ft of soil. Based on our knowledge of the site, most of the alignment does not fall within the remediated area; however, the portion of the alignment near Shipyard Creek and the Local Access Road could fall within this area. The fill in this area should be considered uncontrolled. Also, slag waste material is present over much of the site, including areas not remediated. Based on our knowledge of the site, the slag fill is within most of the alignment on the site and was encountered in the boring we performed near the center of the site (B-23SPT ALT1). Additional exploration will be required to determine the actual extent of the slag and uncontrolled fill.

The subsurface conditions east of Shipyard Creek on the former Naval Base are substantially different from those encountered over the rest of the project site. The borings there encountered from 30 to 50 ft of very soft, very weak, under to normally consolidated and highly compressible Unit 1B clays and silts overlying the Cooper marl. A thin, discontinuous "crust" of sand exists at the ground surface in some areas. N-values in the clay strata were generally weight-of-hammer and CPT tip resistances were less than 5 tsf. Vane shear, Cu and Uu testing, and CPT correlations indicated strengths on the order of 140 psf at the top of the strata to 400 psf at the bottom of the strata. Compression Ratio (Cr) indices ranged from 0.25 to 0.48 and Recompression Ratio (Rr) indices ranged from 0.049 to 0.077. Overconsolidation Ratio (OCR) values ranged from 0.6 to 1.5. The vertical Coefficient of Consolidation (Cv) is generally on the order of 0.015 ft²/day. Figures 4.5A and 4.5B show the subsurface profile along the Main Line 1D.

5.6.1 Static Settlement

We understand that a portion of the Main Line may be constructed as embankments rather than elevated structure; therefore, we estimated settlements assuming an embankment height that approximated the proposed bridge height. For the portion of the Main Line along the western edge of the Macalloy site, we assumed a maximum fill height of 30 ft. Settlement will occur primarily due to compression of the sands and will occur relatively quickly. We estimate that about 6 to 8 in. of settlement will occur, with most of the settlement occurring within 90 days of construction. Figure 5-24 shows the representative embankment cross section modeled and the estimated settlement. Areas of uncontrolled fill could have more compressible materials in them, and the compressibility of the slag over much of the site is unknown at this time.

Constructing any embankment on the former Naval Base soils will be much more difficult and complex. Based on the ramp profile, we estimate up to 15 ft of fill will be placed near the bridge abutment at Station 94+00 on the Main Line about 250 ft east of Shipyard Creek and will decrease to a fill height of about 5 ft from 600 ft east of the creek to the tie-in with the new port. The very soft clay/silt stratum ranges in thickness from about 35 ft at the bridge abutment to about 50 ft at the tie in to the new port.







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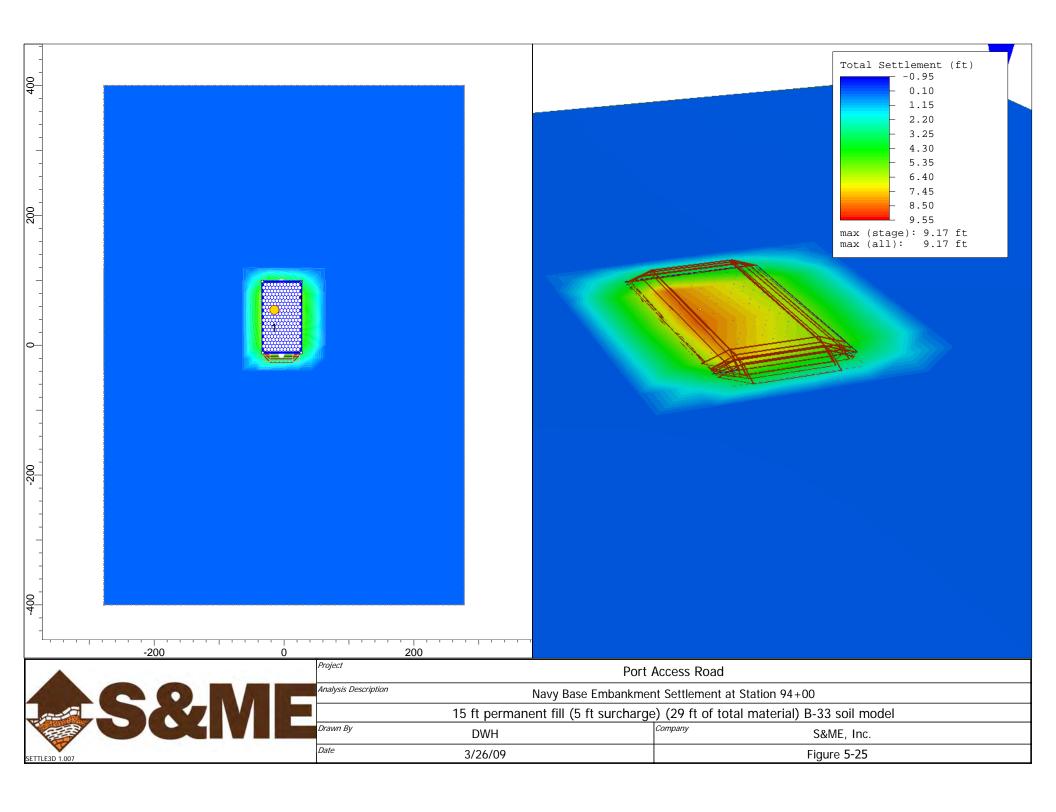
Settlements from the weight of the new fill will occur due to compression of the clay/silt stratum. With a permanent maximum fill height of 15 ft, settlements could be on the order of 9 ft and would occur very slowly. With a 5-ft surcharge, this would result in the placement of about 29 ft of fill. In addition to very large settlement magnitudes, staged construction would probably have to be utilized. We estimate that a maximum initial embankment height of 4 to 5 ft could be constructed before causing a bearing capacity (i.e., lateral squeeze) type failure.

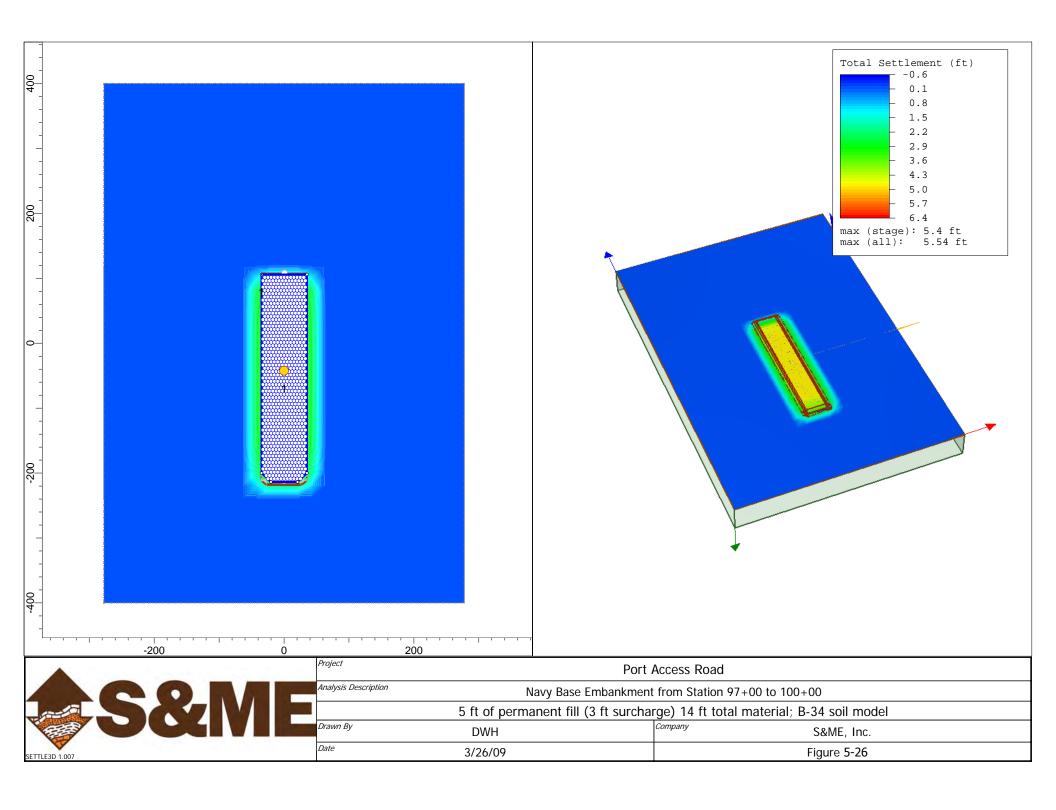
Due to the magnitude and settlement rate, some form of ground improvement will be required at this bridge abutment. Further, based on our analyses, we do not expect that wick drains and surcharging will allow for sufficient settlement to occur in any normal project schedule that would meet typical bridge abutment settlement criteria. A column or pile supported embankment will probably be required for the bridge abutment fill.

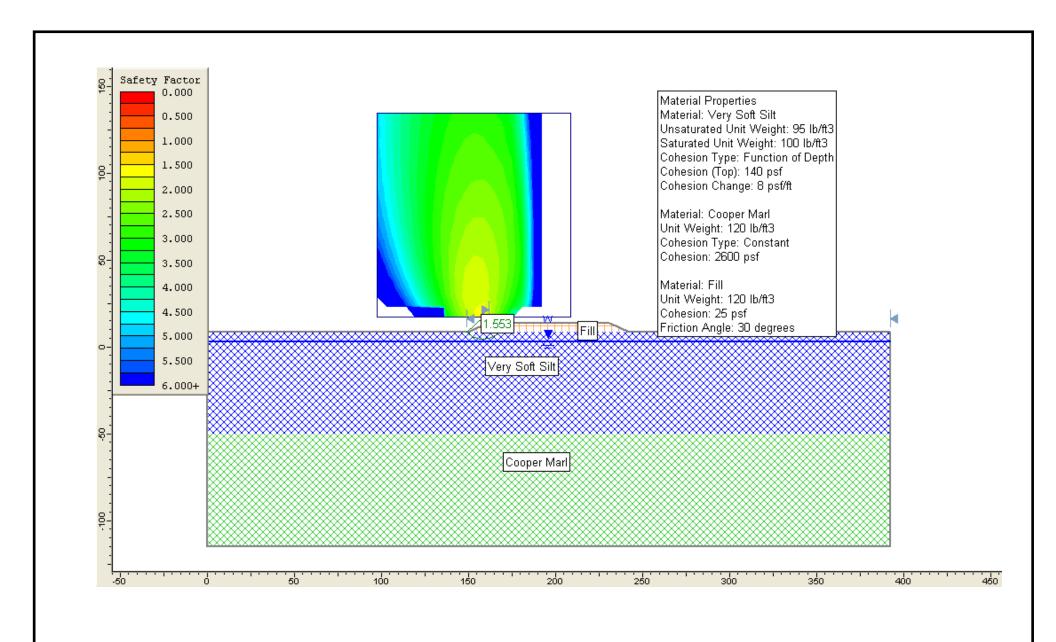
For the portion of the Main Line on the former Naval Base where fill heights will be about 5 ft, we expect that a combination of wick drains and surcharging could be used to reduce settlement to an acceptable amount. Staged construction would still likely be necessary to prevent overstressing the very weak soils. We estimate that total settlements on the order of 5 ft would occur from raising the site grade by 5 ft. Depending on the sensitivity of the soils, many stages of filling could be required to achieve the final grade. Based on our analyses, a combination of wick drains on a 5-ft triangular spacing and a 3 ft surcharge will likely be required to reduce settlements to typically acceptable limits in a reasonable amount of time. We estimate that approximately 2 years would be required from the time the first fill was placed until the surcharge could be removed. This significant time period should be considered when planning the construction sequence. Figures 5-25 and 5-26 show representative embankment cross sections with corresponding settlement magnitudes for the bridge abutment fill and the lower roadway fill.

5.6.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configurations shown for Stations 100+00 and 93+75 for the former Naval Base will be stable during and following construction with a FOS greater than 1.3 under static conditions. For the portion of the Main Line along the western edge of the Macalloy site at Station 70+00, we assumed a maximum fill height of 30 ft. The embankment shown will be unstable without reinforcement or reduction in the fill height with a FOS of 0.96 under static conditions. The FOS for the representative embankment sections are less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield acceleration ranged from 0.12g to 0.13g. Figures 5-27 through 5-42 show representative cross sections at Stations 100+00, 93+75 and 70+00, respectively, under static and pseudo-static conditions including reinforcement or reduced fill heights. Although no detailed deformation analysis was performed, greater seismic deformations could also be expected on the Navy Base embankments than on the other embankments along the alignment.







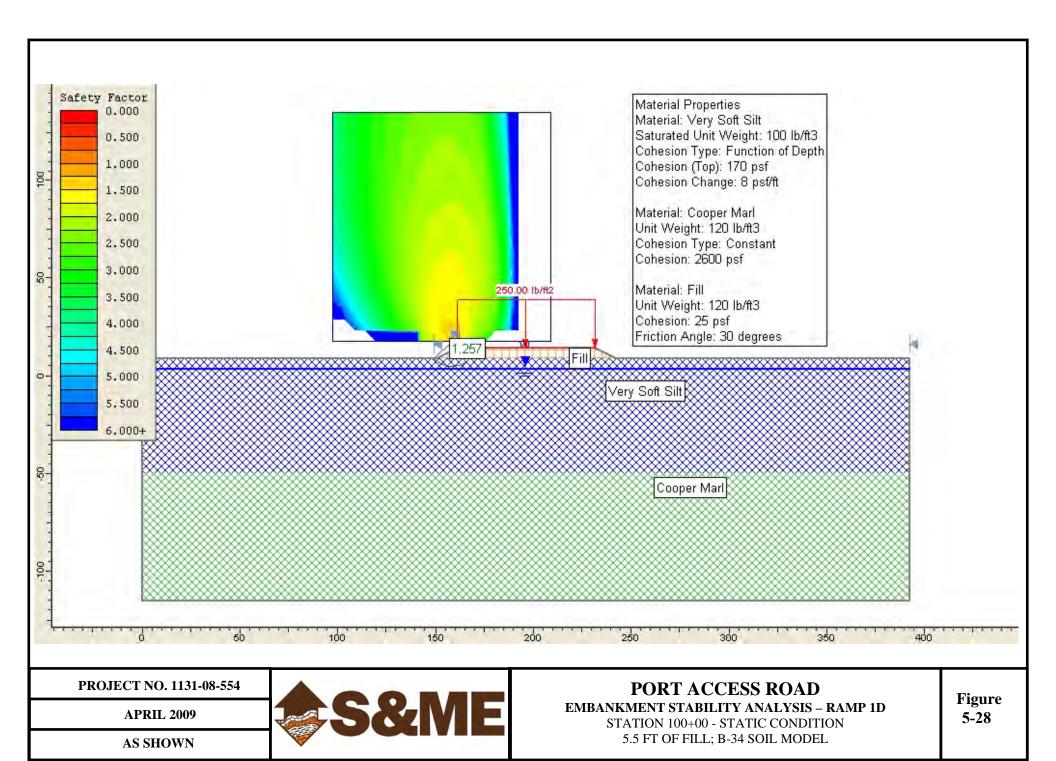
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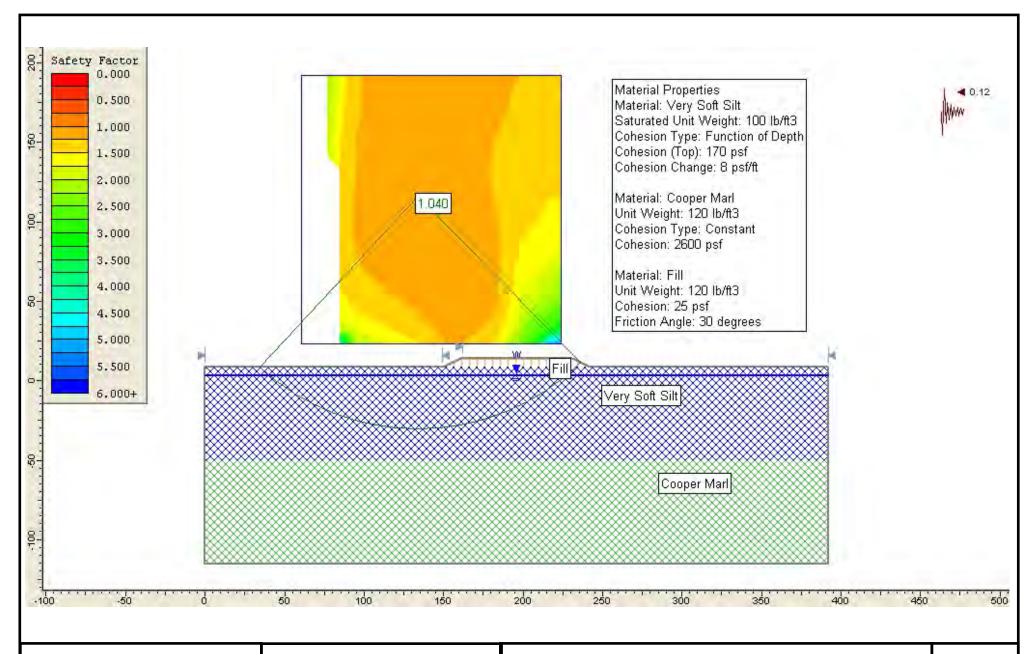
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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 100+00 –STATIC CONDITION (AFTER CONSTRUCTION) 5.5 FT OF FILL; B-34 SOIL MODEL





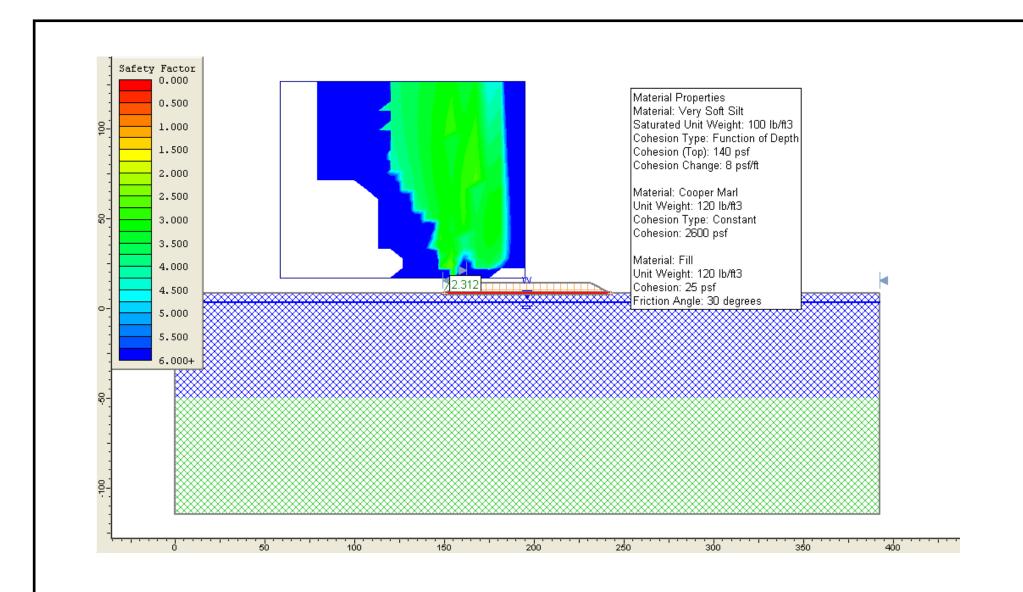
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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 100+00 – PSEUDO-STATIC CONDITION 5.5 FT OF FILL; B-34 SOIL MODEL



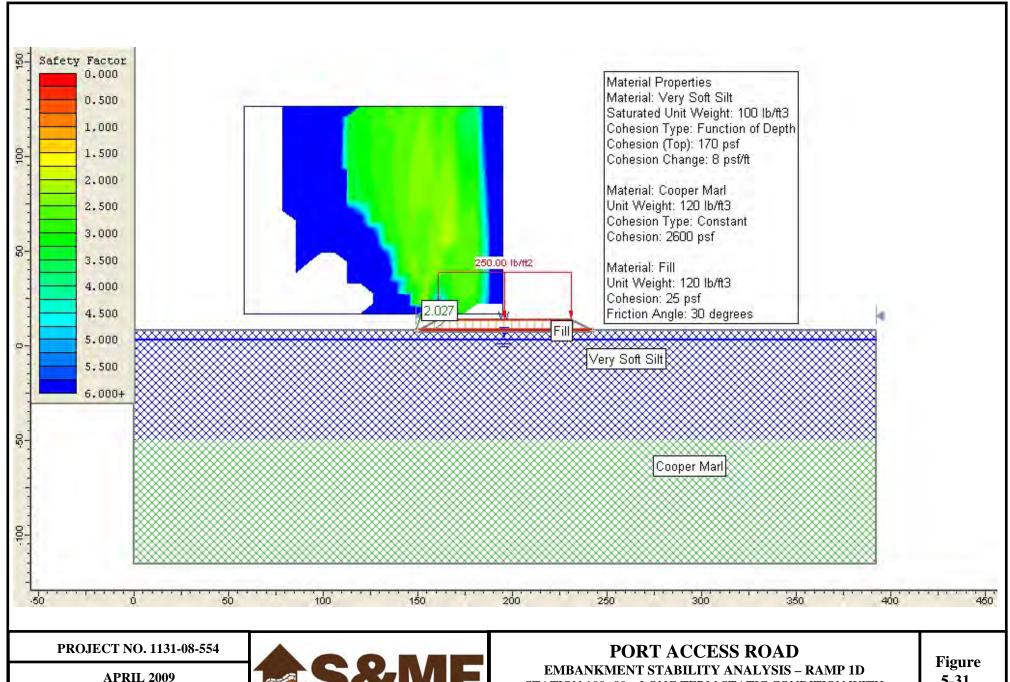
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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 100+00 – STATIC CONDITION AFTER CONSTRUCTION WITH REINFORCEMENT 5.5 FT OF FILL; B-34 SOIL MODEL

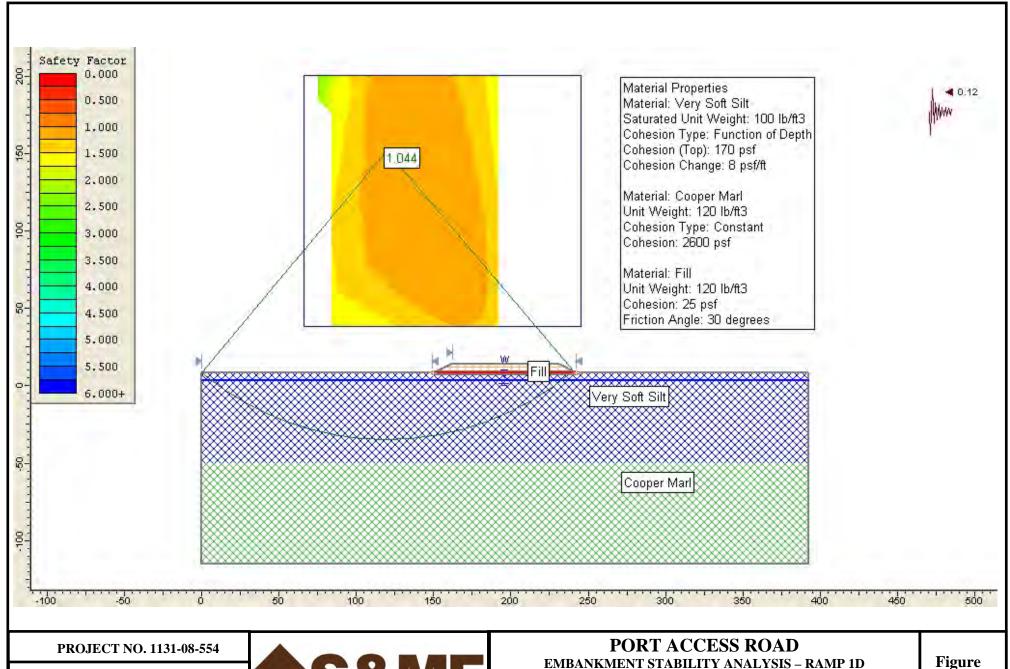


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5-31 STATION 100+00 – LONG TERM STATIC CONDITION WITH

REINFORCEMENT

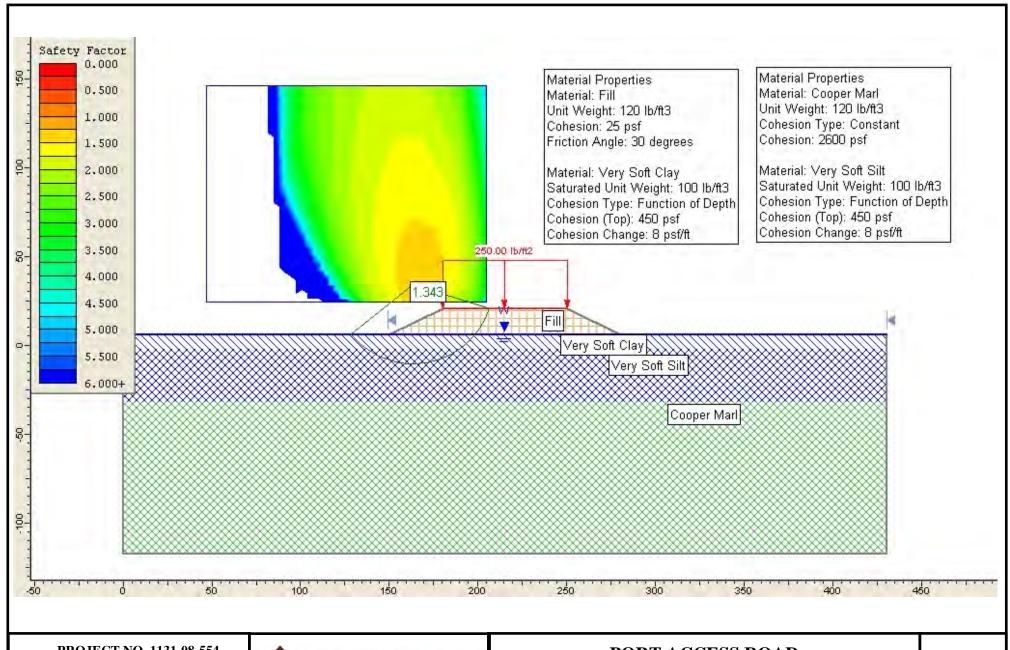
5.5 FT OF FILL; B-34 SOIL MODEL



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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 100+00 – PSEUDO-STATIC CONDITION WITH REINFORCEMENT 5.5 FT OF FILL; B-34 SOIL MODEL



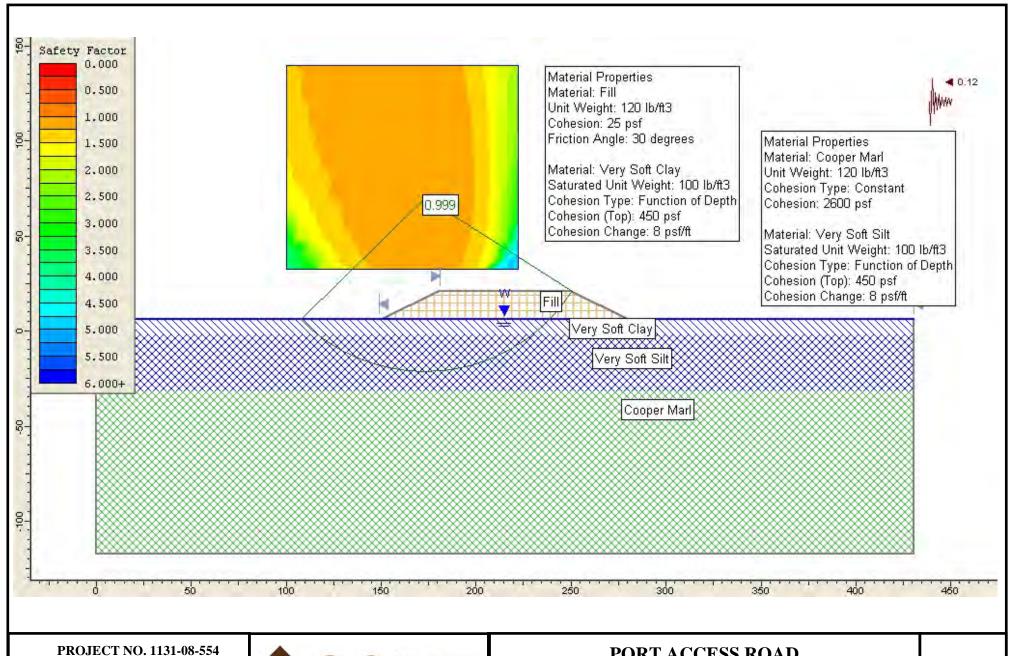
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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 93+75 –STATIC CONDITION (LONG TERM) 15 FT OF FILL; B-34 SOIL MODEL

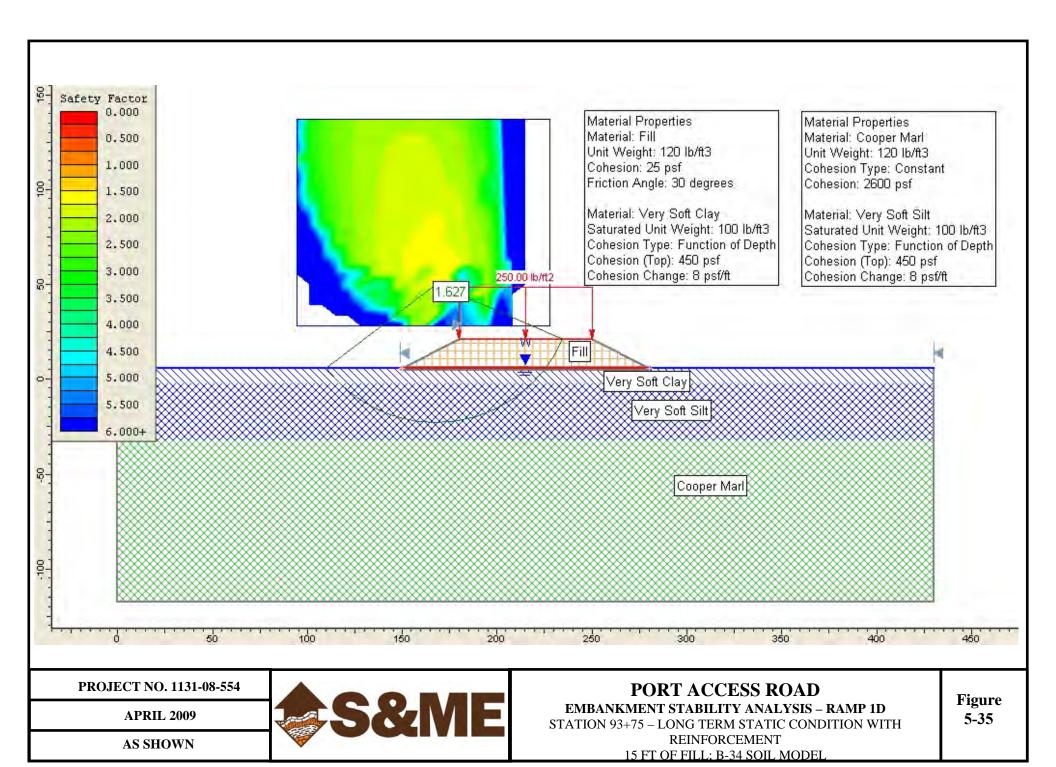


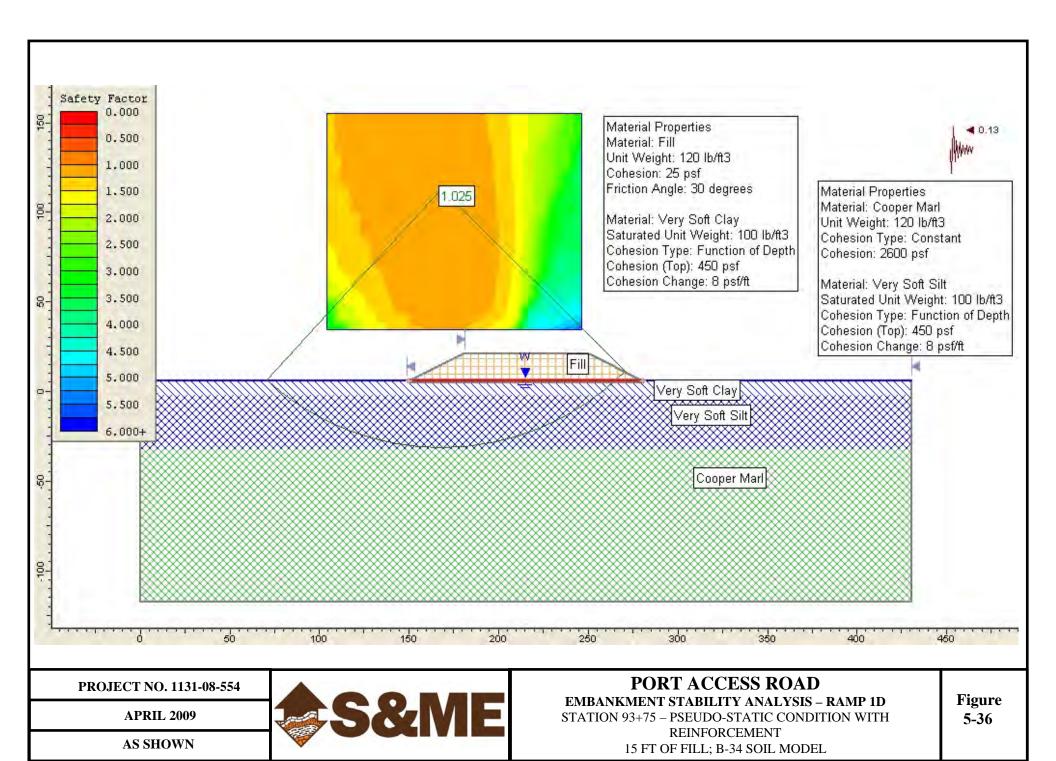
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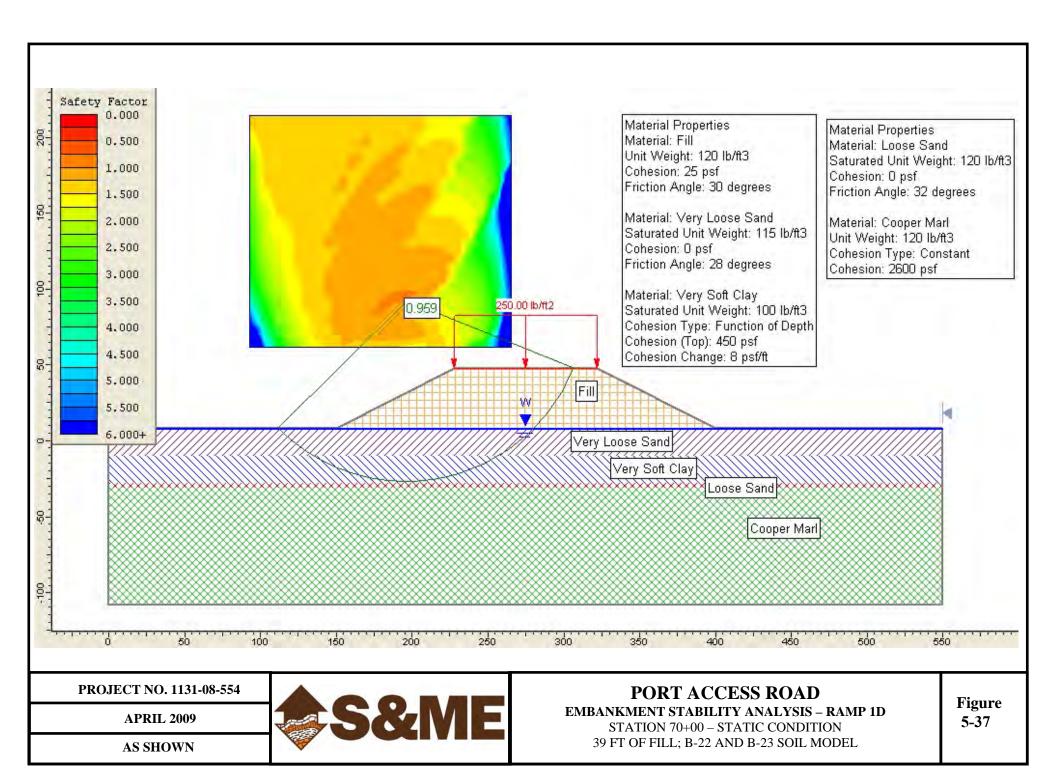


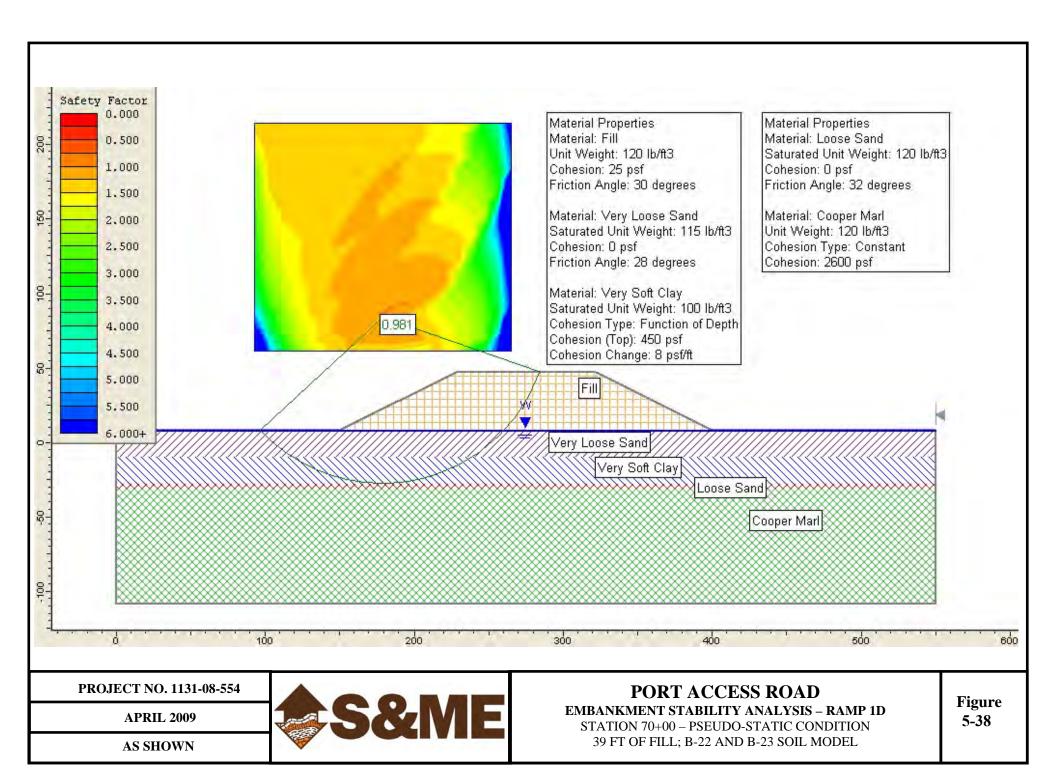
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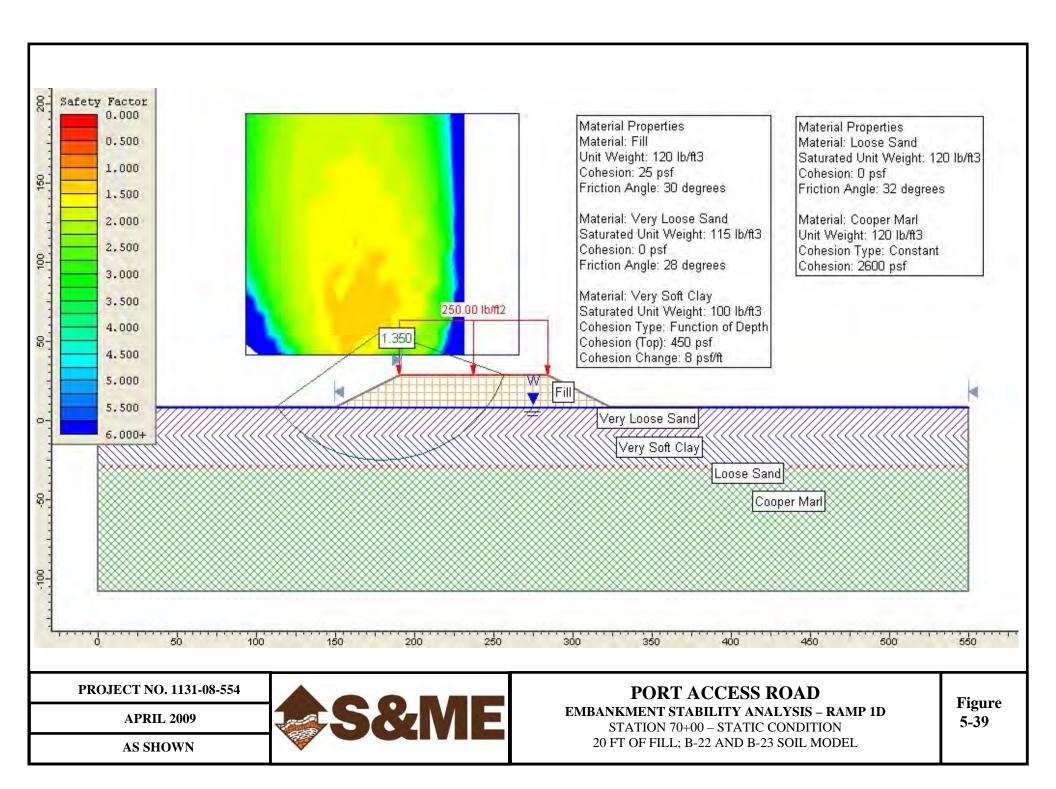
EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 93+75 – PSEUDO-STATIC CONDITION 15 FT OF FILL; B-34 SOIL MODEL

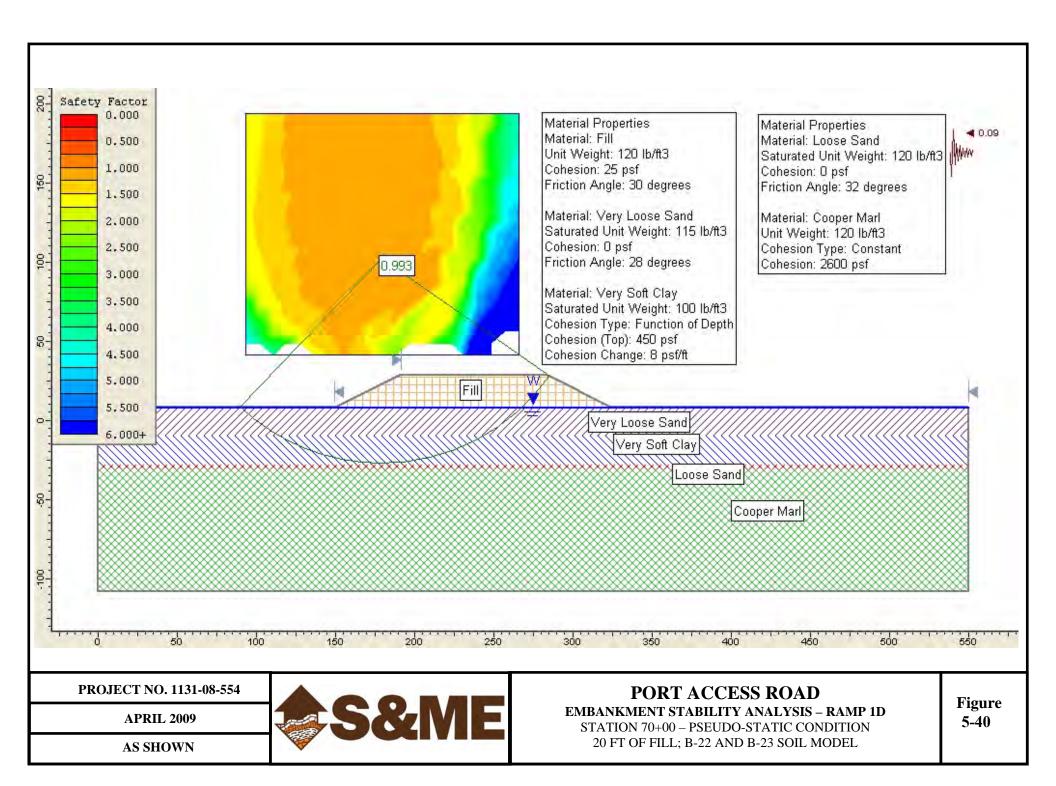


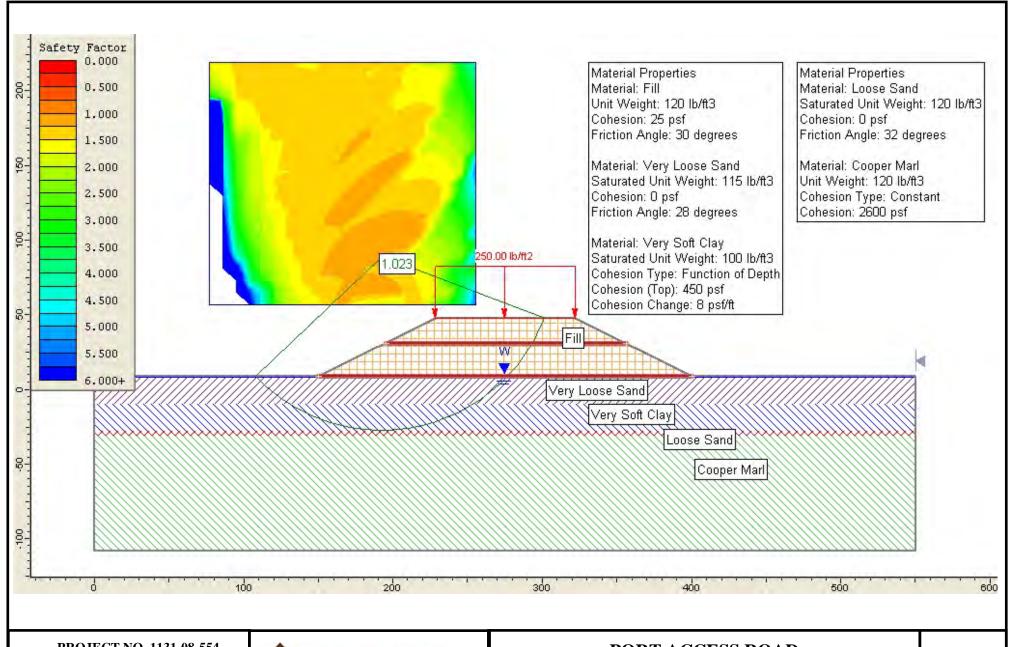












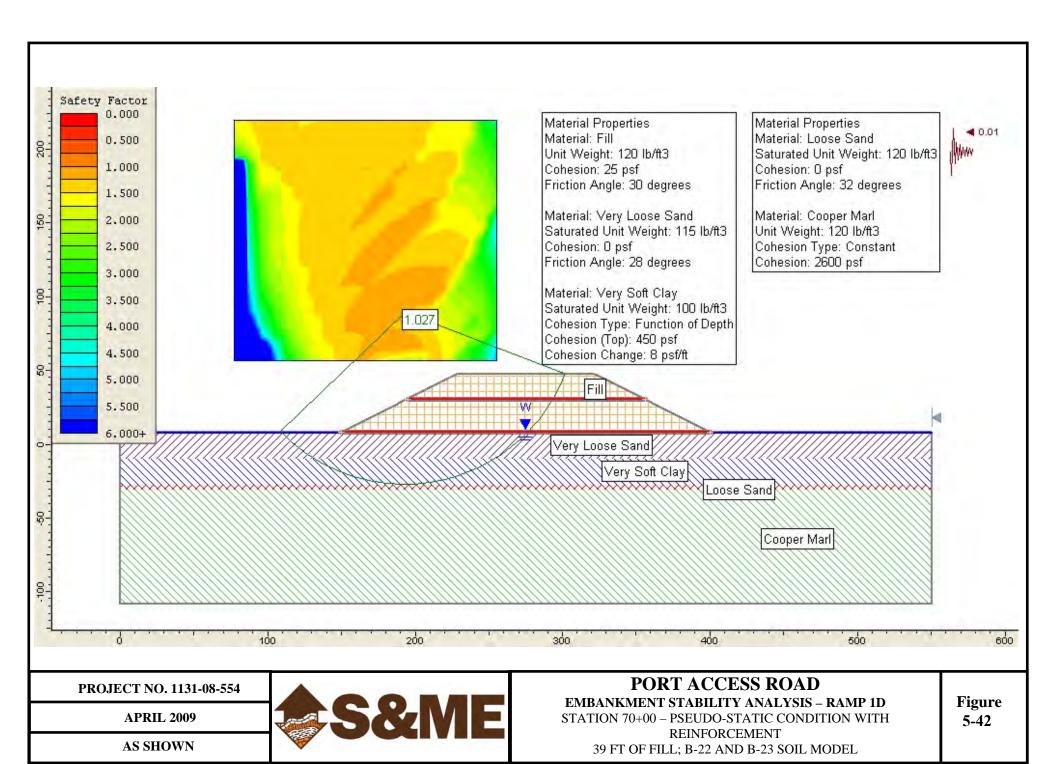
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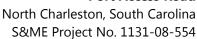
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EMBANKMENT STABILITY ANALYSIS – RAMP 1D STATION 70+00 – STATIC CONDITION WITH REINFORCEMENT 39 FT OF FILL; B-22 AND B-23 SOIL MODEL







5.6.3 Deep Foundations

Figures 5-43and 5-44 presents the estimated axial capacity for drilled shafts and driven, square PSC piles bearing in the Cooper marl. A top-of-marl elevation of -40 ft-NAVD 88 for the Main Line was used. Based on the subsurface profile, this is an appropriate top-of-marl elevation for most of the Main Line. Additionally, the "younger" marl deposit was encountered over portions of the Main Line but not along the entire alignment. The top-of-marl elevation also increases rather dramatically between Spruill Avenue and the Macalloy Site. A more detailed analysis of shaft and pile capacities, particularly for a bridge over Shipyard Creek and the bridge over Spruill and Meeting Street, would need to be performed once final bent locations are established and a decision is made about using embankments or elevated structure.

A lower side friction value of 1.5 ksf was used for the younger marl deposit encountered along a portion of the Main Line. The shaft and pile capacities presented below assume the unit side friction indicated above and a young marl thickness of 10 ft.

Figure 5-43. Main Line 1D Ultimate Drilled Shaft Capacity vs. Tip Elevation

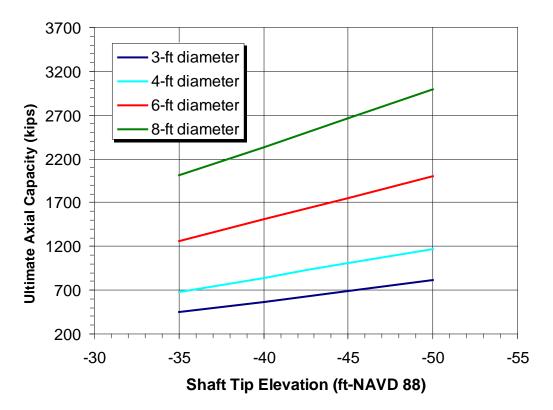
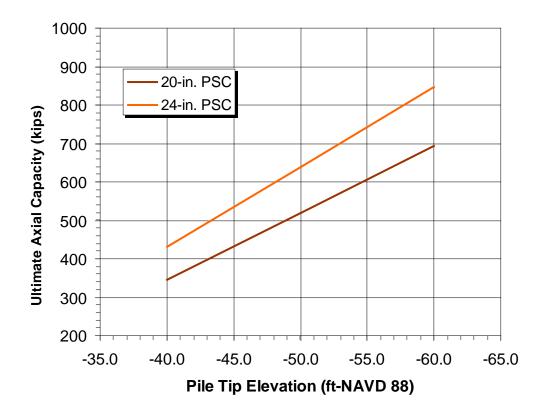




Figure 5-44. Main Line 1D Ultimate Driven PSC Pile Capacity vs. Tip Elevation



5.7 Ramps E and F

Ramps E and F exit from the Main Line 1D on the Macalloy site. Ramp E continues across Shipyard Creek to provide Tidewater Road access. Ramp F will serve a local access road between Bainbridge Avenue and the Main Line. Although we were not able to explore these Ramps as completely as the others, the available subsurface data generally indicates loose to medium dense clayey sands interbedded with layers of medium dense to dense cleaner sands and some thin soft clay layers. The sands extend to an elevation of approximately -18 ft, where the younger marl deposit was encountered. This younger marl transitioned into the Cooper marl at an approximate elevation of -30 ft. While the portion of Ramp E that lies within the Macalloy site west of Shipyard Creek consists of basically sandy soils overlying the Cooper Group, the portion of the ramp that lies within the former Naval Base east of Shipyard Creek consists of the very soft clays and silts described above for the Main Line. For a subsurface profile of Ramps E and F, please refer to the Main Line 1D subsurface profile drawings.

5.7.1 Static Settlement

Based on the ramps' profiles, we estimate up to 11 ft of fill will be placed at the bridge abutments. Settlements from the weight of the new fill are expected due to compression of the upper sands and to a lesser degree the underlying clay layers. We expect settlements on the order of 2 to 4 in. Most of the settlement would occur relatively quickly during construction. Wick drains should not be required for



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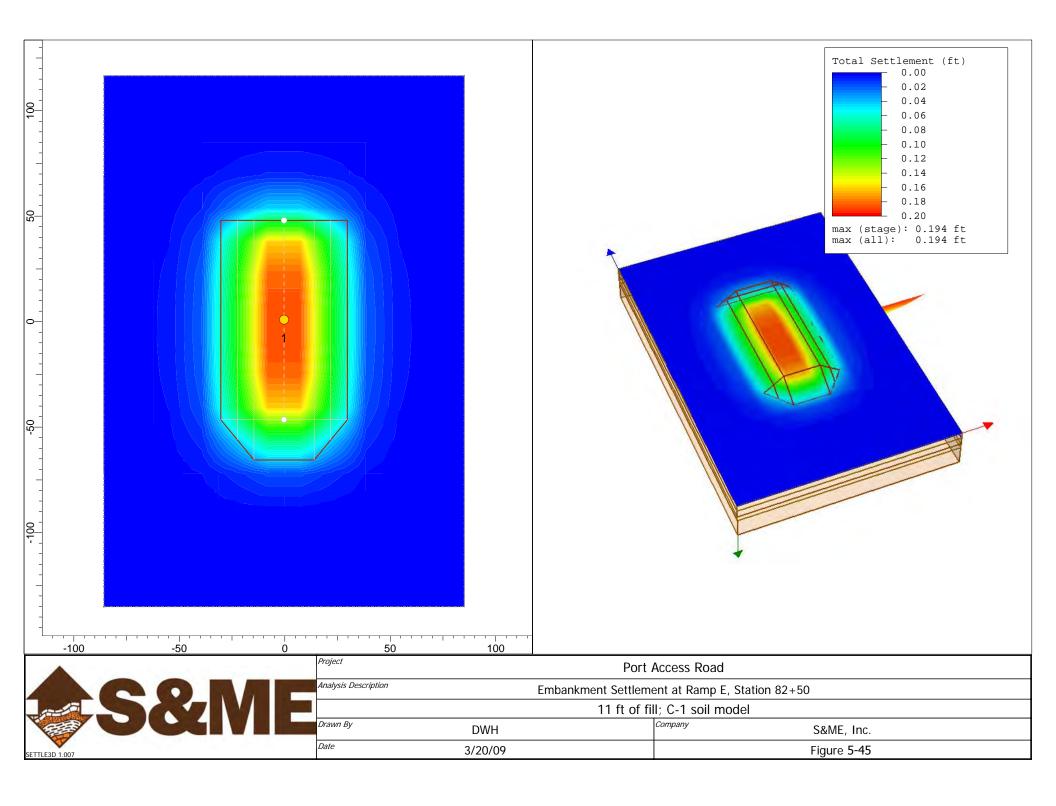
Ramps E or F. Figure 5-45 shows a representative cross section of the Ramp E and Ramp F embankments with the calculated settlement at the point shown on the plan view.

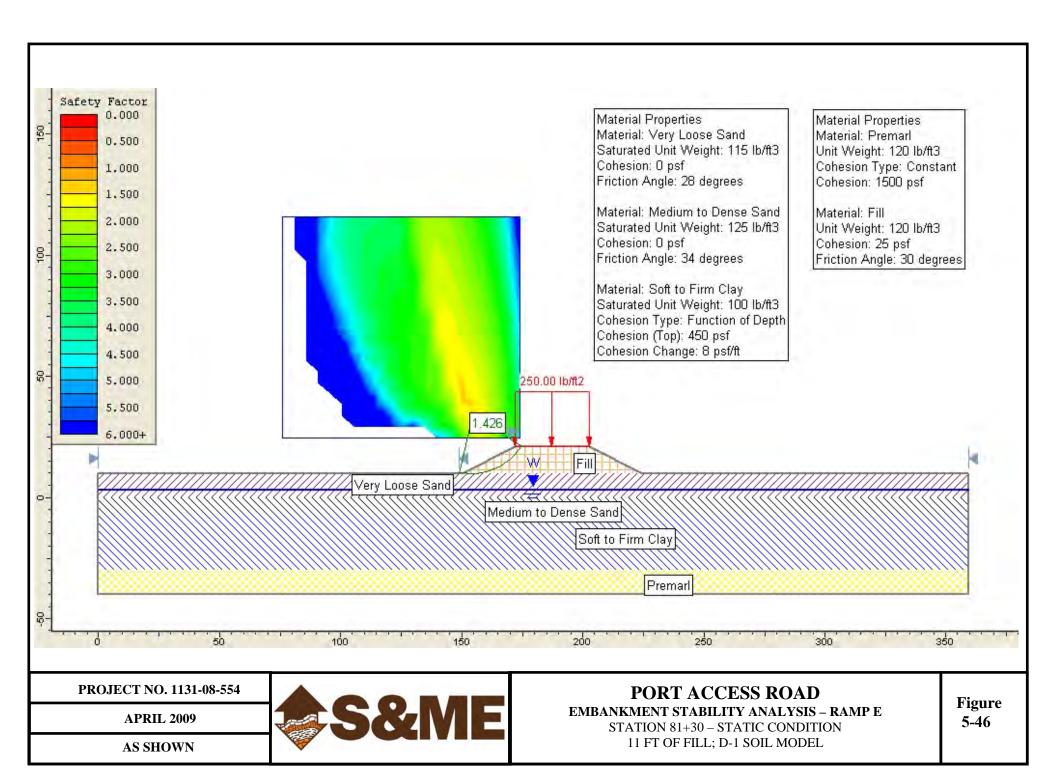
5.7.2 Embankment Global Stability

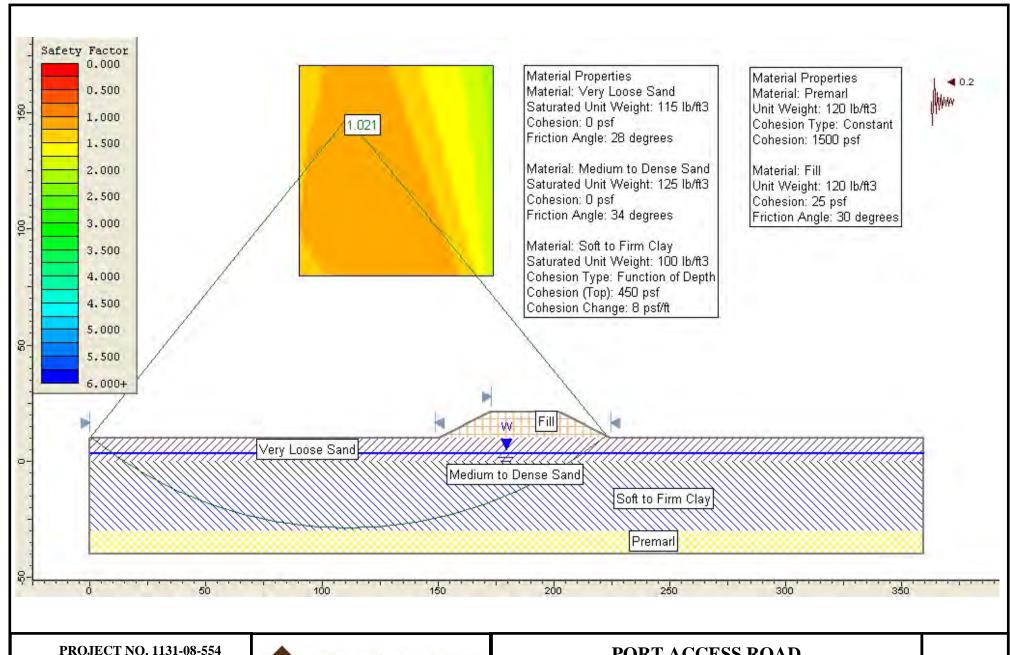
The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.4 under static conditions. The FOS for the representative embankment section is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield accelerations are 0.20g. Figures 5-46 through 5-49 show representative cross sections at Stations 81+30 and 68+30, respectively, under static and pseudo-static conditions.

5.7.3 *Deep Foundations*

Based on the available data, a top-of-marl elevation of -40 ft-NAVD 88 was used for Ramps E and F. Additionally, the "younger" marl deposit was encountered in the borings near the Ramps. Therefore, the axial capacity analyses presented for the Main Line should be applicable for Ramps E and F. Additional exploration would be necessary to confirm this.





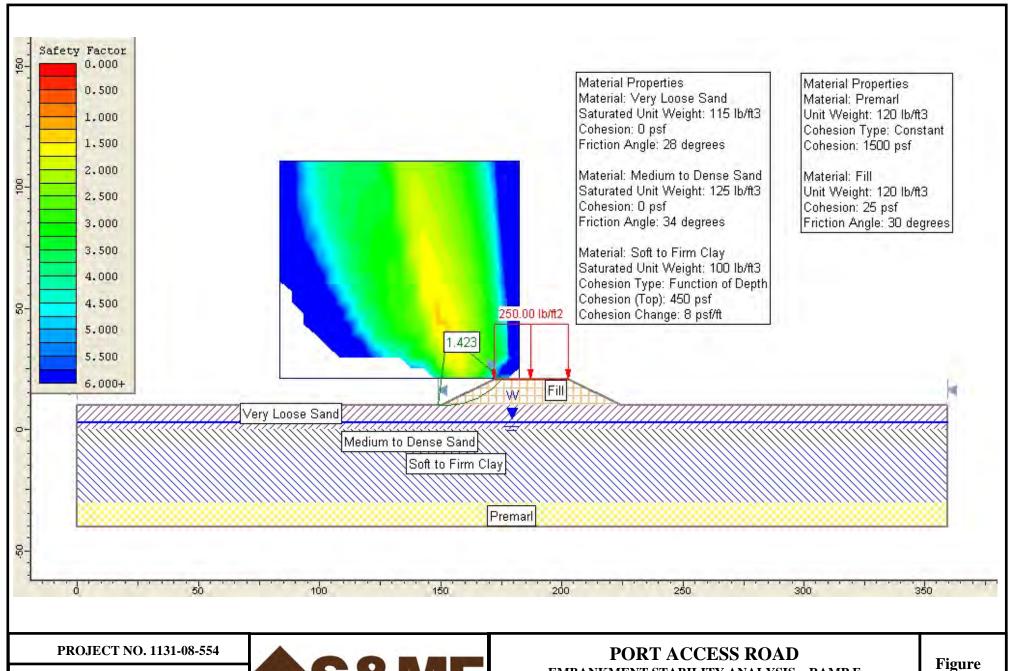


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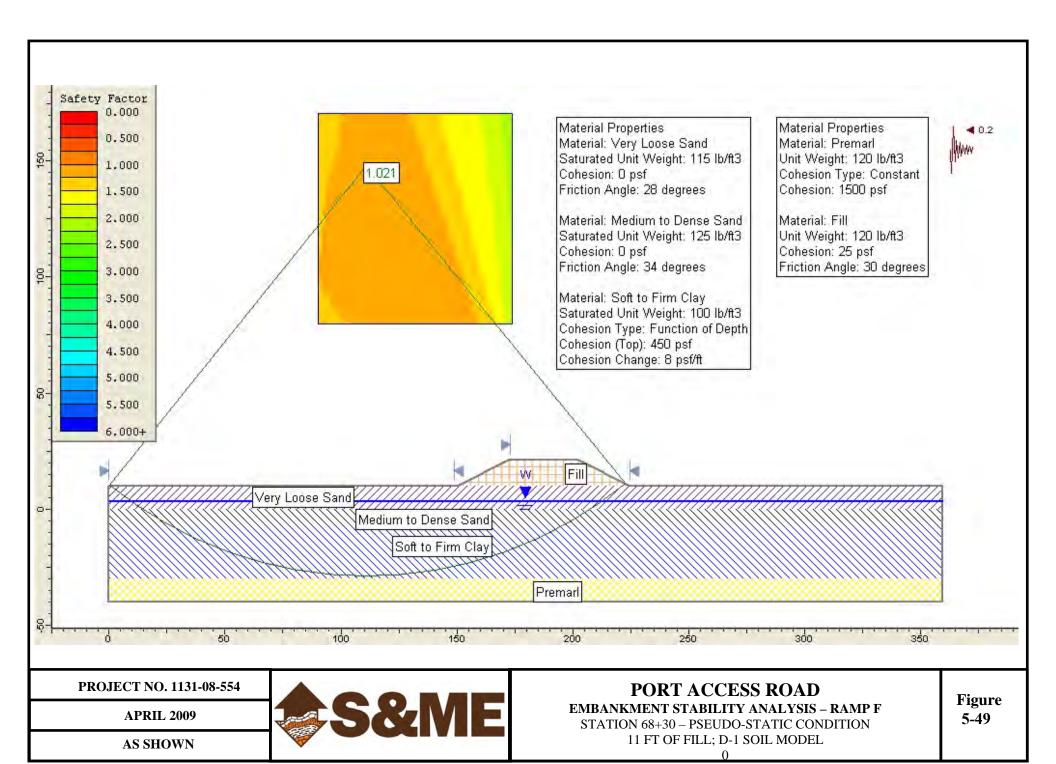
EMBANKMENT STABILITY ANALYSIS – RAMP E STATION 81+30 – PSEUDO-STATIC CONDITION 11 FT OF FILL; D-1 SOIL MODEL



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EMBANKMENT STABILITY ANALYSIS – RAMP F STATION 68+30 – STATIC CONDITION 11 FT OF FILL; D-1 SOIL MODEL 5-48







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5.8 Ramp G

Ramp G begins along I-26 eastbound north of the North Meeting Street exit and follows the existing exit ramp over I-26, King Street Extended and railroad tracks before returning to grade at Meeting Street Extension.

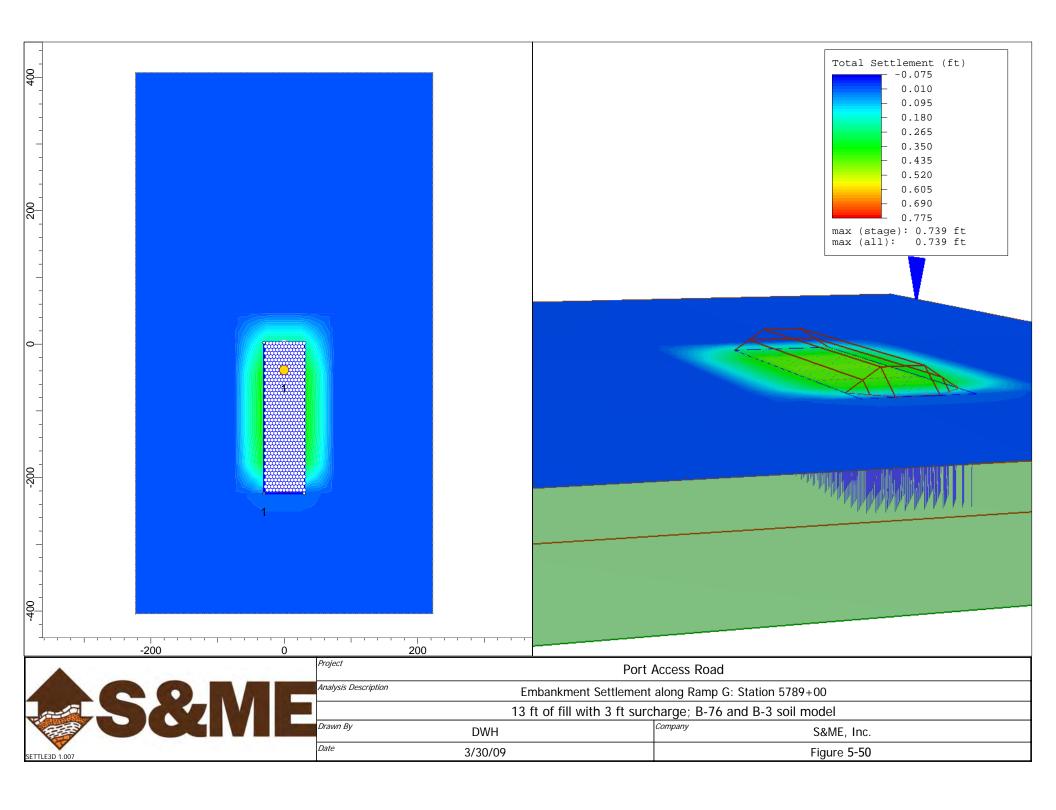
The subsurface conditions along Ramp G generally consist of approximately 20 ft of very loose to medium dense sands overlying approximately 20 to 25 ft of soft to firm clays and silts. The CPT data and laboratory data from Ramp G nearby indicates the clay is slightly overconsolidated. Figure 4-1 shows the subsurface profile along Ramp G.

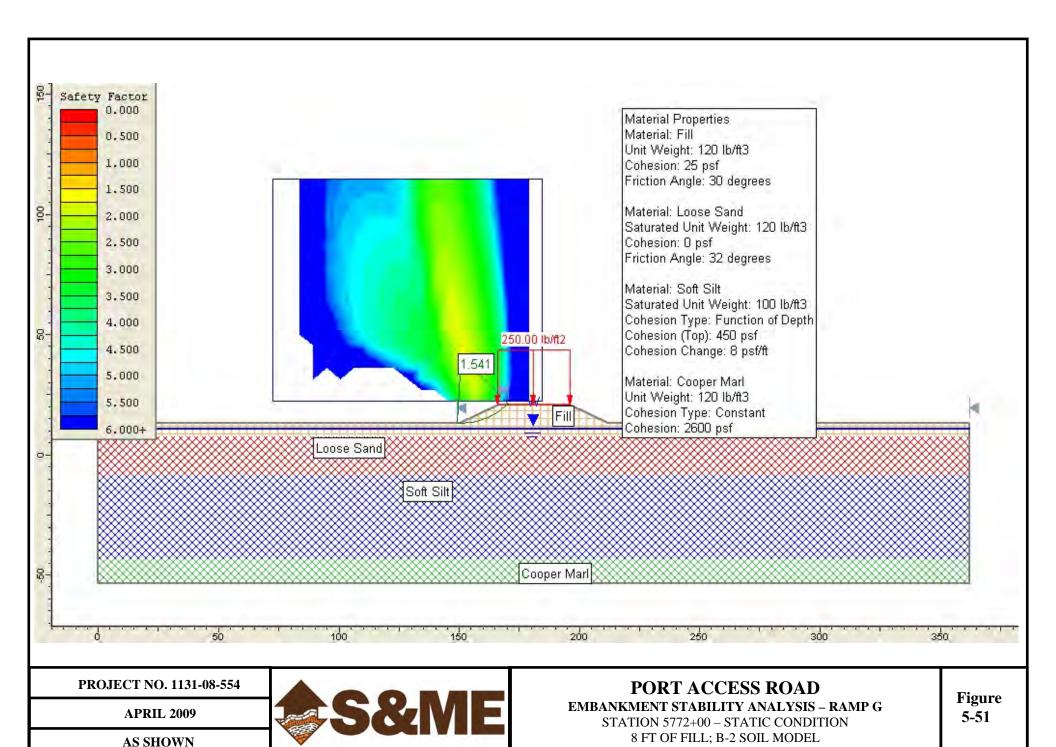
5.8.1 Static Settlement

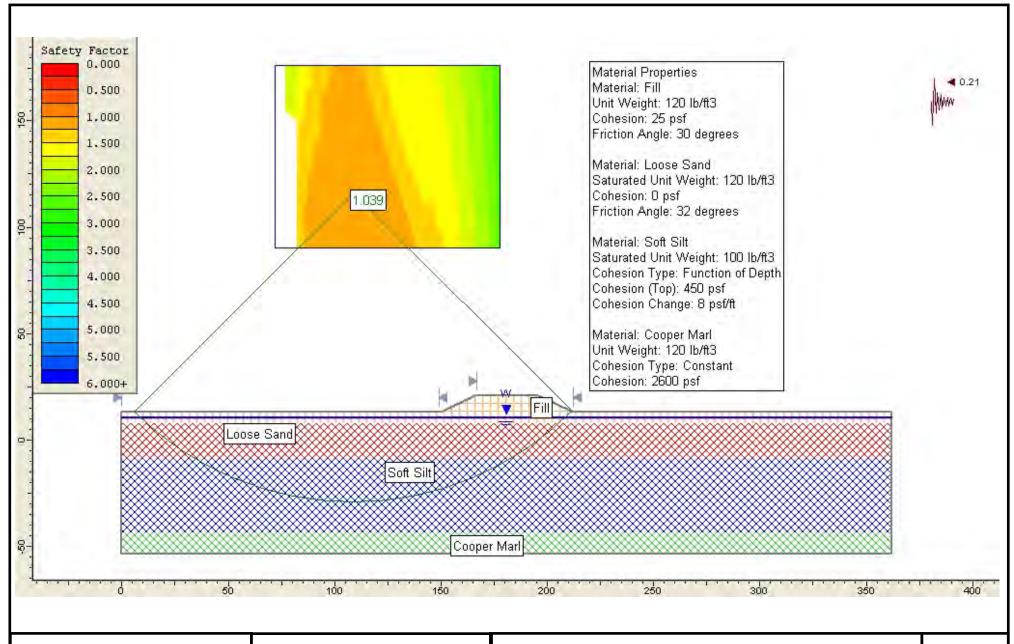
Based on the ramp profile, we estimate up to 12 ft of fill will be placed near Station 5789+00 at the bridge abutment for Ramp G. Settlements from the weight of the new fill are expected due to compression of the upper sands and to a lesser degree the underlying clay stratum. The addition of 12 ft of fill will result in settlements that exceed typical SCDOT bridge abutment limits. With a maximum fill height of 12 ft, we expect settlement could be on the order of 6 to 8 in. Wick drains and surcharging will likely be required to reduce long term settlement. We estimate wick drains on a 5-ft triangular spacing with a 3 ft surcharge left in place for 90 days will reduce post-construction settlement to under 2 inches. Figure 5-50 shows a representative cross section of the embankment with the calculated settlement at the point shown on the plan view.

5.8.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.4 under static conditions. The FOS for the representative embankment section generally is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield acceleration ranged from 0.21g to 0.27g. Figures 5-51 through 5-56 show representative cross sections at Stations 5772+00, 5789+35, and 5801+65, respectively, under static and pseudo-static conditions.







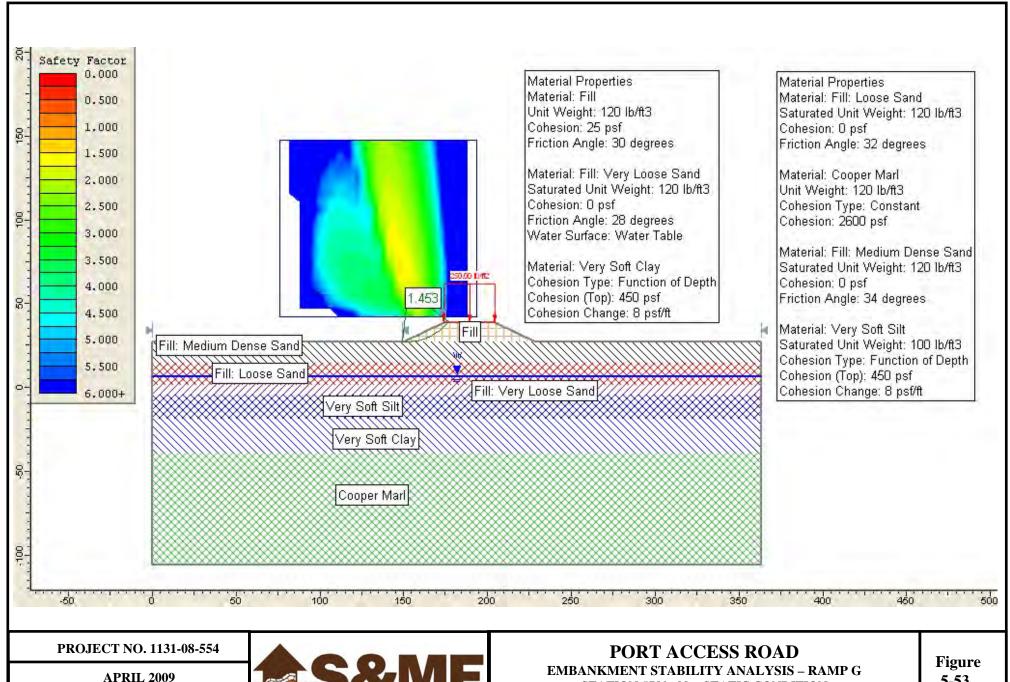
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EMBANKMENT STABILITY ANALYSIS – RAMP G STATION 5772+00 – PSEUDO-STATIC CONDITION 8 FT OF FILL; B-2 SOIL MODEL



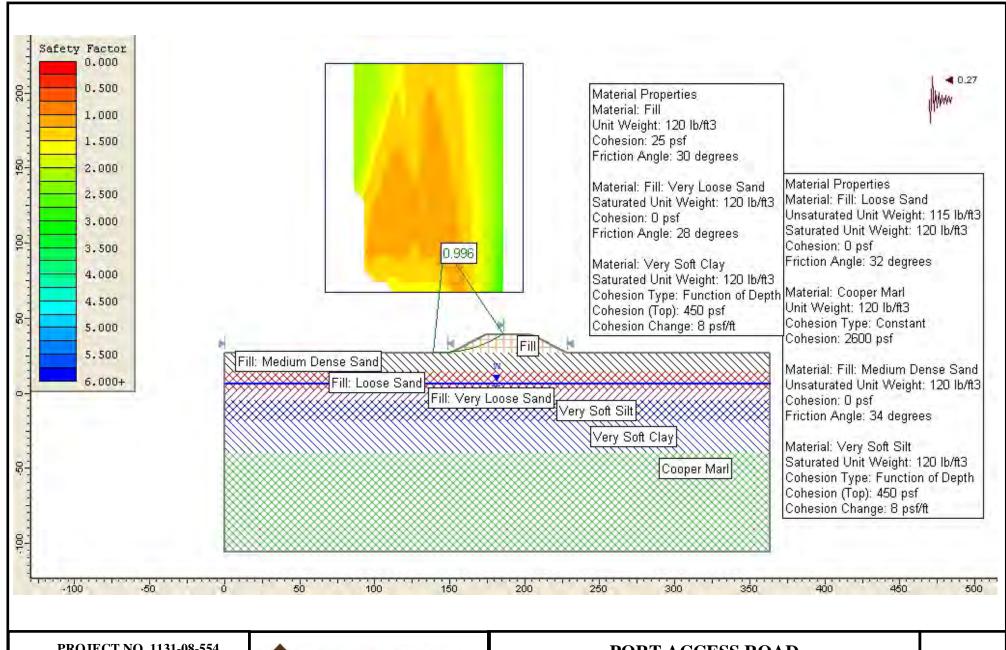
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STATION 5789+00 - STATIC CONDITION

12 FT OF FILL; B-76 SOIL MODEL

5-53



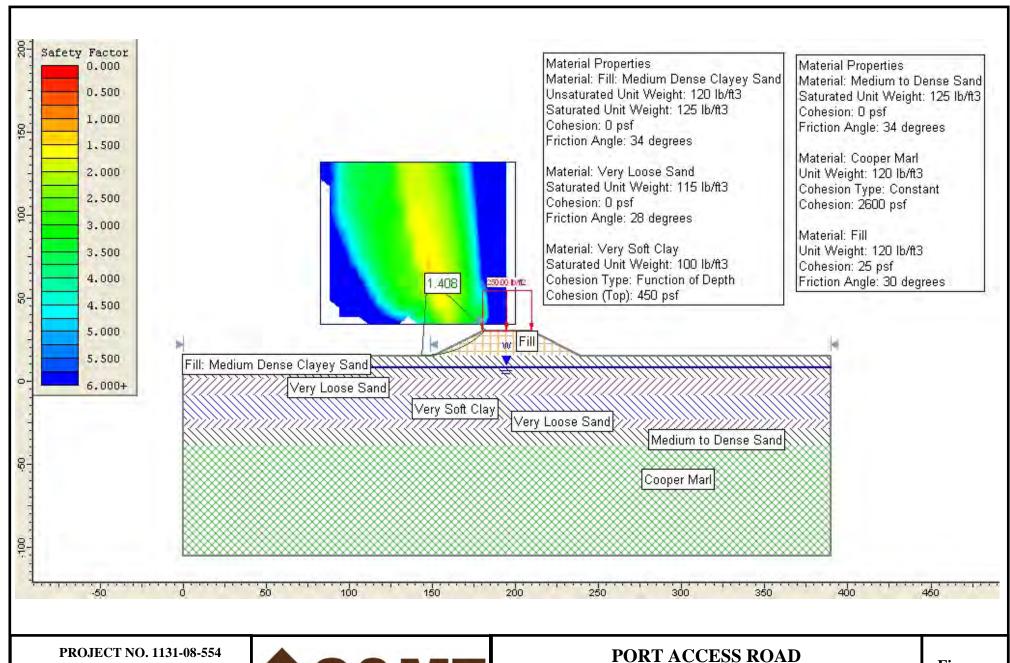
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EMBANKMENT STABILITY ANALYSIS - RAMP G STATION 5789+00 – PSEUDO-STATIC CONDITION 12 FT OF FILL; B-76 SOIL MODEL

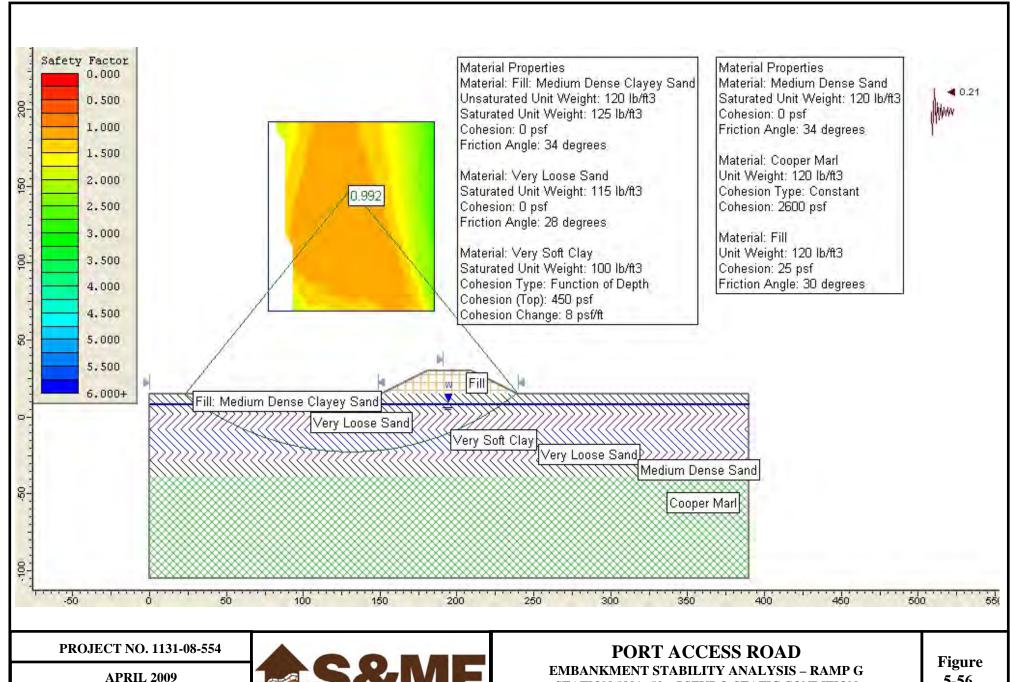


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EMBANKMENT STABILITY ANALYSIS - RAMP G STATION 5801+50 – STATIC CONDITION

15 FT OF FILL; B-75 SOIL MODEL



AS SHOWN

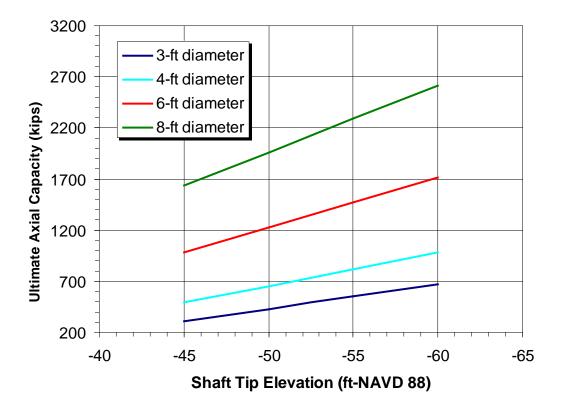
5-56

STATION 5801+50 – PSEUDO-STATIC CONDITION 15 FT OF FILL; B-75 SOIL MODEL

5.8.3 Deep Foundations

Figures 5-57 and 5-58 present the estimated axial capacity for drilled shafts and driven, square PSC piles bearing in the Cooper marl. A top-of-marl elevation for Ramp G of -40 ft-NAVD 88 was used.

Figure 5-57. Ramp G Ultimate Drilled Shaft Capacity vs. Tip Elevation



July 21, 2015



1000 900 20-in. PSC 24-in. PSC 800 Ultimate Axial Capacity (kips) 700 600 500 400 300 200 -45.0-50.0 -55.0 -60.0 -65.0-70.0 -75.0Pile Tip Elevation (ft-NAVD 88)

Figure 5-58. Ramp G Ultimate Driven PSC Pile Capacity vs. Tip Elevation

5.9 Ramp H

Ramp H begins along I-26 eastbound just south of Baker Hospital Road. It parallels the existing on-ramp to I-26 from Meeting Street Extension, and crosses CSX railroad tracks and King Street Extension before returning to grade at Meeting Street.

The subsurface conditions along Ramp H are similar to Ramp G and generally consist of approximately 20 ft of very loose to medium dense sands overlying approximately 20 to 25 ft of soft to firm clays and silts. The CPT data and laboratory data from Ramp G nearby indicates the clay is slightly overconsolidated. Figure 4-12 shows the subsurface profile along Ramp H.

5.9.1 Static Settlement

Based on the ramp profile, we estimate up to 20 ft of fill will be placed near Stations 5636+50 and 5745+00 at the bridge abutments for Ramp H. Settlements from the weight of the new fill are expected due to compression of the upper sands and the underlying clay stratum. Although the underlying clays are slightly overconsolidated, the addition of 20 ft of fill will result in settlements that exceed typical SCDOT bridge abutment limits. With a maximum fill height of 20 ft, we expect settlement could be on the order of 3 to 4 in. Approximately half the settlement should occur within 90 days of fill placement. Wick drains should not be required for Ramp H.



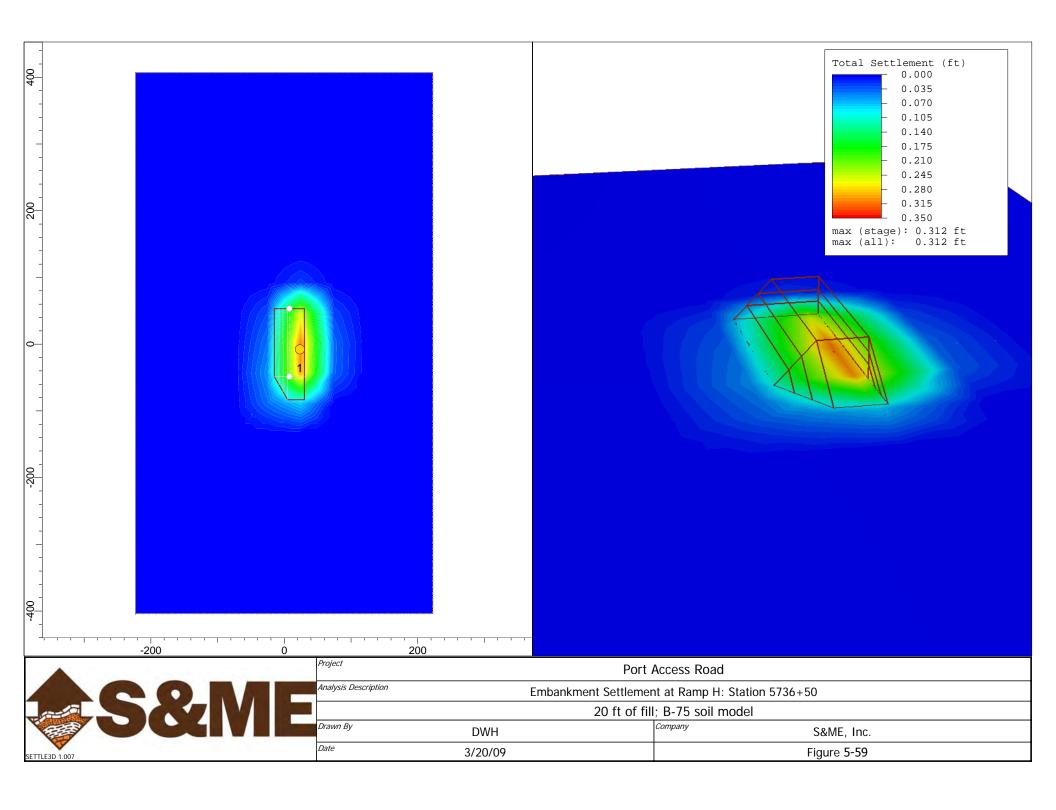
Geotechnical Base Line Report Port Access Road

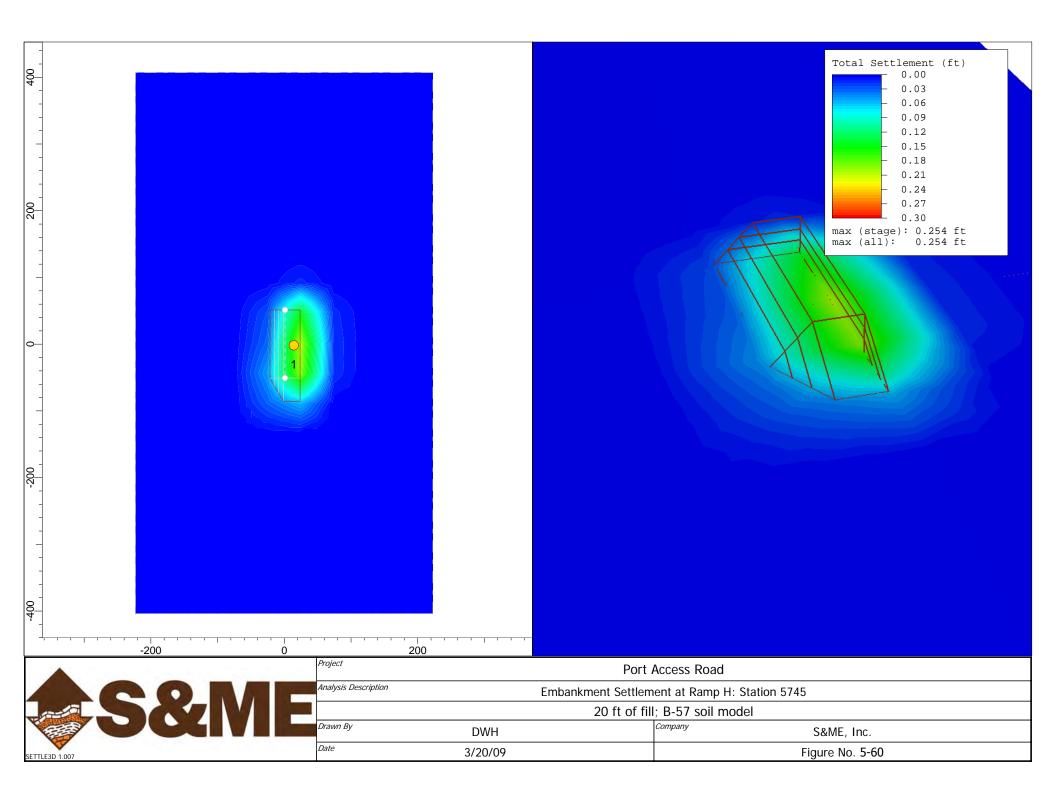
North Charleston, South Carolina S&ME Project No. 1131-08-554

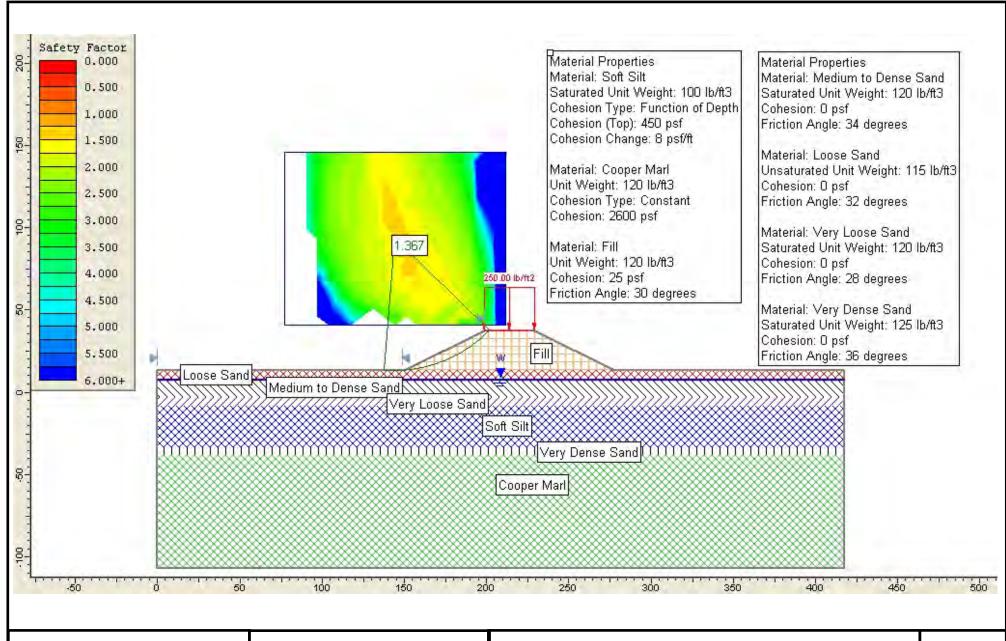
Figures 5-60 and 5-61 show a representative cross sections of the embankment at Stations 5736+50 and 5745+00 with the calculated settlement at the point shown on the plan view.

5.9.2 Embankment Global Stability

The results of our global stability analyses indicate that the embankment configuration shown will be stable during and following construction with a FOS greater than 1.3 under static conditions. The FOS for the representative embankment section in general is less than 1.1 for pseudo-static seismic conditions, under an acceleration of 0.27g. The yield accelerations ranged from 0.12g to 0.27g. Figures 5-62 and 5-67 show representative cross sections at Stations 5744+45, 5736+84 and 5765+00, respectively, under static and pseudo-static conditions.







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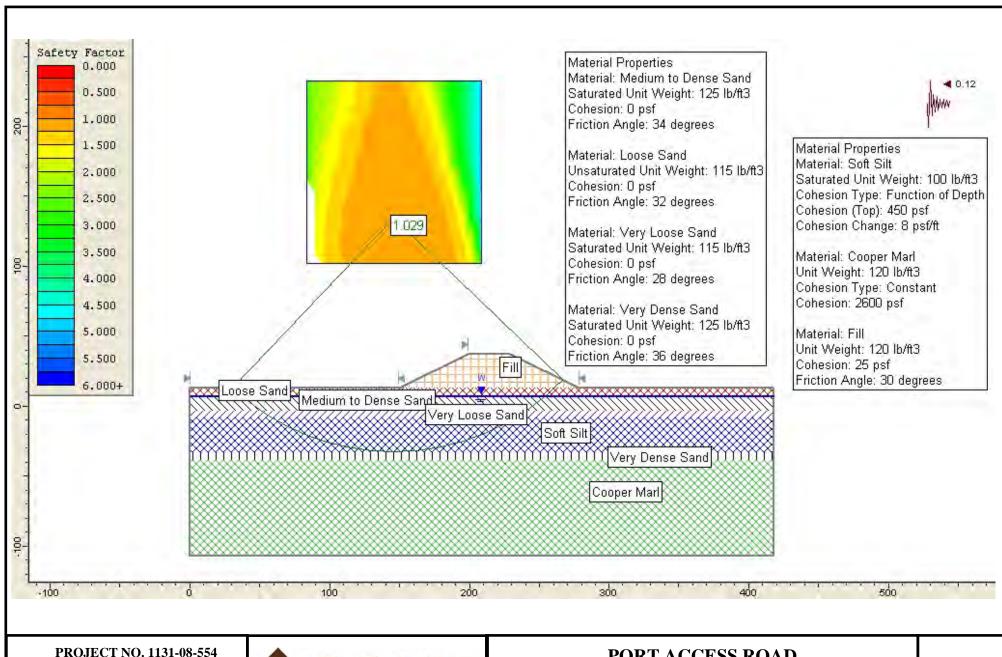
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EMBANKMENT STABILITY ANALYSIS – RAMP H STATION 5744+50 - STATIC CONDITION

24.5 FT OF FILL; B-57 SOIL MODEL

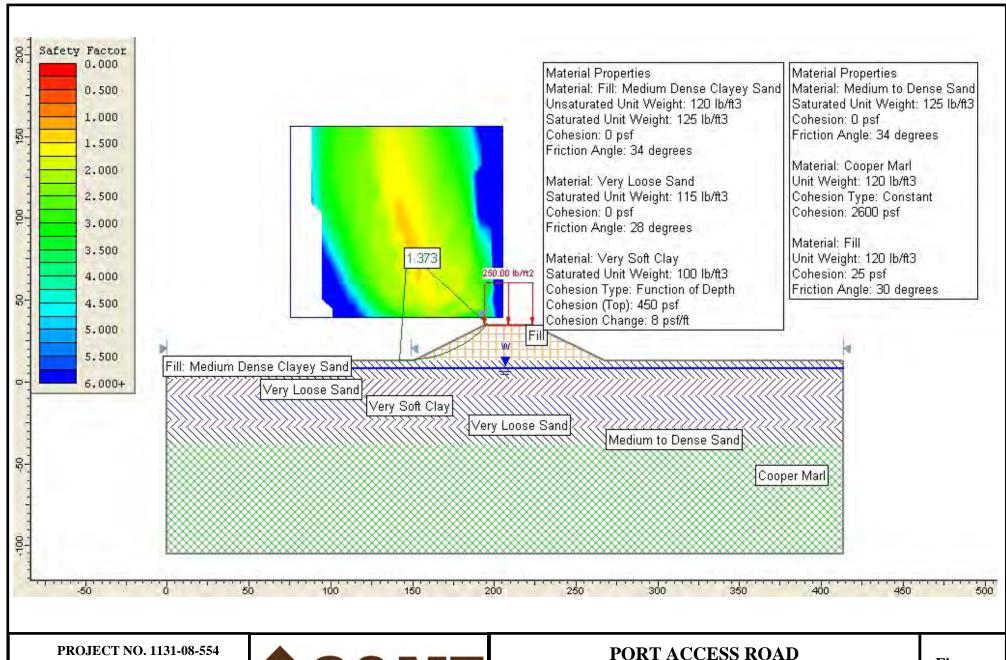


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EMBANKMENT STABILITY ANALYSIS - RAMP H STATION 5744+45 – PSEUDO-STATIC CONDITION 24.5 FT OF FILL; B-57 SOIL MODEL

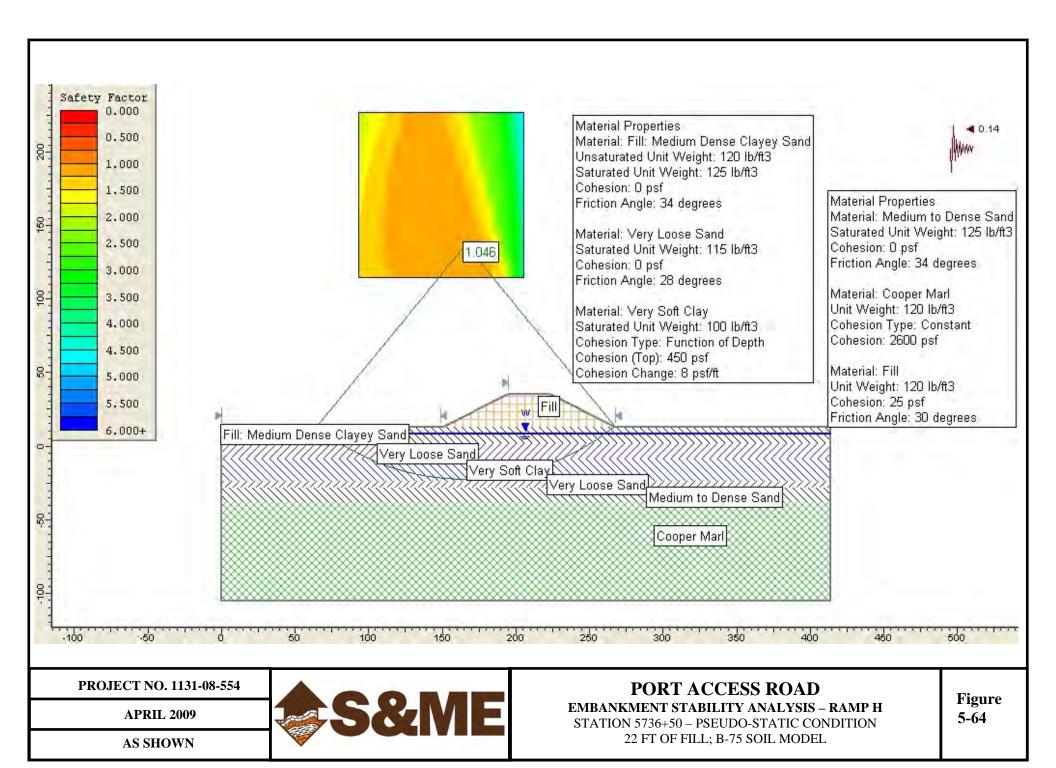


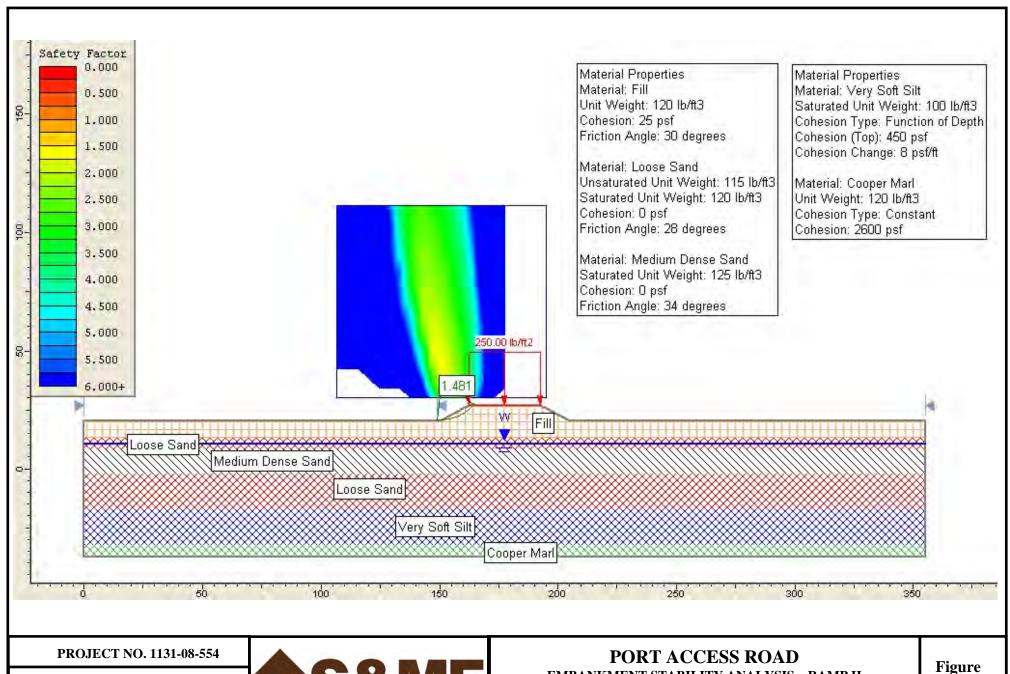
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EMBANKMENT STABILITY ANALYSIS – RAMP H

STATION 5736+50 - STATIC CONDITION 22 FT OF FILL; B-75 SOIL MODEL



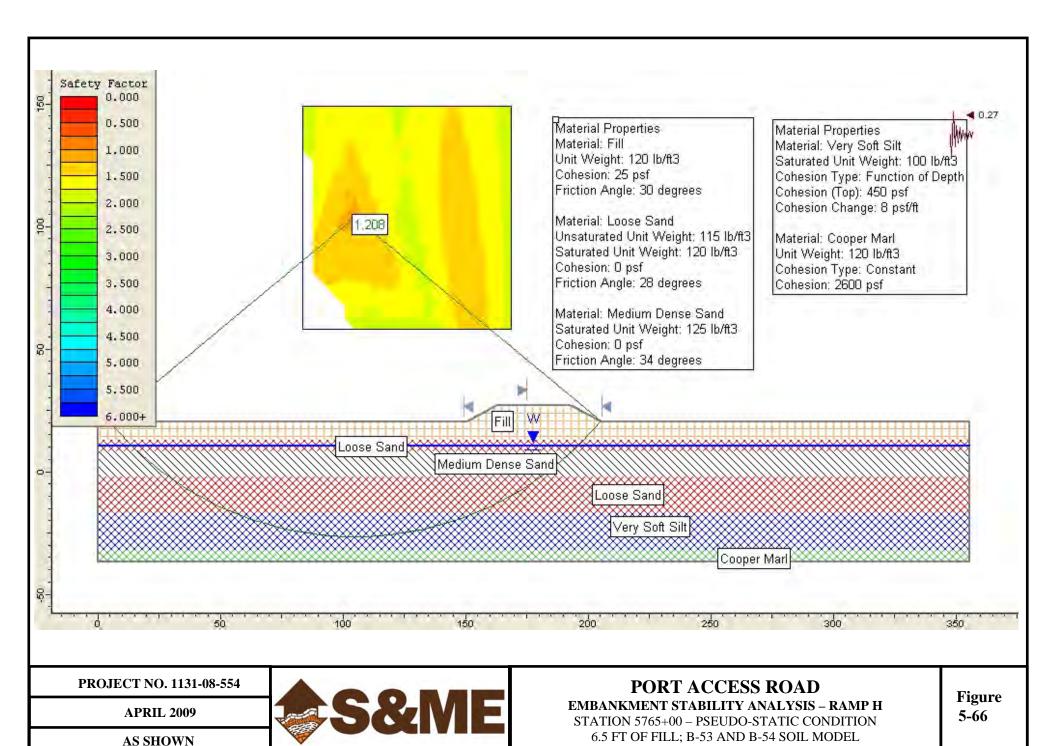


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EMBANKMENT STABILITY ANALYSIS – RAMP H STATION 5765+00 – STATIC CONDITION

STATION 5765+00 – STATIC CONDITION 6.5 FT OF FILL; B-53 AND B-54 SOIL MODEL







5.9.3 Deep Foundations

Based on the subsurface data, the top-of-Cooper elevation for Ramp H is approximately -40 ft-NAVD 88. Therefore, the axial capacity analyses presented for Ramp G should be applicable for Ramp H.

5.10 Local Access Road

Based on the available drawings, an access road will connect the Main Line to Bainbridge Avenue via Ramps E and F on the former Macalloy site. Although a profile of the access road was not available at the time of this report, we understand that a portion of the road will be elevated along Shipyard Creek. The road will transition to existing grade between the incinerator facility and Bainbridge Avenue.

The subsurface conditions along the access road generally consisted of very loose to medium dense silty to clayey sands interbedded with layers of very soft to stiff sandy clays. The young marl was encountered above the Cooper along the portion of the access road near the Main Line. The young marl eventually pinched out about mid-way along the road to Bainbridge Avenue. The end of the road near Bainbridge Avenue crosses a tidal marsh. We encountered buried debris in this area. The container storage area immediately west of the road and adjacent to the incinerator facility is a former landfill as well. It is very likely that buried debris exists along the proposed local access road in this area. Figure 4-10 shows the subsurface profile along the Local Access Road.

5.10.1 *Settlement and Stability*

Although an alignment profile was not available from which to base settlement and stability analyses, we do not expect that any special ground improvement would be required based on the borings performed in the area where the road would like be an embankment. The soils were primarily sandy clays and clayey sands, which would consolidate rather quickly. This assessment assumes no buried debris under the embankment. Quantifying the magnitude of settlement expected over a landfill or buried debris in general would require additional exploration and detailed analyses beyond the scope this preliminary analysis.

5.10.2 *Deep Foundations*

Figures 5-68 and 5-69 below present the estimated axial capacity for drilled shafts and driven, square PSC piles bearing in the Cooper marl. A top-of-marl elevation of -24 ft-NAVD 88 was used. Based on the subsurface profile, the "younger" marl deposit was encountered over the portion of the access road where deep foundations would be utilized. The young marl was encountered at an elevation of approximately - 18 ft-NAVD 88.



Figure 5-67. Local Access Road Ultimate Drilled Shaft Capacity vs. Tip Elevation

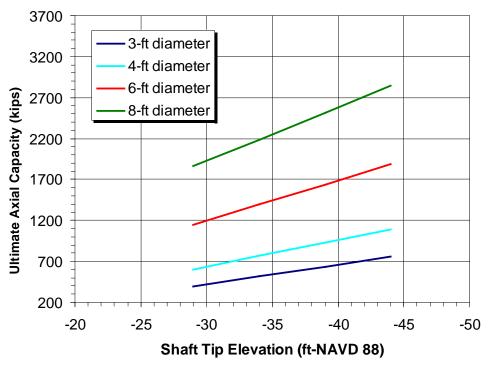
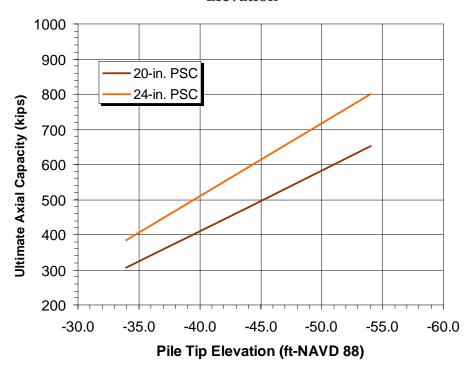


Figure 5-68. Local Access Road Ultimate Driven PSC Pile Capacity vs. Tip Elevation







5.11 Stromboli Avenue

A secondary road will turn off of the Local Access Road between the incinerator facility and the adjacent container storage yard. It will cross a set of abandoned railroad tracks, another container storage yard, and Meeting Street Extension before connecting with the existing Stromboli Avenue. The road will lead west along Stromboli Avenue and terminate at Spruill Avenue. Figure 4-11 shows the subsurface profile along the Stromboli Avenue alignment between Meeting Street Extension and the incinerator facility. A third container storage yard is located north of Stromboli Avenue. All three of these container yards are either known or suspected former landfills. We were not able to drill on the actual storage yards, but drilled just beyond their limits. Uncontrolled fill, debris and isolated organics were encountered in the borings drilled adjacent to the two easternmost container yards. Additional exploration would be necessary to confirm the presence or absence of buried debris in the portions of the alignment that cross theses container yards, and the presence of such buried debris would present a challenge to construction. We note that Figure 4-11 does not show buried debris or garbage because we were not able to drill in the suspected landfill areas.

5.11.1 Settlement and Stability

An alignment profile was not available from which to base settlement and stability analyses; however, the alignment as presently shown will cross at least two suspected former landfills. As discussed previously, quantifying the magnitude of settlement of a landfill with unknown contents and depth is extremely difficult. These areas will present a unique challenge to the final project designers and constructors.

5.12 Construction Considerations

5.12.1 Subgrade Preparation

Due to the presence of clayey surface soils in some areas, establishing positive site drainage before construction will be critical to site development. Prior to beginning mass clearing and grubbing, surface water in the proposed fill areas should be removed by establishing drainage prior to beginning site work. To the extent possible, heavy clearing equipment should not be allowed in saturated areas; such traffic will significantly increase the instability of these soils.

Preparation for fill placement should begin by clearing and grubbing. After clearing and stripping is complete, all areas at grade or to receive fill should be evaluated. Depending on conditions at the time of construction, the evaluation may include proofrolling with a heavily-loaded dump truck or similar heavy equipment to detect unstable/unsuitable areas. Unstable/unsuitable areas should either be repaired in-place or undercut.

5.12.2 Undercutting of Unsuitable Subgrade

As previously mentioned, some of the surface soils along the alignment are moisture sensitive. Moisture sensitive soils are very unstable once they become wet or if they are overexposed to construction traffic. It is difficult to predict the amount of undercutting that will be required since the soils at the subgrade level will be disturbed during site grubbing and will be disturbed to some degree by the roadway construction.



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We note that the extent of undercutting will depend heavily on climatic conditions during construction and, more importantly, the contractor's ability to properly maintain good site drainage and limit the disturbance of temporarily wet subgrades. During periods of heavy rainfall, the undercutting can be limited by maintaining adequate site drainage and prohibiting heavy, rubber-tired equipment from traveling on exposed, wet subgrade soils. The presence of contaminated soils may restrict undercutting or require special handling and disposal.

5.12.3 Subgrade Stabilization

In lieu of undercutting, it may also be appropriate to stabilize soft subgrade areas with used of crushed rock and/or geotextile. Also, depending on the degree of instability at the time of construction and the fill height necessary to achieve the design grade, it may be possible to "bridge" some areas of moderately weak subgrade soils with controlled fill. Bridging typically involves placement of a relatively thick layer (12 in. to 18 in.) of granular fill with a low ground-pressure bulldozer. The bulldozer stays on the top of the bridge lift, pushing the fill ahead of it, to avoid overstressing the underlying weak subgrade. Subsequent lifts of fill may then be placed and compacted in accordance with the controlled fill requirements.

Placing a geotextile between the subgrade and initial fill or bridge lift may also stabilize areas of weaker soils and may reduce the need for undercutting. Areas of significant instability may require some undercutting prior to placement of the stabilization geotextile and subsequent placement of controlled fill. Determination of whether to undercut, bridge, or use a geotextile is best determined by a qualified Geotechnical Engineer in the field at the time of construction. The former Navy Base is an area where geotextiles and bridge lifts will likely be necessary to create a stable working platform. Undercutting and proofrolling are not practical on such thick deposits of very soft soils.

Areas where unstable subgrades are likely to be encountered include, but are not limited to:

- Ramps A and G near the North Meeting Street exit
- Ramp B near the on-ramp from Spruill Avenue to I-26 eastbound
- Ramp C in the area of the bridge abutment embankment
- The Main Line near Shipyard Creek, if it is grade supported at that point
- The Main Line and the Tidewater Access Road east of Shipyard Creek
- The Local Access Road near Bainbridge Avenue

The areas noted above are where we encountered soft, wet subgrade soils during our exploration and are where embankments are presently planned. There are other areas along the alignment where unstable subgrade soils are present, but elevated structures are planned. If the distribution of elevated structure to embankment changes, then additional areas would come under consideration for subgrade stabilization.





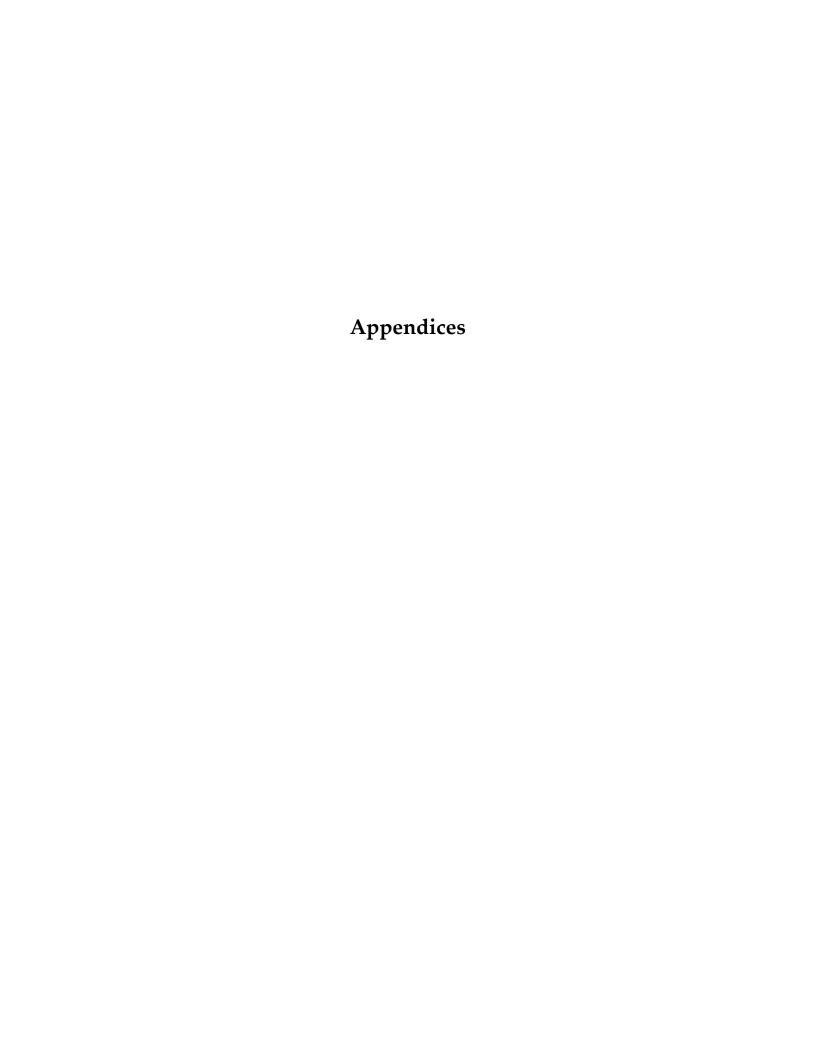
6.0 Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty (express or implied) is conferred.

The analyses and conclusions submitted in this report are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings may not become evident until construction and are not warranted. Due to the distance between each boring, subsurface conditions can be expected to vary from the conditions described herein and shown on the attached logs and cross-sectional profiles.

Boring and sounding penetration data and soil descriptions are included on the attached Boring and Sounding logs and Subsurface Profiles. The enclosed finished logs and profiles represent our interpretation of the contents of the field records based on the results of engineering examination and tests of field samples. Finished logs depict conditions at the specific boring locations at the particular time when drilled. For the purpose of illustration, conditions were interpolated between the borings on the subsurface profiles using reasonable engineering judgment.

The above presented engineering properties are S&ME's interpretation of the laboratory testing results. The geotechnical engineer of record for the project must review the laboratory testing results to develop his or her own interpretation of the testing result and application to the design stress levels and loadings. The above presented strength parameters are for the individual soil samples tested at the stress levels indicated on the laboratory test sheets.



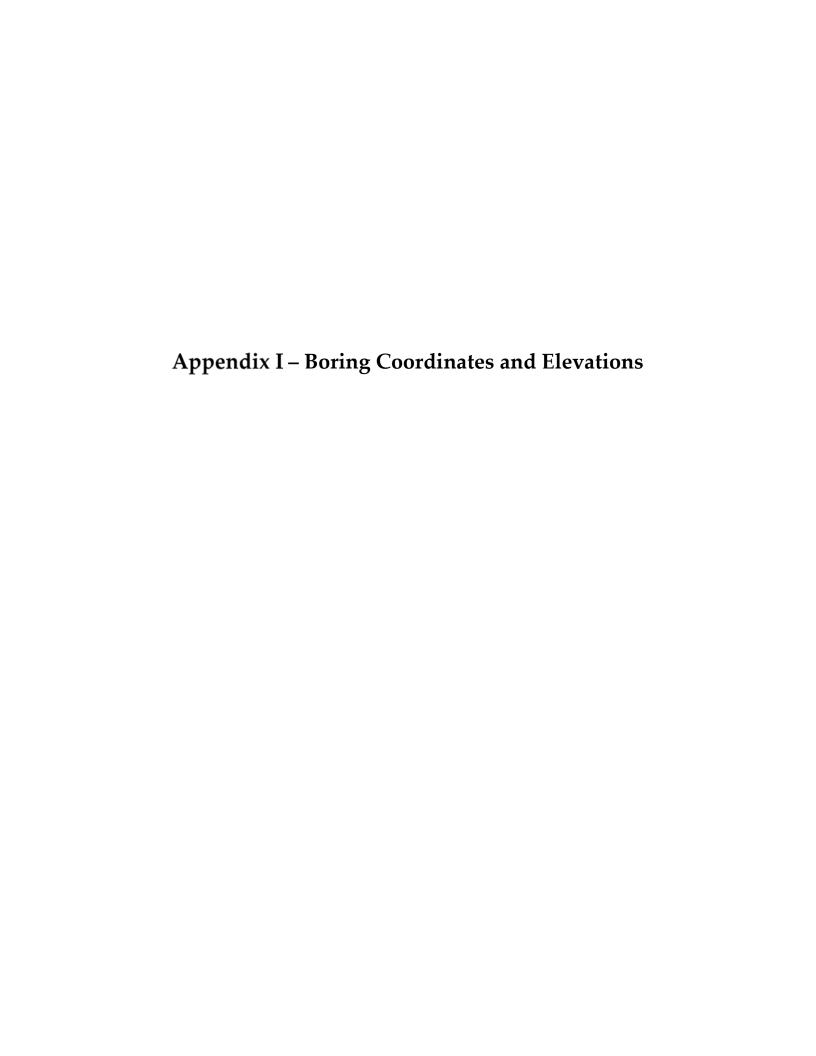


Table I-1. Boring Coordinates and Elevations

Table I-1: I-	26 Port Roa	d Access Bo	rings in La	t/Long and	State Plane
S&ME BORING ID	LAT (North)	LONG (West)	NORTH	EAST	ELEVATION (ft-NAVD 88)
B-01CPT	32.840334	79.967662	367978.9	2317051.2	12.6
B-02SPT	32.838441	79.965459	367297.0	2317734.6	6.5
B-03SPT	32.837647	79.964486	367011.0	2318036.4	6.7
B-04SPT	32.836928	79.962741	366754.9	2318574.8	6.0
B-05DMT	32.836891	79.962714	366741.6	2318583.2	5.0
B-06CPT	32.836681	79.962377	366666.2	2318687.4	8.6
B-07CPT	32.836077	79.961577	366449.0	2318935.3	10.9
B-08CPT	32.835301	79.960428	366170.2	2319291.1	10.3
B-10CPT	32.834032	79.959589	365711.1	2319553.5	7.8
B-11GEO	32.833599	79.958476	365556.9	2319896.9	8.5
B-12SCPT	32.833586	79.958457	365552.5	2319902.9	8.2
B-13CPT	32.833796	79.957743	365631.1	2320121.2	8.8
B-14SPT	32.833867	79.957274	365658.2	2320265.0	12.6
B-15CPT	32.834548	79.956464	365908.4	2320511.2	11.3
B-16SPT	32.834406		365857.6	2320586.9	10.9
B-17SCPT	32.834292	79.956040	365816.9	2320642.7	10.8
B-18SPT	32.834962	79.954958	366063.8	2320972.4	8.9
B-19SPT	32.834947	79.954469	366059.8	2321122.7	10.5
B-20SPT ALT1	32.835504	79.953796	366264.5	2321327.2	12.7
B-21SPT ALT1	32.836079		366476.8	2321603.2	12.5
B-22SCPT	32.838328		367294.4	2321568.0	11.9
B-23SPT ALT1	32.838330	79.952996	367295.2	2321562.6	11.9
B-24DMT	32.838324	79.953015	367292.8	2321556.7	11.9
B-26DMT ALT1	32.835417	79.953739	366233.2	2321345.2	13.0
B-27SPT	32.839965	79.954075	367886.6	2321225.3	11.6
B-28SPT ALT1	32.834594	79.955548	365928.0	2320792.4	7.1
B-29SPT ALT 1	32.842517	79.950563	368826.0	2322294.3	-4.5
B-31SPT	32.842866	79.949465	368956.5	2322630.2	2.8
B-32DMT	32.842993	79.949117	369003.5	2322736.5	3.7
B-33SPT	32.842972	79.949128	368996.1	2322730.3	3.8
B-34SCPT	32.843438	79.948060	369169.0	2323059.7	4.3
B-37SPT	32.842321	79.950207	368755.7	2322404.3	-4.5
B-38CPT	32.842467		368810.5	2322561.9	1.6
B-39SPT	32.842202		368717.0	2322845.8	2.5
B-40CPT	32.841980		368638.7	2323090.1	2.3
B-42SPT ALT 1	32.843023		369004.5	2321753.7	-4.5
B-43SPT ALT 1	32.843996		369354.3	2321317.9	9.1
B-43SPT ALT 2	32.843420		369147.4	2321517.9	-4.5
B-44SCPT	32.844947	79.953772	369699.9	2321009.2	8.3
B-45DMT	32.845567	79.953772	369925.4	2321299.6	 0.3 11.2
B-46SPT	32.845572	79.953840	369925.4	2321276.7	11.2
			370706.1	2321272.2	11.6
B-47SPT	32.847721	79.954719			2.8
B-48CPT	32.849066	79.955477	371193.3	2320761.2	
B-49CPT	32.842451	79.964270	368759.5	2318085.2	15.2
B-50SPT	32.843816		369264.3	2318906.4	9.4
B-51CPT	32.845086		369733.6	2319627.5	7.4
B-51SPT ALT2	32.845129		369754.9	2320190.4	6.9
B-52SPT	32.845455	79.955530	369879.2	2320758.0	16.2

Table I-1 Continued: I-26 Port Road Access Borings in Lat/Long and State Plane **S&ME BORING ELEVATION** LAT (North) LONG (West) **NORTH EAST** (ft-NAVD 88) B-53SPT 32.840771 79.967309 368139.2 2317158.0 13.1 32.838890 79.965152 367461.5 2317827.2 B-54CPT 12.4 B-55SPT 32.838388 79.964332 367281.2 2318080.8 11.9 B-56CPT 32.837441 79.962355 366942.7 2318691.4 9.8 B-57SPT 32.837229 79.961718 366867.7 2318887.8 10.1 B-57SPU 32.837248 79.961723 366874.5 2318886.4 9.7 B-58SPT 32.837245 79.961091 366875.4 2319080.4 14.3 B-59CPT 32.836866 79.961633 366735.9 2318915.3 13.1 B-60SCPT 79.961155 366609.3 2319063.5 13.6 32.836514 B-61CPT 32.835896 79.960432 366386.8 2319287.8 12.5 B-62CPT 32.835147 79.959541 366117.0 2319564.0 11.6 B-63SPT 32.834698 79.958336 365957.5 2319936.0 10.0 B-64CPT 32.834470 79.957609 365876.8 2320160.0 11.4 B-65SPT 32.829776 79.955199 364176.4 2320917.5 8.4 B-66SPT 32.832233 79.956501 365066.1 2320508.7 2.3 B-67SCPT 32.831033 79.955904 364631.5 2320696.3 7.7 B-68SPT ALT1 32.833011 79.956843 365348.4 2320400.7 6.8 B-69CPT 32.828555 79.955149 363732.4 2320937.5 7.9 B-70DMT 32.830574 79.956331 364463.3 2320566.9 4.5 B-71CPT 32.830651 79.956387 364491.0 2320549.4 4.0 B-72SPT 32.831000 79.956606 364617.4 2320480.7 4.3 B-73CPT ALT1 32.831791 79.957274 364903.1 2320272.7 4.0 B-74SPT 32.832559 79.957759 365180.8 2320120.8 4.9 2319421.8 15.2 B-75SPT 32.837054 79.959982 366809.5 B-76SPT 32.837176 79.963382 366843.1 2318377.0 14.3 B-77CPT 32.837882 79.953696 367130.0 2321349.3 10.9 369541.2 B-78 32.844567 79.960373 2319274.0 8.1 B-79 32.843106 79.962994 369001.9 2318474.6 11.7 C\L CREEK* 32.842365 79.949605 368773.6 2322589.0 -4.6 -4.4 C\L CREEK1* 32.842721 79.950889 368899.1 2322193.4

^{*}C\L CREEK and C\L CREEK1 are centerline of Shipyard Creek channel. Horizontal Datum is NAD 83.

Appendix II – Boring and Sounding Records

SPT Boring Logs
SPT Boring Procedures
SPT Energy Measurements Data Sheets
SPT Boring Grout Logs
Table II-1: Bulk and Undisturbed Sample Locations and Depths

Cone Penetrometer Test (CPT) Sounding Logs
CPT Sounding Procedures
CPT Correlations and Robertson Classification Legend

Marchetti Dilatometer Test (DMT) Sounding Logs
DMT Correlations

CPT Pore Pressure Dissipation Test Data

Vane Shear Test Data

SCPT Shear Wave Velocity Test Data MASW and MAM Data

Geophysical Test Data from 800 ft deep Boring B-11GEO
Suspension Logging Procedures and Literature
Stratigraphic Interpretation of Geological Formations Observed in Borehole (B-11)
Resonant Column/Torsional Shear (RCTS) Test Results





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SS - Split Spoon NQ - Rock Core, 1-7/8"
ST - Shelby Tube CU - Cuttings
AWG - Rock Core, 1-1/8" CT - Continuous Tube

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing RW - Rotary Wash RC - Rock Core



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-18.5	26.0 <u> </u>	3" X 30" FIX	ED PI	STON S	SAMP	LE			26.0	ST					X		<u> </u>	
-23.5	=	PUSHED 24	" WITI	H 10" R	ECO\				=									
3	=	WASH ROTA	ARY T	O 38 FI	EET				=									
-28.5	=								-					:				
-33.5	38.0 <u>+</u> 40.0 <u>+</u>	3" X 30" FIX							38.0	ST					×			X
-55.5	\exists	PUSHED 24												:				
-38.5	=	BORING	IEKN	IIINA I E	υAI	40 FEE	1.		=						1 1			
=	=								=									
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= = =	∄								=					:				
-53.5	=								=					- :				
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-58.5 <u> </u>	=								=					:				
-63.5]								=					:	1 1	<u> </u>	<u> </u>	
]]								=									
-68.5	\exists								=									_
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-78.5	=								=						1 1			
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-83.5 -	=								Ξ					:				
-88.5]								=									
3	3								=									
								LF	GEND					<u> </u>			<u> </u>	
		SAI	MPLEF	RTYPE							<u> </u>	D	RILLIN	IG ME				
SS - S ST - S	Split Spoo Shelby Tu	on		NQ - R CU - C		ore, 1-7	//8"				w Stem Ai nuous Flig				V - Rota C - Rock			



File No).224B			No. (113	1-08-55	04 C 0	unty:		CHA	KLES	STON			/Geo		BOLLI	ΕR
Site De			POR															Rout			
3oring		B-03	SPT B		ing L								ffset:					nmei			
lev.:			Latitu				3764		Longi			9.9	64486	3		Start			10/1		
Total D		34 ft			l Dep		ff			ore D			ft			Com				/2008	
		meter	. ,	4					figurat				Requ			$\overline{}$			Used		(1
	achine:	: CM	E-850	_	Drill				D ROT	ARY				_			Er			73%	
Core Si	ize:				Drille	er:	SC				Grou	nd	water	: TO	В	2 ft		24	HR	N/A	
												\top						• CDT	N VALU	IE 📤	
E	Ę.								:은 _	<u>ء</u> ۾	le de	3			l e		PL ×	•	MC	$\overset{LL}{ o}$	
Elevation (ft)	Depth (ft)	N	MATER	IAL	DES	CRIP	TION	1	Graphic Log	Sample Depth	Sample No /Type	-	<u>"</u>	o _	N Value		A F	INES	CONTE	NT (%)	
ă	0.0								ပ်	S L	N Z	=	1st 6"	3rd 6"	Z	0 10				70 80	9
=		<u></u> WASH	ROTAR	Y TC	28.5	FEET					=					:	:	: :	: :	: :	
1.5	∃										=					:	÷	1 1	: :	: :	
											\exists										
-3.5]										=						- :	: :	:	: :	
=	=										\exists						:	1 1			
-8.5											=					i	:	1 1	<u> </u>	<u>: :</u> :	
=]										=						:	: :			
-13.5]										=						:	1 1		: :	
10 =	=]						:	1 1			
-18.5	30.5										=						:			- i i	
-23.5	28.5 – 30.0 –	VANE	INSERT	ED T	OAD	EPTH	OF 3	0		1	=						:			: :	
20.0	32.5	FEET							<i></i> /	_	=						:				
-28.5	34.0	WASH	ROTAR	Y TC	32.5	FEET			<u>/</u>		=						:	1 1	1 1	: :	
=	=		INSERT	ED T	OAD	EPTH	OF 3	4			=						:				
-33.5	=	FEET]		=						-:-	1 1	1 1	: :	
	=										=						:				
-38.5	╡										=						:	: :		: :	
-43.5											=						<u>:</u>				
- -3.5 <u>-</u> -											=					1	:	1 1			
-48.5]							<u> </u>		: :	
= = =	=										=						:				
-53.5	=										=					1	- :	: :	- : :	: :	
\exists											=						i	1 1			
-58.5]										=						:				
-63.5	=										=						<u>:</u>	<u> </u>	<u>i</u>		
-00.0	=										=					1	:				
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-03.5]										=					1	:	1			
-88.5	=										=						- :				
30.0											=					:	:				
-	-									CENT	<u> </u>					1 :		1 1	<u> </u>	<u>: </u>	
			SAMP	LER	TYPF				LE	GENI	J			Г	RILI	NG ME	THO	D			_
SS - S ST - S	Split Spo Shelby T	on	2. a	1	NQ - R			-7/8"			SA - Ho			Auger		R	.W -	Rotary Rock (
JI - 3	Dook Co	ube e, 1-1/8"			CU - C CT - C			ube		DO	A - Co Dri	vino	นบนธ F เ Casin	u u	uyers	K		I VUUK (JUI C		



File No).224B		ect No.	<u> </u>		31-08-	554	Cou	nty:	CH	ARLE	STO	N	En	g./Ge		M.	EICH	ELBE
Site De				ACCES			1				> 664	L .					ute:			
Boring		B-04 S		Boring I				!41			Offset		D-	. 01		lignm		2/00	0000	
	6.0 ft		atitud		32.83	-		gitud			9627	41	_	te Sta					2009	
Total D		120 ft		Soil Dep	_	ft		Core			ft					eted:			2009	
		meter (i		3		ler Co					er Red				<u>N</u>		er U			N
Drill Ma		. CME	-550X		Metho		JD RO	JIAK	-							Energ				
Core Si	ıze:			Drill	er:	S&ME			G	roun	uwate	#F. I	UB	N/A	١		24HI	T	4.5 f	ι
																• SF	PT N \	/ALU	E ●	
ition)	oth (hic	g	ui (ple ype			1	9 0		PL ×	M(X	
Elevation (ft)	o Depth O (ff)			AL DES		ION	Graphic		(ff)	Sample No./Type	1st 6"	2nd 6"	ল ∣	N value		▲ FINE 0 30 4				90
=	2.0	1							0.0	SS SS	0 WOHV	2		3 🕦	A	0	: :	:	: :	
1.0	6.0	medium trace org	dense,	dark gray	ish brow	n, fine;			2.0 - 4.0 -	SS	WOH	1	•	2				- :		
	8.0	1	•				⊿[井	(6.0	SS	3		3	<u>_</u> •				:		
-4.0		SANDY							8.0	SS	2	2	2 4	4	: :		1 1	- :		- : :
-9.0	13.5	saturate	d; with c					1:	3.5	SS	WOHV	VOHW	ОН () •		XX		Q	<u> </u>	
=]]	11		Y SAND	(SP-SM)	i		1 18	8.5	00		0						:		
-14.0]]	loose, gr	ay, fine	<u> </u>					7	SS	1	2	1 3	3	: :		: :	:	<u>: :</u>	- : :
]]	SILTY S	AND (S	<u>M)</u>				2	3.5	SS	WOH	1	2 :	3						
-19.0				sh gray, fi	ne; with	marsh		28	8.5		WOH			3						
-24.0		SANDY	SILT (M	<u></u>														:		
-29.0	20.5		, bluish	gray, fine	e; with sh	iell			3.5	SS	WOH	1	1 2	2		X			<u>(0</u>	A
-34.0	38.5			SILT (ML)			1 3	8.5	SS	2	3	3 (3 •)					
-				, fine, cal				<u> </u>	3.5 -											
-39.0		, 0111	- 5.0011	,, oui	-a. 0000			"	J.J	SS	2	3 4	4	7			<u> </u>			
								. 48	8.5 -											
-44.0								-l: ``	- ‡	SS	2	3 4	4	7): : : : : : : : : : : : : : : : : : :	:	<u> </u>		<u> </u>	- : :
=								. - 5	3.5											
-49.0]]	stiff						-[:]	1	SS	8	4	5 9	9 (: :	:	- : :	: :
=		£						. 58	8.5	SS	3	3 4	4	,				:		
-54.0		firm							+	৩৩	<u> </u>	<u> </u>	+					- :	: :	
50.0							$ \cdot $:	6	3.5	SS	2	2	3 !	5				:		
-59.0											<u> </u>		Ť ,					:		: :
-64.0								. . 68	8.5	SS	2	3	3 (5 •) :		<u> </u>	:	<u>: :</u>	: :
-UT.U]] =							7	3.5									:		
-69.0]]							·[:] '	J.J	SS	2	3	3 (5 •)		X) <u>:</u>	<u> </u>	
								7	8.5 -									:		
-74.0								·[.] '`	~.~ <u>}</u>	SS	3	3 4	4	7			: :	- :		- : :
=]							- ₈ ;	3.5									:		
-79.0									1	SS	3	4	3	7			: :	- :		- :
=								8	8.5				\perp	\sqcup				:		
-84.0]]							-[:]	1	SS	2	3	3 (6): :		: :	:	: :	: :
=							$ \cdot $	[9	3.5	00		6	_ _					:		
-89.0		stiff						- :	7	SS	5	6	5 1	1			: :	- :		
=							$ \cdot $	[98	8.5	SS	2	3 4	4							
							<u> </u>	EGE	ND	<u> </u>		<u></u>	-		y		Contin	านคา	l Next	Page
			SAMPL	ER TYPE									DRIL	LING I		HOD				90
ST - S	Split Spo Shelby T			NQ - F CU - (Rock Core Cuttings Continuo				CFA	HolloContDrivit	inuous	Flight	er		RW	- Rota - Roc				



				II I es																			
File No			224B				(PIN):		1131	-08-5	54 Co	unty:	CH	IARI	_ES	ΓΟΝ		Eng	g./Ge		M.	EICH	ELBE
Site De		_					SRC					1			-				Ro				
3oring			B-04				ocati						Offse						gnm				
Elev.:				Latitu				3692		Longi			.9627	741		Date						/2009	
Total D			120			il Dep		ft			ore De	<u> </u>	ft						ted:			/2009	
Bore H			_		3					igurat			er Re			Y				er U			N
Drill Ma Core S		ie:	CIVII	E-550)	^	Drill	Meth		⊥МЕ МЕ	D ROI		Hamm Groun		_			N/A			ју Ка 24НІ		80% 4.5 ft	
core 3	ize.					Drill	er.	30	UVI⊏			Groun	uwai	ler.	IUE)	IN/A		1	24 111	Τ.	4.5 11	
																			• SF	PT N \	/ALL	JE •	
_												4							기	М	Ω.	11	
Elevation (ft)	Depth (ft)			, , , , , , , , , , , , , , , , , , , 		DEC		TION		phic	Sample Depth	Sample No./Type		_	_	N Value			Р <u>.</u> Ж—	 ——⊖		—X	
Elev.	De		IV	1ATEF	KIAL	DES	CRIP	HON	1	Gra	San De	San Vo./	1st 6"	2nd 6"	.g p	> Z		A	FINE	s co	NTE	NT (%)	
ш		╁								<u> </u>			100	2	3		0 10	0 20	30 4	40 50	60	70 80	90
=	-	\exists									103.5		ļ	F 4 /0		0							
-99.0		-	ver	y hard								SS	8	54/3		0		- :			-	-	
104.0		╡.	firm	1							108.5	SS	1	2	3	5	•	:					
-104.0	1]	1	•							113.5							-	:				-
-109.0	-	∄ -	stiff	F							113.3	SS	WOH	l 3	9	12		•					
=		F									118.5		<u> </u>] :						
-114.0	120.0	' }-	har	d						/ 	1	SS	31	17	19	36	+ :	- :	•	<u> </u>	- :	- :	
4400	1	=																:	:		:		
-119.0	1	=	BOR	ING TE	RMI	NATE	D AT 1	20 FE	ET.									-					
-124.0	1	=										1											
- ···• -	1	=										1											
-129.0	1	#															-	- :		<u>: :</u>	- :	- : :	
		=																					
-134.0		=																:					:
-139.0		=																	- :				
-	1	=										1						:			:		
-144.0	1	=															-:	:	:	1 1	:	: :	:
. =	1	#										1						:	:		:		:
-149.0	1	#										=						:			:		:
-154.0	1	=										=							:				- :
	1	#																:			:		
-159.0	1	=										=					-	- :	:	1 1	- :	- : :	- :
. =	1	=																:	:		:		:
-164.0	1	#										1						:			:		:
-169.0-	1	#																:	:		- :		- :
-	1	=																:	:				
-174.0	1	=																:	:	: :	:	- : :	- :
	1	=										=						:	:		:		:
-179.0	1	=																- :	:		:		:
-184.0 <i>-</i>	1	#										1							:			: :	:
	1	#										1						:			:		:
-189.0	1	=										1					1	:			- :	- : :	- :
=	1	=															:	:	:		:		:
											GENE	<u> </u> 	1				1 :			<u>. :</u>	:	. :	-
				SAMF	PLER	TYPE									DF	RILLIN	NG M	IETH	OD				
SS - S ST - S	Split Sp Shelby	poon Tuh	ı e			NQ - F	Rock Co Cuttings		7/8"			A - Hollo A - Cont			ger		- 1	RW	- Rota - Rocl				
AWG - I	Rock C	Core,	1-1/8"			<u>CT - C</u>	Continu	ous Tu	ube			- Drivi				,			001				

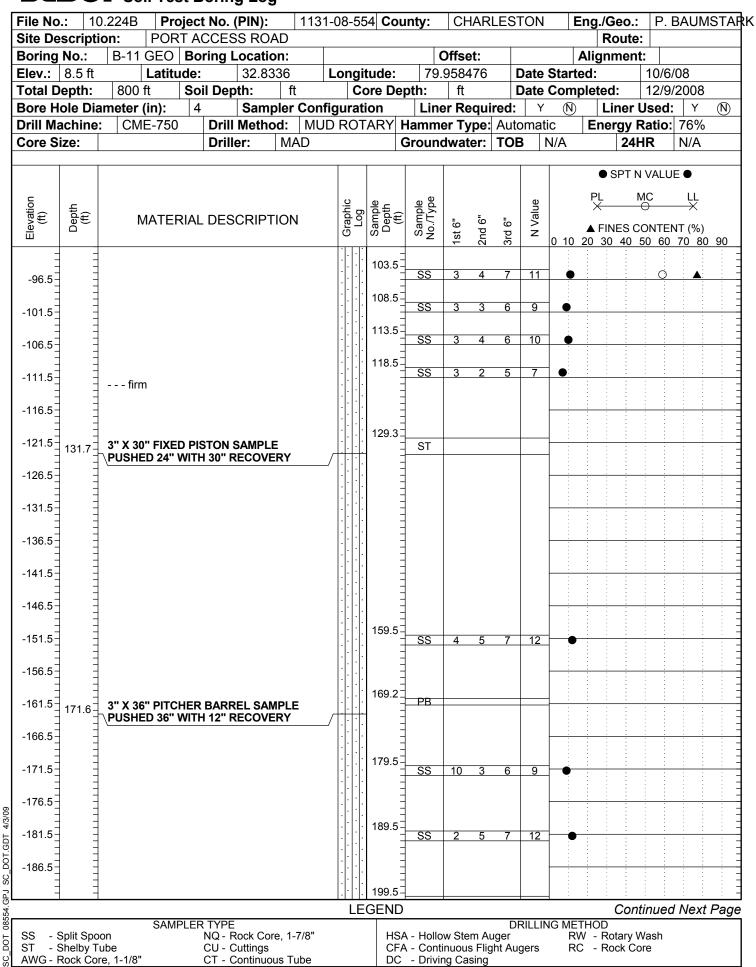


File No.		2 Soil Test B 0.224B Project	t No. (PIN):		131-08-	554 Co	unty:	CHAF	RLES	TON	E	ng./Geo.:	R. I	BOLLI	ER
Site Des	scription	on: PORT A	CCESS RC)AD								Route	:		
Boring	No.:	B-09 SPT Bo	ring Locati	on:			(Offset:				Alignmen	t:		
Elev.:	ft	Latitude:	32.8	3453	Long	itude:	79.	960182		Date	Starte	ed:	7/28/	09	
Total De	epth:	120 ft So	il Depth:	ft		ore De	epth:	ft		Date	Comp	oleted:	7/28/	2009	
		meter (in):		pler Co	nfigura	tion	Line	er Requi		Y	(N)	Liner	Used:	Υ	(N)
Drill Ma		D-50	Drill Meth					er Type:		omat	ic	Energy F	Ratio:	60%	
Core Siz			Driller:	S&M				dwater:	TO			24		N/A	
	I								1			I			
												● SPT N	N VALUI	E●	
Elevation (ft)	Depth (ft)	MATERIAL	. DESCRIP	TION	Graphic	Sample Depth	Sample No./Type	9		N Value		, ,	MC ⊖	X	
Ше	0.0							1st 6" 2nd 6"	3rd 6"		0 10	▲ FINES C 20 30 40			90
	0.2	ORGANIC LADEN FILL: GYPSUM/SII			<u> </u>	0.0 2.5		6 5	3	8	•				:
	5.0	loose, white to brow	-			5.0	SS	4 2	2	4	•				:
	=	\ very loose, ligh	nt brownish gr	ay		7.5	- SS	2 3	4	7	•				
	10.0	FILL: SANDY SILT			$\overline{}$	10.0	SS	3 2	2	4	•				
	10.0	firm, light brownish	•			10.0	SS	4 4	4	8	•				
	13.5	soft, brownish			/_₩	13.5					<u> </u>				
	-	FILL: GYPSUM/SII	•				SS -	3 5	3	8	•				
	18.5	SILTY SAND (SM)				18.5									:
	-	loose, blackish bro cemented pieces	wn, fine; trace	e of			- SS -	3 2	2	4					
	23.5	SLIGHTLY SILTY	•	<u>/I)</u>		23.5	SS	WO	H	0 (
	=	very loose, gray, fir	ne		<i>─\ []]</i>		+ 33								:
	=	CLAY (CL) very soft, greenish	blue; trace of	sand		28.5	ss	WO	<u>—</u>	0 (
	=														
	33.5	CLAYEY SILT (MH	IN.			33.5	SS	14/0		0.0					
	4	•	_	oo of oo			- 55	WO	Н	0 '		: : :	: :	: :	:
	7	very soft, dark gree	eriisii biue, ira	ice oi sa	iu //	200 5	-				:				
]					38.5	SS	WO	Н	0					:
	=						-								
						43.5	SS	WO	Н	0					
	_						_				:				:
	=					48.5	SS	WO	H	0					
	=						1								
]					53.5	ss	WO	ш	0 (
	=						- 33	****							
	58.5	OIT! V 0 117 107				58.5									
]	SITLY SAND (SM) loose, light greenis					SS	2 4	5	9	•				
	-		2. 2,			63.5									
	-	greenish brow	n				SS	2 3	3	6	•	<u> </u>	<u> </u>		:
		-	T (F =		L	EGENI)			<u></u>			tinued	Next	Pag
ST - S	Split Spo Shelby Tu Rock Cor	SAMPLEF on ube e, 1-1/8"	R TYPE NQ - Rock Co CU - Cuttings CT - Continuo	;		CF	A - Cont	w Stem A inuous Fli ng Casing	uger			THOD W - Rotary \ C - Rock Co			

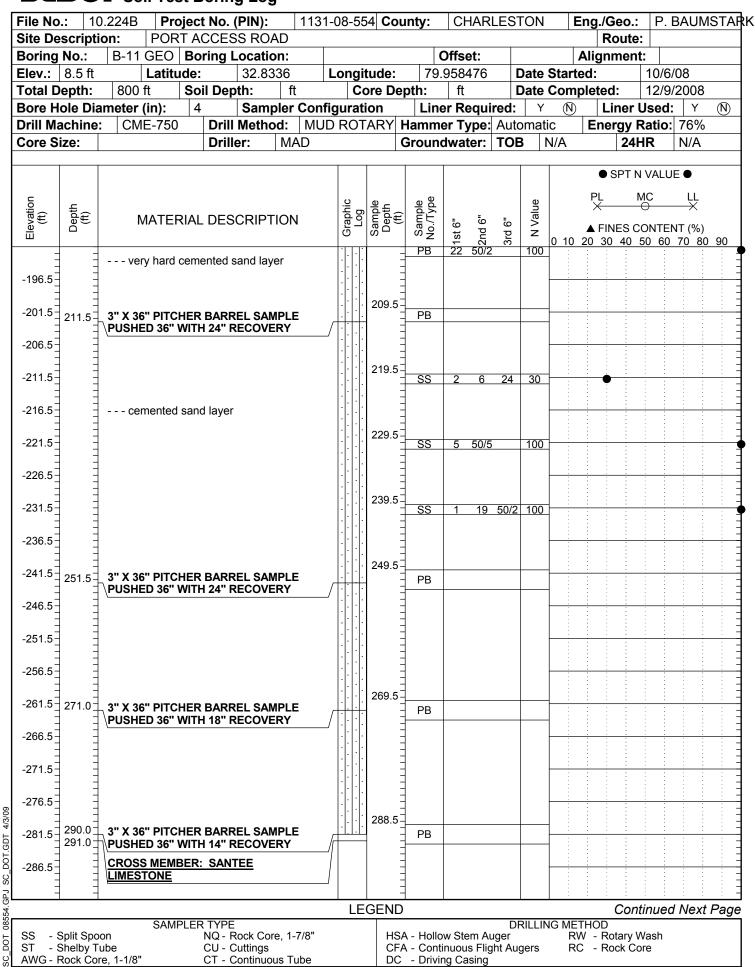


File No Site De		0.224B			No. (F	ROA		ııJl	-08-55) 4 C 0	unty:	01	HARL	. <u>_</u> _3	ION		Eng./G	eo.: oute:	г. D <i>F</i>	NUMSTA
Boring		B-11 G						\neg			1,	Offs	ot:				 Alignn		_	
Elev.:			.atitu			32.833			Longi	tudo:		.9584		٠,	Date				 10/6/08	2
Total D		800 ft			Dept		ft			ore De		ft	770				pleted:		12/9/20	
		ameter (ii		4		Samp		:onfi			•	_	equir	_	Y	(N)	• -	ner U		Y (N)
Orill Ma						Metho					Hamm					$\overline{}$			atio: 7	
Core Si					Drille		MAL				Groun		-	TOE		√A		24HI		I/A
				!													·			
																	● S	PT N \	/ALUE	•
5									l _o	d)	0.0				ω.		ΡĻ	MO	2	LL ×
/atic	epth (ft)	MA	ATFR	ΙΔΙ	DESC	RIPTI	ION		Graphic Log	Sample Depth	a de F	_	<u>.</u> .	=_	N Value		X-)———	- ×
Elevation (ft)		1417	\	1/\L	DLOC	/I XII I I	1011		Gra	Sal De	Sample No./Type	1st 6"	2nd 6"	3rd 6"	z	0 40			NTENT	
	0.0	ORGANI	C LAD	EN T	OPSO	IL= 3 IN	NCHE	S	/	0.0	_	2	3	<u>က</u> 5	8	0 10	20 30	40 50	: :	0 80 90
	2.0	SLIGHTL								2.0	- SS	1	1	1	2	•				
3.5	4.0 <u>-</u> 6.5 -	loose, gra								4.0 6.0		WOF	1 1 1	2	3					
1 =	8.0-	organics	,		,	,				8.0	SS	1	2	1	3	•	XX	: :	: :	: :
-1.5 -	Ξ	SLIGHTL	Y CLA	YEY	SAND	(SP-S	C)			10.0 12.0		_	WOH		0 (
-6.5	14.5	very loos						ace		14.0		MOF	<u>1</u> 1 1	<u>1</u> 1	2					
	=	organics								16.0	SS		WOH		0 (•				
-11.5	=	CLAYEY	SAND	(SC)					18.0 20.0		WOH	WOH	<u>1</u> 1	1 (<u> </u>	-X :	A O
3	Ξ	very loos				ı, fine; v	with d	ebris		22.0	- 55		ı ı IWOH		1 (5	/		7 : :	
-16.5	Ξ	SLIGHTL	V CI A	VEV	CANI	(SD S	C)			24.0 26.0	SS	WOH	HOW	1	1 (: :	1 1	: :	: :
=	Ξ	vey loose				/ (SF - 30	<u>0)</u>			28.0	98		HOW WOH	1	0					
-21.5	=									30.0 32.0			WOH	1				X	X	A (
	=	SILTY SA				c.				34.0	<u> </u>	WOH		1	2	•		: :		: :
-26.5	=	very loos	e, gray	y and	browr	i, fine				36.0			HOW!		1 (
-31.5	=	gray								38.0 40.0	- SS	WOH	₩OH		1 (<u> </u>				
-31.5	=	SILTY CI								42.0		WOH		3	6	•				
-36.5	46.0	very soft,	gray;	with	trace fi	ne sand	d			44.0 46.0		WOH	<u>l 1</u> lWOH	<u>1</u>	2	•				
ΞΞ	-	no sa								48.0	SS	WOH	1 2	3	5	•				
-41.5	=	with		-						50.0 52.0	_	4	<u>5</u>	7	12 6	•	1 1	- :	- : :	<u> </u>
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-46.5	=	with		-	ICS					56.0	- SS	7	9	0	9	•		1 1	: :	
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-56.5	Ξ	cooper soft, olive			ANDT	OIL I (IVIL	<u>L)</u>			63.5	SS	3	4	4	8	•				
-30.5	=		gieei	'						68.5	=									
-61.5	=	stiff firm								00.5	SS	3	2	3	5	•	<u> </u>	1 1	: :	<u> </u>
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			SAMPI	I FP	TYPE				LE	GEN	J			יח	RILLIN	G ME	THOD	ontirر	nued N	lext Pag
	Split Spo	on	JAIVIP I	N	NQ - Ro	ck Core	e, 1-7/	/8"			SA - Hollo			ger		R\	W - Rot			
	Shelby T	ube re, 1-1/8"			CU - Cu	ıttings Intinuou	ie Tub	۰		CF	A - Cont - Drivi	inuou	is Fligh	nt Au	gers	R	C - Roo	ck Core	Э	











Site Description: PORT ACCESS ROAD Route: Boring No.: B-11 GEO Boring Location: Offset: Alignment: Elev.: 8.5 ft Latitude: 32.8336 Longitude: 79.958476 Date Started: 10/6/08 Total Depth: 800 ft Soil Depth: ft Core Depth: ft Date Completed: 12/9/2008	File No	o.: 10).224B	Proiec	t No. (P	IN):	113	1-08-5	554 C c	ount	ty:	СН	IARL	_ES1	ON		En	g./Ge	90.:	P. 1	BAUN	1STA
Boring No. B-11 GEO Boring Location: Offset: Alignment:									1		, -	1										
Second S												Offse	et:				Al	ignn	nent:			
State Post State Sampler Configuration Configurat	lev.:	8.5 ft		Latitude:	: 3	32.833	6	Long	jitude:		79.	9584	76		ate	Sta	rted	l:		10/6	/08	
Drill Machine: CME-750 Drill Method: MUD ROTARY Hammer Type: Automatic TOB N/A 24HR N/A		-								ept					ate							
Some Size: Driller: MAD Groundwater: TOB N/A 24HR N/A				•												_						N
## A FINES CONTENT (%) 301.5 311.5 321.5 331.5			: CME	E-750				JD RO	TARY	_			-				E	Ener				
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MATERIAL DESCRIPTION																		• s	PT N \	/ALU	E●	
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CHICORA MEMBER: BLACK MINGO GROUP 331.5 -336.5 -341.5 -346.5 -356.5 -366.5 -377.0 -371.5 -376.5	-321.5 <u>-</u>								7	1	PB						:			:		-
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LEGEND Continued Next Po								L										(Conti	nuec	Nex	Page
SAMPLER TYPE DRILLING METHOD SS - Split Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Wash	SS - 9	Snlit Sno	on	SAMPLE	R TYPE	rk Core	1_7/8"		Ц	SA -	Hollo	w Sta	m Aıı		RILLIN				ary \//	ash		
ST - Shelby Tube CU - Cuttings CFA - Continuous Flight Augers RC - Rock Core AWG - Rock Core, 1-1/8" CT - Continuous Tube DC - Driving Casing	ST - 9	Shelby T	ube		CU - Cut	tings			C	FA -	Conti	nuous	s Fligi	ht Aug	gers							



File No		0.224			ct No.			1131	1-08-5	554 C	oun	ty:	CH	IARL	ES	ION	E	Eng./G			BAUM	ISTA
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ST - S	Shelby Tul Rock Core	oe		CU - C CT - C	uttings					CF	A - Cor A - Cor : - Dri\	itinuou	ıs Flig	jht Au	gers			ock Cor			



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	Split Spoo Shelby Tu	n	SAMPLE		ock Core	e, 1-7/8	"	LC	HS	SA - Hollo SA - Cont	ow Ste	m Auge	r				tary W	ash	IVEXL	r-a <u>y</u>



		5 0																							
File No.		0.224B					(PIN)			31-(08-55	64 Cc	oun	ty:	CH	IARI	LES	TON		En		90.:	P.	BAUN	1STAF
Site De							SS R			1										-		ute:	<u>L</u>		
Boring						ing l	Locat			ļ.					Offse							nent:			
Elev.:				atitud		_		3336		L		tude:			9584	176		Date					10/6		
Total D		800			Soil 4	nek			ft • Cor	. . : -		ore D	ept		ft			Date Y			_			/2008	
Bore Ho Drill Ma): 750		Deill	Meti		r Cor			ARY	Цa		er Re							ner U		: Y : 76%	N
Core Si		i. Civ	/1 🗀 - /	750	_	Drill			AD	טט	KOI	ANI		ound			TO		N/A		_1161	24H		N/A	
0016 01	126.					J	GI.	101					<u> </u>	ound	awat	CI.	10	ا ر				Z 7 111		14//	
																					• s	PT N '		JE •	
Elevation (ft)	Depth (ft)		MA	TER	IAL I	DES	CRIF	PTIO	N		aphic Log	Sample Depth	E E	Sample No./Type	 	9	9	N Value			PL ×—	- M			
— Ele											ַ פֿ <u>ַ</u>	S		ÿ 8 ——	1st 6"	2nd 6"	3rd 6"	z	0 1					NT (%) 70 80	
-796.5	-	BO	RIN	IG TF	RMIN	VATE	D AT	300 FI	FFT														:		
-801.5	-																								
-806.5	- - - -																						:		
-811.5	- - - -												1										:		
-816.5	- - -																						:		
-821.5	-																								
-826.5	- - - -																						:		
-831.5																							:		-
-836.5	-																						- :		
-841.5	- - -																				:		:		
-846.5	- - - -																						:		-
-851.5	- - -																				:		:		
-856.5	=																						:		
-861.5	- - -																				:		:		
-866.5	- - -																				-				
-871.5	=======================================																						:		
-876.5	=																						:		
-881.5	= = = =												1										:		
-886.5	=======================================																						:		
=		1											7							: :	:		:		

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing



File No		.224B	Proje					31-0	J8-55	04 CO	unty:	CI	TAK	LEST	ON		∟ ng	./Ge		M. I	EICH	ELBE
	scription		PORT															Rou		_		
Boring		B-14 S		Borin				+-		4		Offs			\ - 4	04		gnm		10.4.1	0000	
Elev.:	12.5 ft		atitud			32.83	_	L		tude:		.957			ate						2009	
Total D		120 ft		Soil D			ft	c :		ore Do	•	ft			ate				_		2009	•
	וסופ טומ achine:	meter (i		3		samp letho	ler Co				Hamn	er R			Y	<u>N</u>			er Us	_	60%	N
Core S		D-50			riller		S&ME		KUI	AKI	Grour		-			\/A	=		y Kai 24HR		60% N/A	
core 3	ize.				riller	•	Salvie	_			Groui	iuwa	ter.	IUE) 1	N/A		4	24NK		IN/A	
																		● SP	TNV	ALUE	•	
																		ol.	МС			
Elevation (ft)	E								g g	ple (Sample No./Type				llue		>	'L 	MC O		$\overset{LL}{ imes}$	
leva (ft	Depth (ft)	MA	ATERI	AL DI	ESC	RIPT	ION		Graphic Log	Sample Depth	iam Sam o./T	1st 6"	2nd 6"	3rd 6"	N Value		•	FINE	S CON	ITEN	IT (%)	
ш	0.0								0			~		3rd		0 10					70 80	90
=	1 , =	SILTY SA								0.0		3	3	<u>5</u>	8 7					:		
7.5-	4.0	loose, br	•	•	n trac	e orga	nics	Γ	1//	4.0	- SS	2	5	5	10	•	- :-	- :		- :-	1 1	- :
=	8.0	redd	ish brov	wn				/_	1//	6.0		4	5	6	11	•		:				
2.5	10.0	CLAYEY	SAND	(SC)				F	HH	8.0 10.0		3	<u>5</u>	5 1	10 3 >	•	- :	○▲	: :	- :	1 1	- :
Ξ	13.5	medium		reddis	sh bro	wn, fin	e; trace	:		13.5	; 	Ĭ		•				-		:		
-2.5	E [organics									SS				0) : :	- :-	:		- :	1 1	:
]	SLIGHTL								18.5					0		:		· _ :	<u>:</u>		A : C
-7.5]	mediun d	lense, (gray ar	nd red	d, fine,	saturat	ed		_	4				0	:	÷	:	: :	:		-:-
10.5		SILTY S	AND (S	<u>М)</u>				_		23.5	5 <u>-</u> SS	1	1	2	3	•	:			:		
-12.5	Ε Ε	loose, bli			e, satı	urated					7							:		:	: :	:
-17.5	<u> </u>	CLAYEY								28.5	SS	2	1	1	2	•				- :		
-11.5 <u>-</u>	F +	very soft								33.5	7					:				:		
-22.5	E	-								33.5	'= SS	1	1	1	2	•	<u>:</u>	:		:	<u> </u>	
]	soft;			d 0==	l trass	chall			38.5	; =					:	:			:		:
-27.5	40.0	very			iu and	ı ırace	snell	_	KKK/	1 33.3	SS	1	1	1	2		- :	- :	: :	- :	1 1	- :
=]]	\ no sa						/		43.5	; <u>-</u>					:				:		:
-32.5	<u> </u>	SILTY SA			fina -	ot '	od::#-				SS	5	7	10	17 >	K :	•	0	<u> </u>	- :-	1 1	- :
=		medium wood	uense,	gray, f	iirie, s	alurat	eu, with			48.5	;=	1								:		:
-37.5	E	loose	ے								SS	2	2	3	5		-	:		-	+ +	
=	53.5				ID\'	U T /2:				53.5	;= - SS	2	3	4	7		:	·	: : :	A		
-42.5		COOPER							- : -		7	+ -	<u> </u>	4			:		<u>~ U : </u>	- :	1 1	:
, , -	! !	firm, olive phospha		ı, ıırıe,	caica	reous;	WILLI		[: - - :	58.5	5 <u>-</u> - SS	6	7	5	12	:)					
-47.5]	still									7	Ť				:		:		:	1	
-52.5	1 =	Juli								63.5	SS	3	6	7	13					:		
-52.5									[:[:]-[:	68.5	_ 					:	: -			: -		
-57.5]									00.5	' <u>- ss</u>	1	2	4	6	•	- :	1	<u> </u>	:	<u> </u>	:
=	1 1								[:[-[-]:	73.5	; =											
-62.5]	stiff							- : : -		SS	4	4	6	10	•	- :	- :		- :-	1 1	- :
Ξ	E E								: - - :	78.5	;= <u> </u>						:	:				
-67.5	1 1	firm							- : : -		SS	2	4	4	8	•	- :	:		:	- :	- :
Ξ]								[:[+]+[:	83.5	<u>;</u>	1		2			:	:		:		:
-72.5	! !										<u>- SS</u>	2	3	3	6		:	:	: :	:	: :	- :
=	<u> </u>	er:tt								88.5	;= <u></u>	3	3	6	9		:			:		:
-77.5] =	stiff									7	+ 3	<u> </u>	U	<u> </u>		:	:		:		
-										93.5	5 <u></u> SS	2	3	6	9		:			:		:
-82.5	<u> </u>										7	\					÷	:		÷		
=	=									98.5	5 <u>-</u> SS	3	3	4	7				<u>i</u> i	<u>:</u>	<u> </u>	
									LE	GENI								С	ontini	ued	Next	Page
	Calit C :		SAMPL			ak O =	. 1 7/0"				5 Λ ΙΙ-!!	ou: 0'	onc ^		RILLIN			DD				
SS - S	Split Spoo Shelby Tu					ck Core ttings	e, 1-7/8"				SA - Holl	ow Ste itinuou							ry Was Core) I I		



File No Site De			24B ı: I				PIN): S RO		101-	50- 5	J-7 U (ounty:	01	1/711	LES1	OIN		Eng./Ged Rou		. EICHI	
3oring			B-14 S				ocation						Offs	et:				Alignme			
Elev.:				atitu				33867	L	ong	itude		.957			ate	Start			4/2009	
Total D	epth:		120 ft			I Dep		ft				epth:	ft			ate	Com	pleted:		4/2009	
Bore H	ole Di	am	eter (ii	n):	3		Sam	pler C	onfi	gura	tion	Lin	er R	equi	red:	Y	N	Line	r Used	i: Y	N
Orill Ma	achine):	D-50			Drill	Metho	od:	MUD	RO	TARY	Hamn	er T	ype:	Auto	mati	С	Energy	y Ratio	: 60%	
Core Si	ze:					Drille	er:	S&N	1E			Groun	dwa	ter:	TOE	1 8	N/A	2	4HR	N/A	
											1							• 00			
																		● SP	ΓN VAL	UE •	
Elevation (ft)	Depth (ft)		MZ	ΔTFF	ΡΙΔΙ	DES	CRIPT	LION		aphic	Sample Depth	(ft) Sample No./Type	_	.0	ŧ.	N Value		PL X	MC —	X	
Ele	ے ق				\\\L	DLO	OT (III 1	11011		<u> </u>	Sa	Sai No.	1st 6"	2nd 6"	3rd 6"	ź	0 10	▲ FINES 20 30 4			90
=	=	-	firm								103.	5	1								
-92.5	=											SS	3	3	4	7			: :	: :	
	=										108.	5 <u>-</u> SS	3	3	4	7	•				
-97.5	=	1									.	7	Ť		•	•			: :	: :	
-102.5	=	-	stiff								· 113.	SS	3	4	5	9	•				
	=										· 118.	5 =									
-107.5	120.0	_									4	SS	3	4	6	10	-	: : :	: :	1 1	: :
=	=											=									
-112.5	=		BORI	NG TE	ERMI	NATE	AT 12	20 FEE	T.			4									
-117.5												=									
-117.57	=	1										=									
-122.5	_ _											3									
=	=											=									
-127.5	=											=							- : :		
120 =	=											=									
-132.5	=											=									
-137.5	=	1										=									
= = =	=											=									
-142.5	=											=									
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-147.5	=											=									
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= =	=											=									
-162.5	=											=									
-167.5												4									
107.5	=											=									
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3	=	1										=									
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102.5	Ξ	}]					L	<u>:</u> : :	:		_ : :
-182.5	Ξ	}										1									
											<u></u>							<u> </u>	: :	<u> </u>	- : :
				CALAF	טו כי	TVDE				LE	GEN	D			D:	41 1 110		TUOD			
SS - S	Split Spo	on		SAMI			ock Co	re, 1-7/	8"		Н	SA - Holl	ow Ste	em Au	ıger		R	THOD W - Rotar			
	Shelby T Rock Co					CU - C		us Tub	e			FA - Con C - Driv			iht Aug	gers	R	C - Rock	Core		



File No		0.224B Proje	ect No. (PII		1131-0)8-55	4 Co	untv.	CHAF	RI F.S	NOTS	F	ng./Ge	. □ R	BOLLE	 =R
Site De			ACCESS F		11010	,0 00	, - ₁	unity.	011/11		71011		Rou		DOLLI	-' `
								-	Offset:							
Boring			Boring Loc			•							Alignme		0/00	
Elev.:				2.834406	L		tude:		956219			Starte			9/08	
Total D			Soil Depth:			_	ore De	-	ft				oleted:		9/2008	
		meter (in):		ampler C					er Requ			N		er Used		N
Drill Ma	chine	CME-55	Drill Me	thod:	MUD	ROT	ARY	Hamm	er Type	: Au	tomat	ic	Energ	y Ratio:	56%	
Core Si	ize:		Driller:	SCI				Ground	dwater:	TO	B I	N/A	2	24HR	N/A	
													● SP	T N VALU	JE ●	
Elevation (ft)	O Depth		AL DESCR	IPTION		Graphic Log	Sample Depth (ff)		1st 6" 2nd 6"	3rd 6"	N Value	0 10	PL ★ FINES 20 30 4	MC → S CONTE 0 50 60		90
= =	0.8	ASPHALT= 10 I	NCHES		/	XXX	0.8		6 3			•				Ė
6.0	3	FILL: SAND (SP	<u>?)</u>			XXX	2.5 5.0		3 5		12					
= = =	7.5	loose, dark brow	vn, fine; with o	crushed sto	one	>>>	7.5		8 9	5	14		1			:
1.0	3	medium der	nse		/ [10.0	SS	5 5	5	10	•	: :			
	=	SLIGHTLY CLA		SD-SC)			1	SS	11 10	8	18	- •				
-4.0	Ξ	loose, light redd					15.0	1			1					
	=		•		ŀ		}	SS	1 4	5	9	-				:
-9.0	Ξ	medium der fine	nse, light yello	wish brow	vn,		20.0	1			1.	;	<u> </u>		: :	
=	=		vallowich brow	un fino to			1	SS	5 4	2	6	* •	:O :			
-14.0	25.0	loose, light y medium	yellowish brov	wii, iiile to			25.0	1								<u> </u>
-14.0	=	light reddish	n brown		/			SS	WOHWO	H 2	2	•				
-19.0	30.0						30.0	1							<u> </u>	:
-13.0	=	SILTY SAND (S		trans abal	/	Ш		SS	WOHWO	<u>H 1</u>	1	•	* × ×		○ ≜	:
-24.0	\exists	very loose, bluis	sn green, fine;	, trace sne		Ш	35.0	1				:				:
-24.0	3	SILT (ML)				Ш		SS	1 1	2	3	•			: :	-
-29.0	#	very soft, bluish	green; with c	lay and tra	ace	Ш	40.0	=				:			: :	:
-29.0	3	fine sand				Ш		SS	1 1	2	3	•				
24.0	=	soft				Ш	45.0	=				:				:
-34.0	3	no sand				Ш		SS	1 1	1	2	•				
20.0	=	very soft				Ш	50.0									
-39.0	3	stiff, dark gr	av; with fine s	sand		Ш		SS	WOHWO	H 10	10	•	$\times \times$	4	0	-
44.0	55.0	, 0	•			Ш	55.0	=								
-44.0	E	SLIGHTLY SILT	TY SAND (SP	-SM)				SS	7 11	17	28		•		: :	- :
40.0	=	medium dense,	dark gray, fin	е			60.0	=				:				:
-49.0	3	grayish gree	en				00.0	SS	6 7	9	16 2	A •	0		: :	-:
=	65.0	grayion groc	J				65.0	=								i
-54.0	3	COOPER MARL	.: SANDY SIL	.T (ML)			00.0	SS	15 9	6	15	•				
500	=	very stiff, olive g	green				70.0	=				:			: :	- 1
-59.0	3							SS	7 10	11	21	- :	•		: :	-
-64.0	7						75.0	=				:				:
-04.0	3	firm						SS	1 2	5	7	•				
-69.0	7						80.0	7								
-09.0	=							SS	2 2	5	7	•				
-74.0	\exists						85.0	1								<u> </u>
7	=	very stiff						SS	2 6	9	15	. •)			
-79.0	=						90.0	1					: :			- :
7 5.0	=	stiff						SS	1 5	8	13	•	: :	A	; O ;	- 1
-84.0	₫						95.0	1				- :	<u> </u>		: :	- :
-04.0	=							SS	2 5	7	12	•				-
=							100.0	<u> </u>					<u> </u>	<u> </u>		
						LE	GENE						C	ontinue	d Next	Pag
	Switt C:-		ER TYPE	Cors 4 7"	/O"			·Λ 11-11	Ct ^		DRILLIN			n. \\/-c!-		
	Split Spo Shelby T		NQ - Rock CU - Cuttir	: Core, 1-7/8 nas	0				w Stem A inuous Fli		uaers		V - Rotai C - Rock			
		e, 1-1/8"		inuous Tub	е				ng Casing		J			-		



File No Site De			roject RT AC						64 Cou		1			ΓΟΝ			Geo.: Route		BOLL	
Boring		B-16 SPT	Bor	ring L	.ocat	ion:				(Offse	et:				Aligi	nmen	t:		
Elev.:		Lati	tude:			3440	6	Longi	tude:	79.	9562	219		Date	Start				9/08	
Total D		120 ft	Soi	l Dep	th:	ft	'	Co	ore De	pth:	ft		[Date	Com	plete	d:	10/1	9/200	8
Bore H	ole Dia	meter (in):	4			npler	Conf	igurati	ion	Line	er Re	equi	red:	Y	N			Used		(
	achine:	CME-55	,	Drill				D ROT		Hamm						En			: 56%	
Core Si	ize:			Drille	er:	SC	;		(Ground	dwat	ter:	TOE	1 8	N/A		24	HR	N/A	
																_	SPT	N VALU	JF •	
Elevation (ft)	Depth (ft)	MATE	ERIAL	DES	CRIP	TION	I	Graphic Log	Sample Depth (ft)	Sample No./Type	9	9	9	N Value		PL ×		MC O	LL X NT (%)	
ă								٥	S		1st 6"	2nd 6"	3rd 6"		0 10	20 3	0 40	50 60	70 80) 9
=	=								-	SS	3	4	6	10						
-94.0		very stiff	:						105.0	SS	6	8	17	20		•				_
-99.0	=								110.0	SS	1	3	7	10	:	- :		: :	- : :	
=	=	stiff										<u> </u>		10						
-104.0	=								115.0	SS	1	3	9	12				1 1		
-109.0	120.0								118.5	SS	1	5	10	15				<u>:</u>		
- 109.0 -] =				-							
-114.0	=	PODING:	TEDM	N A T = F) AT 4	20 55	ET		=											
=	3	BORING	ı EKIVIII	IVA I EL	JAI 1	20 FE	€1.		=							:				
-119.0	=] =							:				
-124.0	3								=						<u> </u>	<u>.</u>				
-124.0	=								=						:					
-129.0	=								=						:	:		: :	: :	
=]								=							:				
-134.0]								-							-		1 1		
-139.0	=																			
- 138.0]]								=	-					:					
-144.0]								=							:		1 1	<u> </u>	
]]								=						:					
-149.0	=														:	:			: :	_
-154.0	=																			
104.0	=									1										
-159.0	=								=	1					:	:	: :	: <u>i</u>	: :	
46	=								-						:	:				
-164.0	=								=							-				
-169.0	=								=											
=	=								=											
-174.0	=								=							:				
470.0	=								=	1					:	:				
-179.0	=								=									: :		
-184.0	=								=	1					:	-		: :		
=	=								=							:		: :		
								IF	GEND	1					:	1		1 1	<u> </u>	_
			MPLER											RILLIN	IG ME	THOD)			
	Split Spoo Shelby Tu			NQ - R CU - C			7/8"		HSA	A - Hollo A - Conti	w Ste	m Au	ger	aoro			Rotary Nock C			



_			5 01									01145									
_	le No.		0.224B		ect No. (1131	1-08-55	4 Co	unty:	CHAF	₹LE\$	SION	1	Eng	./Ged		P.B	AUMS	STAR
-		script			ACCES												Rou				
_	oring		B-18 S		Boring L							Offset:		•	01		gnme		/40/	2000	
-	lev.:			Latitud			34962	.	Longit			954958	5		Star			_		2008	
-	otal D		120 f		oil Dep		ft	\ 4		ore Do	•	ft	. !		Con					2008	<u> </u>
_		ole Dia	ameter (i	•	4 Drill	Metho			igurati		Hamme	er Requ						r Us		Y 900/	N)
_	riii ivia ore Si		: CIVIE	E-550	Drille		S&N		DROI	ART	Ground				2 ft			y Ka 24HR	_	80% 3.5 ft	
<u> </u>	ore Si	ze:			Drille	er.	Sal	/I⊏			Ground	awater.	IC	סע	2 IL		4	.4nr		3.5 IL	
																	● SP	ΓNV	ALUE	•	
: i	Elevation (ft)	O Depth	М	ATERI <i>l</i>	AL DES	CRIPT	ΓΙΟΝ		Graphic Log	Sample Depth	Sample No./Type	1st 6" 2nd 6"	3rd 6"	N Value	0.10		` FINES		ITEN	LL X T (%) 70 80	90
			☆CONCR	ETE = 6	INCHES				/111	0.0	HAND	` ''			10 10	:	30 +	<u> </u>	:	10 00	
	4 0	2.5	SLIGHT	LY SILT	Y SAND (SP-SM)			4.0	AUGER	3 2	2	4							=
	4.0	Ξ			own, fine;			dor		6.0		4 2			▋	:		:	:		
	-1.0	11.0	SLIGHT	1 V CI A\	/EV QANI	D (SD)	SC)			8.5	<u> </u>	11 3	1	4	•						=
	=	-	7		brown, fir		<u> </u>			13.5	Ė										=
	-6.0	15.0	¬ \							10.0	SS	2 1	1	2		- :	0	- :		1 1	
	=	Ξ	SAND (S		hanna fia					18.5	3					:		:	:	: :	: =
	-11.0	=	very loos	se, gray	brown, fir	ie					SS	WOH 1	1	2		- :				1 1	
	=	25.0		CLAY (C						23.5	SS	4 3	2	5		:	Ω				= =
	-16.0	25.0_	eg very soft	t, gray; w	ith shell						-	4 3		+ 5		:	- 0	:	:	: :	
	24.0	Ξ	firm	with san	d seams					28.5	SS	WOHWO)H 1	1		:					=
	-21.0	Ξ	CLAYEY	Y SILT (N	<u>/Н)</u>					22.5	7				1	- :		:		: :	: =
	-26.0	35.0	very soft	t, gray						33.5	SS	WC	Н	0	•			×	- : >	<u> </u>	=
		=	\ with	trace or	ganics				W//	38.5	Ξ.				:	:		:	:	: :	: =
	-31.0	=	SLIGHT	LY CLAY	YEY SAN	D (SP-	SC)			00.0	SS	5 3	4	7	•	- :		- :	-	<u> </u>	
	=	Ξ	loose, gi	ray, fine						43.5	=							:			=
	-36.0	Ξ									SS	4 4	3	7	4	1	0	- :	-	: :	===
	=	50.0								48.5	SS	2 2	3	5	-	:					: =
	-41.0	50.0_	CLAYE	Y SAND	(SC)						-			Ť		:	: :	:	:	: :	
	-46.0	55.0	very loo	se, gray,	fine					53.5	SS	1 1	1	2	-	:		:			=
	-40.0	=	SAND (S	SP)						58.5	. 🗏										=
	-51.0	60.0			n, fine; w	ith clay	nodul	es		30.3	SS	3 2	3	5	•	- :		- :	-	<u> </u>	===
	=	Ξ	COOPE	R MARI	: SILTY C	:I ΔΥ ((21.)		⁷ - : : -	63.5	3					:		:	:		= =
	-56.0	=			with som						SS	4 4	4	8	•	- :		- :	-:-	: :	===
	=	=	•							68.5	= - SS	3 2	3	5		:		:	:	: :	: =
	-61.0	=	soft								4	0 2			:	÷	: :	:	:	: :	: =
	-66.0	=								73.5	SS	2 1	2	3	- ·						=
	-00.0	Ξ								78.5	.d					:					
	-71.0	=								70.0	SS	2 2	2	4	•			- :	-	: :	
	=	Ξ								83.5	1				:	:					= =
	-76.0	=									SS	2 2	2	4	•	:	: :	:	:	: :	
		=								88.5	= - SS	2 2	2	4		:		:	:		: =
	-81.0	=									7			 						: :	= =
	-86.0	Ξ								93.5	SS	2 3	3	6	-	<u> </u>		:	- :		<u> </u>
	30.0	=								98.5	Ė					:			:		1 1
	=								<u> </u>		SS	2 2	1	3	• :	:		<u>:</u>	<u>:</u>	<u> </u>	_:
_				SAMDLI	ER TYPE				LE	GENI)			י וופח	ING ME	ETUO		ontin	ued	Next	Page
		Split Spo		OMIVIFLI	NQ - R		re, 1-7/	/8"			SA - Hollo		Auger		F	- WS	Rotar		sh		
		Shelby T Rock Co	ube re, 1-1/8"		CU - C CT - C		us Tub	е			A - Conti			ugers	F	KU -	Rock	Core			



File No		.224B			No. (PIN):		113	1-08-55	04∣ C o	unty:	CH	HARI	_ES	TON	E		Geo.:		BAUMS	ST
	scription				CESS RC								-				Route			
Boring		B-18 S			ing Locat						Offs		_				men			
Elev.:			_atitu		32.8			Longi			.954				Start			_	/2008	
Total D	-	120 f		_	Depth:	f				epth:	ft				Com	• –			/2008	
		meter (i		4				figurat				equi			$\overline{}$			Used		(1
Orill Ma Core Si	achine:	CIVIE	-550		Drill Meth Driller:		⊥MU &ME	ח אטו	AKY	Hamm Groun			TOI		ıc 2 ft	⊏ne		Katio: HR	80% 3.5 ft	
JUIE 3	IZU.				Dillier:	30	בוווג			Groun	uwd	IGI:	101	، ر	∠ Il		24	1117	૩.૭	
																•	SPT N	N VALU	JE •	
Elevation (ft)	Depth (ft)	M	ATER	IAL	DESCRIP	TIOIT	N	braphic Log	Sample Depth	(π) Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value		PL ★			LL × NT (%)	
<u> </u>								11.11.		+	1st	2nc	3rd	2	0 10				70 80	9
-96.0									103.5	SS	2	2	2	4	•		- :			
-101.0									108.5	5 - - SS	2	2	2	4	•		_ :			
=									113.5	-	2	2	3	5						
-106.0									118.5	5	2			5						
-111.0	120.0	BORI	NG TF	RMIN	IATED AT 1	20 FF	FFT.			SS	3	2	3	5	•:	: :	:		: :	- :
-116.0		20.0													:	:	:			
- -121.0																	- :			
-126.0															:					
=																				
-131.0																				
-136.0 -																	:			
-141.0															:		:	: :	: :	
-146.0																				
- -151.0																				
-156.0															:		:			
=																				
-161.0 - -																				
-166.0																	- :			
-171.0																	:	: :	: :	_
-176.0 -															:		:			
- -181.0																	:			
=																:	:			
-186.0																	:			
								LE	GENI	D				1		·				
ST - S	Split Spoo	on lbe e, 1-1/8"	SAMP	N	TYPE IQ - Rock Co CU - Cuttings CT - Continu	6			CF	SA - Hollo FA - Cont C - Drivi	inuou	s Flig	ger		NG ME R\ R(N - R	otary \	Wash ore		



ile No.			24B			. (PIN):		31-08	3-55	4 Co	ınty:	СН	IARLI	EST	ON		Eng	./Ge		M. I	EICHI	ELBE
ite De						SS RO												Rou				
Boring						Location						Offse						gnm				
	9.0 ft			Latitud			34962	Lo		ude:		9549	58	_		Star					2009	
Total D			102 ft		Soil De	<u> </u>	ft	C :		re De	•	ft		_		Con	_				2009	
Bore Ho					4		pler Co						quire		Y	N			er Us	_	740/	N
Orill Ma Core Si		e.	CIVIE	E-850		II Metho Iler:	SCI	IUD F	(01)		Hamme Ground		-			N/A	=		y Ka 24HR	-	74% N/A	
ore Si	ze.				ווטו	ner.	301				Ground	ıwaı	er. I	ОВ		N/A			24NN	`	IN/A	
																		● SP	TNV	ALUE	•	
_											o)						Р	L	MC	;	LL	
atiol ft)	Depth (ft)		Ν.4	ATEDI	AI DE	ecdid:	FION	-	Graphic Log	nple pth ft)	Type		=_		alne		P >	\leftarrow	0		$\overset{LL}{ o}$	
Elevation (ft)	, De		IVI	~ I EK!/	~L DE	SCRIPT	ION		Gra L	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value						IT (%)	
_	0.0		VASH F	ROTARY	7 TO 75	FEET			-	-	_	-	2	ਲ		0 10	20	30 4	10 <u>50</u>	60	70 80	90
Ξ, Ξ		∄ "			. 5 . 0	- ·				-	1						:			:		
4.0		=								-							:	:		:	: :	
-1.0		=									1					:		:		:	: :	
-1.0		=									1						:			:		
-6.0		\exists								-	=					:	:	:		:	1 1	
=		=								-	_						:	:		:		
-11.0		=								-	1						:	:	<u> </u>	:		
100=		=								-	1											
-16.0		=									1										1 1	
-21.0		=								-	1											
		=								-							:			:		
-26.0		=								-	1					:	- :	:	<u>: :</u> :	:	: :	
=		=								-	1						:	:		:		
-31.0		=								-	1						:	:		:		
-36.0		=																		<u>:</u>		
-50.0		\exists																		:		
-41.0		=								-	1						<u>:</u>	:	: :	:	1 1	
=		=								-]					:	:			:		
-46.0		=								-						:	:	:	<u>: :</u>	:	: :	
		=								-						:	:	:		:		
-51.0		=								-	1					:				:	: :	: :
-56.0		=									1						- :	:		:	: :	
		=								-	1						:			:		
-61.0		=								-	1					:	:	:	1 1	:	1 1	: :
=	75 O	Ė								75.0						:	:	:		:		
-66.0	75.0 77.0	ا2 ل_				SAMPL				7 O.U .	ST						×	X	0	•		
-71.0		_ ∟				COVERY		/		:	1					:		:		:	1 1	
-, 1.0		∃ W	/ASH R	ROTARY	TO 100) FEET					1					:	:			:		
-76.0		\exists								-	1					:	- :	:	: :	:	1 1	- : -
=		$\frac{1}{2}$								-	_						:			:		
-81.0		=								-							:			:	1 1	
		=								-												
-86.0		=								-	1						:			:		
=	100.0	<u> </u>								100.0						:	<u>:</u>	<u> </u>	<u> </u>	:	<u> </u>	
									LEC	GEND									ontin	ued	Next	Page
	Split Sp			SAMPL	ER TYP. NQ -	'E Rock Col	re, 1-7/8'	•			A - Hollo			er		IG MI F			ry Wa	sh		
ST - S	helby	Tube	<u>ڊ</u>		CU -	Cuttings					A - Conti - Drivir		s Flight		ers				Core			



File No. Site De		.224B on:	PORT A	ct No. (ACCES			101-	JU-33	- - C0	unty:	ТОП	IARL	<u>∟01</u>	OIN	[Eng./Ge Ro	ute:	M. EICH	LLDE
Boring			PT A B								Offse	t:				Alignm			
Elev.:			atitude		32.83		L	onait	ude:		9549		D	ate	Start			11/2009	
Total D		102 ft		oil Dep		ft			re De		ft					pleted:		11/2009	
		meter (i		4	Samp		onfic	_			r Re	quir		Υ	(N)		er Us		(N)
Drill Ma					Metho					Hamme				mati				io: 74%	
Core Si	ize:			Drille	er:	SCI				Ground			ТОВ		1/A		24HR	N/A	
				•	•					1		•						•	
																● SI	PT N VA	ALUE	
Elevation (ft)	Depth (ft)	MA	ATERIA	L DES	CRIPT	ION		Graphic Log	Sample Depth	Sample No./Type	st 6"	9	9	N Value		PL ×	MC	LL X TENT (%)	
ă		011 V 0011	FIVED D	UCTON C	AMDLE			Ö	S	σ _Z - ST	1st	2nd 6"	3rd 6"	z	0 10	20 30	40 50	60 70 8	
=	102.0	3" X 30" PUSHED				•	/			31						X	* : () A	
-96.0	=									=									
-101.0	3									=								<u> </u>	
- 101.0	=									=					:				
-106.0	=									=					:				
=	=									=									
-111.0	=									=					:	: :	1 1		: :
= = =	=									=									
-116.0	=									=					:				
-121.0	\exists									=					:				
121.0	=									=									
-126.0	=									=				}	:	<u> </u>	: :		- : -
=	=									=									
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126.0	=									=								<u> </u>	
-136.0	=									=									
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-146.0	=									=									
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-156.0	\exists									=					:				
100.0	\pm									=									
-161.0]									=					:	<u> </u>	<u> </u>		- : -
3]									=									
-166.0	=									=					:	1 1			- : :
174 0	=									=					:				
-171.0	=									=					:				
-176.0	=									=									
= = =	=									=									
-181.0	=									=					:	: :	1 1	: : :	: :
Ⅎ	\exists									=									
-186.0	=									=					-				
										<u> </u>						<u> </u>	<u>i</u> i	<u> </u>	
								LE	GENI)									
SS - S	Split Spoo	on	SAMPLE	R TYPE NQ - R	ock Core	e, 1-7/8	3"		HS	SA - Hollo	w Stei	m Aud	ger		G ME R\	THOD W - Rota	ary Was	h	
ST - S	Shelby Tu	ube e, 1-1/8"		CU - C					CF	A - Conti	nuous	Fligh	t Aug	jers		C - Roc			



File No		0.224B Project			24 00 55	1 00	untu	CHADLE	CTON		na /Coo :	ЪГ	0011	-D
File No			ct No. (PIN):		31-08-55	04 CO	unty:	CHARLE	-510N		ng./Geo.:		BOLLE	=K
Site De			ACCESS RO		_				_		Route			
Boring			oring Location		-			Offset:			Alignment			
Elev.:	10.5 ft			34947	Longi			954469		Starte		9/24/		
Total D	epth:		oil Depth:	ft		ore De	• ,	ft		Comp	oleted:	9/24/	2008	
Bore H	ole Dia	meter (in):	4 Sam		nfigurati			er Require		<u></u>	Liner	Jsed:	Y	N
Drill Ma	achine	CME-850	Drill Metho	od: M	UD ROT	ARY	Hamme	er Type: A	utoma	tic	Energy F	Ratio:	73%	
Core S	ize:		Driller:	SCI			Ground	dwater: T	ОВ	N/A	24H	łR	N/A	
											'			
											● SPT N	VALUE	•	
Elevation (ft)	O Depth		AL DESCRIPT		Graphic	Sample Depth	Sample No./Type	1st 6" 2nd 6"	3rd 6" N Value	0 10	PL N ★ FINES C 20 30 40		` '	90
=	=	SLIGHTLY CLAY				0.0	HAND							
5.5-	5.0	dark brownish gra	ay, fine to medio	um		5.0	AUGER					<u> </u>	<u> </u>	
-	7.5	SANDY CLAY (CI	L)			7.5	SS	1 1	1 2	•				
0.5	3	soft, gray				10.0	SS	4 4	3 7	•	<u> </u>			
3.5					<i>□ [///</i>	1	SS	1 1	1 2	-	: O:		: :	i
-4.5	15.0	CLAYEY SAND (S				15.0	1							
7.5		loose, light gray, f	fine				SS	1 1	1 2		0			
-9.5		very loose				20.0	1						<u> </u>	:
0.0	=	SILTY SAND (SM	1)				SS	1 2	1 3	-				- :
-14.5	25.0	very loose, light to		ne to		25.0	1		_				1 1	- :
-14.5	=	medium grained	,				SS	1 3	5 8	- ●	XO			
-19.5	30.0	- brown to blac	ck: with trace de	bris		30.0	1							
- 18.5						1	SS	WOH	0	•				-
-24.5	=	CLAYEY SAND (S	<u>30)</u>			35.0	1				<u>i i i</u>	<u> </u>	<u> </u>	
-24.5		loose, gray, fine			<i>□ </i>		SS	WOHWOH	1 1	•				-
-29.5		CLAY (CL)				40.0	=						: :	:
-29.5	\exists	very soft, gray; wi	ith trace fine sa	nd			SS	WOHWOH	1 1	•				
24.5	45.0					45.0	=							
-34.5	\exists	stiff, gray, fine	e; with trace wo	od			SS	4 4	5 9	•				- :
-39.5	50.0					50.0	1							
-39.5	=	CLAYEY SAND (S	<u>SC)</u>				SS	2 6	10 16	-		: :	: :	:
-44.5		medium dense, gi	ray, fine			55.0	1					<u>i</u>	<u> </u>	
-44.5		loose					SS	2 3	6 9	•	▲ 0			
-49.5	60.0					60.0	1				<u>i i</u> i	<u> </u>	<u> </u>	<u> </u>
-49.5		SLIGHTLY CLAY			1///	1	SS	5 6	24 30	* •	0			
-54.5	65.0	medium dense, da	ark gray and br	own, fine		65.0	1	<u> </u>			<u>i i</u> i i			
-54.5		∖to medium			_/		SS	3 4	6 10	-				:
-59.5]	COOPER MARL:	SANDY SILT (I	ML)		70.0	1			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>:</u>
-58.5]	stiff, olive green		٠			SS	2 2	5 7	-				:
-64.5	=	firm				75.0	1						1 1	<u>:</u>
-0-7.5							SS	1 2	4 6	•				
-69.5	\exists					80.0	1							
-09.5	=						SS	1 2	5 7	-				
-74.5						85.0	1					: :		
7 4.5							SS	2 2	5 7	┦ ●				
-79.5						90.0	1							:
							SS	2 2	4 6	 ●				÷
-84.5	=					95.0	1	1 2	45 1-					
-0 -1 .5]	=	very stiff					SS	1 2	15 17	│	•			
	=	- ,				100.0					<u> </u>	: :	<u> </u>	<u>:</u>
					LE	GENE)					tinued	Next	Pag
ST - S	Split Spo Shelby T	ube	NQ - Rock Co CU - Cuttings	•		CF	A - Conti	w Stem Aug nuous Flight	er		THOD V - Rotary V C - Rock Co			
AWG - F	≺ock Coı	e, 1-1/8"	CT - Continuo	ous Tube		DC	ت - Drivir -	ng Casing						



File No Site De	scription		Projec DRT A					30 00	54 Co ι	y.	011	IARL		<u> </u>			Geo. Route		BOLL	
Boring		B-19 SP		oring I							Offse	t:					nmer			
	10.5 ft		titude			33494	7 L	_ongi	tude:		9544			ate	Start			9/24	/08	
Γotal D		120 ft		il Dep		ft			ore De		ft		_		Com		ed:		/2008	
		meter (in):				npler	Confi	gurat	ion	Line	er Re	quire	ed:	Υ	(N)	<u> </u>		Used		(1
	achine:	CME-8	50		Meth	nod:	MUE	ROT	ARY I							En			73%	
Core Si	ize:			Drill	er:	SC	:1		(Ground	dwat	er: -	TOE	3 1	N/A		24	HR	N/A	
								1									CDT	N VALL	IF A	
tion	£ .							jë Z	t Se	ole ype				ne		PL ×		MC O	$\overset{LL}{ o}$	
Elevation (ft)	Depth (ft)	MAT	ERIA	L DES	CRIP	PTION		Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value		▲ F	INES (CONTE	NT (%)	
▥								10	0) –		135		3rd		0_10	20 3	30 40	50 60	70 80	9
=		soft							=		WOH	<u>woh</u>	5	5	•	:				
-94.5									105.0	SS	16	12	11	23		•		: :		
=		very sti	ff						110.0											
-99.5									110.0	SS	WOH\	WOH	6	6	•	:				
-104.5		firm							115.0							<u>:</u>				
104.5		stiff							118.5	SS	2	3	7	10	•	: -	: : -			
-109.5	120.0							<u> - - -</u>		SS	3	4	7	11	•	- :	: :	: :	: :	
=	=								=							:				
-114.5	F	BORING	TERM	IINATE	D AT 1	120 FE	ET.		=							:		: :		
110 =	=								=							:				
-119.5									=							:		: :	: :	
-124.5	=								=							:				
	=								=							:				
-129.5	=								=						:	- :	: :	: :	: :	
40. =	=								=							:				
-134.5	=								=							÷		: :		
-139.5	=								=											
									=							:				-
-144.5									=							:				
=									=							:				
-149.5	l d								=							:				
-154.5									=											
-134.5]								=											
-159.5]								=							<u>:</u>	<u> </u>	<u> </u>	1 1	
]									=											
-164.5									=							- :	: :	- :		
-169.5																				
_ 108.0 <u>_</u>									=											
-174.5	3								=							- :		<u> </u>		
]]								=											
-179.5	=								=						:	:	: :	: :	: :	
104 5	ļ ļ								=						L		<u>:</u> :	<u>:</u> :		
-184.5	=								=							:				
	1														:	:	<u>: :</u>	<u> </u>		
			וווחו בי) TVDF				LE	GEND					41 1 110		TUO	,			
	Split Spoo	n	AMPLE	NQ - F	Rock C	ore, 1-	7/8"		HSA	A - Hollo	w Ste	m_Aug	ger			W - F	Rotary			
	Shelby Tu	ibe e, 1-1/8"		CU - C					CF/	A - Cont - Drivii	inuous	Fligh	ıt Auç	gers	R	C - F	Rock C	ore		



File No		.224B		ct No.	<u> </u>		31-08-5	54 C o	unty:	CH	IAR	LEST	ΓΟΝ		Eng./0			BAUN	1STA
	scripti		PORT /				_		1.	~	.4.					coute:			
Boring			PT AIB				1			Offse			-	O4 = ==	Align	ment		/2000	
lev.:		120 ft	atitude		32.83			itude:		9537	96			Start		-I.		/2009	
Total D				oil Dep 4		ft		ore D	<u> </u>	ft	:		Jate	Com (N)	plete	a: iner l		/2009 : Y	
	achine:	meter (ii	,		Metho		nfigura		Hamm	er Re				$\overline{}$				80%	N
Core S		CIVIE	-55	Drill		SCI	OD KO	IARI	Groun		_			N/A	EIIE	24F		4 ft	
JUIE 3	ize.			ווווטן	eı.	301			Groun	uwai	er.	IOL) 1	N/A		241	ii.	4 11	
															•	SPT N	VALU	IE •	
_									a. 0				4		PL	N	ΛС	LL —×	
Elevation (ft)	Depth (ft)	N 1 /	ATERIA	I DES	CDIDT	ION	Graphic	Sample Depth	Sample No./Type		=_	-	N Value		\times		⋺—	\rightarrow	
Elev (1		IVIA	AI EKIA	IL DES	CRIPT	ION	Gra	Sar De	Sar No./	1st 6"	2nd 6"	3rd 6"	> Z					NT (%)	
	0.0 2.0	GRAVEL						0.0		11	75 16	. සි 12	28	0 10	20 30	0 40 5	<u>50 60</u>	70 80	90
=				CAND	(OD OM)		- 	2.0	SS	8	8	5	13	•)				
7.5	6.0	SLIGHTL	donae d	SAND	(SP-SIVI)	<u>!</u>		4.0) - <u>SS</u>		_		40		- 1 1	<u>:</u>		1 1	- :
Ξ	=	medium of stained w	uense, a vith some	ark gray e clav	to black	k, organii		6.0		3	<u>5</u>	<u>5</u> 4	10 7						
2.5		L			0.4ND //	20)		10.0		1	1	1	2	•	: :	-:-	: :	: :	
_ =] =	HAND AL		LAYEY	SAND (<u>5U)</u>		13.5	5 <u>-</u> SS	4	3	5	8			:			
-2.5		gray brov	wii, iine						-	-	J	J				:			- :
7 -	=	SLIGHTL	Y CLAY	EY SAN	D (SP-S	<u>(C)</u>		18.5	5- <u>-</u>	6	6	8	14	•		:		: :	- :
-7.5	1 7	medium	dense, g	ray brov	vn, fine			<u> </u>	-										
-12.5	23.5	loose	e, brown					23.5)	1	2	3	5	•	: :	- 1		: :	- 1
-12.5_	28.5	very	loose, w	ith trace	clay			28.5	.=										
-17.5		loose	, black,	coarse				20.0	SS	1	3	2	5	•	X	× Ö		A	- :
	33.5	mediı	um dens	e, browr	ı, coarse)		33.5	,∄										
-22.5		CLAYEY	SAND (SC)				00.0	SS	6	6	4	10	•	<u> </u>	<u>:</u>	<u>: :</u>	: :	<u> </u>
=	38.5	loose, da	ırk gray;	with trac	e shell			38.5	5										
-27.5]	SANDY (CLAY (C	1)					SS	12	10	20	30	:	•) :	: :	- : :	- :
Ξ	=	firm, dark			wood s	silt, and		43.5	5=										
-32.5]	organics			wood, c	int, arra			SS	10	11	14	25	:	•	- :	: :	: :	- :
=	48.5	CLAYEY	SAND (SC)				48.5	5=		_		44						
-37.5]	medium			fine				<u> </u>	'			14	:	<u> </u>	XO : X		: :	- :
=]	\L		un gray	,0			53.5	5 <u>-</u>	4	6	8	14						
-42.5		SAND (S						•	-	4	0	0	14	:	: :	:		: ;	-
]	medium	dense, g	ray, fine				58.5	5 <u>-</u> - SS	3	4	7	11						
-47.5 <u>-</u>] =	with	trace cla	У			- : :		-			•				:			- :
-52.5		COOPER					: . .	63.5	5- <u>-</u> - SS	4	5	8	13			<u> </u>	<u> </u>		
-ט∠.5 <u>-</u> -		stiff, olive	e green, t	fine; with	n trace s	hell	[:[:]	. 60 5	-							-			
-57.5] =	firm						68.5) = =	3	3	5	8	•		<u> </u>	<u> </u>		
-								. 73.5	;∃										
-62.5 -]							. , 5	'ss	1	2	3	5	•	-	- :	<u> </u>		- :
Ξ] =							78.5	<u></u>							:			
-67.5]								SS	2	2	4	6	•	-	- :	: :	- ; ; ;	- :
Ξ	=							83.5	5=										:
-72.5] =								SS	2	3	4	7	-	: :	<u>×</u>	$\overset{\circ}{\overset{\circ}{\overset{\circ}{\overset{\circ}{\overset{\circ}{\overset{\circ}{\overset{\circ}{\overset{\circ}$		- :
=] =							88.5	5=	2	1					:			
-77.5]	stiff							- SS	2	4	5	9	-		:	: :	: :	:
=] =	£:						93.5	5 <u>-</u>	1	2	4	6			:			
-82.5		firm							=						: :	:	: :		:
Ξ]						[:[.]-]	98.5	5 <u>-</u> SS	1	7	16	23			:			
							LE	GENI				- 10				Cont	inue	d Next	Pag
			SAMPLE	R TYPE		. = :-:					_	DF	RILLIN		THOD				
	Split Spo Shelby Ti				Rock Core	e, 1-7/8"			SA - Hollo FA - Cont				gers		W - R C - R				
	Rock Cor			CT - C			C - Drivi			,	,		- '`		-				



Site De	script				CCES												Ro	ute:			1STA
Boring	No.:	B-2	SPT	ABTO	fing L	.oca	tion:				(Offs	et:				Alignn	nent	:		
Elev.:	12.5 f	t	Latit	_			35504	4	Longi			.953	796	[Date	Start	ed:		2/23	3/2009	
Total D		120			I Dep		ft				epth:	ft					pleted:			3/2009	
Bore H				4		Sar	npler (Con	figurat	ion	Lin	er R	equi	red:	Υ	N		ner L			N
Drill Ma		: CI	ME-55		Drill				D ROT	ARY	Hamm						Ener			: 80%	
Core S	ize:				Drille	er:	SC				Groun	dwa	ter:	TOE	1 8	N/A		24H	IR	4 ft	
																	• s	PT N	VAI l	JF •	
tion)	ţ,								ji b	eg 🛊	ble ype				<u>e</u>		PL X—	- IV	1C	$\overset{LL}{ imes}$	
Elevation (ft)	Depth (ft)		MATE	RIAL	DES	CRIF	PTION		Graphic Log	Sample Depth	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value		▲ FINE	ES CO	ONTE	NT (%)	
Ш	_	1-	1							0,	0, Z	18,	2n	310		0 10	20 30				
=	_	h								103.5	;=										
-92.5	-	fi	rm								SS	1_	1_	5	6	•	1 1	- :	1 1	1 1	- :
=	_									108.5	5= SS	2	3	5	8						
-97.5 <u> </u>											-	_	<u> </u>								
-102.5										113.5	5- - SS	2	2	6	8	•					<u>:</u>
102.0										118.5	<u> </u>							: -			: -
-107.5	120.0									- 110.0	SS	4	3	6	9	•		-	<u> </u>	<u> </u>	- :
=	_										7										
-112.5		ВС	RING T	ERMI	NATE	TA C	120 FE	ΞТ.			=						+ +	-		- : :	- :-
											=										
-117.5	_										=							-			-
-122.5	_										=							-			:
-	_										\exists										
-127.5	_										\exists					:		-	<u>: :</u>	- : :	- :
=	_										=					:					
-132.5											=					:		-			-
407.5											=					:					
-137.5											=					:	1 1	:			- :
-142.5	_										=										
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-147.5	_										\exists					:		-	: :	- : :	- :
=	_										\exists					:					
-152.5	_										=					:		-			
-157.5											=						<u> </u>	:	<u> </u>	<u> </u>	:
											=							:			
-162.5											=					:		- :			- 1
=											=							:			:
-167.5											=							:		<u> </u>	
170.5											=							:			:
-172.5 -											=										- :
-177.5											=						<u> </u>	:		<u> </u>	<u>:</u>
											=										
-182.5											=							-	: :	<u> </u>	- :
=											=							:			:
									LE	GENI	 D	1			<u> </u>	<u> </u>		•	• •		-
00	D111 C		SAM		TYPE		\					61			RILLIN		THOD		<i>1</i> 1		
SS - S ST - S	Split Spo Shelby T	on			NQ - R CU - C		ore, 1-7	/8"		HS	SA - Hollo	ow Ste	em Au	iger ht Au			W - Rot C - Roc				



File No		0.224B		ect No.	<u> </u>		31-08-5	54 C c	ounty:	CH	ARLES	STON		Eng.			EICH	ELBE
	script			ACCES						011					Rout			
Boring				Bofling				.4		Offset		D-4-	01-		nme		10000	
Elev.:	12.5 f		Latitud		32.83			itude:		.9528	91	Date			- al.		3/2009	
Total D		120 f		Soil De		ft		ore D	_•_	ft				nplet			3/2009	<u> </u>
Bore n Drill Ma		ameter (i		3	∣ Samp I Metho	oler Cor			Hamm		quired					r Used		N
Core S		CIVIE	E-550X	Dril		S&ME	טא ענ	IAKI	Groun				N/A	E		/ Ratio 4HR	8 ft	
core 3	ize.				iei.	Salvie			Groun	uwate	#1. TC	7 6	IN/A		2	4nk	οιι	
														•	SPT	N VALU	JE •	
ation :)	ff (;						ohic	th of	iple ype			alue		PL ×	-	MC	LL ×	
Elevation (ft)	O Depth			AL DES		ION	Graphic	Sample Depth		1st 6"	2nd 6" 3rd 6"	N Value	0 10			CONTE 50 60		90
_	2.0	\						0.0		6	6 9 2 1	15 3		•	1 1			-
7.5 <i>-</i>	4.0			brown, fi ind trace				2.0 4.0	SS SS	3	3 2			- :	1 1			
=] =	▼`			J. 941 1103	-	-/	6.0		3	2 2	4 2						
2.5		SILTY S						8.0	<u> </u>	1	<u>ı 1</u>	12		:	: :	: :	: :	
=	=	very loo	se, dark	prown, f	ine; with	organics		13.5	5=	1	1 2	1		i				
-2.5				Y SAND		='			- SS	1	1 2	3		- :	<u> </u>	: :		
=	18.5	n '		ay and br	own, fine	9,		18.5	5= <u></u>	2	1 1	1 2		A	0			
-7.5	60	saturate							7	-		1		-				
-12.5	23.5	very		light brow	n, mediu	um coars	e ////	23.5	5- - SS	1	1 2	3						
-12.5	=	with						28.5	-									
-17.5 -		SILTY S				L - 11		28.5	SS	WOH	2 1	3	•	:	<u> </u>			
		very loo	se, dark	gray, fin	e; with sl	nell		33.5	5=				:	:				
-22.5	=	SANDY	CLAY (CL)					SS	1	2 3	5	•	<u> </u>	0 :	X	1 1	- : -
Ξ	38.5	soft, dar	k gray, f	fine; with	silt			38.5	5=									
-27.5		\ no s	and						SS	4	5 5	10	+) :	: :	- : :	: :	
Ξ		firm	; trace s	hell			_	43.5	5= SS	13	26 12	2 38	1					
-32.5		SLIGHT	LY SILT	Y SAND	(SP-SM)	<u>)</u>			-	13	<u> 20 12</u>	_ 36					: :	
27.5	48.5			brown, m	nedium g	rained;		48.5	5= - SS	2	3 3	6		:	<u>i</u> i			
-37.5 <u>-</u>		with she		_				53.5	4			Ţ		:	: :	: :	: :	
-42.5 -				, fine, sat			- : :	. 33.8	SS	3	4 5	9	•	· :	: :			- : -
				SILT (ML	_		: - -	58.5	5 =					:				
-47.5			•	, fine, ca	Icareous				SS	3	4 4	8	•	- :	1 1	: :	<u> </u>	
Ξ	=	stiff						63.5	5=				1 _:	:				
-52.5		firm							<u>- SS</u>	2	3 4	+7		- :	1 1	: :	: :	
=	=							68.5	5= SS	WOH	2 3	5		i				
-57.5 <u> </u>									=	77011				:	1 1	1 1	: :	
-62.5	=							73.5	5- - SS	1	2 3	5	_	<u> </u>	<u>i</u> i	<u> </u>		
-02.5] =							. 78.5	-					-				
-67.5] =	soft						. 10.8	SS	1	1 2	3	•	<u> </u>		XX		. : -
								83.5	5=					:				
-72.5	=								SS	1	2 2	4	•	:	1 1	1 1	: :	
Ξ	=							88.5	5 =		0 0			:				
-77.5		firm							- SS	2	2 3	5		:	1 1	1 1	: :	
=								93.5	5= SS	2	2 3	5	-	:				
-82.5	=								-	-		+ 5		:	1 1			- : -
Ξ								98.5	5= <u></u>	2	2 3	5		:				
							LI	EGEN							Со	ntinue	d Next	Page
	2 MH O =		SAMPL	ER TYPE		. 1 7/0"				C*-		DRILLI			D			
	Split Spo Shelby T				Rock Cor Cuttings	e, I-//8"			SA - Hollo FA - Cont					₹VV - RC -		y Wash Core		
		re, 1-1/8"			Continuo	us Tube			C - Drivi			-						



File No. Site De		0.22 ⁴ ion:					PIN): S RO/		113	ı-∪ö	-၁၁	4 60	unty:	CF	IAKI	LES1	UN		Eng.	Rout		. EICH	CLRE
Boring							ocatio							Offse	et:					nmei			
Elev.:				.atitu			32.83			Lor	nait	ude:		9528			Date	Star				3/2009	
Γotal D			20 ft			l Dep		ft				re De		ft		_			plete	ed:		3/2009	
Bore He					3		Samp	_	Conf	figui			Line		qui		Y	(Ñ			Used		(N)
Drill Ma			CME-		X	Drill	Metho						Hamm				mati	ic	En	ergy	Ratio	: 80%	
Core Si	ze:					Drille	er:	S&I	ME				Ground	dwat	er:	TOE	1 8	N/A	•		HR.	8 ft	
																				SPT	N VAL	UE •	
Elevation (ft)	Depth (ft)		MA	ATER	RIAL	DES	CRIPT	TION		aphic	og.	Sample Depth	Sample No./Type	=_			N Value		PL ×		MC O	—X	
Ele										Ğ		Sa	S o	1st 6"	2nd 6"	3rd (ź	0 10				ENT (%) 0 70 80	90
-92.5	=											103.5	SS	2	3	5	8	•					
3	=		stiff									108.5	= - SS	2	4	5	9		:				
-97.5	=		Juil									113.5	-	2	3	4	7						
-102.5												118.5]										
-107.5	120.0	<u> </u>	very	stiff						十	1 1.		SS	6	8	12	20						
-112.5	=	ı	BORIN	NG TE	RMII	NATE	AT 12	0 FEE	ĒT.														
-117.5	=																	:	:				
-122.5	=																						
-127.5	=																		:				
-132.5	=																						
-137.5	=																		:				
-142.5	=======================================																		:				
-147.5	=																						
-152.5	=																		<u>:</u>				<u> </u>
3	=======================================												<u>-</u>					:					
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-162.5	=																						
-167.5													=										
-172.5	- - - -																		:				
-177.5	=												=						:				
-182.5	=																		:				
													<u> </u>						:	<u> </u>		<u> </u>	
				SAMF	PLER	TYPE					LE(GENI		_		DF	RILLIN	NG ME	THO	2			
SS - S ST - S AWG - F	Split Spo Shelby T Rock Co	ube			 	NQ - R CU - C	ock Cor uttings ontinuo					CF	SA - Hollo FA - Cont C - Drivii	inuou	s Flig	iger		F	RW - F	Rotary	Wash Core		



File No				24B			t No.			1131-	08-55	64 Cou	ınty:	CHA	RLES	OT	1	ΙE		Geo		. EICH	ELBE
ite De							CCES													Rout			
Boring	_						ntinAg L			<u> </u>		4 •		Offset:		D 1				nme		0000	
Elev.:		2.5 ft			Latitu				3608			tude:		95289	1	Date					_	2009	
Total D			_	32 ft			il Dep		ft			ore De	-,	ft	!	Date						2009	(1)
Bore H Drill Ma						4		Sam Meth		Config			⊥Line Hamm	er Req				N			r Used		N
Core S				CIVII	E-850	,	Drill		sc		KUI		Hammo Ground				N/A	٨	_cn		HATIO	74% 8 ft)
ore 5	ıze	•					ווויזט	er:	30	ı			Jioun	uwatel	. 10	סי	IN/	`		4	+⊓K	Ιοιι	
																			•	SPT	N VAL	JE •	
Elevation (ft)	Į Ę	ا ج		_	-			o=:-	- 1.0		Graphic Log	Sample Depth (ft)	Sample No./Type			N Value			PL ×		MC O	—X	
leva (ft	Dec	(#)		M	1ATEI	RIAL	DES	CRIP	TION		3rap Lo	Sam Dep (ft	sam o./T	1st 6"	2nd 6" 3rd 6"	S			▲ F	INES	CONTE	ENT (%)	1
Ш		0.0		. 	· · · · ·							, , , , , , , , , , , , , , , , , , ,	" Z	2 6	2n 3rc	\ <u>_</u>	0	10				70 8	
=	1	∄	SI	IELB	Y TUB	E TC	25 FE	ΕT				=	1					:				:	= =
7.5		\exists											1				-	- :	-	<u>: :</u>	: :	- :	- : -
Ξ	1	‡	<u> </u>									=	1					:				:	=
2.5	1	=										-	1					:	:				
_ =		=																:				:	
-2.5 <u>-</u>	1	∄										-	1					:	:			:	: :
-7.5	1	∄											1					-	-			:	- : -
	1	\exists											1					:				:	
-12.5		5.0	2"	A su	" QUE	I BV	TUBE	DIIGUI	בון אייי	ГН		25.0	ST				\downarrow	- :	<u>:</u>	<u>: :</u>	: :	:	
Ξ		7.0	∖22	" RE	COVE	RY	ODE	ı UƏHI	-D 4411	··· /		200					\uparrow	:	-	· .		:	
-17.5 <u> </u>		0.0 2.0	_ `—				O 30 F	EET		/		30.0	ST					:	:			:	
-]	=======================================	٦ ′ –				TUBE		ED WIT] =											: =
-22.5	1	∄			COVE							=	1					:	:			:	: -
-27.5	1	\exists																-	:	: :	: :	:	= =
21.5	1	\exists										=	1										=
-32.5		=											1				\vdash	-	-	1 1	-	:	
Ξ	-	∃										-										:	
-37.5 <u> </u>	1	∄											1				\vdash	:	:	1 1			- : -
	1	\exists											1					:	:			:	: -
-42.5		\exists											1					:	:				-
-47.5=	1	=										-	1				L	<u>:</u>	<u>:</u>		<u> </u>	<u> </u>	
- 4 1.5	1	∃										-	1										
-52.5 -	}	=																			: :		
=	1	∄										-	1					:	:				=
-57.5	1	Ⅎ										=	1				\vdash	:	:	: :	: :	:	: -
Ξ	1	\exists											1					:					: -
-62.5	1	\exists											1					:	:		: :		-
67.5	1	∃										-	1						<u>:</u>	<u>i</u> i		:	
-67.5 <u>-</u>		=										=											
-72.5	1	∄										-	1					- :	<u>:</u>		: :		
-	1	∄										-	1					:	:			:	= =
-77.5 <u>-</u>	1	\exists											1				-	:	:	: :	: :	:	: -
=	1	\exists											1					:	:			:	= =
-82.5	1	=											1				\vdash	:	:	: :	- : :	- :	
=	1	∃											1					:				:	=
											LE	GEND					<u> </u>				•		<u> </u>
00	o				SAM	PLEF	TYPE		· -	7.(0)"				61		RILL	ING				. \^/ :		
		Spo					NQ - F			//8"		HS	A - Hollo A - Cont	w Stem inuous F	Auger light A	ugers		RV RC		Rotary Rock (Wash Core		
AWG - I				-1/8"					ous Tu	be		DC	- Drivii	ng Casir	ng	<u> </u>							

SC_DOT 08554.GPJ SC_DOT.GDT 4/3/09



File No Site De			ct No. (PIN):		1-08-55	64 Co	unty:	CHAF	RLES	STON	E	ng./Ge Rou		BAUM	STAF
Boring		B-23 SPT A IB io					14	Offset:				Alignm			
Elev.:	12.0 ft			3833	Longi	hildə.		.952996		Date	Starte			0/08	
Total D			oil Depth:	ft			epth:	ft				oleted:		0/2008	
		meter (in):		pler Con			• •	er Requ	ired				er Usec		(N)
	achine:	· · · ·	Drill Meth					er Type			$\overline{}$		y Ratio		
Core S	ize:		Driller:	S&ME				dwater:			7 ft		24HR	6 ft	
	'		1			<u>'</u>			<u>'</u>			<u>'</u>			
												● SP	T N VAL	JE ●	
on					.≌	ے ہے	e e			<u>e</u>		PL X	MC	LL	
Elevation (ft)	Depth (ft)	MATERIAI	L DESCRIP	TION	Graphic Log	Sample Depth	Sample No./Type			N Value		, ,	O	-NIT (0/ \	
Ele	0.0				ত	S	l s S	1st 6" 2nd 6"	3rd 6"	z	0 10		S CONTE 10 50 60		90
		ASPHALT= 6 INCI			/	2.0									
7.0	1.3 - 2.0 -√	CRUSHED STONE	_			4.0 6.0		10 12 5 2		23 5	-	•			
		CRUSHED STONE		<u>s</u>		8.0	- SS	4 3	2	5					
2.0	12.0	FILL: SLIGHTLY S	SILTY SAND (SP-SM)		10.0 12.0	_	2 4	<u>2</u>	10	• :	(A	: : :	: :	
=	7	medium dense, da	ark brown to b	lack, fine		14.0	- SS	3 2		4	. .				
-3.0	15.8	CLAYEY SAND (S	(C)			16.0		3 3 1 WO	6	9					
	=	gray, loose, fine	_			18.0 20.0		3 8		22	T	•			
-8.0	22.0	brown				22.0	SS	7 10		_	A	• 0			
-13.0	26.0	gray brown				24.0 26.0		1 1 WOH 2	1 3	5					
-	20.0	very loose				28.0	SS	3 3	4	7					
-18.0	=	loose, fine to o	coarse			30.0		WOH 1 WOH 2	WO 2	H 1	•				
-	=	SAND (SP)				32.0 34.0		1 2		3					
-23.0	=	very loose, gray, c	oarse; with tra	ace		36.0		1 2		4	•	A 0			
-		phosphate] [///	38.0 40.0		2 1 WOH 1	2	3					
-28.0	43.0	SLIGHTLY CLAYE				42.0	- SS	3 4	4	8	•				
-33.0	43.0	very loose, gray, fi	ne; with trace	shell		44.0	- SS - SS	2 2		6	-	1 1	<u> </u>	<u> </u>	
-55.0	\equiv	medium dense	e, gray, fine to	coarse	_ - -	48.5		2 3		+ -	1				
-38.0	=	SILTY CLAY (CL)				10.0	SS	2 2	4	6	•				
		very soft, gray; wit	h trace sand a	and shell		53.5	;=]								
-43.0	=	soft			IJ ┃╢╟	57.5	SS	2 3	3	6	-				
		CLAYEY SAND (S	 '			57.5	'= <u>ss</u>	3 3	2	5	•			: :	
-48.0	=	loose, gray; with tr	ace shell			00 -									: :
-53.0		very loose				63.5	SS	2 3	3	6			<u> </u>		
30.0		very loose, da silt and shell	rk olive green	; with trace		68.5	;=				1				
-58.0		loose					SS	2 3	2	5	•	1 1	1 1 1	1 1	- : -
=	=	COOPER MARL:	SANDY SILT	(ML)	-	73.5	;=	<u> </u>		<u> </u>					
-63.0	=	soft, olive green; w					SS	3 3	2	5	-				
20.0	=	loose, olive gr				78.5	5 <u> </u>	2 3	2	5	-				
-68.0	=	firm				02.5	-			"					
-73.0	=					83.5	'= <u>ss</u>	2 2	2	4					
-		soft				88.5	;=								
-78.0							SS	2 1	2	3	• :	: :	<u>: : i</u>	<u>: :</u> :	: -
=						93.5				1					
-83.0							SS	2 2	2	4	+	<u> </u>			
=	=					98.5	;]				-	×			<u> </u>
					LE	GENI)	•				C	ontinue	d Next	Page
SS - S	Split Spo	SAMPLER	R TYPE NQ - Rock Co	nre 1 ₋ 7/Ω"		ЦС	SA - Hollo	w Stem A		RILLII	NG MET	HOD / - Rota	ry Wach		
ST - 5	Shelby Ti	ube	CU - Cuttings	3		CF	A - Cont	inuous Fli	ght A	ugers		· - Roca			
AWG - F	Rock Cor	e, 1-1/8"	CT - Continu	ous Tube		D0	C - Drivi	ng Casing	1						



File No		.224B			No. (113	1-08	5-55	4 C0	unty:	CI	TAK	LES.	TON		ng./G			BAUM	SIA
	scription		PORT										Off.	-4:					oute:			
Boring	No.: 12.0 ft	B-23 S	P । 🏭 .atituc			32.83			1 -	n ~ !-	tude:	7/	Offs 9.952			Doto	Start	Alignr		: 9/30/	0 0	
⊏iev.: ∣ Total D		120 ft			Dept		აიაა ft		LO			epth:	9.952 ft					ea: pleted			08 2008	
		meter (i		4		Sam			fiau	_			ner R							Jsed:		(N)
	achine:	CME	•		Drill l		-					Hamn					$\overline{}$				80%	
Core Si				-	Drille			ME				Groui					7 ft		24H		6 ft	
											· ·								•			
																		• 8	SPT N	VALUE	■	
o	ے									≌	<u>e</u> _	e e				<u>e</u>		PL ×	M	IC	LL —X	
Elevation (ft)	Depth (ft)	MA	ATERI	IAL I	DESC	CRIP	TION		9	Grapnic Log	Sample Depth	Sample No./Type		9		N Value		/\			, ,	
Ë										5	S		I —	2nd 6"	പ3rd 6"		0 10	20 30		ONTEN 60 60		90
=	=	firm									103.5	SS	2	3	3	6		: :	:		: :	:
-93.0	=										103.5	'= ss	3	3	4	7						
=	=								$ \cdot $		108.5	; <u>]</u>] :					
-98.0	=											SS	2	3	3	6	-		:			
100.0											113.5	;= <u> </u>	3	3	2	5						
-103.0	=								$ \cdot $		118.5	-	+ -									-
-108.0	120.0								[:]		118.5	SS	6	3	3	6			- :			
=======================================	=											1										
-113.0	=	BORII	NG TEF	RMIN	IATED	AT 1	20 FF	ET.				=						: :	- :			
												=										
-118.0												=										
-123.0												=										
120.0	=											=										
-128.0	=											=					:		:	: :	1 1	- :
=	=											=										
-133.0												=							÷	: :		
-138.0																						- :
-130.0												=							:	: :		
-143.0												3					- :	<u> </u>	<u>:</u>	: :	1 1	
=	=											3										
-148.0	=											3						-	:	: :	: :	-
-153.0	=											=							:			
-155.0	=											=										
-158.0]]					:	1 1	<u>:</u>	: :	: :	:
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-163.0												=						1 1	:		: :	:
169.0	=]						<u>:</u> :	:		<u> </u>	_ :
-168.0	=											=							:			:
-173.0												=										
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-178.0												=					:	1 1	:	: :	1 1	:
100.0												=										
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=	=											<u> </u>						<u> </u>	- :		<u> </u>	
			CANADI	ED.	TVDE					LE	GENI)				יי וום	IC NAC	TUOD				
SS - S	Split Spoo	n	SAMPL	N	IQ - Ro	ock Co	re, 1-	7/8"			HS	SA - Hol	ow St	em Au	ıger			N - Ro				
ST - S	Shelby Tu	be e, 1-1/8"		C	CU - Cu CT - Co	uttings	_				CF	A - Cor Driv	itinuou	ıs Flig	jht Au	gers	R	C - Ro	ck Cor	e		



File No Site De			24B	Proje					1 13	1 -00		r ₁ 30	unty:	101	., \I \L		TON	•	ng./G	oute:		BAUM	
Boring				PT AL									(Offse	ıt.	\neg				ment:			
Elev.:				_atitud			32.83			Lou	nait	ude:		9529			Date	Starte			9/30/	'08	
Fotal D			52 ft		Soil D			ft				re De		ft	,50			Com				2008	
Bore H		_			4		Sam			fiau				r Re	auir					iner U			(Ñ)
Drill Ma				-550			letho						Hamme					\sim		rgy R			<u></u>
Core S					_	riller		S&				_	Ground		-			7 ft	1	24H		6 ft	
																			• :	SPT N	VALU	E●	
L .											ا ر	a)	m &				ω		PL X	M	C	LL —X	
Elevation (ft)	Depth (ft)		M	ATERI	AI D	FSC	RIPT	ION		ranhir	Log	Sample Depth	Sample No./Type	=	<u>.</u> 0		N Value		, ,			, ,	
Ele,	0.0			\						رُ	5	Sa De	Sa No.	1st 6"	2nd 6"	3rd 6"	ź	0.10		NES CC			
_	0.0	W	ASH R	OTARY	′ TO 5	0 FEE	ΞT								N	<u></u>		0 10	20 30	40 5	0 60	70 80	90
7.0		}]										1
7.0] =	¥											=										
2.0		1											=										
		1											=										
-3.0		1											=					- :	: :	:		: :	- :
=	=	1											_					:					
-8.0		1											_					:	: :	:		1 1	:
12.0		1											=										:
-13.0		1											=							:			
-18.0] =	1											=						<u> </u>			<u> </u>	
	=	1																					:
-23.0													=					:	: :	:		: :	- :
= =	=	1											_					:				: :	
-28.0		1											_					:		:			:
22.0		1											=						<u> </u>			<u> </u>	_ :
-33.0	=	1											=										-
-38.0	50.0	1		FD/F-	DIOT:					\perp		50.0								0)//			- :
	52.0	3' Ի	· X 30" USHEC	FIXED 24" W	PISTO ITH 24	N SA I" RE	AMPL COVE	E ERY		+			- ST					1	×	⊖ ×▲ (:
-43.0] =	1								_			=					<u> </u>	<u> </u>			<u> </u>	- :
	=	1											_					:					
-48.0		1											=									: :	:
-53.0		1																					
-55.0																							
-58.0	-	1																-	1 1		: :	<u> </u>	- :
=	=	1											_										
-63.0		1											=					:	: :		: :	: :	- :
00.0		1											=					:					:
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-73.0] =	=																					- :
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-78.0	=	1																:	: :	1 :	: :	1 1	:
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-83.0		1																	1 1				-
		1_																					
											LE	GENE)										
SS - S	Split Spo	oon		SAMPL			ck Co	re 1-	7/8"			НЗ	A - Hollo	w Ste	m Au	D	RILLIN	IG ME		otary W	ash		
ST - S	Shelby 7	Tube					ttings	. J, 1-1	, 5			CF	A - Conti	ทบดบร	, Tu	ສວາ ht A⊔	aers			ock Cor			



File No).224B		ect No				31-08-	554	Cou	nty:	CH	ARLE	STC)N	Er	ng./G		R. I	BOLL	ΞR
Site De			PORT					_										oute:	1,		
Boring		B-27 S										Offset					lignr				
Elev.:	12.0 ft		atitud			2.839		Lon	_			9540	75			tarte			3/2/2		
Γotal D		120 ft		Soil D			ft			Dep		ft					leted		3/2/2		
		meter (i	•	4				nfigur				er Red	• -		Υ	N			lsed:		(1
Orill Ma		CME	-850			thod		UD RO	OTAF	_	lamme		_				Ener			74%	
Core Si	ize:			Dr	iller:		SCI			C	round	dwate	er: T(ОВ	N/	Α		24H	R	N/A	
																	• 9	DT N	VALUI	F A	
Elevation (ft)	£							<u>ن</u> ا ن	E e	£	Sample No./Type				e ne		PL ×—	(C	$\overset{LL}{ o}$	
evat (ft)	Depth (ft)	MA	ATERI	AL DE	SCR	IPTIC	NC	Graphic	Log	Depth (ft)	amp J./T.		_0_	٥	Value		▲ FIN	ES CC	NITEN	NT (%)	
ă	0.0							9	S			1st 6"	8 2nd 6"	بر ا	z ₀					70 80	9
=	2.5	SLIGHTL								0.0	SS	4			19		•	:		: :	
7.0	5.0	medium fill	dense,	light br	own, f	ine; po	ossible			2.5 5.0	SS	2			10	•					
=	7.5	1						$-\ A$	4	7.5	SS SS	4			9			i			
2.0	‡	CLAYEY								10.0	SS	3			9 8 X		: 0	- :		<u> </u>	
3	15.	loose, lig	nt brow	n to br	own, fi	ne				<u>,</u>]	- 55		•			-					
-3.0	15.0	SLIGHTL	Y CLA	YEY S	AND (S	SP-SC)		 	15.0	SS	1	1 .	1	2	- :					
	20.0	medium		yellowi	sh bro	wn, fin	ne; with			20.0						:					
-8.0	20.0	crushed	stone							20.0	SS	1	1 2	2	3		*	0			
-13.0	\exists	SLIGHT								25.0								Ė			
-13.0	=	loose, gr	ayish b	rown to	yellov	vish br	rown,			=	SS	1	3 9	9 .	12	•		-			
-18.0	30.0	, L							% :	30.0	00		4 /	\perp	_	:		:	•	1 1	
- 5.5	\exists	CLAYEY								3	SS	1	1 2	2	3_	1		XX	A O		
-23.0	=	very loos	se, bluis	sh tan; v	with si	It and	shells	_] : -	$\cdot \cdot $	35.0	SS	1	4	7 .	11	<u>:</u>				<u> </u>	
\exists	₫	CLAYEY	SILT (I	<u>MH)</u>						40.0						-					
-28.0	=	soft, bluis	sh tan;	with sa	nd and	d shell	S		<u> </u> '	40.0	SS	4	7 8	8 .	15	•		-			
	=	stiff								45.0											
-33.0	=	COOPER	R MARL	: SANI	DY SIL	T (ML	<u>.)</u>			=	SS	2	4	7	11	•	: :	ΧO	X	: :	
-38.0	=	soft, gree	enish br	rown, fi	ne; wit	h shel	ls			50.0	00										
	∄	stiff							- :	=	SS	3	5 6	6	11						
-43.0	‡	von	etiff					$ \cdot $;	55.0	SS	4	11 1	2 2	23					: :	
=	=	very	อแแ					: -		Ē.,,			'			:	-	-			
-48.0	=	stiff							-[:]	60.0	SS	4	5 8	8	13	•		-		<u> </u>	
	∃	2,4								65.0 65.0											
-53.0	∄								- : '	JJ.J	SS	4	4 8	8	12	•		:			
-58.0	\exists									70.0						<u>:</u>		:	: :	: :	
35.0	‡									=	SS	3	3		10			:			
-63.0	F									75.0	SS	2	5 6	6 .	11	-		- :		1 1	
=	=							$ \cdot $.		<u> </u>	- 55				•			Ė			
-68.0	=									80.0	SS	2	4 9	9	13	•		-		<u> </u>	
	∄							: :		85.0 _						:					
-73.0	=								- - - - - - - - - - - - -	JJ.J	SS	1	2 8	8	10	•		:			
-78.0	∄							: -		90.0			_			:		:		: :	
, 0.0	Ę	very	stiff						- :	=	SS	1	2 1	5	17	•					
-83.0	7	- 0.00								95.0	SS	2	4 8	8 .	12						
=	=	stiff								‡	33		- (1	14						
-									<u>: . 10</u> .EGE	00.0☐ = ND						:	: :	Conti	nucd	Nove	P
			SAMPL	ER TY	PE			L		חוו				DRII	LING	METI		COHIL	nued	Next	
	Split Spo Shelby T	on		NQ		Core,	1-7/8"				- Hollo			r			- Ro				
		re, 1-1/8"				iys inuous	Tube				- Conti - Drivir			, tuge		NO	- 110	on OUI	J		



Site De	.: 10	on:	POR	T AC	CES	SRC	DAD											/Geo. Rout	e:		ER.
Boring			SPT A									Offse	et:					nmer			
	12.0 ft		Latitu		<u> </u>		33996	55	Longi	tude:		9540			Date	Start		· · · · ·		2009	
Total D		120			l Dep		ft			ore De		ft				Com		ed:		2009	
	ole Dia	meter	(in):	4			npler	Conf	igurati			er Re	qui			(N)			Used	i: Y	(1
Orill Ma	achine:	CN	1E-850		Drill		nod:	MU	D ROT	ARY	Hamm	er Ty	/pe:	Auto	omat	ic	Er	nergy	Ratio	: 74%	
Core S	ize:	•			Drill	er:	SC	Ì			Groun	dwat	er:	TOE	1 8	N/A		24	HR	N/A	
																		SPT	N VALI	JE ●	
Elevation (ft)	Depth (ft)	ı	MATEF	RIAL	DES	CRIF	OIT	I	Graphic Log	Sample Depth (ft)		1st 6"	2nd 6"	3rd 6"	N Value	0 10	PL × ▲ F 20	INES	MC CONTE	LL ENT (%) 0 70 80	09
_	=										SS	2	4	8	12		1	: :		: :	
-93.0										105.0					40						
]	SS	3	4	9	13	:	7				
-98.0		ve	rv etiff							110.0	- SS	4	7	10	17	1 :	•	: :		- : :	
=		ve	iy Sull							115.0		•	•]	-:				
-103.0											SS	4	5	14	19		•				
-108.0	120.0								[:[:[:]:	118.5	SS	11	11	24	35	L	_				
- 100.0		_														:	:				
-113.0	=	D C					100									<u> </u>		1 1			
=		RO	RING TI	EKMI	NAIE	JAI 1	ı∠v FE	⊏1.		:											
-118.0	=										1						- :		- : :	- : :	
]	1					:	:				
-123.0											1					:	:				
-128.0											=					1	- :		: :	: :	
0.0											=					:	:				
-133.0											=					- :	- :	: :	<u> </u>	<u> </u>	
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-138.0]									:							:	: :	: :	: :	
-143.0											=					L_ :		<u>:</u> :		<u>:</u> :	
- 143.0	=																				
-148.0	=															- :	- :	: :	<u> </u>	- : :	
=	=															:	:				
-153.0										:							:	: :	<u>: :</u> :	- : :	
150.0										:							:				
-158.0 <u>-</u>										:	1					:	:	: :	: :	: :	
-163.0											1						- :	<u> </u>	<u> </u>	- : :	
-											1					:	:				
-168.0	=										1					:	:	: :	: :	- : :	
=											1					:	:				
-173.0]	1						:				
-178.0											=					- :	<u> </u>	: :	: :		
5.5											=					:	:				
-183.0											1					- :	- :-	: :	: :	<u>: :</u> :	
=]									:						:	:				
	1								LF	GEND	<u> </u>				<u> </u>	<u> </u>	-			<u> </u>	
			SAMI		TYPE			7.6"				<u> </u>			RILLIN	IG ME					
SS - S	Split Spoo Shelby Tu	on		1	NQ - F	ock C	ore, 1-	7/8"		HS	A - Hollo A - Cont	w Ste	m Au	ıger		R	VV -	Rotary	Wash Core		



ile No.			24B			t No. ((PIN): SS ROA		131-	JØ-55	4 CO	unty:	CH	ARL	⊏ 51	ON		⊏n(J./Ge	eo.: ute:	IVI.	EICH	⊏LRI
Boring							ocatio						Offse	t·				Δli	gnm				
	12.0 f			Latitu				39965		onai	tude:		.9540			ate	Star				 3/3/2	2009	
Total D		_	38 ft			il Dep		ft			ore De		ft		_				ted:			2009	
Bore Ho		$\overline{}$			4			pler C	onfic	_		• •	er Re	quire		Y	(Ñ	•		er U			(N)
Orill Ma				E-850			Metho					Hamm				mat						74%	$\overline{}$
Core Si	ze:					Drille	er:	SCI				Groun	dwate	er:	ТОВ	I	N/A			24HI	₹	N/A	
																			• SF	PT N \		E●	
ion	£									 은 _	e c	le de				ne		Ę	ԴL X	MO	<u> </u>	$\overset{LL}{ imes}$	
Elevation (ft)	Depth (ft)		M	1ATEF	RIAL	. DES	CRIPT	ION		Graphic Log	Sample Depth	Sample No./Type	9	9	9	N Value			FINE	S CO	NTEN	NT (%)	
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7.0	Ξ											=					H		:				
=	Ξ											=						:			:		
2.0	Ξ											=					H		:	<u>. :</u>	- :	- :	- :
												=						:			:		
-3.0	=											=						- :			:		
-8.0	=											=							- :	<u> </u>			- :
=:-	Ξ											=						:	:		:		
-13.0	=											=					-	- :	:	1 1	- :		- :
=	30.0										30.0	=						:	:		:		
-18.0	32.0						SAMPLI	E			33.0	_ ST						-:	:	X	(2)	- X	- :
-23.0	33.0 <u> </u>	$\Gamma \cap \Gamma$					OVERY					ST						:	X 4 C) .	:		:
-23.U <u> </u>	36.0	1 1 -				O 33 FI			/f		36.0	ST] :		X (× :			
-28.0	38.0	3'	' X 30	" FIXE	D PIS	STON S	SAMPLI OVERY	E	ſ			‡					-	- :	:	1 1	:		- :
=	Ξ	1 11-				O 36 FI						=						:	:		:		
-33.0	Ξ	1 1					SAMPLI					=						-:	:	: :	:	: :	- :
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-38.0	=	_		_		_		_				=						-:	:		:		- :
-43.0	=											=						:	:		:	- : :	- :
= = =	Ξ											=						:	:		:		
-48.0	Ξ											=					- :	- :	:	: :	:	<u>: :</u> :	- :
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30.0	Ξ											=						:	:		:		
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3	=											=						:	:		:		
-68.0	Ξ											=						:	:		:	- :	
-73.0	Ξ											\exists							<u>:</u>	<u> </u>			
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										LE	GENI)	1				<u> </u>	-	•	•	•	<u> </u>	-
	- II.t C		-	SAM	PLER	RTYPE)!: O	4					O:	^		RILLIN	IG M					-	
	Split Spo Shelby T						Rock Cor Cuttings	e, 1-7/8	5 "			SA - Holle FA - Con				ore				ary Wa k Core			

SC_DOT 08554.GPJ SC_DOT.GDT 4/3/09



Route Secription: PORT ACCESS ROAD Route R	LBE
Institute	
Otal Depth: 120 ft Soil Depth: ft Core Depth: ft Date Completed: 2/17/2009 2/17/2009 CME-550 Drill Method: MUD ROTARY Hammer Type: Automatic Benergy Ratio: 74% Otal Core Size: Driller: S&ME Groundwater: TOB 7 ft Energy Ratio: 74% Otal Core Size: Driller: S&ME Groundwater: TOB 7 ft Z4HR N/A	
Ore Hole Diameter (in): 3in/4in Sampler Configuration Liner Required: Y % Liner Used: Y 74% Liner Used: Y % Liner Used: Y 74% Liner Used: Y 74% Liner Used: Y X Y Y Y Y Y Y Y Y	
Till Machine: CME-550 Drill Method: MUD ROTARY Hammer Type: Auto—atic Renergy Ratio: 74% N/A	
Second water Tob 7 ft 24HR N/A	N
Second S	
MATERIAL DESCRIPTION 2.0 2.0 2.0 3.0 3.0 14.0 -8.0 18.5 -13.0 18.5 -13.0 -8.0	
MATERIAL DESCRIPTION 2.0 2.0 2.0 3.0 3.0 14.0 -8.0 18.5 -13.0 18.5 -13.0 -8.0	
MATERIAL DESCRIPTION	
CLAYEY SAND (SC)	
CLAYEY SAND (SC)	
2.0	90
2.0	:
SiltTY SAND (SM)	
-3.0 -8.0 -8.0 -8.0 -8.0 -8.0 -8.0 -8.0 -8	-
	-
-8.0 -18.0 -18.0 -18.0 -18.0 -18.0 -18.0 -18.0 -18.0 -18.0 -23.0 -23.0 -23.0 -28.0 -33.0 -38.0 -	
-13.0 -13.0	-
-18.0	
cose, light brown, fine; with shell hash cose, light brown, fine; with shell cose, light brown, fine; saturated cose, light brown, light brown, light brown, light brown	:
clay (CH) very soft, gray, fine, saturated; with shell 28.5 SS 1 1 2 3 3 4 3 4 4 3 5 5 5 5 5 5 5 5 5	÷
-28.0 -28.0 -28.0 -28.0 -28.0 -38.5 -33.0 -38.0 -38.0 -38.0 -38.0 -48.0 -48.0 -58.0 -58.0 -58.0 -58.0 -63.0 -68.0 -68.0 -73.5	-
very soft, gray, fine, saturated; with shell	i
trace shell & organics no shell SILTY SAND (SM) very loose, greenish gray, fine, saturated with trace shell loose medium dense course grained; with phosphate and shell course grained; with phosphate and shell soft soft soft SS 1 1 1 2 3	:
no shell Siltry SAND (SM) very loose, greenish gray, fine, saturated 43.5 SS 2 2 2 4 M M with trace shell with trace shell loose 48.5 SS 7 6 2 8 medium dense course grained; with phosphate and shell COOPER MARL: SANDY SILTY (ML) firm, olive green, fine 68.5 SS 2 2 2 4 M course grained; with phosphate and shell COOPER MARL: SANDY SILTY (ML) firm, olive green, fine soft sof	- :
-33.0 -38.0 -38.0 -38.0 -48.0 -48.0 -53.0 -58.0 -68.0 -68.0 -68.0 -38.0 -38.0 -38.0 -38.0 with trace shell with trace shell with trace shell medium dense course grained; with phosphate and shell course grained; with phosphate and shell soft	
-38.0 -38.0 -43.0 -43.0 -48.0 -53.0 -58.0 -68.0 -68.0 -68.0 -73.5 -78.5	- :
-38.0 -43.0 -48.0 -53.0 -58.0 -68.0 -68.0 -73.5 -78.5	-
-43.0 -48.0 -48.0 -53.0 -58.0 -63.0 -68.0 -68.0 loose medium dense medium dense course grained; with phosphate and shell course grained; with phosphate and shell soft soft soft loose medium dense course grained; with phosphate and shell soft soft soft soft soft soft loose medium dense soft soft soft soft soft soft loose soft soft soft soft soft soft	
medium dense course grained; with phosphate and shell course grained; with phosphate and shell soft 53.5 SS 3 5 5 10	
-48.0 -53.0 -58.0 -58.0 -68.0 -58.0 -58.0 -58.0 -68.0 -73.5 -78.5	:
-53.0 -58.0 -58.0 -68.0 -68.0 -58.0 -73.5 -78.5 -78.0 -78.5 -78.0 -78.5	i
-53.0 shell	-
Shell COOPER MARL: SANDY SILTY (ML) firm, olive green, fine -63.0 -68.0 -68.0 -68.0 -68.0 -68.0 -68.0 -68.0 -68.0 -73.5 -78	-
-58.0 -63.0 -68.0 -73.5 -78.5	-
-63.0 -68.0 -resoft -r	- :
-63.0 -68.0 -68.0 -73.5 -78.5 -78.5 -78.5 -78.5	
-68.0 soft 73.5 soft 78.5 soft	- :
-68.0 SS 2 2 2 4 • 78.5 78.5	:
\dashv \dashv r	-
-73.0 d d d d d d d d d d d d d d d d d d d	
	:
78.0 = = = = stiff 83.5 = =	:
-70.0]]	
-83.0 firm firm firm firm firm firm firm	<u>:</u>
-03.0]	:
-88.0 SS 2 2 3 5 ●	
98.5	
	:
LEGEND Continued Next F	Page
SAMPLER TYPE DRILLING METHOD SS - Split Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Wash	
T - Shelby Tube CU - Cuttings CFA - Continuous Flight Augers RC - Rock Core WG - Rock Core, 1-1/8" CT - Continuous Tube DC - Driving Casing	



							g Lo																
File No		0.22					(PIN):		1131	-08-5	54 Co ı	unty:	CH	HARI	_ES1	ON		Enç	j./Ge		M.	EICH	ELBE
Site De				PORT											-			T =		ute:	<u></u>		
Boring				PT AI		ıng L			_		4		Offs				O+		gnm			100	
Elev.:				.atitud		l Dan		3459		Longi			.955	548		ate					2/17		
Total D Bore H			120 ft			l Dep		ft		igurat	ore De	<u> </u>	ft er Re)ate			ted:	er U		/2009 : Y	(N)
ore n Orill Ma			CME-				Meth					⊢Line Hamm					_					74%	
Core S		<u>, </u>	OIVIL-	- 550	_	Drille			ME	- 101		Groun					7 ft			24H		N/A	
																						1	
																			• SF	PT N Y	VALL	JE ●	
Ę	_									ပ	ω _	0 0				Φ		Ę	PL ×—	M	Ć	LL ×	
Elevation (ft)	Depth (ft)		MA	ATER	IAL	DES	CRIP	TION		aphi -og	Sample Depth (ft)	Sample No./Type	ļ.,	9	<u>.</u>	N Value			•			, ,	
E										ق ا	Sa	Sa No.	1st 6"	Znd	3rd 6"	ź	0 10	 0.20	FINE	S CC 40 50	NTE 0 60	NT (%) 70 80	90
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-98.0	1	=									103.5	SS	3	2	3	5	•	:	:		:		:
=		=									108.5						:	:			:		:
-103.0	1		- stiff									SS	5	8	5	13	1 1	• :	:	: :	:	: :	- :
-	1	=	004								113.5	SS	2	2	2	4		:			:		:
-108.0	1	d	- soft								140 5	-	<u> </u>					:	:		:		
-113.0	120.0	1	- firm								118.5	SS	2	3	3	6	•	- :	- :		- :		- :
=	1	1																					
-118.0	1	=	BORIN	NG TEI	RMIN	NATE	D AT 1	20 FF	ET.			1						- :		: :	- :	- : :	- :
460 -	1	=				- -	•					1											:
-123.0	1	=										1						:	:		:		:
-128.0	1	=										1						:			:		:
	1	=																:	:		:		:
-133.0	1	=									-							:		: :	:		:
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=	1	=										1					:				:		
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				SAMPI	I FP	TVPE				LE	GEND)			חם	RILLIN	IC M	FTH/	חכ				
SS - S	Split Sp	oon	,	OMIVIE'I	Ν	NQ - R	lock Co		7/8"			A - Hollo			iger		I	RW .	- Rota				
ST - 9	Shelby	Tube ore, 1-	-1/8"		C	20 - C	uttings ontinu	ous Tu	be			A - Cont - Drivi			nt Aug	jers	ı	KC -	- Roc	k Cor	е		



File No		7 ■ Soi 0.224B		et No. (113	1-08-5	54 Co	untv:	СН	ARLES	TON	E	ng./Geo.:	: P. (OREE	
Site De			PORT A					1 - 0	-,.					Route			
Boring			SPT A IB						(Offset				Alignmen			
Elev.:			Latitude		32.842		Longi	itudo:		95056		Dato	Starte		10/17	7/08	
Total D		120 f		oil Dept		ft		ore De		ft				oleted:		7/2008)
				4 Dept					• ,				(N)		Used:		
		ameter (i	,				figurat				quired:		$\overline{}$				N
Drill Ma		: CME	-4 5		Method		וטא טנ		Hamm					Energy			
Core Si	ıze:			Drille	r:	MAD			Ground	dwate	r: TO	В	Γidal	24	HR	N/A	
									_			_		• • • • • • • • • • • • • • • • • • • •			
														● SPT I	N VALUI	= ●	
5	_						్లు	ے ہ	e e			o o		PL ×	MC	LL —X	
(ft)	Depth (ft)	М	ATERIA	LDESC	RIPTIO	NC	Graphic Log	Sample Depth	a m L	=_	oj	N Value		, ,	_	, ,	
Elevation (ft)			, , , _ , , ,			J. .	5	Sa	Sample No./Type	1st 6"	2nd 6" 3rd 6"	Ź	0.40	▲ FINES C			00
	0.0		Y SAND (S	C)			177	0.0		Λ 	2nd 6" 3rd 6"	0	0 10	20 30 40	50 60	70 80	90
=	=		se, greeni		arown fir	20		2.5	-	1	VOR	0					=
-9.5	5.0	very loo	se, greeni	Sii giay i	JIOWII, III	ie	_{{//	5.0			VOR	0		X	: :	- :	<u> </u>
∃	=	CLAYE	Y SILT (MI	<u>H)</u>				7.5	= 00		VOR	0		X	<u> </u>	-	- 11 1-
-14.5	=	very sof	t, olive gre	en, with	trace sa	nd		10.0	- SS		VOH	0		: '` :	: :		
3								:	-	'							Ξ
-19.5								15.0	- SS	3	1 2	3		: : : : : : : : : : : : : : : : : : :	· · · · · ·	: :	<u> </u>
=	=	soft									' -					: :	
-24.5	20.0	COORE	D MADI -	CANDY	CII T /NAI	١		20.0	- SS	2	1 2	3	•	<u> </u>	: :	1 1	: -
3			R MARL:	SANDY	OILI (IVIL	-1			=		1 4						
-29.5	=	soft, oliv	e green					25.0	SS	2	2 3	5			1 1	+ +	
3								1	=			T				: :	: =
-34.5	=	≎r:tt						30.0	- SS	3	5 5	10	-	1 1 1	: :	1 1	-
]	_	stiff									<u> </u>	10				: :	: =
-39.5	=							35.0	- SS	4	4 5	9		* ************************************		<u> </u>	
]										-	4 5	+ 3					
-44.5	=							40.0	- SS	3	3 5	8			<u> </u>	-	
3									_	3	3 3	0					: E
-49.5	=	_						45.0	- - SS	3	3 4	7			: :	: :	
]		firm							<u> </u>	3	3 4	+ /					: <u>=</u>
-54.5	=							50.0	-	_	4 0	10					
		stiff							- SS	3	4 6	10					=
-59.5	=	_						55.0	- SS		3 3				: :	1 1	<u>: -</u>
3		firm							<u> </u>	3	3 3	6			: :		= =
-64.5								60.0	-	2	3 3	-					
= = =		with 	trace she	ell				-[SS	2	3 3	6					= =
-69.5		_						65.0	1		2 2				: :	<u>.</u>	
3		soft							- SS	3	2 2	4	•	XX	' i i i	A	: =
-74.5	=	_						70.0	- 00	4	3 4	7		<u>: </u>	<u>: </u>	<u>: i</u>	=
		firm 	; no shell						SS	4	3 4	+ ′					: =
-79.5	=		Anna a - I-	.II				75.0	- SS	3	3 3	6					
]		with	trace she	e11					1		<u> </u>	+ 5					-
-84.5	=							80.0	- - SS	3	2 3	5			: :	<u> </u>	<u>: -</u>
3		soft									<u> </u>				: :	1 1	1 3
-89.5	=	3011						85.0	- SS	3	4 5	9					-
]	=	stiff					: . - :				<u>+ 3</u>	1 9					= =
-94.5	=	_						90.0	- SS	2	3 4	7	=	<u>: : : : : : : : : : : : : : : : : : : </u>	<u> </u>	: :	<u>: -</u>
=		firm 					- - -				J 4	+'-				: :	: =
-99.5								95.0	-	1	1 6	10		<u> </u>	: :	: :	_ ; _ =
=======================================	=	stiff						1	SS	4	4 6	10	T		: :	: :	=
								100.0					1	<u> </u>	1 1	: :	_ : =
							LE	GENE)						tinued	Next	Page
SS - S	Split Spc		SAMPLE	R TYPE	ock Core,	1_7/0"		ЦС	SA - Hollo	W Ston		RILLIN	IG MET	THOD V - Rotary '	Mach		
	Shelby T			CU - Ci		1-110			A - Cont			ıgers		· - Rocary			
		re, 1-1/8"			ontinuous	Tube			- Drivii			-					



File No).224B		ect N				113	1-08-55	4 Co	unity:	Cr	IAK		TON			Geo.:		OREE	
Site De			PORT															Route			
Boring		B-29 S										Offse						nmen			
	-4.5 ft		_atitu				4252		Longi			.950				Start				7/08	
Γotal D		120 ft		Soil	<u> </u>		ft				epth:	ft				Com	• -			7/2008	
		meter (i		4					igurat			er Re			Y	$\overline{}$			Used		(1
	achine:	CME	-45	_		Meth			D ROT	ARY	Hamm						En			70%	
Core S	ıze:				Orille	er:	MA	AD.			Groun	dwa	ter:	TOE	3	Γidal		24	HR	N/A	
																		CDT	N VALU	IE 🗭	
Elevation (ft)	₽								þ –	e t	Sample No./Type				ne		PL ×		MC	$\overset{LL}{ o}$	
evat (ft)	Depth (ft)	M	ATER	IAL C	DESC	CRIP	TION	1	Graphic Log	Sample Depth	am (T.C		9	9	N Value		≜ F	INESC	ONTE	NT (%)	
ū									O	S	II	"9 1st 4	"9 bn2 4	3rd 6"		0 10				70 80	9
=		no s	hell								SS	4	4	6	10	•					
-109.5]									105.0		-	1	E	0		-				_
-	=										- SS	5	4	5	9		:	X÷C			
-114.5										110.0	- SS	6	9	10	19	:	:	: :	: :	: :	
=	=	very	stiff								_					1	-				
-119.5										115.0	SS_	4	5	7	12	•	:		: :		
104 =	120.0	stiff									=						:		: :		
-124.5 -]	=					:	:		: :	: :	
-129.5	=										=						-				
	=	BORI	NG TEI	RMIN	ATED	AT 1	20 FE	ET.			=										
-134.5											=						:	: :	<u> </u>		
	=										=										
-139.5	=										=						:			: :	
] =										=						:		: :		
-144.5	=										=						:				
-149.5	=										=						- :		: :	- : :	_
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-154.5											=						:		: :	: :	
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164 =]										=								<u>i</u> i		
-164.5 <u>-</u>]										=										
-169.5]										=										
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=]]										=						:				
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-199.5	=										=										
	=										1							<u> </u>	: :	<u> </u>	_
									LE	GENI)										_
SS - S	Split Spo	on	SAMPI	N	Q - Ro	ock Co		7/8"		HS	SA - Hollo	ow Ste	em Au	ger		IG ME R) Rotary \	Wash		
ST - S	Shelby To	ube				uttings					A - Con	tim	o Elial	ĥŧ Λιι	aoro			Rock C			



File No		.224B				(PIN):		31-08-5	54 C c	unty:	CH	IARL	ES1	ΓON	E		Geo.	_	. EICH	HELBE
Site De	escripti	on:	POF	RT AC	CCES	SS RO	AD									- 1	Route	e:		
3oring	No.:	B-31	SPT	Boı	ring l	_ocati	on:				Offse	et:				Alig	nmer	nt:		
Elev.:	3.0 ft		Latitu	ude:		32.84	12866	Longi	itude:	79	.9494	65		Date S	Start	ed:		10/	8/08	
Total D	epth:	120	ft	Soi	il Dep	oth:	ft	C	ore D	epth:	ft			Date C	Com	plete	ed:	10/	8/2008	3
Bore H	lole Dia	meter	(in):	4		Sam	pler Co	nfigurat	ion	Lin	er Re	quir	ed:	Υ	N	ı	Liner	Used	d: Y	N
Drill Ma	achine:	CM	E-850)	Drill	Metho	od: M	UD RO1	ΓARY	Hamm	er Ty	pe:	Auto	matio	;	En	ergy	Ratio	73%	, 0
Core S	ize:				Drill	er:	MAD			Groun	dwat	er:	TOE	3 T	idal		24	HR	N/A	
																			1	
																•	SPT	N VAL	UE •	
o	ا ہے ا							. <u>e</u>	ے ہو	e e				e l		PL ×		MC	$\overset{LL}{\longrightarrow}$	
Elevation (ft)	Depth (ft)	N	/ATEI	RIAL	DES	CRIP1	TION	Graphic	Sample Depth	Sample No./Type	 	9	9	N Value			INFO	OONT	-NIT (0/	`
Ele	0.0							5	۵ ک	l s S		2nd 6"	3rd 6"	z) 10				ENT (% 0 70 8	
	3.0	SANDY	CLAY	(CL)				1//	0.0	- SS	<u> </u>	WOR	۲.)	0) :			: 0	:	
=	5.0	very so				e; with re	oots		2.5	SS	<u> </u>	WOR		0	. :	:			:	
-2.0	1 3.0	<u> </u>			· · · · · · · · · · · · · · · · · · ·			- /////	5.0 7.5		<u> </u>	WOR		0	1		X	×	:	A
=	‡	SILT (N		,	ا حالاندر ،	traca =-	oto or -l		10.0	- 66	1	WOR		0	•					
-7.0	1 1	very so organic		k gray	, with	uace ro	ois and		1 .0.0	SS	<u> </u>	WOR		0	1	:	: :	X	- >	× _
40.0	‡ ‡	J. 301110							15.0	,=					:				:	
-12.0]								1	SS	—	WOR		0	1	:			:	
470	‡ ‡								20.0	,=					:	:			:	
-17.0]	no	odor							SS	-	WOR		0	1	:			:	
22.0] =								25.0	1	\perp					<u>:</u>	<u>. </u>		:	<u>i </u>
-22.0]									SS	'	WOR		0	:					
27.0	1 1								30.0	1	\perp				<u>:</u>					
-27.0 <u>-</u>	‡ ‡	witl	h trace	shell						SS		WOR		0	:	-				
-32.0 -	35.0								35.0							<u>:</u>	<u> </u>			<u> </u>
-32.0	‡	COOPE					MH)	<u> </u>		SS	3	3	4	7			X	×	A	A
-37.0 -	1 1	firm, oli	ve gre	en; wi	ith clay	y			40.0	1					<u>:</u>	<u>:</u>	<u> </u>			
-01.0	‡ ‡	stif	f							- SS	2	3	5	8	•	:				
-42.0 ⁻	1 1								45.0	1					:				:	
- 1 2.0 _	‡	ver	y stiff						1	- SS	6	7	9	16		•				
-47.0 -	1 1								50.0	1		_			:					
- 1.0-	‡ ‡									SS	5	6	9	15) :	1 1		:	: :
-52.0 -]								55.0	1						- :			:	
JZ.U_	‡ ‡	firm	n							- SS	2	3	5	8	•					
-57.0 -]		_						60.0	<u> </u>	1			4.4	:	:	1 1			
Ju_] =	stif	t						1	SS	3	5	9	14	•	'				
-62.0 -	‡								65.0	1	1	2	7	10		- :	<u>. i</u>		- :	: :
	<u> </u>	trad	ce shel	II					1	- SS	3	3	1	10	-					
-67.0	‡ ‡								70.0	- ss	2	5	7	12	:	:	1 1	- : :	<u> </u>	<u> </u>
-]									35	+	<u> </u>		14		:			:	
-72.0	‡ ‡	£:	•						75.0	- - SS	2	2	4	6		- :			:	
Ξ]	firm	1					- : : -	1		+-		7	0						
-77.0 <u> </u>] =								80.0	- SS	1	3	4	7		:	1 1	:	:	: :
=	‡								1		+ '		7	'		:			:	
-82.0]	stif	f						85.0	- SS	2	4	7	11		- :	1 1		:	<u>: </u>
=	‡ ‡	501	ı					- : : -	1		† <i>*</i>		,		:					
-87.0]								90.0	- - SS	1	3	6	9	:	:	: :	- : :	- :	
=	‡ ‡									7	T					:				
-92.0]								95.0	- <u>SS</u>	3	5	8	13	•	:	<u> </u>		:	: :
=	‡ ‡									1	T								:	
	1 -							<u> </u>	100.0						:	-	· · ·	-4!	. al A.I	4 D-
			CANA	ם בי	TVDE	:		LE	GENI	J			רי	OII I INI	2 M/E	TUOF		าเเทน6	d Nex	t Pag
	Split Spo		SAIVI	LLEK	TYPE NQ - F	: Rock Co	re, 1-7/8"		HS	SA - Holl	ow Ste	m Au		RILLIN			Rotary	Wash		
ST - S	Shelby Tı	ube			CU - C	Cuttings			CF	A - Con	tinuous	s Fligh		gers			Rock C			
AWG - I	Rock Cor	e, 1-1/8"		(CT - C	continuo	us Tube		D0	C - Driv	ing Ca	sing								



File No Site De		0.224 on:			t No. (101-C	,o-ot) 4 C 0	unty:	СП.	AKL.	EST	OIN	[Eng./G	oute		EICH	_LDE
Boring			31 SPT		oring L							Offse	t:				Align				
Elev.:				itude:			2866	1	onai	tude:		9494		Г)ate	Start			10/8	1/08	
Total D		12	20 ft		il Dep		ft			ore D		ft					pletec	1.		/2008	
Bore H							oler Co	nfia	_			r Re	auir		Y	(N)			Used		(Ñ)
Drill Ma			ME-8			Metho					Hamm				1					73%	<u> </u>
Core Si		. C	,ıvı∟-o	30	Drille		MAD		KUI	ANI	Ground			TOB		idal	LITE	24F		N/A	
Sole S	ize.				ווווט	₹I.	IVIAD				Ground	ıwaı	∄1.	IUB) !	luai		241	ıĸ	IN/A	
																	• :	SPT N	I VALU	JF •	
tion	£ _								hic	ple th	ple				Ine		PL ×		MC	LL —×	
Elevation (ft)	Depth (ft)		MAT	ERIAL	_ DES	CRIPT	ION		Graphic	Sample Depth	_	1st 6"	"9 Znd 4	3rd 6"	N Value	0 10				NT (%) 70 80	90
=	=										- SS	2	4	8	12	•	· >		€ :		
-102.0	=			••						105.0) =	WOH	2	14	17				<u> </u>	: :	
=	=	'	very stif	П								VVOH	3	14	17			:			
-107.0	=									110.0)	3	6	11	17			- :	<u> </u>	- : :	
=	=											<u> </u>	U	-11	17			:			
-112.0	=									115.0) - - SS	3	6	10	16			- :	: :	: :	
=	=									118.5	t:										
-117.0	120.0								<u> </u>	1	SS	7	6	11	17	: 1		:	1 1	: :	
=	=										=					:				: :	
-122.0	=	R	ORING	TFRM	INATFI) AT 12	0 FEET	.			=					:	- : :	- :	: :	1 1	
=	=	0		LEINI		- Al 14	LI	.			\exists					:					
-127.0	=										=					:	+ +	÷	1 1		- : :
=	=										=					:		:			
-132.0	=										=					:	: :	:	: :	: :	
	=										=					:					
-137.0	=										=							-			
140.0	=										=					:					
-142.0	=										=							-		: :	
-147.0	=										=					:					
-147.0	=										=					:				: :	
-152.0											=					<u> </u>	1 1			: :	
	=										=							:		: :	: :
-157.0	=										=					- :	1 1		<u> </u>	<u> </u>	
=	=										=					:	: :	:		: :	
-162.0	=										=					:	1 1	- :	1 1	: :	- : :
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-167.0	=										=					:	: :	:	: :	: :	- : :
=	=										=					:					
-172.0	=										=					:	1 1	:			: :
	=										=							:			
-177.0	=										=					:	1 1	1			
-182.0	=										\exists							<u> </u>			:
-102.0	=										=										
-187.0	=										=					- :			<u> </u>		
.57.0	=										=					i					
-192.0	=										=										
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	=															:	1 1	<u>:</u>	1 1	1 1	- : :
			~ .	MDI	7 7/2-				LE	GENI))	<u> </u>	TUOS				
SS - S	Split Spo	on	SA	NVIPLEF			e, 1-7/8	"		HS	SA - Hollo	w Ster	n Au	ger		R۱	THOD N - Ro				
ST - S	Shelby T Rock Co	ube	'0 "		CU - C	uttings	us Tube			CF	FA - Cont C - Drivii	nuous	Fligh	nt Aug	gers		C - R				

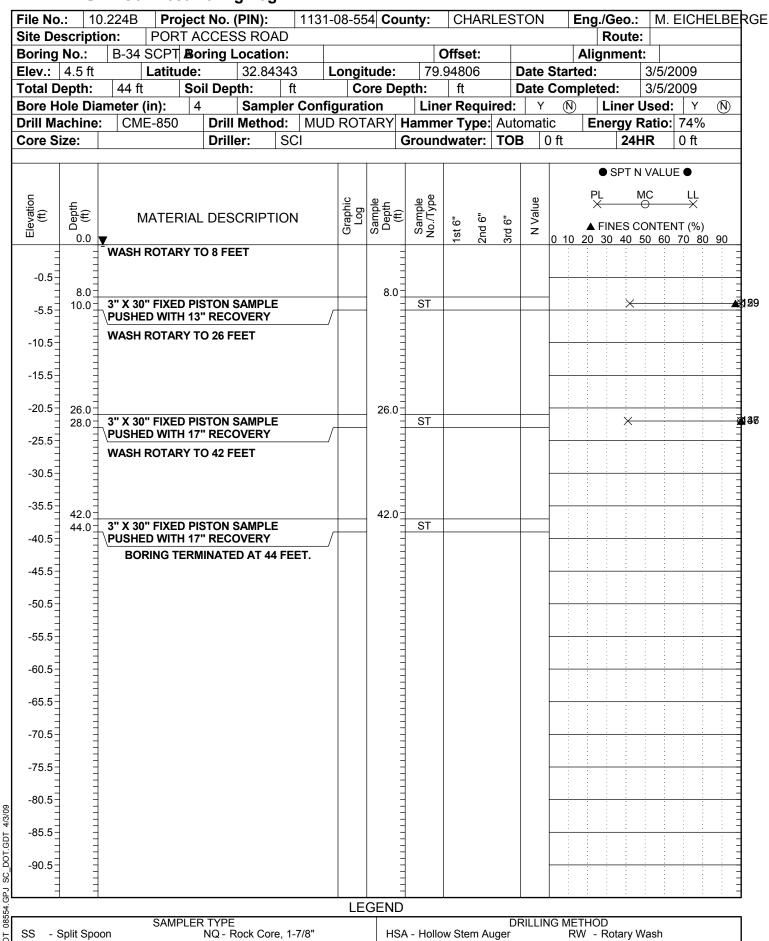


Site De		IDODT 1	005005	710			unty:	CHA				ing./C		+	BOLLI	
			CCESS RO				1.	Off4.					oute:			
Boring Elev.:	4.0 ft	B-33 SPT Bo	ring Locat	342972	Long	itdo.		Offset: .949128	,	Doto	Start		ment:	9/24/	00	
⊏iev.: Total D			∣ ა∠.୯ il Depth:	ft	Long	ore D		ft	•		Com			9/24/ 9/24/		
		meter (in): 4	·	npler Cor			•	er Requ	iirod			• –	iner U		2008 Y	(N)
Drill Ma			Drill Meth		JD RO		Hamm				$\overline{}$		rgy R	_		<u> </u>
Core S		. ONL-330	Driller:	S&ME	D IVO	1741		dwater			N/A		24H		N/A	
00.00	.20.		D 1111011	JOGIVIE		ļ	O. Gair	arrato.	. ,		1 1// (14// (
												•	SPT N	VALUE	•	
Elevation (ft)	Depth (ft)	MATERIAL	. DESCRIF	PTION	Graphic	Sample Depth	Sample No./Type	1st 6"	3rd 6"	N Value		PL ★	M NES CC)	LL ×	
Ш	0.0	OU TV OAND (OM			10.1		_				0 10		40 5			90
3	=	SILTY SAND (SM) very loose, light bro	to arecom	iah hraum		1.0	:]	3 2	2 2		•	: :		:	: :	:
-1.0	6.0	fine; with shells	own to green	iisii biowii,		6.0	$\frac{1}{1}$ SS	2 1	1							÷
=	7.5	- √ greenish browi	n			8.5	SS SS SS	1 1	1	0) : : : :		A		
-6.0	=	SANDY SILT (ML)			- / 		-	WC	<u> </u>	10	T			- :		
]	soft, gray				13.5	5 <u>-</u> - SS	WC)H	0				:		
-11.0 -	=	L			┘╽┇┇	40.5	7			Ţ				:		-
-16.0		SILT (MH) very soft, dark gray	r with alax a	nd trace fire	, 	18.5) = =	WC	DH	0	•	<u> </u>				:
	=	sand	, willi ciay a	iiu liace iiii	•	23.5	<u>;</u>									
-21.0	=	no sand				20.0	SS	WC	DH	0	•	1 1		X	<u> </u>	
3	=	dark grayish gr	reen; with sa	nd and		28.5	;=					: :		:		:
-26.0	=	shells					SS	WC	DH	0	•	1 1		- :		- :
_	25.0-					33.5	;= <u></u>	WC	7 <u>U</u>	0				:		
-31.0	35.0	SILTY SAND (SM)					7	VVC	<u>ЛП</u>	0	T			:		:
-36.0	40.0	loose, light greenis	h brown, fine	e; with shell	s	38.5	5- - SS	3 2	2 5	7		X	-0:		A	
-30.0	=	COOPER MARL: S	SANDY SILT	(ML)		43.5	-									
-41.0	=	firm, olive green		<u> </u>		. 43.0	'= ss	2 4	3	7	•					
3	=					48.5	;=									
-46.0	=						SS	1 3	8 4	7	-			0:	_	
						53.5	5 <u></u> SS	2 3	3 3	6						
-51.0						.	-		, ,	1				:		
-56.0	61.0					58.5) <u>-</u>	2 2	2 3	5	•			<u> </u>		
00.0	01.0	COOPER MARL: S	SILTY SAND	(SM)		63.5	<u>;</u> =							:		
-61.0		loose, olive green;	with clay				SS	3 4	4	8	•	: :	C	:	: :	- :-
	70.0					68.5	SS SS	2 3	3 2	5				:		:
-66.0	70.0				11:17	-	35	3	, 2	1 5		: :	: :	:	: :	:
-71.0] =						=					<u>:</u> :	:	:	<u>:</u> :	_ :
-/ 1.0]	BORING TERM	IINATED AT	70 FEET.			=							:		
-76.0	=						=							- :	1 1	- :
	=						=									
-81.0							=					1 1		:		- :
=							=									
-86.0							=				:	: :	: :	:	: :	:
04.0] =						=					<u>:</u> :	:	:	<u>:</u> :	_ :
-91.0 -] =]							:		
	=					<u></u>	<u> </u>				:	<u>: i</u>		:	<u> </u>	:
		CAMPLE	TVDE		LE	GENI)			ייי ויוחר	VIO NAC	TUOD				
	Split Spo Shelby T		NQ - Rock C CU - Cutting				SA - Hollo FA - Cont		Auger			W - R	otary W			



						g Log																
File No).224B				PIN):		113	1-08-	554	Coi	unty:	CH	ARI	_ES	ΓΟΝ		Eng./			P. BAU	MSTA
Site De						S ROA									-		-		Rout			
Boring			SPT A		ing L								Offse					Alig	nmer			
Elev.:	l		Latitu			32.84		2	Long				.9491	28			Start			_	24/08	
Total D		52 ft		_	Dep		ft					epth:	ft					plete			24/200	
		meter (4		Samp		_					er Re			Y	N		_iner			$\overline{}$
Drill Ma		: СМ	E-550	_		Metho	_		DRC	IAI	_	Hamm		_				En			o: 80°	
Core Si	ıze:				Drille	er:	S&	IVIE				Groun	awat	er:	TOE	5 I	N/A		24	HR	N/A	١
																		_	SPT	N VAI	LUE •	
Elevation (ft)	₽ _								hic	g Be	£ _	Sample No./Type				ne		PL ×		MC	$\overset{LL}{\longrightarrow}$	
eva (ft)	Depth (ft)	M	1ATER	RIAL	DES	CRIPT	ION		rap	Log	Depth (ft)	am 0./T	1st 6"	2nd 6"	3rd 6"	N Value		▲ F	INFS	CONT	ENT (%	6)
□	0.0									S		νž	1st	2nc	3rd	Z	0 10				30 70	
=		WASH	ROTAR	Y TO	20 FI	EET					-	=					:	:		i		
-1.0	=																:	- :		:		: :
3]											=										
-6.0																	:	- :				: :
=																	:	:	: :	:		
-11.0											-						:	-		- :	<u> </u>	
40.0	20.0										20.0						:	:		:		
-16.0	22.0	3" X 30]		ST					:	:		:	X	
-21.0]]	PUSHE					:KY		J			=						- :		- :		: :
]	WASH	KOTAR	Y TO	30 FI	ET.												:				
-26.0	30.0	3" X 30	" EIVEE	סום נ	TON	SARADI I				_ ;	30.0	ST						-			<u> </u>	
=	32.0	∖PUSHE															:	:	*	` <u> </u>		
-31.0		WASH							7								:	<u>:</u>	<u> </u>		1 1	: :
											-							:		i		
-36.0																				:		
-41.0												=										
-41.0												=										
-46.0	50.0									_ ;	50.0						- :	-			: :	1 1
=	52.0	_ 3" X 30 \PUSHE	" FIXEL D 24" V	O PIS WITH	10N 8	ECOVE	E RY		+			ST						:		X-		
-51.0			RING TE					T.	٦									-				
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-01.0]																:					
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-91.0												=						- :		- :		
=																	:	:		:		
									<u> </u>	FGF	END)						-		•		
			SAMP	PLER	TYPE										DF	RILLIN		THOE				
SS - S	Split Spo Shelby T	on ube		١	NQ - R	ock Cor uttings	e, 1-7	7/8"				A - Hollo A - Cont			ger		R	W - F C - F	Rotary		1	
ST - S				Č						- 1			ng Cas			J-1.J		- '				





CFA - Continuous Flight Augers

DC - Driving Casing

RC - Rock Core

POT

- Shelby Tube

AWG - Rock Core, 1-1/8"

CU - Cuttings

CT - Continuous Tube



Be Description: PORT ACCESS ROAD	File No.		So						121 ()0 EE	- 1 Co		CL	IA DI	F0 ⁻	- CNI		Ena	100	<u> </u>	D ()DEE	
									131-0	JO-50	04 60	unity.	Ci	IAKL	LES	ON		Ellg			۲. ر	JKEE	
A													7 4	.4.				A II					
											4				٠,		01				0/40	/00	
									L					21						_			
III Machine: CME-45 Drill Method: MUD ROTARY Hammer Type: Automatic Energy Ratio: 70% N/A		•				<u> </u>						•			_			_					
The state																	$\overline{}$		l				(N)
MATERIAL DESCRIPTION SANDY SILT (MH) very soft, gray and black 7.5 SILTY SAND (SM) very loose, gray and olive green, fine loose colive green colive green stiff GOOPER MARL: SANDY SILT (ML) firm, olive green, with fine sand stiff 64.5 firm 64.5 firm 64.5 firm 64.5 firm 64.5 stiff 69.5 stif			: CM	E-45						ROI				_									
MATERIAL DESCRIPTION SANDY SILT IMH) very soft, gray and black 9.5 7.5 SILTY SAND (SM) very loose, gray and olive green, fine loose very loose, brown and gray olive green olive green stiff stiff stiff stiff stiff firm firm firm firm firm firm stiff	Jore Si	ze:				Drille	r:	MAL)			Ground	dwat	ter:	IOE	3	lıdal		2	24HK	₹	N/A	
MATERIAL DESCRIPTION SANDY SILT IMH) very soft, gray and black 9.5 7.5 SILTY SAND (SM) very loose, gray and olive green, fine loose very loose, brown and gray olive green olive green stiff stiff stiff stiff stiff firm firm firm firm firm firm stiff		1															1		A CD	T NI V	'A L L L	- 🕳	
Sandy silt (MH) very soft, gray and black Silt Sandy silt (MH) very soft, gray and black Silt Silt																			● 5P	I IN V	ALUE		
Sandy silt (MH) very soft, gray and black Silt Sandy silt (MH) very soft, gray and black Silt Silt	e e	ے ا								<u>ي</u> .	<u>o</u> _	<u>e</u> e				e e		P	L_	MC	;	LL —×	
SANDY SILT (MH) very soft, gray and black 7.5 5.0 SS WOR 0	vati (ft)	ebtl (#)	N	MATER	RIAL	DESC	RIPT	ION		aph -og	eptl (#)	E F	- -	9	<u>.</u> 0	Valt		·	•	_		, ,	
9.5 SANDY SILT (MH) very soft, gray and black 7.5 5.0 SS WOR 0.0	E E		$\overline{}$							_დ_	SS	S S	st (bu?	3rd (ź	0 10						۵n
9.5 7.5 7.5 SILTY SAND (SM) Very loose, gray and olive green, fine 19.5 loose very loose, brown and gray olive green olive gre		- 0.0	Y SAND	/ SILT (MH)					////	2.5	+	_	- (1	(1)		0 10	20	30 4	10 30	- 00	70 80	90
3.5 3.5		3				olack					1	SS		WOR		0 (:			:		
14.5 SILTY SAND (SM) very loose, gray and olive green, fine loose very loose, brown and gray 17.5 SS 1 1 2	-9.5	75	•								7	SS		WOR		0 (•	- :	· ×	-	X :	A	
very loose, gray and olive green, fine loose very loose, brown and gray olive green olive green loose; with shells COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand stiff 44.5 firm firm firm firm firm firm firm stiff		7.5	SILTY	SAND (SM)						1	- 66		WOR		0 (•					A	
loose very loose, brown and gray olive green	-14.5	=				lolive	green, f	fine			1	SS		WOR			• :	:	:		:		: :
very loose, brown and grayolive greenloose; with shells COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand stiff stiff stiff firm stiff firm stiff	10.5	=	100	se							5	SS	2	3	5	8		⊗	X				
very loose, brown and gray olive green	- 19.5	=	.50								17.5	_	L		_			:	:		:	: :	:
29.5 34.5 30.0 loose; with shells COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand stiff stiff firm stiff	24 =	‡	ver	y loose,	brow	n and	gray					SS	1	1	1	2		A		<u> </u>	:	<u>i</u> i	
olive green olive green loose; with shells COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand stiff stiff firm firm firm firm firm stiff	-24.5	=									22.5										-		
33.5 33.5 33.5 33.5 33.5 33.5 33.5 33.5	-20 5	=	oliv	ve greer	า							SS	1	2	2	4	•	:	:		:		- :
34.5 39.5 COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand 32.5 SS 3 3 4 7 44.5 44.5 49.5 59.5 firm stiff	-29.5	#									27.5							i	i		-		
39.5 COOPER MARL: SANDY SILT (ML) firm, olive green; with fine sand 32.5 SS 3 3 4 7	-34 5	30.0	lon	se: with	shell	s			_			SS	3	3	4	7							
39.5 firm, olive green; with fine sand 37.5	-34.5	Ξ.					SII T (M	11)			32.5] _: [: -			:		
44.5 49.5 49.5 54.5 stiff	-39 5	3						<u>'L'</u>				<u> </u>	3	3	4	7	•		X	0:	- 4	×	
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49.5 54.5 55.5 55.5 55.5 55.5 55.5 55.5	=	#	Otti								42.5					40							
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stiff firm 62.5 SS 3 3 4 7 67.5 72.5 72.5 77.5 SS 4 6 6 12 88.5 88.5 88.5	=	=									57.5	SS	4	4	4	8		:	:		:	: :	
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94.0 T VPIV STIT	04.5	‡									35	SS		8	8	16] :	•	:		:		: :
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LEGEND Continued Next Page										LE	GENE)							С	ontin	ued	Next	Page
SAMPLER TYPE DRILLING METHOD NO. Pools Corp. 1 7/9" USA Hellow Stom Avers. DNA Detant Week		onlik O-		SAMF			ale O =	. 4 7"	o"			Λ 11-11	Ct	. no. A :		RILLIN				m, \A/-	o.b.		
								E, I-//C)		HS	A - Holic A - Cont	w อเย inuou	s Flial	ger nt Au	gers							
VG - Rock Core, 1-1/8" CT - Continuous Tube DC - Driving Casing								us Tube	e														



		St Dorling Lo		24 00 5	-1 0-			IADLE			F /		I D	ODEE	
File No.: 10 Site Descripti		<mark>oject No. (PIN):</mark> T ACCESS RC		31-08-55	04 60	unty:	CF	HARLE	5101	N	Eng./C	seo.: Coute		OREE	
	B-37 SPT						Offse				Align				
Boring No.: Elev.: -4.5 ft			4232	Longi	tudo		9502		Dot	e Star		men	10/1	2/00	
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Bore Hole Dia			pler Cor					equire		Y (Ñ			Used:		(N)
Drill Machine		Drill Meth	ibiei coi	JD ROT									Ratio:		$\overline{}$
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Elevation (ft) Depth (ft)	MATER	RIAL DESCRIP	TION	Graphic	Sample Depth	Sample No./Type	=_		rd 6" N Value				_		
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-119.5						-			J 17	-		- :		- : :	
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-134.5						3							1 1	1 1	
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	SAMF	PLER TYPE		LL	- CLIVE				DRILL	ING MI	ETHOD				

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing



File No.).224B			No. (I			31-08-	554 C c	ounty:	CH	HARI	LES	ΓON		Eng			P. B	AUM	STA
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Core Si		. Civi	L-330		Drille		S&ME	או טכ	IAINI	Groun		-	TOE		N/A	-		y ixa 24HR		00 /0 N/A	
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-7.5	10.0_	shell, c	rushed	stone	e, and o	debris				-	23	10	U	10		-			:		
10.5	Ξ				n some	clay, s	shell, and		13.	5 <u>-</u> SS		WOH		0 (: *	- :		
-12.5	=		d stone			,			18.	7							- '		:		
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-27.5	=	-	oft, dark							SS		WOH		0 (- :	- :	: :	- :	: :	- :
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-32.5	34.5	٦	th trace	wood	l and o	rnanics		THE		SS	1_	2	2	4	• :	:	:	: :	:	: :	- :
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			SAMF		TYPE									RILLIN		ETHC					
	Split Spo Shelby T				NQ - Ro CU - Cu		e, 1-7/8"			SA - Holl FA - Con				nore				ry Wa Core			
		re, 1-1/8"					us Tube			C - Driv			Au	9013	,		1 1001	. 5016			



File No.		0.224B		t No. (PI			1-08-5	54 C c	unty:	CH	ARLE	STC	N	E	ng./G		P. BAU	MSTA
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	2.5 ft		Latitude:	_	2.8422			itude:		.9487	/1	+	te St				9/25/08	^
Total D		30 ft		il Depth		ft		ore D		ft					leted		9/25/200	
ore Ho Orill Ma		ameter (Drill M	ample				Hamm		quire		Y	N		ner U		$\overline{}$
Core Si		Civi	E-550	Driller:		ME	טא עו	IARI	Groun				N/	^	Ener	24HI	atio: 80°	
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	Split Spc		SAIVIPLE	NQ - Roc		1-7/8"		H	SA - Hollo	ow Stei	m Auge	r		RW	/ - Ro	tary Wa		
ST - S AWG - F	helby T			CU - Cutt CT - Con					FA - Cont C - Drivi			Augei	rs	RC	- Ro	ck Core	9	



		Soi												T -											
File No		0.224B				PIN):		1131	I-08-	554	4 Co	un	ty:	CH	IAR	LES	ΓOΝ		Er		Geo.		Л. Еі	ichel	berge
Site De						S ROA														_	out	_			
Boring					ing L	ocatio								Offse							mer				
Elev.:			Latitu			32.84	_		Lon	_				9479	978		Date					_	/2/08		
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leva (fi	Depth (ft)	M	IATER	RIAL I	DES	CRIPTI	ION		3rap	의	Sar Der	티.	šar lo.∕I	1st 6"	2nd 6"	3rd 6"	%			▲ FII	NES	CONT	ENT	(%)	
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-17.5	23.0		•								23.0	,=									:				
-22.5	25.0	3" X 30							\perp		_5.5		ST								X :			A	$\xrightarrow{\bigcirc}$
	=	PUSHE					RY		/			\exists													
-27.5	31.5	WASH	ROTAR	Y TO	31.5 I	FEET						=													
=	33.0	VANE II	NSERT	ED TO	O A D	ЕРТН О	F 33	,				=													
-32.5	=	\FEET]			=								: :	- :	:	: :	: :	-
=	38.0	WASH	ROTAR	Y TO	38 FE	ET			\mathcal{A}	_	38.0		ST					1			; X-				
-37.5	40.0	√3" X 30'							$/\!\!\!\!\!/$			+	01												
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-42.5	=	DOF	CING 1E	=IXIVIII	NAIEI	J A I 40	FEE					=									:	:			
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-57.5	=											=										÷	: :		
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-01.5 -	=											=									:				
-72.5												=									- :				
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-77.5												=						<u> </u>		<u> </u>		:	: :		
=	=											=									:				
-82.5	=											=								: :	- :	- :	: :		
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-87.5 <u> </u>	=											=									:	:			
00.5	=											=						L			_ :	_	<u>:</u> :		
-92.5 <u> </u>	=											=									:				
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									L	E	GENE)													
SS - S	Split Spc	on	SAMP			ock Core		7/8"			нс	SA -	Hollo	w Sta	m Δι	DI	RILLIN				otary	Wash	,		
ST - 9	Shelby T	ube		С	U - C	uttings					CF	-A	Conti	nuous	s Flig		gers				ock C		•		
AWG - F	Rock Co	re, 1-1/8"		С	T - C	ontinuou	ıs Tu	be			DC	<u> </u>	Drivir	ig Ca	sing										



Eile			SOII				440	04 00 5	54 C-		CLIA	ם כי	OTON!	-	ing /C	<u> </u>	D /		
	No.	.: ∣10 scripti	0.224B		ct No. (F ACCESS			31-08-5	54 C 0	unty:	LHA	KLE	STON		ing./G	eo.: oute:	۲. (OREE	
		scripti No.:			oring Lo			T			Offset:				⊨R0 Alignn				
Ele		-4.5 ft		atitude		32.843		Longi	tudo:		95231		Data	Starte			 10/1	5/08	
		epth:	120 ft		oil Dept		ft		ore D		ft	'			oleted:			3/08 3/2008	
			meter (in			Sample				-	r Req	uirad				ner U		Y	(N)
		chine:		,		Method:				Hamme				$\overline{}$				70%	
	re Si		OIVIL	70	Drille		ИAD	JD 1101	17 (1 (1	Ground				N/A		24H		N/A	
					1 - 1 - 1 - 1	[-						.							
uo		h						ic	<u>е</u> с	le pe			e e		● S PL ×	SPT N		E ● LL	
Elevation	(#)	O. Depth			L DESC	CRIPTIC	ON	Graphic	S -			2nd 6" 3rd 6"	_	0 10				NT (%) 70 80	90
	\exists	2.5 -	CLAYEY		-	_			0.0		W	OH	0	•	A	0	:		_
	- -9.5	5.0 _	very loos trace roo		rayish br	own, fine	; with		5.0	SS	W	OR	0	•			:		▲ ₫
	-9.5	7 -	SILTY CI							_ SS	W	OH	0	•	A	0	:		-
	7	7.5	very soft,	olive gre	een; with	trace roc	ts and		7.5	ss	W	OH	0	•	>	-	:	: :	- T
-1	 4.5	10.0	sand						10.0			2 2	4	• >		≜ X	-		
	-	- - -	very loos	•	•	own, fine	!			-		<u> </u>	4						
-1	19.5	=	SILTY CI	AY (CH)).				15.0) - SS	5	3 1	4	•			- :		
		-	very soft,			trace sar	nd			-									
-2	24.5	-	very loos	e, light g		with trac	е		20.0	SS	2	1 2	3	•	A	0	:		
	}	=			ono olive	o groon]									-
-2	29.5	-	no cr		one, onve	e green			25.0) SS	2	3 3	6				:		-
]	=	10000	•															=
-3	34.5	30.0							30.0								- :		-
	_	-	medium (_			- SS	2	5 6	11	•					
	1	_	mediam	acrisc, ac	ant onve t	green, m			35.0	<u>, </u>									
-3	39.5	_							35.0	'SS	4	7 8	15				:		-
		_												1					
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-4	19.5								45.0)	3 4	4 5	9	•			:		
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-5	54.5	=								SS	3	5 9	14	•					: -
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-5	59.5	=							55.0		1	4 -	+_		: :		:	: :	
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-6	64.5	60.0	COOPER	MARL:	SANDY S	SILT (ML)	11.11	60.0)SS	3	2 4	6	•			:	: :	
	}	-	soft, dark				-			_				1			:		: -
L		=							65.0	<u>, </u>				:	<u> </u>		:	<u>:</u> :	
								LE	GENI							Conti	nued	Next I	Page
-6 SS	_ 9	Split Spo		SAMPLE		ock Core,	1-7/8"		Н	SA - Hollo	w Stem			NG ME	THOD W - Ro	tary \//	ash		
ST	- S	Shelby T	ube		CU - Cu	uttings			CF	A - Conti	nuous F	light A			C - Ro				
AW	/G - F	Rock Co	re, 1-1/8"		CT - Co	ontinuous	Tube		D(C - Drivin	ıg Casir	ıg							



Site De				CESS R											ute:			
Boring		B-42 SPT							Offse	et:				Alignn	nent:			
Elev.:					843023	Longi			9523	317			Starte			0/15		
Total D		120 ft		Depth:	ft		ore De _l		ft					leted:			/2008	
		meter (in):	4		mpler Cor				er Re			Υ	$\overline{}$		ner Us		Υ	(
Drill Ma		CME-45		Drill Met		UD RO1								Ener	gy Rat		70%	
Core Si	ze:			Driller:	MAD			Ground	dwate	er:	TOE	3 1	N/A		24HR	<u> </u>	N/A	
														• 9	PT N V	ΔΙΙΙΕ		
Elevation (ft)	₽_					ji c	e ∓ _	Sample No./Type				ne		PL ×	MC	,	$\overset{LL}{ o}$	
eva (ft)	Depth (ft)	MATE	RIAL	DESCRI	PTION	Graphic	Sample Depth (ft)	am 5./T	9	2nd 6"	3rd 6"	N Value		▲ FIN	ES CON	JTEN	T (%)	
□							0) —		1st 6"				0 10	20 30	40 50	60	70 80	ξ
_	_						_	SS	3	4	4	8	•			:		
-	+						-									:		
-74.5	7	hard; no	chall				70.0	SS	12	20	27	47				- :	1 1	_
=	1	· Haru, HU	JI ICII				-	1 33	12	20		+/				:		
=							75.0									:		
-79.5 -		stiff					'5.0_	SS	4	4	5	9	•			:		
_	_						-]			:		
-84.5	-						80.0	-								:	: :	
-0-7.0	+						-	SS	4	6	7	13	•		0	:	<u> </u>	
7	7						-						:			:		
-89.5	7						85.0	SS	4	4	6	10		: :	: :	:		
‡	‡						-	33	4	4	0	10				:		
							000									:		
-94.5	_						90.0	SS	4	5	7	12	•	<u> </u>	<u> </u>			
	_						-]			:		
-99.5	}						95.0									:		
-33.3	7						-	SS	4	5	7	12	•					
7	7						-									:		
-104.5	7	very stiff					100.0	SS	3	7	10	17				:		
=	=	very suii					-	33	3	ı	10	17				:		
=	=						105.0	1								:		
-109.5		hard					100.0_	SS	8	16	22	38			•	:		
_							-									:		
-114.5	_						110.0								: :	:		
	_	stiff					-	SS	3	4	6	10	•			:		
-	-						-									:		
-119.5	7						115.0	SS	4	5	9	14		: :	: :	:	: :	
=	7						-	55	-			1-7				:		
10	120.0						118.5 -	SS	4	5	8	13	•			:		
-124.5	0.0						1 -									:		
=	=						-	-								:		
-129.5							-	1						: :			: :	
	_	BORING T	ERMIN	NATED AT	120 FEET.		-	-								:		
_	_						-									:		
						1 5	GEND						:	1 1	: :	:	: :	_
			1PLER			LE	.GEND				DF	RILLIN	IG MET					_
SS - S	Split Spo				Core, 1-7/8"		HSA	A - Hollo		m Au		gers		V - Rot	ary Wa	sh		



File No. 10.2248			■ Soil	i est E	soring L	.og													
Boring No. B-43 SPT ABDrilling Location: Core	File No	.: 10).224B	Projec	t No. (PIN	l):	113	1-08-55	4 Co	unty:	CHAF	RLES	STON	E	Eng./G	90.:	R. E	BOLLE	ΞR
Elev. 9.0 ft	Site De	scripti	on: P	ORT A	CCESS F	ROAD	•		•		•			•	Ro	ute:			
Elev: 9.0 ft	Boring	No.:	B-43 SF	T AIBIO	fling Loca	ation:					Offset:				Alignn	nent:			
Total Depth: 120 ft Soil Depth: ft Core Depth: ft Date Completed: 10/3/2008 Parce Holo Diameter (in): 4 Sampler Configuration Liner Required: W Liner Used: V Drill Machine: CME-850 Drill Method: MUD ROTARY Hammer Types Automate: TOB N/A 24HR N/A			-				96	Longit	tude:	79.	953725	5	Date				10/3/0	38	
Bore Hole Diameter (in): 4 Sampler Configuration Liner Requirect: Y No. Drill Machine: CME-850 Drill Michael: MUD ROTARY Hammer Type: Automate: TOB NIA ZaHR NIA											_								
Drill Machine: CME-850 Drill Method: MUD ROTARY Hammer Type: Automatic Energy Ratio: 73% 24HR N/A												ıired							(N)
August Core Size: Driller: S&ME Groundwater: TOB N/A 24HR N/A				,										$\overline{}$					
Section Sect					1		_								1		_		
Secondary Seco						100				<u> </u>		. ,					- 1		
MATERIAL DESCRIPTION S S S S S S S S S															• s	PT N	/ALUE	•	
10.0 10.0 10.0 15.0	Elevation (ft)				_ DESCR	IPTION	١	Graphic			1st 6" 2nd 6"	3rd 6"	Z	0 10	▲ FINE	ES CC	NTEN	T (%)	90
SANDY CLAY (CL) Stiff, light reddish brown to gray mottled 15.0 SS SS S 10 10.0 SS SS SWOH 1 2 3 SS WOH 1 2 SS SS 1 3 SS		2.5								_				•					
10.0 SANDY CLAY (CL) Stiff, light reddish brown to gray mottled 15.0 SS 1 3 0	4.0		loose, ligh	t brown a	and black; v	with fine	roots										- :	: :	
100 SSF, 100	=]	SANDY C	LAY (CL	<u>)</u>					= 00						' i i			
	-1.0	10.0	ղ stiff, light r	eddish b	rown to gra	y mottle	ed		10.0						: :	: :	- :	: :	
10.0 10.0]]	verv s	tiff. liaht	reddish bro	wn				_	vvOii i		"						
SLIGHTLY CLAYEY SAND (SP-SC) Very loose, light brown, fine SANDY SILT (ML) Soft, light gray, with trace clay CLAYEY SAND (SC) loose, gray, fine COOPER MARL: SANDY SILT (ML) Soft, dark olive green stiff stif	-6.0	15.0	1	- , J -					15.0	- SS	1 1	1	2		: XXO	<u>: :</u> :	<u>:</u>	: :	-: -
Very loose, light brown, fine SANDY SILT (ML) Soft, light gray, with trace clay SANDY SILT (ML) Soft, dark olive green SANDY SILT (ML) Soft, dark olive green SOFT SOF	=		SLIGHTLY	CLAYE	Y SAND (S	P-SC)		7/		_				1					=
SANDY SILT (ML) Soft, light gray; with trace clay SS WOHWOH 2 2	-11.0	20.0	- 1						20.0	SS	1 3	3	6	•	: :	: :	:	: :	: -
Soft, light gray, with trace clay CLAYEY SAND (SC) loose, gray, fine COOPER MARL: SANDY SILT (ML) soft, dark olive green]	25.0						<u> </u>	25.0	=									
21.0 CLAYEY SAND (SC) loose, gray, fine COOPER MARL: SANDY SILT (ML) Soft, dark olive green stiff Sol, dark olive green	-16.0	25.0	11					11111	25.0	SS	WOHWC)H 2	2	•	X :			: :	-
CAYEY SAND (SC) loose, gray, fine COOPER MARL: SANDY SILT (ML) Soft, dark olive green stiff SS 1 2 3 5 SS]	=	Soft, light (gray; witi	n trace clay]	30.0	3									
COOPER MARL: SANDY SILT (ML) soft, dark olive green stiff	-21.0	=	CLAYEY S	SAND (S	<u>C)</u>				30.0	SS	1 2	2	4	•			:		=
COOPER MARL: SANDY SILT (ML) soft, dark olive green	[]	loose, gray	y, fine					35.0	3				:	: :	: :	:	: :	: -
-31.0 soft, dark olive green 40.0 SS 1 2 3 5	-26.0	\exists	COOPER	MARI	SANDY SII	T (MI)		-	00.0	SS	2 3	5	8				- :		
stiff firm -41.0 stiff st	[]				I (IVIL)			40.0	=									
	-31.0	=		Jiive gre	CII				10.0	SS	1 2	3	5	•		1	:		: =
		=							45.0	=									=
	-36.0	=	firm							SS	1 2	4	6	•	: :	: :	:	: :	
-46.0 -51.0 -56.0 -61.0 -71.0 -71.0 -76.0 -81.0	[[110]	∃							50.0	1									=
-51.0 -56.0 -61.0 -66.0 -71.0 -71.0 -76.0 -81.0 -86.0 -85.0 -95.0 -85.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -95.0 -96.0 -76.0 -77.0	-41.0		stiff							<u> </u>	4 4	6	10		: 0	: :	A		: -
-51.0 -56.0 -61.0 -66.0 -71.0 -76.0 -81.0 -86.0 -86.0 -81.0	-46 0	=							55.0	1					<u> </u>		:	: :	: =
-56.0 -61.0 -66.0 -71.0 -71.0 -76.0 -81.0 -86.0 -86.0 -75.0	-40.0	=								<u> </u>	4 4	8	12	-					= =
	-51 0	=							60.0	=					: :		- :	1 1	<u> </u>
-61.0										<u> </u>	2 3	5	8	•					
-61.0	-56.0]							65.0	- 66	0 0		10	1	: :	: :	:	: :	: =
		=								<u> </u>	0 0	4	10	⊤					
-66.0 -71.0 -76.0 -81.0 -86.0 -86.0 -75.0	-61.0		firm						70.0	98	3 2	5	7	:	1 1	: :	:	1 1	: =
-71.0 -76.0 -81.0 -86.0 -86.0 -85.0]]	111111							1	<u> </u>		T '	1					
-71.0	-66.0								75.0	SS	2 2	5	7		- :		- :	: :	= =
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SS 1 1 7 8			Stiff						an n	\exists						: :	:		: =
LEGEND SAMPLER TYPE SS - Split Spoon ST - Shelby Tube SAMPLER TYPE COntinued Next Page BAMPLER TYPE SS - Split Spoon ST - Shelby Tube CU - Cuttings SAMPLER TYPE CFA - Continuous Flight Augers CFA - Continuous Flight Augers RC - Rock Core	-81.0								90.0	SS	1 1	7	8	•		: :	:		-
LEGEND SAMPLER TYPE SS - Split Spoon ST - Shelby Tube SAMPLER TYPE COntinued Next Page BAMPLER TYPE SS - Split Spoon ST - Shelby Tube CU - Cuttings SAMPLER TYPE CFA - Continuous Flight Augers CFA - Continuous Flight Augers RC - Rock Core		=							95 N	=				:			:		: =
LEGEND Continued Next Page SAMPLER TYPE SS - Split Spoon ST - Shelby Tube LEGEND DRILLING METHOD HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core	-86.0								33.0	SS	1 3	7	10	•		: :	- :	: :	
LEGEND Continued Next Page SAMPLER TYPE SS - Split Spoon ST - Shelby Tube LEGEND DRILLING METHOD HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core		=							100 O	=									= =
SAMPLER TYPE SS - Split Spoon NQ - Rock Core, 1-7/8" ST - Shelby Tube DRILLING METHOD HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core	-81.0 - -86.0 - SS - S							LE		•			'	•	(Conti	nued	Next	Page
ST - Shelby Tube CU - Cuttings CFA - Continuous Flight Augers RC - Rock Core	00			AMPLER			7/0"				6:		DRILLII		THOD				
	SS - S ST - S						-7/8"						ugers						
					CT - Conti	nuous T	ube						J-: •						



File No Site De	scriptio		Projec DRT A				. 13	1-08-55	, ₁ 301	uiit y .	101	17 XI XI		ΓΟΝ			/Geo. Route		BOLL	
Boring		B-43 SP									Offse	 et:					nmen			
Elev.:			itude:			4399)6	Longi	tude:		9537		1	Date	Star			10/3	/08	
Γotal D		120 ft		il Dep		ft			ore De		ft				Com		ed:		/2008	
		neter (in):						figurat			er Re	aui			(N)		Liner			(1
	achine:	CME-8			Meth	od:	MU	D ROT	ARY	Hamm	er Ty	pe:	Auto						73%	
Core Si	ize:			Drille			ME			Ground					V/A	-		HR	N/A	
						'								. '	,					
																	SPT	N VALL	JE •	
Elevation (ft)	Depth (ft)	MAT	ERIAL	_ DES	CRIP	TION	I	Graphic	Sample Depth (ft)		1st 6"	2nd 6"	3rd 6"	N Value	0 10		FINES (30 40	50 60	LL X NT (%) 70_80) 9
	=								105.0	SS	2	3	9	12) :		0: :		•
-96.0 _	=									<u> </u>	3	6	8	14						
-101.0									110.0	SS_	1	2	9	12	•)				
-106.0	=								115.0	SS	4	6	11	17		•				
-111.0	120.0								110.3	SS	2	4	10	14		<u> </u>				
-116.0		BORING	TERM	INATFI	D AT 1	20 FF	ET.									:				
-121.0	=		1111		- · · ·											:				
-126.0																:				
\exists	=															:				
-131.0																				
-136.0	#																			
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-146.0	#															:				
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-171.0 -	#															:				
-176.0																				
	=															:	<u>:</u> _:			
-181.0															:	:				
-186.0																:				
								LE	GENE)					_				<u> </u>	
ST - S	Split Spoo	n	MPLEF	R TYPE NQ - R CU - C CT - C	lock Co cuttings	3			CF.	A - Hollo A - Conti - Drivir	inuou	s Flig	iger			.W -	D Rotary Rock C			



3oring		B-43 SPT A								Offset				Alig	nme			
Elev.:		Latitud			43996	L		tude:		95372	:5	Date					2/2009	
Total D	-		Soil Dep		ft				epth:	ft		Date		•			2/2009	
		meter (in):	4		pler C					er Req			\sim			r Used		N
Orill Ma		CME-850		Meth		MUD	ROT	ARY	Hamm					En			: 74%)
Core Si	ze:		Drill	er:	SCI				Ground	dwate	r: TO	В	N/A		24	4HR	N/A	
															QDT	N VAL	IE 🖨	
Elevation (ft)	₽ .						hic L	t Se	Sample No./Type			ne		PL ×		MC O	$\overset{LL}{ o}$	
eval (ft)	Depth (ft)	MATERI	AL DES	CRIP	ΓΙΟΝ		Graphic Log	Sample Depth	amp D./T	9	2nd 6" 3rd 6"	N Value		▲ F	INFS	CONTE	ENT (%)	
ӹ	0.0						۳	S I	νž	1st 6"	2nc 3rd	Z	0 10				70 8	
=	\exists	WASH ROTARY	7 TO 26 F	EET					=					:				:
4.0	\pm								=				- :	- :	: :	: :		- :
3	3								=					:				:
-1.0	=								=					:	1 1			- :
	=								=									
-6.0 -	=								=									:
-11.0	=								=					-	<u>: </u>	- : :		- :
<u>-</u> =	=								=									
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Ⅎ	28.0	3" X 30" FIXED PUSHED WITH				ſ			- ST				1	:				:
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-20.0 -	=								=					:				
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							LF	GENI	<u></u>				1 -	•				
		SAMPL	ER TYPE		. =	\"						RILLI				104 :		
SS - S ST - S	Split Spoo	ON The	NQ - F CU - C		re, 1-7/8	5"			SA - Hollo FA - Conti						Rotary Rock (Wash		



File No		.224B	Project			113	1-08-5	54 C o	untv.	СН	ARI F	STON	ı F	Eng./Ge	0 · E	P. OREE	=
Site De			ORT AC					o .	unity i	10	, <u></u>		-	Rou		. 0112	_
Boring		B-43 SP							- 1	Offse	t·			Alignmo			
Elev.:			titude:		32.8434		Longi	itude:		9527		Data	Start			/16/08	
						ft				952 <i>1</i>	0						0
Total D		120 ft		I Depth				ore D						pleted:		/16/200	
		meter (in)					figurat				quire		$\overline{}$		er Use		N
Drill Ma		: CME-4	15		ethod:		א טו	IARY	Hamm	_					•	i o : 70%)
Core S	ize:			Driller	: N	1AD			Ground	dwat	er: T	ОВ	Tidal	2	24HR	N/A	
								1									
														● SP	T N VA	LUE	
Ē							0		η φ			(n)		PL ×	MC	LL ×	
atio t)	Depth (ft)	N 1 A T	ΓERIAL	DESC	DIDTIO	N I	ig 8	일독단	T get		· .	alice		X		——X	
Elevation (ft)		IVIA	IERIAL	DESC	KIPTIO	IN	Graphic	Sample Depth	Sample No./Type	1st 6"	9 p	3rd 6" N Value		▲ FINES	S CON	TENT (%)	
ш	0.0	<u> </u>								, ,	TO 2nd 6"	ਲ∣	0 10	20 30 4	0 50	60 70 8	0 90
=	2.5	CLAYEY S			_			0.0 2.5		I		0	-	1			
-9.5	5.0	very loose,	black ar	nd dark g	ray, fine			5.0	. —		NOH	0	- :				2
=		CLAY (CL))				⁻ /	7.5	:] 33		NOH	0	_	1	_		
-14.5	=	very soft, g	='					10.0	SS		NOH	0	<u> </u>		0		_ : =
							_	1.	- SS	WOH\	WOH	1 1	7	0 : 4	\		=
-19.5	E	SILTY SAN			_			15.0	1			4 2			<u> </u>		
-] =	very loose,	dark gra	ay and bi	own, fin	Э			- SS	1	_1	1 2		XX	<u> </u>		: =
-24.5	20.0	gray						20.0	1		4	4		: :	<u> </u>		
=		\ brown	and light	gray			_/		SS	2	4	4 8					
-29.5]]	COOPER I	MARL: S	ANDY S	LT (ML)		_	25.0	<u> </u>								
20.0		stiff, olive g							SS	3	2	4 6	-				=
-34.5]	_	,					30.0	E								
J4.J_		firm							SS	2	3	4 7	 ●	: :			: =
-39.5]							35.0	1								
-39.5_]	stiff							SS	4	5	7 12					: =
-44.5								40.0	,=				:				<u> </u>
-44.5]								SS	4	5	7 12	_ •	0	A		
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-59.5]]	firm						-5.0	SS	4	3	4 7	_				: =
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-64.5 <u> </u>]]	stiff						30.0	SS	3	5	6 11		: :	: :		: =
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-99.5		very st	iff					95.0	SS	4	5 1	15 20	1 :	•	: :	: : :	=
=]]	, -·						100.0	E.					: :			i
								GENI					•		ontini	ed Nex	t Page
		.5.	AMPLER	TYPF				LOLINE				DRILLI	NG MF		Sililiu	CU IVEX	. r aye
	Split Spo	on		NQ - Roo		1-7/8"			SA - Hollo			er	R\	W - Rota		n	
	Shelby T	ube re, 1-1/8"		CU - Cut CT - Cor		Tube			A - Cont Drivii			Augers	R	C - Rock	Core		
144G - 1	YOUR CO	C, 1-1/0		O 1 - COI	เนเนบนธ์	iune		1/0	וועווט - כ	iy Uds	ni iy						



hine:	B-43 SPT ABG Latitude: 120 ft So	being Lo : 3 bil Depth 4 \$ Drill M Driller	ocatio 32.843 h: Samp Methor:	n: 342 ft oler Co d: N MAD	Onfig	Co urati ROT	ARY I	79. oth: Line lamme		requir rpe: er:	ed:	Date Y omat	0 10	Aligited:	Liner nergy 24 SPT	nt: 10/ 10/ r Used Ratio 4HR N VAL	70% N/A))
i.5 ft oth: e Diar hine: e:	Latitude: 120 ft Sc meter (in): 4 CME-45 MATERIAL stiff	cil Depth Dill M Driller	32.843 h: Samp Methor:	342 ft bler Co d: N MAD	Onfig	Co urati ROT	On ARY I (L)	79. oth: Line lamme Ground Sround SS SS SS SS	9527 ft ft er Re er Ty dwat	78 equir/pe: er: 5 6 7	red: Auto TOE	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Com © ic Tidal 0 10	ted: pleto Fl	ed: Lineinergy 24 SPT	10/ 10/ r Used Ratio 4HR N VAL MC	16/200 d: Y o: 70% N/A LUE LL ENT (%)))
e Diai	MATERIAL very stiff	Driller Driller	Samp Methor:	ION	MUD	urati ROT	On ARY F (4) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	Sample Sa	"9 tsl 5	"9 puz 5 6 7 7	ed: Auto TOE	9 ne	ic Tidal	Pl ×	Liner nergy 24 SPT	Ration N VAL	d: Y o: 70% N/A UE ● LL ENT (%)))
hine:	MATERIAL stiff	Drill M Driller	Methoor:	d: N	MUD	ROT	Namble (#) 105.0 115.0	Sample Sample Sample SS	## 15	"9 puz 5 6 7 7	## Auto	9 PEN Z 11 14 15 14	ic Tidal	PL X AF 20	P SPT	Ration N VAL	D: 70% N/A LUE ● LL ENT (%)	,)
(#)	MATERIAI stiff very stiff	Drill M Driller	Methoor:	d: N	MUD	ROT	Namble (#) 105.0 115.0	Sample Sample SS	"91515 5	er:	## ## ## ## ## ## ## ## ## ## ## ## ##	9 enle N N 11 14 15 15	0 10	PL ×	SPT	N VAL	N/A LUE ● LL ENT (%))
(H)	stiff	L DESCI	RIPTI	ION		Graphic Control of Con	Sample Debth (#)	SS Sample SS No./Type	5 5 5	5 5 6 7	"9 pug 6 8	9nle N / 11 14	0 10	PL ★ F 20	● SPT	N VAL	LL LL)
	stiff					Graphic Company of the Company of th	105.0 110.0 115.0	SS SS SS	5 5 5	7	8 8	11 14 15 14		PI ×	INES	MC O	LL ENT (%))
	stiff				-	Graphic	105.0 110.0 115.0	SS SS SS	5 5 5	7	8 8	11 14 15 14		PI ×	INES	MC O	LL ENT (%))
	stiff					Graphic Control of the Control of th	105.0 110.0 115.0	SS SS SS	5 5 5	7	8 8	11 14 15 14		▲ F 20	FINES	CONT	ENT (%))
20.0	very stiff	MINATED /	AT 120) FEET			110.0	SS SS SS	5 5 5	7	8 8	15		•	30 40	30 6	NO 70 6	
20.0		MINATED A	AT 120) FEET			110.0	SS	5	7	8	15		•				
20.0		MINATED A	AT 120) FEET	·.		110.0	SS	5	7	8	15		•				
20.0		MINATED /	AT 120) FEET			115.0	SS	5	7 7 6	7	14		•				
20.0		/INATED /	AT 120) FEET			-	SS	5	7	7	14	-					
20.0		MINATED A	AT 120) FEET	·.		-			6	10			•				
20.0		IINATED /	AT 120) FEET			118.5			6	10			•				
0.0		MINATED /	AT 120) FEET		. I: U .	-	33	3	U	10	10						
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	n	NQ - Roo		e, 1-7/8	"		HSA	- Hollo	w Ste	m Au	ger		R	.W -	Rotary			
		Spoon y Tube	y Tube CU - Cu	Spoon NQ - Rock Core y Tube CU - Cuttings	Spoon NQ - Rock Core, 1-7/8 y Tube CU - Cuttings	Spoon NQ - Rock Core, 1-7/8" y Tube CU - Cuttings	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" y Tube CU - Cuttings	Spoon NQ - Rock Core, 1-7/8" HSA y Tube CU - Cuttings CFA	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollo y Tube CU - Cuttings CFA - Cont	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Ste y Tube CU - Cuttings CFA - Continuous	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Au y Tube CU - Cuttings CFA - Continuous Fligh	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger y Tube CFA - Continuous Flight Au	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger y Tube CU - Cuttings CFA - Continuous Flight Augers	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger R Tube CFA - Continuous Flight Augers R	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" y Tube DRILLING METHO HSA - Hollow Stem Auger RW - CFA - Continuous Flight Augers RC -	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Tube CFA - Continuous Flight Augers RC - Rock Core	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Wash y Tube CU - Cuttings CFA - Continuous Flight Augers RC - Rock Core	SAMPLER TYPE Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core



File No			ect No. (PIN)		31-08-55	64 C o	unty:	CHAR	RLES	STON	E	ng./G			OREE	
	escripti		ACCESS RO										ute:			
3oring		-	Boring Locat					Offset:				Alignn				
Elev.:			-	345572	Longi			953855			Starte			10/6/		
Total D	Depth:		oil Depth:	ft		ore D	•	ft			Comp				2008	
		` '		npler Cor				er Requ						Jsed:		(N
Orill M	achine	CME-850	Drill Metl	nod: Ml	JD ROT	ARY	Hamm	er Type	: Au	tomat	tic	Ener	gy R	atio:	73%	
Core S	ize:		Driller:	SCI			Ground	dwater:	TC	В	N/A		24H	R	7 ft	
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												• s	PT N	VALUE	Ε ●	
<u>_</u>					U	a)	n 9			l o		PL X	M	IC	ĹĻ	
Elevation (ft)	Depth (ft)	MATERIA	AL DESCRIF	NOIT	Graphic Log	Sample Depth	Sample No./Type			Value		X-) 		
) 		IVIATEINIA	AL DESCINII	HON	Gra	Sar	Sar No./	1st 6" 2nd 6"	3rd 6"			▲ FINI				
	0.0	CLAYEY SAND	(SC)		- XXX	0.0		4 7	<u> </u>	2 19	0 10	20 30	40 5	0 60	70 80	90
=	‡ ‡	medium dense, b		, fine to		2.5	· 🗕	4 6	8		-					
6.0	5.0	medium sand; wi	ith trace roots	, ille to		5.0	SS	3 3	6			: :	-:	: :		
=	‡ ‡	brown; no ro				7.5	'- 00	3 4	3				:			:
1.0	3 3				┚ [///	10.0	- SS	3 2	1		• : .	<u>: :</u>	-	: :	- :	
=	‡ ‡	CLAYEY SAND		a a di:		4			•			: Ĭ	Ė		: :	
-4.0]]	loose, brown and sand; with trace		neaium		15.0	- SS	1 2	2	4	•	1 1	:		: :	
-	=					200							:			
-9.0	20.0	very loose, to	an and gray, fil	ie		20.0	- SS	1 1	1	2	•	:X :X	:	. O: A	. : : :	
=	25.0	\ trace shell			////	25.0	Ē									
-14.0	25.0	CLAY (CL)				25.0	SS	3 5	6	11	•	: :	-:-	: :	-: :	
=	30.0	very soft, gray; w	ith fine sand a	nd trace		30.0	Ξ.				:		:			
-19.0	30.0	Sileli				30.0	'- <u>ss</u>	1 1	2	3	•	A	Ö			
=	35.0	SANDY CLAY (C				35.0	.a									
-24.0	35.0	stiff, gray and oli	ve green; with	trace		35.0	SS	1 1	3	4	•	1 1	:		- : :	
=]]	cemented fine sa	and 		_	40.0	E.						:			
-29.0	1 1	SILTY SAND (SI	<u>(I)</u>			40.0	SS	2 2	4	6	•		: 0		1	A
	= =	very loose, olive	green, fine; wi	th trace cla	y	45.0	, 🗏				:		:			
-34.0	= =	COOPER MARL	· CI AVEY SII :	T /MI \	<u> </u>	10.0	SS	3 3	6	9	•				1 1	
20.0	‡ ‡	soft, olive green;				50.0	,=				:		:			:
-39.0]]	_		Julia			SS	3 3	8	11	_		:			
440	‡ ‡	firm; with trac	ce shell			55.0	,=									
-44.0]]	stiff					SS	5 6	9	15	_ •		- :			
-49.0]]				: . : :	60.0	<u> </u>									
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-54.0]]					65.0	1						- :	<u> </u>	<u> </u>	
J-1.0 _	‡ ‡						- SS	5 6	7	13	-		:			
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-]						- SS	4 5	4	9	┤					
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=	∄ ∄	firm					1	' '	-	+ '	 		:			
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-84.0]]					95.0	- SS	WOH 3	8	11		<u> </u>	- :	: :	<u> </u>	
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		SAMDL	ER TYPE		LE	GENI	<u>, </u>		г)BII I II	NG MET		JUNI	riuea	Next	<u>~</u>
	Split Spo	on	NQ - Rock C					w Stem A	uger		RV	V - Rot				
T - :	Shelby To	ube e, 1-1/8"	CU - Cutting	s Jous Tube				inuous Flig ng Casing	ght A	ugers	RC	- Roo	ck Cor	·e		



File No		0.224B					21.00	0 55	1 60			ЦΛП		STON		- n a /	<u> </u>	П	ODE	_
Site De				ct No. (ACCES			31-00	0-00	4 C0	unty:	0	ПАК	LES	OIV			Geo.: Route		ORE	=
Boring		B-46 SP		oring L							Offs	of:					ımen			
Elev.:			titude			45572	10	nait	tude:		9.953			Dato	Start		IIIIEII	10/6	/N8	
Total D		120 ft		oil Dep		ft	LO		ore De		ft				Com		q.		/2008	
		ameter (in)		<u>оп Бер</u> 4		pler Co	nfiai				_	equi	red					Used		
Drill M					Metho	od: M	IUD F	ROT	ARY	Hamn									73%	$\overline{}$
Core S				Drille		SCI				Grour					N/A	1		HR	7 ft	
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l 6	ا د						.	<u>.</u>	<u>a</u> _c	e e				e e		PL X		MC	LL ×	
Elevation (ft)	Depth (ft)	MAT	ERIA	L DES	CRIP1	ΓΙΟΝ		Graphic Log	Sample Depth	Sample No./Type		9		N Value				_		
ĕ							(Ō	S		1st 6"	2nd 6"	3rd 6"	Z	0 10				NT (%) 70 8	
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54.5	1 1						:			- SS	4	5	8	13	•					= =
-99.0]]						:		110.0	- - SS	2	5	9	14			- :			
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-104.0	= =	very st	iff				:	$ \cdot \cdot $	115.0	_ <u>SS_</u>	4	6	10	16		D	- :	: :		<u> </u>
1 400 0	₹	stiff					:		118.5		5	6	9	15			:			: =
-109.0		Suiii					$-\uparrow$			= 35				1.0			:	: :		<u> </u>
-114.0	= =									=					- :		- :		: :	
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		S	AMPLE	R TYPE									Г	RILLIN	NG ME	THOD				

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing

DRILLING METHOD er RW - Rotary Wash Augers RC - Rock Core

SC_DOT 08554.GPJ SC_DOT.GDT 4/8/09



ile No		.224B			t No. (<u> </u>		31-(J8-55	54 Co ι	inty:	CF	IARL	EST(UN	ĮΕ	ng./G		M. I	EICHE	-LBE
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	achine:	CM	1E-850			Metho		UD	KOT		Hamm						Ener	gy Ra	-		
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ation t)	t) at	_		D: 4:	D=2	00:5-	1011		Graphic Log	oth	Sample No./Type				N Value		PL X—		;	$\overset{LL}{ o}$	
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HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing



ile No).224B				(PIN):		31-0	08-55	4 Co	unty:	Cl	HARI	LES	ΓΟΝ		Eng./			BAUM	STA
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ore Si	ıze:				Dril	ier:	S&ME	=			Groun	awa	ter:	TOE	3 I	N/A		24	HR	4.5 ft	
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evat (ff)	Depth (ft)	N	ЛАТЕ	RIAL	DES	CRIPT	ION		Graphic Log	Sample Depth	Sample No./Type		.9	9	N Value		A E			NT (%)	
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-8.5	20.0	sand le						Γ			_	-			<u> </u>		:				
12 [25.0				wn cle	ean sand	lense			23.5	SS	2	1	1	2			<u> </u>	<u>:</u> :		_ :
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R TYPE
NQ - Rock Core, 1-7/8"
CU - Cuttings
CT - Continuous Tube

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing



ore Hole rill Mach ore Size: (t) 6.5 1.5 -3.5 -8.5 -23	1.5 f pth: e Dia hine	25.5 ft Scameter (in): 4 : CME-550 MATERIAL WASH ROTARY T Y 3" X 30" FIXED PI PUSHED 24" WIT	32.847 poil Depth: Sample Drill Method Driller: L DESCRIPTION TO 23.5 FEET	7721 I ft ler Confi d: MUE S&ME	gurat	ore De ion ARY	Repth: Sample Ground And	er Typ	9 uired: e: Aut	Date Y omati	Start Com N ic N/A	Lir Ener	1: 11 ner Us gy Ra 24HF PT N V	Atio: R /ALUE C	2008 Y 80% 4.5 ft	
ore Hole rill Machi ore Size: (1) (1) (2)	pth: e Dia hine e: (tj) 0.0	25.5 ft Scameter (in): 4 : CME-550 MATERIAL WASH ROTARY T Y 3" X 30" FIXED PI PUSHED 24" WIT	DESCRIPTION SAMPLE TH 21" RECOVER	ft ler Confi d: MUE S&ME ON	gurat O ROT	Sample Depth ARY	Sample No./Type	ft er Req er Typ dwate	juired: pe: Aut r: TOI	Date Y omati B	N/A	Lir Ener	es CO	intio:	2008 Y 80% 4.5 ft	
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Ore Size: University (#) 6.5 1.5 -3.5 -3.5 -18.5 -23.5 -28.5 -33.5 -43.5 -43.5 -58.5 -58.5 -58.5	(t) 0.0 Debtu	MATERIAI WASH ROTARY T ▼ 3" X 30" FIXED PI PUSHED 24" WIT	Driller: L DESCRIPTION SAMPLE THE 21" RECOVER	S&ME ON		Sample Depth	Sample No./Type	dwate	r: TOI	1 B	N/A	● S PL ★ FINI	PT N V MC ES COI	YALUE	4.5 ft ■ LL T (%)	
uojtevation (#) 6.5 -3.5 -3.5 -3.5 -28.5 -38.5 -38.5 -48.5 -48.5 -58.5 -58.5	(t) Depth (23.52	WASH ROTARY T ▼ 3" X 30" FIXED PI PUSHED 24" WIT	L DESCRIPTION SAMPLE THE 21" RECOVER	ON RY	Graphic	Sample Depth	Sample No./Type					PL	PT N V	/ALUE	LL X T (%)	
6.5 - 1.5 - 23 - 13.5 - 25 - 23.5 23.5 23.5 43.5 43.5 43.5 53.5 58.5 58.5 58.5 58.5 58.5 58.5 58.5	23.5	WASH ROTARY T ▼ 3" X 30" FIXED PI PUSHED 24" WIT	TO 23.5 FEET ISTON SAMPLE 'H 21" RECOVER	RY /	Graphic			1st 6"	2nd 6" 3rd 6"	N Value	0 10	PL	MC O	NTEN	LL × T (%)	90
6.5 - 1.5 - 23 - 13.5 - 25 - 23.5 23.5 23.5 43.5 43.5 43.5 53.5 58.5 58.5 58.5 58.5 58.5 58.5 58.5	23.5	WASH ROTARY T ▼ 3" X 30" FIXED PI PUSHED 24" WIT	TO 23.5 FEET ISTON SAMPLE 'H 21" RECOVER	RY /	Graphic			1st 6"	2nd 6" 3rd 6"	N Value	0 10	PL	MC O	NTEN	LL × T (%)	90
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-3.5 -8.5 -13.5 -23.5 -18.5 -23.5 -33.5 -33.5 -43.5 -43.5 -53.5		PUSHED 24" WIT	H 21" RECOVER	RY		23.5						X		•	×	
-3.5 -8.5 -13.5 -23.5 -18.5 -23.5 -33.5 -33.5 -43.5 -43.5 -53.5		PUSHED 24" WIT	H 21" RECOVER	RY		23.5						X		0	X	
-8.5 -13.5 -18.5 -23.5 -23.5 -33.5 -38.5 -43.5 -48.5 -53.5		PUSHED 24" WIT	H 21" RECOVER	RY		23.5						X		0	*	
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SS - Split ST - Shelt	-	CAMBLE	R TYPE NQ - Rock Core CU - Cuttings	, 1-7/8"		HS	A - Hollo A - Conti	w Stem	Auger			THOD N - Rot C - Roc				



File No).224B				PIN):		1131	-08-55	4 Co	unty:	CH	HARI	LES	ON] I		Geo.:		BAUN	1STA
Site De						S RO						_		ı				Route			
Boring		B-50	SPT		ring L	ocation.						Offs						nmen			
	9.5 ft			ude:			43816	} I	Longi			.961	58			Start			_	1/08	
Total D		50 f			I Dep		ft			re De	·	ft					plete			1/2008	
Bore H				4					gurat				equi		Y	N		_iner			N
Drill Ma		CM	IE-550			Metho			ROI		Hamm		_				En): 80%	
Core Si	ze:				Drille	er:	S&I	VIE			Groun	dwa	ter:	TOE	3 I	V/A		24	HR	3 ft	
																	_	SPT	.ι \/ΔΙ	IIF 🌰	
Elevation (ft)	₽_								hic	유도	Sample No./Type				ne		PL ×		$\overset{MC}{\ominus}$	$\overset{LL}{\longrightarrow}$	
eva (ft)	Depth (ft)	ľ	MATE	RIAL	DES	CRIPT	ΓΙΟΝ		Graphic Log	Sample Depth	am _j		2nd 6"	3rd 6"	N Value		▲ F	INFS (CONT	ENT (%)	
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	20.0	CLAYE								18.5	= - SS	2	2	3	5		:				:
-10.5	20.0	very lo		ray, fin	e; with	trace	silt and	t	N//		7						-				
-15.5	25.0									23.5	- - SS	2	2	1_	3	•	<u> </u>			:	
-15.5	=	SLIGH								28.5	.=										
-20.5	=	very lo	ose, g	ray, fin	e; with	trace	shell			20.5	SS	1	1	1	2	•					- :
= =====================================	=	CLAY	EY SAI	ND (SC	<u>)</u>					33.5	Ξ.										
-25.5	=	very lo	ose, g	reenish	n brow	n, fine				00.0	SS	1	2	1	3	•		0		- : :	- :
3]	tra	ice she	ell and	phosp	hate				38.5	3						:				- 1
-30.5	40.0	COOP	ER MA	RL: C	LAYE	Y SILT	(ML)		- ////		SS	2	1	2	3	•	-			: :	- :
Ξ.	=	soft, ol								43.5	= <u></u>	2	2	3	5				.		
-35.5	=		J	-							7						- ^				-
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									LE	GENI)										
SS - S	Split Spo	on	SAM	IPLER I	TYPE NQ - R	ock Co	re, 1-7	/8"		HS	SA - Hollo	w Ste	em Au	iger			THOD W - F) Rotary '	Wash		
	Shelby T			(uttings				CF	A - Cont	inuou	s Flig	ht Au	gers			Rock C			



File No	o.: 10 escripti).224B	PORT	ject N				1-08-5	54 C c	ounty:	CH	HARL	EST.	ON	E		Geo. Route		. EICH	ELBE
			SPT A								Offse	.								
Boring		B-51				32.84		Long	:4d.a.	70	9.9573			\			nmer		9/08	
Elev.:		50 ft	Latitud				ft			epth:	ft	000		ate S			. d.		9/06 9/2008	
Total D	-	meter		Soil						_•				ate ((N)			Usec		
	achine:		(III): E-550			Samp Metho	ler Con			Hamn	er Re				$\overline{}$				i: † : 80%	N
Core S		. Civi	<u>L-330</u>		Orille		S&ME	טא טו	IANI	Grour			TOB		I/A			HR	4.5 f	
zore 3	IZE.				Jillie	١.	Salvic			Groui	iuwai	lei.	ЮВ) IN	W/A		24	пк	4.51	ι
																•	SPT	N VAL	UE ●	
_																DI		MC	- 11	
Elevation (ft)	£ _							Graphic	Sample Depth	(ft) Sample No./Type				N Value		PL ×		MC O	— <u>X</u>	
leva (ft	Depth (ft)	N	//ATER	IAL C	DESC	RIPT	ION	3rap	Sam Deg	Sam o.7	1st 6"	2nd 6"	3rd 6"	\ \ \ 		▲ F	INES (CONTE	ENT (%)	
Ш	0.0									_	18	2n	310		0 10	20 3	80 40	50 60	<u>70 80</u>	90
=	1 1	ASPHA						-/1888	1.0 3.9	=	9	4	7	11	•					- :
2.0-	4.5	FILL: S							6.0	$\frac{1}{2} \frac{SS}{S}$	3	2	1	3	•				-	
Ξ	7.5	dark gr	ay, fine;	ceme	nt sta	bilized	silty sand		Ά.	SS		WOH		0)	:		: :		
-3.0	9.5	FILL: S	LIGHTL	Y SIL	TY SA	ND (S	P-SM)		_	SS	WOH	WOH	4	4	•	:		: :		<u> </u>
Ξ	13.5		n dense,	, light l	brown	, fine;	with trace		13.	5=		WO:					; ;			į
-8.0]	shell								- SS		WOH		0	• : :	: X				<u> </u>
	20.0	FILL: S	SILTY SA	<u> AND (S</u>	<u>SM)</u>				18.	5= SS_		WOH		0						:
-13.0	20.0	very loc	ose, gray	y; with	shell	hash			1	-		77011				-		<u> </u>	<u> </u>	:
10 0		SILT (N	ЛН)						23.	5- - SS	WOH	<u>IWOH</u>	2	2			(<u>i</u>	<u> </u>
-18.0 -]	III .	oft, black;	; orga	nic sta	ained			20.	-										
-23.0] =				- 1-	-			28.	SS	WOH	WOH	1	1						
0.0]		SAND (S ose, darl		mad	ium			33.5	5 =						:				:
-28.0						iuiii]	55.	SS	1	1	1	2	•	:		<u> </u>	-	:
=	38.5		NIC CLA						38.	5=						:				
-33.0	<u> </u>	very so	oft, dark o	gray; v	vith w	ood				SS	2	2	2	4	•	:		- : :	- : :	- :
=]		SAND (S						43.	5	2	2	2	-			0			:
-38.0		very loc	ose, blui	sh gra	ıy, fine	e; with	trace she			SS	12	3	3	6		-		<u> </u>		- :
=	50.0	ligh	nt brown	ish gra	ay; wit	h trace	shell and	- - - - - - - - - - - - -	48.	5 <u>SS</u>	3	4	5	9						:
-43.0	30.0	phosph						┚╟┸┸	1	- 55				-						:
-48.0 -		COOPE	ER MAR	L: SIL	TY SA	AND (S	<u>M)</u>			=							<u> </u>		<u>i</u> _i	<u> </u>
-4 0.U _]	loose, d	olive gre	en						=				Ī						
-53.0 [–]	1 =	BOI	RING TE	RMIN	ATEC	AT 50	FEET.	_		=										
-]									=										:
-58.0]														- :	-	: :		-	- :
Ξ										=										:
-63.0] =									=				-	:	:	1 1	: :	1 1	:
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70.0	∃									=					:	:				:
-73.0]]									=				Ī		:		: :		
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			SAMP	I FR T	YPF			LE	GEN	ט			DE	RILLIN	GME	ТНОГ)			
SS - S	Split Spo	on	O/NIVII"	N	Q - Ro		e, 1-7/8"			SA - Holl			ger		R۱	W - F	Rotary			
ST - S	Shelby Ti	ube e, 1-1/8"			U - Cu T - Co		ıs Tube			FA - Cor C - Driv			nt Aug	jers	R	ان - F	Rock C	ore		



ile No		.224B			(PIN):		1-08-55	04 Cοι	ınty:	CF	IARL	EST	ON	E	ng./G		M.	EICH	-LBE
	scripti				SS RO		1			O.C	. 4 .					oute:			
oring			SPT ALE				1	4		Offse			-4- 4		Alignr		0/4	2/00	
lev.:			Latitud			15119	Longi			.9573	3/3	_		Start			0/10		<u> </u>
Total D	-	22 ft		Soil De	<u> </u>	ft		ore De	• ,	ft or Bo					pleted			0/2008	
	oie Dia achine:	meter ((in): E-550	4 Dri	_ Sam II Meth	pler Con	i figurat JD ROT				quire		Y	<u>N</u>		ner Us gy Ra			N
ore Si		CIVII	330		li wetne ller:	S&ME	וטא ענו		Groun					: I/A	Liler	gy Ra 24HF		4.5 ft	,
OIE 3	ZE.			וזטן	iiei.	JORIVIE			Jiouil	uwat	CI.	IUB		v/ /₹		44 11	`	મ.ઇ ાા	
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Elevation (ft)	ŧ.						hic	gt (Sample No./Type				lne		PL X—	MC O		$\overset{LL}{ imes}$	
Eleva (ft	Depth (ft)	M	/ATERI	AL DE	SCRIP	ION	Grap	Sample Depth (ft)	Sam No./T	1st 6"	2nd 6"	3rd 6"	N Value			ES COI			
ш	0.0	WASH	ROTARY	7 TO 24	FFFT		_	_		1,8	2	S.	_	0 10 :	20 30	40 50	60	70 80	90
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2.0]	<u>-</u>						=					-				:		-
-3.0	3							=											
-3.U <u> </u>	3							=						:					
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-13.0	=							=						:	<u> </u>	<u> </u>	:	: :	
-18.0	24.0	2" V 20	" FIXED I	DISTOR	CVMDI			24.0	ST			_			<u> </u>				
-10.0	26.0	PUSHE	D WITH 2	24" RE	COVERY	_		1 -	31			\dashv							
-23.0	3						_		_				-	:			- :		
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NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube

HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing



le No		.224B				(PIN):		131-	U8-5	54 Co ι	ınty:	CH	HARI	_ESI	ON		⊨nç	J./Ge		M.	EICHI	=LRF
	scription					S ROA					1.	Off	_4-	-			A	Ro		<u> </u>		
Boring		B-52			ring L	ocatio		-	- · · · ·	4		Offse			_ +-	04-		gnm			/OO	
lev.:	16.0 ft		Latitu		I Dar	32.84	_	L		tude:		.955	ექ		Date					10/7		
Total D	•	50 ft			I Dep		ft	0 to £!		ore De	•	ft						ted:			/2008	(A)
	ole Dia		<u> </u>	4	ריים ח	Samp			_				equi		Y	ic (sed:		N
	achine:	CIVI	E-45			Metho		VIUD	KUI	ARY I			-								70%	
Core S	ıze:				Drille	er:	SCI				Groun	uwa	er:	IUE	5 [V/A			24HI	K	N/A	
																		• SF	T N V	/ALU	E●	
_																					11	
Elevation (ft)	E								g g	pg ç (Sample No./Type				lue		,	У <u> </u>	M(—X	
leva (ft	Depth (ft)	N	MATER	RIAL	DES	CRIPT	ION		Graphic Log	Sample Depth (ft)	sam o./T	1st 6"	2nd 6"	3rd 6"	N Value		•	FINE	s co	NTE	NT (%)	
Ш	0.0								<u> </u>		υž	1st	2nc	3rd		0 10					70 80	90
=	0.5				TOPS	OIL= 6 I	NCHES	<u> </u>		2.5	00	6	0	9	10			:		:		:
11.0-	5.0	FILL: S							\bowtie	5.0	SS	5	9 5	9	18 14			:		:		- :
Ξ	7.5	mediur mediur	n dense	e, bro	wn an	d black,	fine to			7.5	SS	3	6	6	12					:		
6.0	10.0	11	•	uace	10018				$\Rightarrow \Rightarrow$	10.0	SS	3	3	6	9		-	:	: :	- :		- :
Ξ	1.3	gra	_							1. -												
1.0	15.0	III.————				<u>SAND</u>				15.0	SS	1	WOH	1_	1		<u>:</u>	.0	1 1	:	: :	- :
=	20.0=	mediur with br	n dense	e, dar ick ar	k brow	n and g	ıray, fir	ie;		20.0							:	:		:		:
-4.0	20.0	 			-					20.0	SS	2	1	2	3	•	:	:		:	: :	:
2 -			CLAYE				a la col			25.0	1					:	:	:		:		:
-9.0 <u>-</u>]	mediur	n dense	e, gra	y, tine	; with de	edris]	SS	WOH	WOH	2	2	•	X	X 0	A		: :	
-14.0 [–]	30.0	POSSI	BLE FII	LL: 0	RGAN	IIC SAN	DY			30.0												
- 14.0 _		CLAY] =	SS	1	3	5	8	•				:		
-19.0 -]	stiff, lig	ht brow	/n						35.0	000	1			_		:	:		:		:
]	POSSI	BLE FII	LL: S	ILTY S	SAND (S	<u>(M)</u>			-	SS	1	1	1	2	•	:	:	0	:		:
-24.0	40.0	very lo	ose, gra	ay and	d brow	n, fine				40.0	SS	1	2	3	5		- :	:	: :	- :	1 1	- :
Ξ]	CLAYF	Y SAN	D (SC	C)				- : : -	=		'		J	3		:	:		:		
-29.0]	11				gray, fir	ne; with	,		45.0	SS	3	4	4	8	•		. 0	: :	- :		- :
=		shells	٠, ٠.٠			J . J,	,			48.5]				:		
-34.0	50.0	wit	h trace	roots	and s	ome sh	ells		1.111.	1 =	SS	4	4	6	10		<u> </u>	:	1 1	:		:
]	SILTY	SAND ((SM)													:			:		
-39.0		loose,			nish gr	ay, fine				=	1						:	:		:		:
44.0			ry loose	•	•	•				=	1										: :	
-44.0]	l	•			SAND (S	:M)	—		=							-	:				:
-49.0 -]		olive gr			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,, ,,,										:			:		
-J.U_						D AT 50) FEET			=							:					:
-54.0		ы	KING I	⊏KIVII	IIVA I E	אני ארי	, FEE I	•		=	1					- :	<u>:</u>	:	: :	:	: :	<u>:</u>
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-59.0										=						- :	- :	- :		:		- :
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SC_DOT 08554.GPJ SC_DOT.GDT 4/3/09

R TYPE
NQ - Rock Core, 1-7/8"
CU - Cuttings
CT - Continuous Tube SS - Split Spoon ST - Shelby Tube AWG - Rock Core, 1-1/8"

DRILLING
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing



File No.		.224B	PORT A				31-(08-55	54 Co	unty:	CH	HARL	EST.	ON		Eng	./Geo Rout		I. EICH	ELBE
Site Des Boring			SPT A Bo				1				Offse	nt:				ΛIi	gnme			
	16.0 ft		Latitude:		32.84		+	ongi	tude:		.955		-	ate S	Star				7/08	
Total D		2.5 f		il Dept		ft			ore D		ft			ate C				_	7/08 7/2008	
Bore Ho						ler Co	nfic	_		• • • • • • • • • • • • • • • • • • • •		equir		Y	(N)	_	Line			(N)
Drill Ma			E-850		Metho					Hamm					$\overline{}$				5: 73%	
Core Si	ze:			Drille	er:	SCI				Groun	dwat	ter:	ТОВ	N	l/A		24	4HR	N/A	
																	● SPT	NI V/AI	IIE 📤	
Elevation (ft)	epth (ft)	_		5-				ohic g	Sample Depth	Sample No./Type		_		alue		P >	<u> </u>	MC O	X	
:leva		N	MATERIAL	DESC	CRIPT	ION		Grap Lo	Sam Dep	Sam No./T	1st 6"	.9 pi	3rd 6"	N Value					ENT (%)	
ш	0.0	ORGAI	NIC LADEN	TOPSO)II = 6 II	ICHE 9					2	دا 2nd 6"	32.6	11	0 10	20	30 40	50 6	0 70 8	90
= =	2 E 🗀		SAND (SP)	IUFSC	<u> </u>	TOTIES			0.0	<u> </u>	_									
11.0	31	mediur	n dense, bro	own and	d black.	fine to				=					:	:		:		:
6.0	=	mediun	n grained; w	ith trace	e roots		_			=					:	:	: :	:		
5.0	=	В	ORING REF	USAL A	AT 2.5 F	EET.				=						:		:		
1.0	=									=				-	- :	:	: :	:		- :
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-4.0	∄									=				-	:	:		:		
-9.0	∄									=					- :	:	: :	:		- :
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								15	GENI	<u> </u>					- 1	- 1	1 1	:	: : :	: -
			SAMPLER					LE					DF	RILLING						
SS - S ST - S	plit Spoo	n be			ock Core uttinas	e, 1-7/8"			HS CF	SA - Hollo	w Ste	em Aug s Fliah	ger		R	?W -	Rotary			
T - S	helby Tu lock Core	be		CU - C					CF	A - Cont C - Drivi	inuou	s Fligh	nt Aug	jers			Rock (



File No. Site Des		0.224B ion:			t No. (SS RO		131-	<u> </u>	<u>,-</u> , CO	ounty:	_ Ur	HARL	<u>-LOI</u>	OIN		Eng./G	oute:		EICHE	<u>-LDE</u>
Boring			2 SPT E					$\overline{}$			$\overline{}$	Offse	et:	\Box		$\overline{}$	Alignr				
Elev.:			Latitu				45456	3 1	ongi	itude:		9.9555		<u></u>	Date	Start			10/7/	/08	
Total De		26 f			il Depi		ft			ore De		ft					npleted			7/2008	
Bore Ho				4			pler C	Confi					equir					iner U			(N)
Drill Ma			ME-850			Metho					Hamm							rgy Ra			
Core Si			<u>/IL 00 </u>		Drille		SCI		110		Groun			TOB		N/A		24HF		N/A	
JUIU 2.	26.					"·	100.				<u> </u>	<u> </u>	16	10.	<u>, </u>	N (1) .				1807.	
		1															• 5	SPT N \	VALU	JE •	
Elevation (ft)	Depth (ft)		MATER	RIAL	. DES	CRIP ⁻	TION		Graphic Log	Sample Depth	(ft) Sample No./Type	st 6"	2nd 6"	9	N Value		PL ×	M(⊖ NES CO	c	—X	
ă	0.0								Ö	S	ωž	1st	2nd	3rd 6"	Z	0 10	20 30				
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1.0	, ∃	4]			ļ	'	:			<u>:</u>		<u>:</u> -
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-4.0	, ∃	f									=			ļ	'	:		- : :	<u>:</u>		-
3	24.0	4								24.0	, 🗐			ļ	'						
-9.0	26.0		30" FIXEI								ST								$\stackrel{:}{-}$		
=	, ∃	PUSH	HED WITH	H 23"	RECC	VERY		/			=				Ī '						
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-19.0	, <u>∃</u>	1									=			ļ	'	+	- : :	- : :	- :	- : :	
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-34.0	, <u>j</u>	1									=			ļ	'				-:		
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-44.0	. 3	1									=			ļ	'				. :		
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-54.0	, <u> </u>	1									=			ļ	'	:			<u> </u>	<u></u>	
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-59.0	, ∃	1									=			ļ	'					<u> </u>	
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-64.0	, ∃	1									=			ļ	'		<u> </u>		<u>:</u>		<u></u>
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-79.0	,]	1									=			ļ	'	<u> </u>		- : :	- :-	- : :	
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			- SAM		RTYPE					GEN	<u> </u>				<u> </u>	IC MI	ETHOD				
SS - S ST - S AWG - R	Split Spo Shelby T	Tube		1	NQ - Ro	Rock Cor Cuttings				CF	SA - Hollo FA - Cont C - Drivi	tinuou	us Fligh	uger		R'	RW - Ro				



		■ Soi								101110								
File No).224B		ect No. (31-08-5	54 CC	ounty:	CHARL	.ES	SION	E	ing./C			BOLLE	=R
Site De				ACCES											oute			
Boring		B-53 S		Boring L			+			Offset:				Align	men			
Elev.:			Latitud		32.840			itude:		.967309			Start				/2008	
Total D		50 ft		Soil Dep		ft		ore D		ft			Com				/2008	
		meter (i	•	4	Sampl					er Requir			• • •			Used:		N
Drill Ma		CME	E-850		Method		JD RO	TARY		er Type:				Ene			73%	
Core S	ize:			Drille	er:	SCI			Groun	dwater:	TO	В	N/A		241	I R	2.5 ft	
												1			ODTA			
														•	SPIN	I VALU	Ŀ♥	
Elevation (ft)	e						ا <u>ن</u> _	_ e	Sample No./Type			e		PL ×	ı	ИС ⊖	LL —X	
evat (ff)	Depth (ft)	M	ATERI	AL DES	CRIPTION	NC	Graphic	Sample Depth		9		Value		▲ □IN	اده ر	ONTE	NT (0/.)	
Ш	0.0						ق	S	1	1st 6" 2nd 6"	3rd 6"	Z	0 10				70 80	90
_		SILTY S	AND (SI	<u>M)</u>				0.0	_	1 1	2	3	•					
8.0-	5.0			k and dark	brown, f	ine; wit	h	2.5 5.0		3 4	5	9	•					
0.0	E	fine root	S					7.5	<u> </u>	2 3	5	8	•	X	O.		: :	
3.0-	10.0		e, grayis	sh brown t	to reddish	n brown		10.0) = SS	3 4	6	10	•					
] 3.0 =		mottled					_]		SS	3 4	7	11			:	: :		- 1
-2.0	15.0	CLAYEY						15.0	E	10011 1		1			- :			
]	medium mottled,		brown to r	eddish b	rown			- SS	WOH 1	_1	2	-		÷			:
-7.0	Ε	1		h				20.0)	WOHWOH	1	1		<u> </u>	- :	: :	<u> </u>	- :
] =]]	light mottled	grayish	brown to	readish t	orown				VVOI IVVOII		+-	T		:			- : :
-12.0]		IVEIIT	Y SAND (SD SW)			25.0) SS	2 1	2	3		<u> </u>	<u>:</u>	1 1		
=				light grayi		fine						T .	_	7: :	:			:
-17.0	30.0	ار			311 DIOWII	, 11110	<u></u> ┛┌┼┪┱┧	30.0) <u> </u> SS	WOHWOH	1	1		1 1		1 1	1 1	
=		SILTY S						0.7	7		•		T		:			
-22.0]		se, light	greenish	blue, fine	; with		35.0)	WOHWOH	2	2	•	1 1	- :	1 1		
] =]	shells						40.0										
-27.0		SILT (M						40.0) <u>ss</u>	WOH		0	•		X :	- X :	0	_
	45.0	very soft	t, greeni	sh blue; w	ith clay a	and trac	e	45.0	,]				:	: :	:			
-32.0	45.0	1					/		- SS	3 3	5	8	•	- : :	÷	: :		
	50.0	with	•					48.5	5- - SS	3 5	6	11	-			<u> </u>		
-37.0		<u> </u>													:	-		
-42.0-		COOPE	R MARL	: SANDY	SILT(ML	<u>)</u>			=									
-42.0]	stiff, oliv	e green						3									
-47.0]]	BOR	ING TER	RMINATE	D AT 50	FEET.			3				:			<u>: :</u>		
]								=						:			
-52.0	1 =								=				:	1 1	- :	<u> </u>		
] =]								3									
-57.0] =								3				1	1 1	:	1 1	: :	1 .
] =									₫						:			
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-67.0									\exists						<u> </u>			
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-72.0]								3				:	1	:			
-77.0-] =								1					1 1	:	1 1		
-,,,,,=	Ε								=				:		:	: :		
-82.0]]								3				-		- :			
52.5									\exists						:			
	=								<u> </u>				1	1 1	:	: :	: :	
-77.0 - -82.0 - SS - S			0444=	ED = :-			LI	EGEN	D									
 SS - S	Split Spo	on	SAMPL	ER TYPE NQ - R	ock Core	. 1-7/8"		H	SA - Holla	ow Stem Au	[ger	RILLII	NG ME R\	THOD N - Ro	otarv \	Vash		
	Shelby T	ube		CU - C	uttings			CI	FA - Cont	tinuous Fligh		ugers		C - R				
AWG-1	Rock Cor	e, 1-1/8"		CI - C	ontinuous	iube		100	Drivi - Drivi	ing Casing								



Site Des			TAC											-		Route			
Boring		B-53 SPT A		ing L							Offset				Aligr	nmen			
Elev.:						4077		_ongi			96730			Start			9/19	/2008	
Total De		34 ft	Soil	Dep		ft			re De		ft		Date	Com	plete	d:	9/19	/2008	•
Bore Ho	ole Dia	meter (in):	4		Sam	pler	Confi					uired			L	_iner	Used	: Y	(1
Orill Ma	chine:	CME-850)	Drill	Meth	od:	MUD	ROT	ARY F	łamme	er Typ	e: Au	tomat	ic	Ene	ergy	Ratio	: 73%)
Core Si	ze:			Drille	er:	SC	:[round	dwate	r: TO	В	N/A		24	HR	N/A	
								_					_						
															•	SPT	N VALL	JE ●	
5								l _o	σ.	o o			a)		PL X		MC	LL ×	
Elevation (ft)	Depth (ft)	MATER	2ΙΔΙ Ι	DES	CRIP	TION		Graphic Log	Sample Depth (ft)	Sample No./Type	=	-	N Value						
) Ee	۵	IVI) (I LI	\// \L	DLO	O1 (11)	11011		Gr.	Sal De	Sa No.,	1st 6"	2nd 6" 3rd 6"	z	0.40			CONTE		
	0.0	WASH ROTAR	RY TO	32 FI	FFT			1				<u>0</u> 0		0 10	20 3	0 40	50 60	70 8	0 9
∄	Ⅎ	WAOIIROTAI		02 1 1]					:	: :		: :		
8.0	=								=										
∄	=													:					
3.0	‡								=										
[]	=																		
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-7.0	Ⅎ													:	: :		: :	: :	
7.0	‡																		
-12.0	Ę														- :		<u> </u>		
=	=																		
-17.0	20.0																- :		
=	32.0 <u> </u>	3" X 30" FIXE	D PIST	TON S	SAMPI	LE			32.0	ST				1		× :	- : :	; 	4
-22.0	· · · · · · · · · · · · · · · · · · ·	PUSHED WIT					/			-				1	: :		: :		
=	‡	BORING T	ERMI	NATE	D AT	34 FEE	ET.		=										
-27.0	=																1 1		
	=																		
-32.0	=														: :		: :		
-37.0	=								=							<u> </u>			
-31.0	=																: :	: :	
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-47.0	7														- : :	:	1 1	- : :	
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		CVIVI	PLER ⁻	TYDE				LE	GEND			г	RILLI	NC ME	THOD)			
	Split Spoo	on	N	IQ - R	ock Co	ore, 1-7	7/8"		HSA	- Hollo	w Stem	Auger		R	W - R	Rotary			
	Shelby Tu	ıbe e, 1-1/8"	C	CU - C	uttings	s ous Tu	ıhe		CFA	Conti - Drivir	nuous l	Flight A	ugers	R	C - R	Rock C	ore		



Site De			RT A	CCES	SRC	DAD										Rout	e:		
Boring		B-55 SPT		ring L							Offse					Alignme			
Elev.:	12.0 ft		_			38384	L	ongit			.9643	2278	Da	te St	tarte	ed:		3/2008	
Total D		50 ft		il Dep		ft		_	re De	• , —	ft					oleted:		3/2008	
		meter (in):	4			npler Co					er Re			Υ	N		Used		(1
	achine:	CME-850)	Drill			ИUD	ROT		Hamm						Energy			
Core Si	ize:			Drille	er:	SCI			(Groun	dwate	er: T	ОВ	N/	Α	24	HR	N/A	
																● SPT	N VALI	JF •	
																		J_ •	
Elevation (ft)	₽ _							hic B	be + ↓	Sample No./Type				ine		PL ×	MC —	$\overset{LL}{\longrightarrow}$	
eva (ft)	Depth (ft)	MATE	RIAL	DES	CRIP	MOIT		Graphic Log	Sample Depth (ft)	am o./T	9	.9 [و ا	N value		▲ FINES	CONTE	NT (%)	
ѿ	0.0							Θ	<i>S</i> –	1	2 1st 6"	-2nd 6	ল	0	10	20 30 40			9
=	0.2	TOPSOIL= 2		<u>ES</u>			/,		0.0	SS				9	•				
7.0	2.5	SILTY SAND					- 1		2.5 ₋ 5.0-	SS	WOH 3		4 6 1	0	<u> </u>	<u> </u>	: :	: :	
3	7.5	loose, dark bi	own a	and bla	ck, fin	e; with fi	ne		7.5	SS	2			3		0			
2.0	=								10.0	SS	1			3		<u> </u>	: :	: :	
	15.0-	CLAYEY SAN							4E 0						:				
-3.0	15.0	loose, grayish	brow	n, fine				M	15.0	SS	V	VOH		0		\ O	: :		
	20.0	SLIGHTLY C							20.0	1									
-8.0		medium dens	e, ligh	nt grayi	sh bro	own, fine			-3.0	SS	WOHV	VOH	1	1	:				
-13.0	=	very loos	е						25.0	1			\perp		- :			<u> </u>	
10.0	=	SILTY SAND	(SM)						=	SS	1_	1	1 2	2					
-18.0	=	very loose, bl	uish g	reen, f	ine; w	ith shells	;		30.0	SS	1	1	1 .	2	-		: :	- : :	
=	=	CLAYEY SIL	Г (МН)									++		:				
-23.0	=	very soft, blui		_					35.0	SS	WOH	1	1 :	2	-	X	- : :	X	0
=	\pm	with shell	_						40.0					\neg	:				_
-28.0	=	trace san							40.0	SS	WOH	1	1 :	2_	-				
, , , <u>, , , , , , , , , , , , , , , , </u>	=	trace she							45.0						:				
-33.0	46.5	SILTY SAND	(CRA)						-		WOH	1	1 :	2_					
-38.0	48.5 50.0	medium dens		nt areei	nish h	rown fin	e /-		48.5	SS	6	8	8 1	6		0			
	=								=	1									
-43.0	=	COOPER MA			SILT	(IVIL)			-	1				-			: :	:	
=	=	very stiff, oliv							=	1					:				
-48.0	=	BORING '	ΓERM	INATE	D AT	50 FEET.	•		=					\vdash	-		- :	- : :	
	=								=						:				
-53.0	=								=	1					-				
-58.0]								=						<u>:</u>		<u> </u>		
-50.0	=								=	}									
-63.0	=								=										
=	=								=	1					:				
-68.0	=								=					\vdash	:		: :	: :	
\exists	=								=	1					:		: :		
-73.0	=								=	1					:		-		
-78.0	=								=	1									
-/0.0	=								=						:		: :		
-83.0	=								=										
	=								=										
	-							1 -	OENID						:	<u>: : :</u>	<u>: i</u>	<u> </u>	_
		SAM	IPI FR	TYPE				LE	GEND				DRII	IING	MET	THOD			
SS - S	Split Spo	on		NQ - R		ore, 1-7/8	3"		HS	A - Hollo	w Ster	n Auge	er		R۷	V - Rotary			
ST - S AWG - F	Shelby Tı	ibe		CU - C	uttinas	S			\perp CEA	A - Con	เทเเดเเร	⊢liaht	Auger	S	RC	- Rock (ore		



Site De Boring Elev.:			POR		ノンレし	\sim 1 \sim											אַנווטא	ტ.∣		
Elev.:	NO:	R-F	55 SPT A								- 1	Offset					Rout nmer			
			Latitu		nig L		3838 3838	4	Longi	hiqo.		.96432		Dato	Start				2/2008	
[otal D	epth:		ft		l Dep		ft			ore De		ft	270		Com		d.		2/2008	
	lole Dia			4	. Dob				gurati			er Rec	uired					Used		(1)
	achine		ME-850		Drill	Meth				ARY I					\sim				70%	_
Core S		- -	000		Drille		SC				Groun				N/A			HR	N/A	
																	- 1		1	
																•	SPT	N VAL	JE ●	
Ē									0	4)	ωψ			d)		PL ×		MC	LL X	
/atic ft)	Depth (ft)		MATER	2ΙΔΙ	DES	CRIP	TION	l	Graphic Log	Sample Depth (ft)	mple Typ	_	-	N Value				_		
Elevation (ft)	ا م			\I/\L	DLO	CIVII	1101	ı	Gra	Sar De (Sample No./Type	1st 6"	2nd 6" 3rd 6"		0.40				NT (%)	
	0.0	WAS	SH ROTAF	RY TO	24 FI	EET				_		_	0 c	·	0 10	20 3	30 40	50 60	70 80) 9
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2.0]									=						- :				
2.0 _	‡ ‡									=										
-3.0										=						- :	<u> </u>	-	- : :	
=]]									=										
-8.0]]									=					:	:	<u>. :</u>	: :	1 1	
-	24.0	~								24.0					1					
-13.0	26.0		30" FIXE						_	=	ST				-	X (→ X	<u> </u>		
-18.0	1 1		BORING T					<i>′</i> ≣T.		=								: :	: :	
- 10.0]]	_								=									1	
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-33.0	1 1									=						:		: :	: :	
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	<u> </u>								LE	GEND	1	I.		1	1 .	-	-	<u> </u>	<u> </u>	
	O=114 O=		SAMI		TYPE		1	7/0"			\	O+-		DRILLII	NG ME	THO)	\\/ !-		
	Split Spo Shelby T				NQ - R CU - C		ore, 1- ⁻ 3	۱/۵		HSA	A - Hollo A - Cont	w Stem inuous	ı Auger Flight A	ugers			Rotary Rock C	Wash Core		



File No			224B			t No. (1131	-08-55	o4∣ C o	unty:	CH	ARL	ES⁻	ΓΟΝ	ΙE	ng./G			BOLLE	-R
Site De		•				CCES						-							oute:			
Boring			B-55			ring L							Offse					Aligni				
Elev.:			1		ude:			38384	}	Longi			9643	2278	_		Starte				/2008	
Total D			37 f			il Dep		ft			ore D		ft				Comp				/2008	
Bore H					4					igurat			er Re			Y	N		ner L		,	N
Orill Ma		ne:	CM	1E-85	0	Drill				D ROT	ARY	Hamme						Ene			70%	
Core S	ize:					Drille	er:	SCI				Ground	dwate	er: ¯	ΓOΕ	3 1	N/A		24H	R	N/A	
											l							•	SPT N	\/^	г .	
on	ے ا									္ခ	ے ف	e be				e		PL X	N		$\overset{LL}{ o}$	
Elevation (ft)	Depth	E	1	MATE	RIAL	DES	CRIP	TION		Graphic Log	Sample Depth	Sample No./Type	 0			N Value		A FIN			, . NT (0/ \	
Ε̈́	0.	.0								ō	S	l s S	1st 6"	2nd 6"	3rd 6"	z	0 10				NT (%) 70 80	90
=			WASH	ROTA	RY TO	O 35 FE	ET					=			•							-
7.0-	1	=										\exists										
7.0		=										=										
2.0	1	=										=					:	: :	:		1 1	
	1	\exists										=							Ė			
-3.0	1	=										=					:	: :	- :	: :	: :	- :
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22.0	35.	.0									35.0	.=					:					
-23.0	37.	.0	3" X 3	0" FIXI	ED PIS	STON S	AMPI	E				- ST						<u> </u>	:		- : :	0 :
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				SAN	/IDI ED	TYPE				LE	GENI	נ			חם	SILLIV	IG MET	HUD				
SS - S	Split S	Spoo	n	JAN		NQ - R			/8"			SA - Hollo			er		RV	V - Ro				
	Shelb		be e, 1-1/8'			CU - C		s ous Tul			CF	A - Conti C - Drivir	nuous	⊢ligh	τAu	gers	RC	: - Ro	CK CO	е		



File No.).224B		oject				131-	·U8-55	4 CO	unty:	CH	IAK	_ES1	ON		Eng./	Geo. Rout		. EIC	HELBE
Site De						S ROA)tt	4.								
Boring		B-57			ing L	ocatio			o naid	hudai		OG47)oto !	Ctor	Alig	nmer		6/200	<u> </u>
	10.0 ft		Latitu		Dan	32.83		L	_ongi	tuae: ore De		9617	710		Date :		tea: iplete	. d.		6/2009	
Total D	•	120 t			Dep		ft	fi			• ,	ft T Bo					•			6/2009	
Bore Ho				3	D-:III	Samp						er Re			Y	<u>N</u>			Used		$\overline{}$
Drill Ma		D-5	U	_		Metho			ROT		Hamm		-				En): 60%	′ o
Core Si	ze:				Drille	er:	S&N	1L			Groun	dwat	er:	TOE	3 r	N/A		24	HR	3 ft	
									T								_	SDT	N VAL		
																		OF I		UE 🐱	
<u>io</u>	۲								်ခ် _	۽ ڇ	be /				ne		PL ×		MC	$\overset{LL}{ o}$	
Elevation (ft)	Septh (ft)	N	1ATEF	RIAL I	DES	CRIPT	ION		Graphic Log	Sample Depth	Sample No./Type		9	9	N Value		A E	INITO			`
E E	0.0								ō	SS		1st (2nd	3rd 6"	Z	0 10				ENT (% 0 70 8	
=		SLIGHT	TLY SIL	_TY S/	AND (SP-SM))		IJ	0.0		3	4	6	10	•					
- 4	-	loose, b	rown t	o dark	brow	n, mois	_			2.0	- <u>SS</u> - SS										
5.0	6.0	∖trace ro	ots and	d orga	nic sta	ained		1		4.0 6.0		3	5	7	12	•					
= =	#	CLAYE	Y SAN	D (SC)					8.0	SS	4	6	6	12 >	k 🗓	C) :			
0.0	Ι]	black, f			1					10.0		3	2	3	5	•	:		:	:	: : :
	13.5	٦ ا			ottlad					13.5	SS	1	0	1	1 (
-5.0	Ε		y to bro					—									:	: :			
-10.0	18.5	SLIGHT							////	18.5	SS	WOH'	WOH	WOH	0)		:		0	A	
-10.0	3	medium coarse,			brow	n, medi	ium			22.5							:				
-15.0	\exists			itou						23.5	SS	1	1	1	2	•	:		: :		
-13.0	=	coa								20 5	=										
-20.0	=	SLIGHT					<u>SC)</u>			28.5	SS	1	1	1	2	•					
20.0	=	very loc	se, gra	ay, sat	urated	t				33.5						:	i				
-25.0	=	SANDY	SILT (ML)						33.5	SS	1	1	0	1 (:				
	= =	very so			rated;	with tra	ice she	ell		38.5	=						:				
-30.0	3	gra								30.5	SS	1	2	1	3	•			- : :		<u> </u>
=	43.5	with	•		511011					43.5	=										
-35.0	.0.0_	\ with			s			/	111	1 -5.5	SS	16	26	24	50 >	(▲	0 :	: :	•		
1	48.5	SLIGHT				SD GW	١			48.5]						:				
-40.0	-5.0	1					_	h	<u> </u>	.5.5	SS	3	4	6	10	•	- :	<u> </u>			<u> </u>
- =	=	very de	_1_	ay, co	aise,	saเนraโ	eu, Wit	"		53.5]						:				
-45.0	‡				Maria	OU = #				-3.5	SS	2	4	5	9	•					: :
=	3	COOPE					<u>/IL)</u>			58.5											
-50.0	=	stiff, oliv	ve gree	en; with	n trace	e shell					SS	3	4	4	8	•	:	: :	- :	:	1 1 .
=	Ę	firm								63.5							:				
-55.0	=	stiff	f								SS	3	4	5	9	•	:	<u></u> ×	→	:	: : :
=	=									68.5					_						
-60.0	=	firm	1								SS	3	3	5	8	:	1	. <u>:</u>	: :		1 1 .
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-65.0	=										SS -	3	3	4	1		- :	: :			
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-70.0	Ę	stiff	Ť								SS -	3	4	5	9		<u>:</u>				<u> </u>
\exists	=	-								83.5	SS	3	4	4	8		:				
-75.0	=	firm	1								=	٦	4	4	0		:				
=	=	-1:0	:							88.5	SS	3	4	5	9		i				
-80.0	‡	stiff									-		+	J	9		:				
_ =	=									93.5	SS										
-85.0	‡										-					-	:		:		
3	3									98.5	SS	3	5	9	13						
									I F	GENE		<u> </u>	ິນ	9	13			Cor	ntinue	ed Nev	t Page
			SAME	PLER T	TYPE					JEINE				DF	RILLIN	IG ME	THOD		iiiiuc	, a 1 VC/	r age
	Split Spo			N	IQ - R	ock Cor	e, 1-7/	8"			A - Hollo			ger		F	W - F	Rotary	Wash		
	Shelby T	ube e, 1-1/8"				uttings ontinuo	us Tub	e			A - Cont			ııı AU(jers	۲	C - F	KUCK (Jore		



ile No		10.22					(PIN)		1131	-08-5	54 Co ı	ınty:	CH	IARI	_ES1	ON		Enç	j./Ge		M.	EICH	ELBI
Site De				POR									_						Ro		<u> </u>		
Boring			3-57 S				Locat						Offse			_			gnm				
Elev.:				_atitu				3722		Longi			.961	718		ate						/2009	
Total D			120 ft			il Dep		f			ore De	<u> </u>	ft						ted:			/2009	
Bore H					3					igurat			er Re			Υ	<u> </u>			er U			N
Orill Ma Core S		e:	D-50				Meth			D ROI		Hamm					IC N/A			ју Ка 24НI		60% 3 ft	
,UIE 3	ize.					Drill	CI.	30	&ME			Groun	uwal	UCI.	IUE	ا ر	N/A			∠ 4∏	1	ا ۱ د	
																			• SF	PT N V	/ALU	E •	
_												0						F	PI	М	0	11	
Elevation (ft)	Depth (ft)		N 4	^ T C C	N A I	DEC		TION		phic	Sample Depth (ft)	Sample No./Type		_		N Value)	Դ_ Ծ—)—	$\overset{LL}{ o}$	
Elev.	De		IVI	ATER	IIAL	DE2	CRIP	TIOI	N	Gra	San De (f	San No./	1st 6"	9 pc	3rd 6"	» Z		•	FINE	s co	NTE	NT (%)	
ш										<u> </u>			18	2	ઝ		0 10	20	30 4	40 50	0 60	70 80	90
=	_	=									103.5					40							
-95.0	1	=									:	SS	3	4	6	10		•	-		- :		-
-100.0	1	=									108.5	SS	1	2	3	5					!		
- 100.0 _	1	=									113.5	-									:		
-105.0	1	=									113.3	SS	4	6	9	15		•			:		:
=	1	=									118.5							:			_ :		
-110.0	120.0	}	- very	hard						/ III	-	SS	3	28	24	52	1	- :		- (<u> </u>	- :
445.0	1	=																:			:		
-115.0	1	=	BORI	NG TE	RMI	NATE	D AT 1	20 FI	ET.			1						-					
-120.0	1	=																				<u> </u>	
-	1	=										1						:			:		
-125.0	1	=										1						- :	:	: :	:	1 1	:
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-130.0	1	=																- :			- :		
-135.0	1	=																	- :				
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100.0	1	=																:			:	: :	
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_	1										OEND						<u> </u>	- 1	:	<u>: :</u>	:	<u>: i</u>	:
				SAMP	I FR	TYPE	:			LE	GEND	1			DE	RILLIN	IG M	FTH	חכ				
SS - S ST - S	Split Sp Shelby	oon		C, 11VII	- 1	NQ - F	Rock C		-7/8"			A - Hollo			ger		F	₹W ·	 Rota 				
	JUBIOV	rube	-1/8"		(CU - C	Cuttings	>			CF	A - Cont - Drivi	ırıuou	s riig	ιιι AU(jers	H	₹0 .	- Rocl	Core	J		



		SOI						1404	20.55			OLIAB					10		FIOLI	EL DE
ile No		0.224B		ect N				131-	J8-55	64 Cou	nty:	CHAR	LES	ION		Eng	./Geo.		EICH	ELBE
ite De Boring		B-57 S	PORT								-	Offset:				ΛI	Route gnmer			
elev.:	10.0 f		Latituc				37229		onai	tude:		961718		Date	Ctor		_		/2009	
cotal D		ι ι 32 ft		ue: Soil [ft	<u> L</u>		re De		961718 ft		Date Date					1/2009	
		ameter (i		4			pler C	Onfic	_			ા er Requi		Y	COII (Ñ	_		Used		(N)
Orill Ma			E-850			Metho						er Type:							: 74%)
Core Si		. OIVIL			Orille		SCI	.,,,,,,	1			dwater:			N/A			HR	3 ft	
					G		1 301				Jui 10		, . JL	- '	•// \		47		1011	
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Elevation (ft)	Depth (ft)	R 4	٨٣٥٥	141 -		יחוחי	1401		Graphic Log	Sample Depth (ft)	Sample No./Type	_ =	_	N Value		`>	L 	MC O	—X	
ileva (f	De (f	IVI	ATERI	IAL D	DESC	KIP	ION		Gra L	San De (f	San Jo./	1st 6" 2nd 6"	3rd 6"	Š					NT (%)	
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5.0										=						- :			<u> </u>	= = =
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-10.0	20.0									20.0						:	<u>:</u> :	<u>i</u> i	<u> </u>	<u>:</u> =
-10.0	22.0	3" X 30"								=	ST					:		: :		=
-15.0	=	PUSHE						/		=						- :			: :	_ = =
=	=	WASH F	ROTARY	Y TO 3	30 FE	ET				=					:	:				: =
-20.0	30.0	211 V 2011	LIVES	DIOT	ON C	AND				30.0	CT.					- :		<u> </u>		: =
=	32.0	_ 3" X 30" \PUSHEI						/		=	ST					:	×	× :		⊃ ♠ = -
-25.0			ING TE							=					<u> </u>	- :	<u> </u>	: :	: :	
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									IF	GEND		<u> </u>		<u> </u>	<u> </u>	-			<u> </u>	· -
			SAMPL	LER T	YPE								DF	RILLIN						
	Split Spo Shelby T			NC	Q - Ro	ock Co uttings	re, 1-7/	8"		HSA	- Hollo	w Stem A	uger		F	RW -	Rotary Rock C			
V/V/C E	Rock Co	re, 1-1/8"					us Tub	e		DC	Drivir -	ng Casing	giic Au	guis	r	.0 -	NOUN C	, JI C		

SC_DOT 08554.GPJ SC_DOT.GDT 4/3/09



File No	. 10).224B	Dre	niact	No	(PIN):	1	131_	<u> </u>	4 Cou	ıntv	CF	IARL	FSI	ON		=na /	Geo.:	Т	BUR	NIS
	scripti					S RO		131-	00-50) 4 CU(arity.	Ci	IAINL	LOI	OIV	•		Route		DOIN	INO
Boring		B-58		_		ocati						Offse	. + •					nmen			
Elev.:			Latitu		ilig L		37245		ongi	tude:		.9610		-)ata	Start		IIIIEII		19/08	
		120			I Dan		57245 ft	L				ft	ופנ				eu. plete	. d.		19/00	
Total D					I Dep			· fi	_	ore De			!				•				
	achine	meter	(in): E-55	4	Deill	Sam Meth	pler C				⊥⊔ Hamm		quir		Y	N		_iner			
Core S		Civi	⊏-၁၁		Drill		SCI	טטואו	KUI		Groun		_			N/A		24		56° N/A	
core 3	ize:				וווזט	er.	SCI				Groun	uwai	er.	TOE) 1	W/A		24	пк	IN/F	١
																	•	SPT	N VAL	UE •	
Elevation (ft)	₽ .								hic	t Se	Sample No./Type				ne		PL ×		MC —	$\overset{LL}{\longrightarrow}$.
evat (ft)	Depth (ft)	N	/ATE	RIAL	DES	CRIP	TION		Graphic Log	Sample Depth (ft)	am (9		Value		A C	INIES (CNIT	ENT (%	۲)
ă	0.0								O	S	ωŽ	1st	2nd 6"	3rd 6"	z	0 10				0 70	
=	0.5	ASPHA	LT= 5	INCH	<u>ES</u>			ſ		0.9	SS	4	4	3	7	•		1 1			
0.5	0.9	CONC	RETE=	5 INC	HES			-		2.5	SS	3	4	5	9	•					
9.5	7.5	FILL: S	AND (SP)						5.0 <u>-</u> 7.5 -	SS	3	2	2	4	•	:				
4.5 -]	loose, y			wn. fir	ne. moi	st	/		10.0	SS	2	3	5	8	•					
4.5 __	= =									:	SS	7	7	12	19 >	K ♠	• 0	: :			: :
-0.5]]	SLIGH								15.0											
-] =	loose, y			wn, tir	ie, moi	Sī			-	SS	8	9	8	17	1	•				
-5.5]	me								20.0	SS		WOH		0 (1 1
Ξ]	red									- 55		WUH		0		:	: :	: :		: :
-10.5	25.0	ver	y loose	e, gray	y; with	trace s	shell			25.0	SS	MOH	WOH	2	3		:		X		<u> </u>
Ξ]]	CLAYE	Y SAN	D (SC	<u>)</u>						- 55	VVOI	IVVOIT					i '			
-15.5	1 =	very lo	ose, fin	e, sat	urated	d, bluish	n gray			30.0	SS	WOH	2	2	4	-	:	: :	- :		: :
=]]] -		VVOI									
-20.5]]									35.0	SS	WOH	1	1	2		-				1 1
=]									=		1		•			:		: :		: :
-25.5	40.0	SILTY	SAND	(SC)					///	40.0	SS	WOH	2	5	7)	<u>:</u> K ●:	-	A ():		1 1
Ξ	45.0	loose, g			wn fir	ne satu	ırated			45.0							:				: :
-30.5	45.0									45.0	SS	4	1	16	18		•				1 1
=]]	SLIGH								50.0						:	:	: :			: :
-35.5	1 =	mediun	n dense	e, gra	y, fine	, satura	ated			50.0	SS	15	26	29	55 >	K 🛕 C) :		•		1 1
Ξ	55.0	ver	y dens	e; witl	h trace	e phosp	hate			55.0											
-40.5	33.0	COOPE	ER MAI	RL: S	ANDY	SILT (ML)			33.0	SS	4	5	6	11	•	:				1 1
=]	stiff, oli	ve gree	en						60.0											
-45.5]]										SS	3	4	5	9	•	:		:		: :
50.5	‡ ‡									65.0											
-50.5 <u> </u>	E	ver	y stiff								SS	7	9	8	17		•		:		
-55.5	Ė									70.0					_		<u> </u>		: :		<u> </u>
-33.5	1 =	stif	f							-	SS	4	4	5	9	•	:	 	<u>;</u>		: :
-60.5]]									75.0		1									
-	1 =									-	SS	WOH	4	10	14)				
-65.5 -]]									80.0	00	1			40						1 1
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-70.5	‡ ‡									85.0	- SS	5	6	10	16				- :		: :
=]]	ver	y stiff							-		5		10	10	i '	•				
-75.5] =		-							90.0	SS	5	5	9	14		:	: :	: :		: :
=]									=				J				: :			
-80.5]									95.0	SS	5	5	6	11		- :	: :			1 1
Ξ	F F										- 55			J		[Ė				
	1 -								<u> </u>	100.0							•	<u> </u>	4im.	- d N/-	v4 D=
			CAM	DI ED	TYPE				LE	GEND	1			חב	211 I IV	IG ME	THOD		แทนย	ed Ne	хт Ра
	Split Spo		OAW	I	NQ - F	Rock Co		8"			A - Hollo			ger		R	W - F	Rotary \			
ST - 9	Shelby T	ihe		(רוו - ר	Cuttings				CF	A - Con	tinuou	s Fliah	t Auc	ners	R	C - F	Rock C	ore		



File No Site De	scription	.224B on: F	Project A				1131-		1,	.				ON			Geo.: Route		BURN	_
Boring		B-58 SF		oring l							Offse	et:					nmen			
	14.5 ft		atitude			3724	5 L	ongi	tude:		9610			ate	Start				9/08	
Γotal D		120 ft		oil Dep		ft	<u> </u>		re De		ft				Com		d:	10/1	9/2008	3
		meter (in				npler (Confi				er Re	quir			(N)		iner	Used	: Y	(
Orill Ma	achine:	CME-	55	Drill	Meth	od:	MUD	ROT	ARY I	lamm	er Ty	pe:	Auto	mati	С	En	ergy l	Ratio	56%	
Core S	ize:			Drill	er:	SC				Ground					N/A		24	HR	N/A	
																	SPT	I VALL	JE •	
Elevation (ft)	Depth (ft)	MA	TERIA	L DES	CRIP	TION		Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value		PL ★		MC → ONTE	LL X NT (%)	
Ш								1.1.1.	0)	SS	181	<u>2</u>	% 3rc	11	0 10				70 80	_9
=	=								=	_ 33_		3	0							
-90.5	=								105.0	SS	4	5	10	15	•) :			- : :	—
_ =	=								110.0 <u>-</u>							:				
-95.5	=								-	SS	3	30	50/2							_
-100.5	=	hard, t	hin cem	ented la	ayer				115.0 <u> </u>											
. 30.5	=	firm							_ 118.5 -		WOH		6	7	•	:				
-105.5	120.0	very s	stiff				/	<u> </u>	- 10.0	SS	5	5	16	21	:	•	X÷C		<u> </u>	_
=	=								=							:				
-110.5	=	BORIN	G TERM	IINATE	D AT 1	20 FE	ΞT.		=						- :	-				
44,5,5	=								=						:					
-115.5	=								=						:	:			: :	
-120.5	=								=						:	<u>:</u>				
-	=								=						:	:				
-125.5	\exists								=							-		<u> </u>		
=	\exists								=							:				
-130.5	=								=							:				
-135.5	=								=									<u> </u>		
-135.5	=								=						:					
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=	=								=						:	:				
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-155.5	=								=						:	-		<u> </u>	<u> </u>	
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-175.5	=								=						:	-		: :	: :	
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-180.5	=								=						:	:		: :	: :	_
=	=								=							:				
	1							LE	GEND	1										_
SS - S	Split Spoo		SAMPLE			ore, 1-7	'/ 8 "		ПС	A - Hollo	W Sta	m Au		RILLIN	IG ME	THOE) Rotary \	Nach		
	Shelby Tu			CU - C			, 0		113/	A - Conti	** O(C	· · · · · · · ·	90'				Rock Co			



			l lest E								1					_				
File No.).224B	Projec		<u> </u>		131-	-08-55	64 Co	unty:	CH	IARL	EST.	ON			Geo.:		BAUM	STAR
Site Des			PORT A														Route			
Boring		B-63 S			ocatio						Offse						nmen			
	10.0 ft		Latitude:		32.83	-	L	ongit			9583	356		ate					3/2009	
Total De		120 ft		oil Dep	_	ft			ore De	• ,	ft					plete			3/2009	
		meter (i	-		Samp						r Re			Υ	N		Liner			N
Drill Ma		D-50)	_	Metho			ROI		Hamm		_				En			: 60%	
Core Si	ze:			Drill	er:	S&M	E			Ground	ıwat	er:	TOB	5 r	I/A		24	HK	N/A	
																_	SPT	J \/ΔI I	IF •	
Elevation (ft)	o Depth o (ft)	M	ATERIAL	L DES	CRIPTI	ION		Graphic Log	Sample Depth	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	0 10	PL ⊁	INES C	MC ⊖ CONTE	LL X NT (%) 70 80	90
-	=	FILL: SA	AND (SP)						0.0	- SS	3	3	4	7	•			: :		
5.0	=		dense, bro	own the	e gray bro	own, fii	ne,		2.0 4.0		3 6	3 10	7	10 20	•		<u>. </u>	<u>i</u> i		=
3.0	7.5	moist							6.0	- SS	3	3	1	4	•	-				F
0.0	CLAYEY SILT(MH)								8.0		1	1	1	2	•	:				
	CLAYEY SILT(MH) very soft, dark gray, saturated; with trace					;		10.0 13.5		_1_	0	1	1			×			<u> </u>	
-5.0								1 .5.5	SS	1	0	1	1 ()	:		1 1	- : :	====	
=								18.5	1					:	:				: =	
-10.0	very soft, dark gray, saturated; with trace sand with trace shell and sand									SS	1	0	1	1 (<u>:</u>	:	: :	1 1	1 1	
=									23.5											. =
-15.0										SS	4	5	2	7	•	- :	1 1	1 1	- : :	=
∃									28.5		4			4 4						= =
-20.0										SS	1	0	1	1		:	: :	: :		- : -
=									33.5	SS	1	0	1	1 4						: =
-25.0	=								7			'		:	:	: :	: :	: :	<u> </u>	
Ε	with trace shell and sand								38.5	SS	1	1	1	2					¥ :	- : - I
-30.0	=	no s	meii							-			-			:				
25.0	=	6	da de la com						43.5	SS	1	1	2	3	•					=
-35.0	=	soft, wood	dark brow	vn; with	organics	s and				-	Ċ	•	_							: =
-40.0	49.0		gry; with	phosph	ate piece	es	/		48.5	SS	2	4	6	10	•		× ×	04	<u> </u>	: =
-40.0	=		R MARL: S				/		53.5	=						:	: :	: :	: :	: =
-45.0 =	=		e green, fi			<u>,</u>			55.5	SS	3	4	6	10	•					
-0.0	=		•		aratea				58.5	=										. =
-50.0	=	trace	e shell frag	yments					30.5	SS	3	3	5	8	•	<u>:</u>	: :	1 1	<u> </u>	
	=								63.5	∃						:				: =
-55.0	=								-3.3	SS	4	4	7	11	•	<u> </u>		1 1		
=	=								68.5							:				= =
-60.0	=	firm								SS	3	3	3	6	•:	:	<u> </u>) 	<u> </u>	-:-
\exists	\exists								73.5		2	2	2	E		:				: =
-65.0	=									SS	3		3	5		:	<u>. : : : : : : : : : : : : : : : : : : :</u>	1 1		\exists
_ =	=								78.5	SS	2	3	4	7		:		1 1		-
-70.0	= =									-		J	7	-		:				
3	=								83.5	SS	2	3	4	7		:				
-75.0	=								00-	-		_		•		:				: =
-80.0	=								88.5	SS	2	3	3	6	•	<u>:</u>				: =
-00.0	=								93.5	3					:					= =
-85.0	=								93.5	SS	3	3	4	7	•					=======================================
30.0	=								98.5	=						:				= =
=	=							<u> </u>		SS	3	4	4	8	•	:	<u> </u>	<u> </u>	<u> </u>	_:_3
			04445: 55) TV:				LE	GENE)				NII 1 11 11	0.11			tinue	d Next	Page
	plit Spo helby Tu lock Cor	ube	SAMPLER	NQ - F	Rock Core Cuttings Continuou				CF	SA - Hollo FA - Conti C - Drivir	nuous	Fligh	ger		R		O Rotary \ Rock Co			



File No Site De		0.224B on:	POR		No. (1-08-		1		1			ΓΟΝ		Eng./G	out		. Baun	
Boring		B-63 S			ing L							(Offse	et:				Align	mer	nt:		
Elev.:		: I	_atitu				347		Lon	gitu	ude:	79.	9583	3356	[Date	Start				8/2009	
Total D	epth:	120 ft		Soil	Dept	th:	ft					epth:	ft		[Date	Com	plete	d:	2/1	8/2009	
Bore H	ole Dia	meter (i	n):	3		San	npler	Con	figur	atio	on	Line	r Re	quir	ed:	Y	(N)	L	iner	Use	d: Y	(N)
Orill Ma	achine	: D-50)		Drill			ML	ID RO)T/	۱RY	Hamme	er Ty	/pe:	Auto	omati	С	Ene	ergy	Rati	o: 60%	
Core S	ize:				Drille	r:	S&	ME				Ground	dwat	er:	TOE	1 8	N/A		24	HR	N/A	
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																		•	SPT	N VAI	.UE ●	
on	ا ء ا								. <u>e</u>		e c	e e				e e		PL ×		MC	LL ×	
Elevation (ft)	Depth (ft)	M	ATER	IAL I	DES	CRIP	MOIT		raph	Log	Sample Depth	Sample No./Type		9	9	N Value		, . A EU	NIEG .	_		
Ë									Ō	(ഗ്ര്വ	N S	1st 6"	2nd 6"	3rd 6"	z	0 10				ENT (%) 80 70 80	
	=										103.5						:	: :	:	:		:
-95.0 -]										103.5	SS	3	4	4	8	•			- :		
]										108.5	=								:		
-100.0												SS	4	3	4	7	•	: :		:		- :
=	\exists										113.5	_ SS	_			44		: :	÷	:		:
-105.0		stiff										-	3	6	5	11			- :	:		- :
-110.0	120.0									$\cdot \cdot $	118.5	 	4	4	7	11	•					
-110.0																	:		:	:		:
-115.0]											=								- :		
=	=	BORI	NG TE	RMIN	IATED	AT 1	120 FE	ET.				=								:		
-120.0																	:	1 1		- 1		- :
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-125.0]]					:	: :	- :	- :		- :
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-130.0												=										
-135.0]											=					- :			- 1		- :
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-150.0												=										
-155.0 -	l d											=								:		
-	=											=										
-160.0												=					:	: :	:	1	: : :	:
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-175.0												=								- :		- :
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-185.0	╛											=							:	:		:
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									L	EC	SENE)										
SS - S	Split Spo	on	SAMP			ock ∩	ore, 1-	7/8"			HS	A - Hollo	w Ste	m Au		RILLIN		THOD W - R	otary	Wash		
ST - S	Shelby T	ube			CU - C			. , 5				A - Conti			301	aoro	D.	C - R	ook C	`oro		



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		. CIVIE	-45	-				WIUL	KUI	ART										-	70% N/A	
ore 3	ıze:				Drille	r.	SCI				Groun	uwa	ter.	10	Ь	N/A		4	40K		IN/A	
																	•	SP	TNV	ALUE	•	
vation (ft)	epth (ft)	M	ATER	RIAL	DESC	CRIPT	ION		aphic Log	ample epth	π) ample ./Type		9	9	Value		PL ×	INIE	_			
Ħ	0.0								Ō	SS	1	1st (2nd	3rd	z	0 10						90
_	0.3	ORGANI	C LAD	DEN 1	<u> </u>	IL= 4 I	NCHE	<u>s</u> ,	/ XXX		′ ⊣	1			5	•	:	: :		:	: :	- :
3.5-	2.5 <u>-</u> 5.0 -	FILL: CL	AYEY	SAN	ID (SC)	1										•	×0	<	A	- :		
-		loose, br	own, f	ine; v	vith roc	ots				7.5	5	3		5		•	:			:		
-1.5	10.0	POSSIB	LE FIL	<u>.L:</u> SI	<u>LIGH</u> T\	<u>/ SA</u> NI	DY CL	AY		10.0)	1	3	1			- :	-				
=] =	(CL)						_		4		1				1	:					:
-6.5	15.0	soft, red,	gray	and b	rown n	nottled				15.0)	1	1	1	2			0		-	1 1	
44.5		SLIGHTI	LY SIL	TY S	AND (S	SP-SM	<u>)</u>			20.0	=						:			:		- :
-11.5 -] =	loose, br	own, f	ine							SS_	2	3	4	7	•	:			:		- :
-16.5	=	very	loose,	, light	brown	; with r	red			25.0) =						:			- :	: :	
												2	4	2	<u></u> б		:			:		
-21.5					h.c	fir -				30.0) =	2	3	7	10		•		<u> </u>	-	<u> </u>	
=	=				prown,	Tine					7		<u> </u>		10	1				:		
-26.5				(CL)						35.0)	5	7	8	15	1	•			:	: :	- :
6.	=	soft, gray	/							40 0] _						:			:		1
-31.5	=	SILTY S	AND (SM)				_		70.0	' <u>SS</u>	3	8	9	17		•			:		
-36 5	45.0	very loos	se, gra	y, fin	е					45.0) =			_			- :					
-		loos	e, gray	, fine	:					48 5	5 🗆	2	4	6	10	│	:		O	•		
-41.5	50.0	1.1	ium de	ense;	2 inch	thick c	ement	ed		70.0	SS	6	9	9	18	1	•					
=		1		N - 0	ANDY	OU T #	al V				=						:			:		:
-46.5 <u> </u>	=	1			ANDY S	SILI (N	VIL)				=						:			- :	: :	- :
] =	1	•	11							=									:		:
-51.5 -] =			EDMI	NATE) AT =(N FEE7				=									:		- :
-56.5		BUR	iivo II	∟r∖ıVII	MAIEL	, AI 3(V I EE	•			=						- :			- :		
											=						:			:		
-61.5											=					1	:	: :	: :	:	: :	-:
=											=						:			:		
-66.5	=										=						- :				1 1	-:
74 5											=					L	:			_:	<u> </u>	_ :
-/1.5	=										=						:					
-76.5											=						- :			:		
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-81.5		10.0 11.0 10.0 11.0		:	: :	-:																
=	MATERIAL DESCRIPTION	:		:																		
-86.5											=						:			:		-
		10.224B																				
									LE	GEN	D											
SS - S	Split Spo		SAMF			ock Cor	re 1-7/	8"		н	SA - Hall	ow Ste	em Au		RILLI				v Wa	sh		
							. J, 1-11	_							inere							



		V∎ Soil					104.0	0.55	4 0 -			<u> </u>	TON	1-	1	0		DOLL!	
File No		0.224B	Projec				131-0	8-55	4 Co	unty:	CHAR	KLES	HON			Geo.:		BOLLI	<u>-K</u>
Site De			PORT A								Off4:					Route			
Boring		B-66 S			ocatio		١.,	! 4			Offset:		D-4-			nmen		0/00	
Elev.:			atitude		32.832		LC		ude:		.9565			Start		. al .	11/1		
Total D		120 ft		oil Dep		ft	£:		re De	•	ft			Com				1/2008	
Drill Ma		ameter (i : CME	•		Samp Metho						er Requ	_		<u>N</u>		Liner		73%	N
Core Si		L CIVIE	-630	Drille		u. IN SCI	ו טטו/	KO I			ner Type: idwater:	_				urfa224bl		N/A	
Core 3	IZE.				#I.	301				Groun	iuwater.	10	ь і,	Gioui	iu St	JI I CALSTO	IIN	IN/A	
															•	SPTN	I VALU	E●	
															DI		MC.		
Elevation (ft)) th							g g	eg e	Sample No./Type			N Value		PL ×		MC ⊖	$\overset{\square}{\to}$	
leva (ft	Depth (ft)	M	ATERIA	L DES	CRIPTI	ION		Graphic Log	Sample Depth	sam o./T	OMHOM 1st 6" 2nd 6"	3rd 6"	\second		▲ FI	INES C	ONTE	NT (%)	
ѿ	0.0							0			1st 2nc	370		0 10				70 80	90
=	-	SILT (ML						Ш	0.0 2.5	_	I		1						
-2.5	=	very soft	, black; w	ith orga	nics			Ш	5.0		WOHWO		1		<u>:</u>		1 1	1 1	÷
=	7.5	OL IOLITI	LY SILTY	CAND (SD SM)				7.5	- 00	1 6	16	22						
-7.5	10.0	h 	dense, gr		<u> SF-SIVI)</u>		/		10.0	- SS	9 14		20	1	•		: :		
∃	45.0-	\		ay, iiic			/		15.0] :	:		: :		:
-12.5	15.0	V CHIAD IC		c			/	Ш	15.0	SS	WOHWO	H 1	1		-				+
4	=	medium	dense, gr	ray, fine				Ш	20.0]									
-17.5	-	SILT (MI	<u>1)</u>					Ш	20.0	SS	WOHWO	HWO	H 1	•			X	$\overline{}$	- (
-22.5	=	very soft	, light blui	ish gree	n; with c	lay		Ш	25.0	1				1	- :		<u> </u>		- 1
-22.5	=	with	trace fine	sand				Ш		SS	WO	Η	0 (
-27.5	=							Ш	30.0		NA/OLDA/O				- :		1 1		
=	_							Ш		- SS	WOHWO	H 1	1						
-32.5	=							Ш	35.0	- - SS	WOH 1	1	2				<u> </u>	1 1	
=								Ш			777011		<u> </u>		:				- :
-37.5	40.0	SILTY S	AND (SM))					40.0	SS	3 4	2	6	•					-
=	45.0 <u>-</u>		ht bluish		ine; with	shells			45.0	=									
-42.5	45.0_				•				45.0	SS	WOH 2	4	6	•	1	A O :	1 1		+
47.5	=		LY SILTY tht bluish						50.0	=									
-47.5	-				II IC					SS	WOH 10	14	24	- :	•				- :
-52.5	55.0		ium dense						55.0				1.0		:				
32.0	-	COOPER	R MARL:		SILT (M	L)				SS	2 4	6	10	-	:		: :		:
-57.5	=	stiff, olive	e green, fi	ine					60.0	- - SS	2 4	6	10				<u> </u>	1 1	
=	=							$\cdot \cdot $		=	2 7		10	1					
-62.5	-	very	stiff						65.0	- - SS	7 7	10	17	: (•	: :	: :	: :	-
=	-	10.7	ou						70.0]					
-67.5	-	01:tt							70.0	SS	3 2	6	8	•	-		: :	: :	
70.5	=	stiff							75.0	=				:	:				
-72.5	=	firm						$ \cdot \cdot $		SS	2 2	5	7	•	:	X X) i	1	
-77.5									80.0										
= 0.77	=	stiff								SS	3 3	9	12	•					
-82.5	_								85.0	- - SS	5 5	10	15				: :		
=	=									_	3 3	10	15		-				
-87.5	=							-[:[-]	90.0	- SS	5 5	10	15		: D:	: :	: :	1 1	-:-
=	=							[:[-]-[05.0	7					:				:
-92.5	=	very	stiff					$ \cdot \cdot $	95.0	SS	4 4	11	16		•	X	0 :		<u>.</u>
=	=								100.0	3				:					
	I	1					l	LE(GENE		1			<u> </u>		Con	tinued	l Next	Pa
00 7	D111 C		SAMPLE			:-	.,				61 :		RILLIN	IG ME)			
	Split Spo Shelby T			NQ - R CU - C	ock Core uttings	e, 1-//8	ı *				ow Stem A tinuous Fli		ugers			Rotary \ Rock Co			
		re, 1-1/8"			ontinuou	ıs Tube)				ing Casing		J		-				



	scriptio		TAC								. C.F	4.					Rout				
Boring		B-66 SPT		ng L							offse						nme				
Elev.:		Latitu				3223		Longi		79.9		5		Date					/10/0		
Total D		120 ft	Soil	Dep		ft			re De		ft			Date					/11/2		
		neter (in):	4				Con	figurati	on	Line	r Re	quir	ed:	Y	N		Line			Υ	(1
	chine:	CME-850			Meth			ID ROT											io: 7		
Core Si	ze:			Drille	er:	SC				Fround	wat	er:	TOE	3 (Grour	nd S	urf æ	HR	N	/A	
																	ODT	N1 \ / A			
																•	5P1	N VA	LUE	•	
uo	ے ا							.≌	<u>e</u> _	e e				e e		PL ×		MC		LL ×	
Elevation (ft)	Depth (ft)	MATER	RIAL D	DESC	CRIP	TION	1	Graphic Log	Sample Depth (ft)	Sample No./Type	<u>-</u> -0		<u>.</u> 0	N Value		, ,					
H								\ <u>0</u>	S O	S S	വ 1st 6"	യ2nd 6"	"9 p.z 16	z	0 10				TENT 60 70		g
=	=								=	SS	5	9	16	25			: :	- :		:	_
102 5	=								105.0 <u> </u>												
-102.5	=								=	SS	4	7	11	18		•					
-107.5	∄								110.0								<u> </u>		<u> </u>	:	
	#								=	SS	5	7	11	18	}	•				:	
-112.5	3								115.0	SS	5	7	11	18			<u> </u>	- :	<u> </u>		
3	=								118.5 											:	
-117.5	120.0									SS	5	8	12	20	:	•	: :	:	: :	:	_
=	‡															:				:	
-122.5	=	BORING TI	ERMIN	ATEC	AT 1	20 FE	ET.										: :			- :	_
	=				•		- •								:	:		:		:	
-127.5	\exists															:	1 1	:	: :	:	_
120 =	=														:					:	
-132.5	=																1 1			:	
-137.5	=															-				- :	
=	\exists								=											:	
-142.5	#														<u> </u>		<u> </u>	- :	: :	- :	_
=	=															:					
-147.5	=														:	:	: :		1 1	:	_
Ė	=														:	:		:		:	
-152.5	=															:		:	1 1	- :	_
4===	3															:				:	
-157.5	∄															:		:		:	_
-162.5	\pm																				
-102.5	=																				
-167.5	=														:		<u> </u>	:	1 1	:	
- =	=															:		:		:	
-172.5	=																<u> </u>		1 1	- :	_
=	‡																			:	
-177.5	=								=									:	<u> </u>	- :	_
	=															:				:	
-182.5	=																	:	: :	:	_
107.5	=																			_ :	
-187.5	=														:	:	: :	:	:	:	
-192.5	直														:		<u> </u>	:		:	
132.3	#								-												
	=														:	:	<u> </u>	:	<u> </u>	:	_
			D. == -					LE	GEND				_	DII		T1 : 5					
SS - S	Split Spoo		PLER T	YPE Q - Ro	l. O.	4	7/01		1	- Hollov	04-	A		RILLIN) Rotary	, \\/ool	h		



File No Site De			oject RT AC						64 Cou	···, ·	CHAF				ng./Ge Ro	ute:	· <u>-</u>	OLLEI
Boring		B-66 SPT									Offset:				Alignm			
Elev.:		Latite				3223	3 L	.ongi	tude:		9565		Date	Start			1/11/	08
Total D		22 ft		Dep		ft			re De	oth:	ft				oleted:			2008
		meter (in):	4	•		pler (Config				er Requ					er Us		Υ
Orill Ma	chine:	CME-850)	Drill	Meth	od:	MUD	ROT	ARY I	lamme	er Type	: Aut	omati	С	Ener	gy Ra	tio:	73%
Core Si	ize:	·		Drille	er:	SC	I		(round	dwater:	TOI	3 (Grour	d Surf	224HR	?	N/A
															● S	PT N V	ALUE	•
5	_							<u>.</u> 2	е _С	e e			<u>o</u>		PL X	MC	;	LL ×
Elevation (ft)	Depth (ft)	MATE	RIAL	DES	CRIP	TION		Graphic Log	Sample Depth (ft)	Sample No./Type	 e	<u>.</u> 0	N Value					
E	0.0							ق _	Se	S _S S	1st 6" 2nd 6"	3rd 6"	ź	0 10	▲ FINE 20 30			
=	=	WASH ROTA	RY TO	20 F	EET				=		, , ,			- 10	: :	: :	:	: :
-2.5	₫								_								:	
-2.5	=								=								:	
-7.5	=								=					- :	: :	: :	- :	
	=																:	
-12.5	=														: :	: :	:	
3	20.0								000									
-17.5	20.0 <u> </u>	3" X 30" FIXE	D PIS	TON S	SAMPI	LE			20.0	ST				:	: :		:	
20. =		PUSHED 24"	WITH	24" R	ECOV	<u>ERY</u>] =								:	
-22.5	=	BORING 1	ΓERMI	NATE	D AT	22 FEE	Т.											
-27.5	=																	
-7.5	=																	
-32.5	=													:	1 1	: :	:	<u> </u>
=	=													:			:	
-37.5	=														: :	: :	:	: :
=	=													:				
-42.5	\pm								=					:	: :		:	
-47.5	=								=					:		<u> </u>		
- - 1.5	=														1 1	<u> </u>		
-52.5	=																- :	
=	=																:	
-57.5	=														: :	1 1	:	: :
\exists	\pm								=					:			:	
-62.5]														<u> </u>		-	
-67.5	3														<u> </u>	<u> </u>	<u>.</u>	<u> </u>
-01.07	=														1 1			
-72.5	=																- :	
=	=																:	
-77.5	=													:	: :	: :	:	: :
\exists	=													:			:	
-82.5	=																:	
-87.5	=														<u> </u>	<u> </u>	<u>:</u>	<u> </u>
-07.5	=														: :	: :		
-92.5	=																- :	
	=													:			:	
	-														: :	<u>: :</u>	<u>:</u>	<u>: i </u>
		SVIV	IPLER	TYPE				LE	GEND			ח	RILIN	IG ME	THOD			
	Split Spoo	on	١	NQ - R	ock Co	ore, 1-7	7/8"		HSA	- Hollo	w Stem A	uger		R۱	V - Rot			
	Shelby Tu	ıbe e, 1-1/8"			uttings	s ous Tu				Conti Drivir -	nuous Fli		gers	R	C - Roc	K Core		



File No.		0.224B Projec	t No. (PIN):	113	1-08-55	54 C o	unty:	CHARI	LESTO	N	Eng./Geo.:	P. 0	DREE	
Site De	scripti	on: PORT A	CCESS ROAL)							Route	:		
Boring	No.:	B-68 SPT AIBTO	fling Location	1:				Offset:			Alignmen	t:		
Elev.:		Latitude:			Longi	tude:	79.	956843	Dat	te Star		9/22/	2008	
Total D			il Depth:	ft		ore D		ft			pleted:	9/22/		
		meter (in): 4						r Requi		Y (Ñ	•			(N)
Drill Ma			Drill Method					er Type:			Energy I			
Core Si		I ONL OU		SCI	D ITO	/ (()			TOB	N/A	24		N/A	
0010 01	20.		Dillier.	<u> </u>			Oround	awater.	100	14//	2-71	111	14//-1	
											● SPT N	I VALUE	.	-
Elevation (ft)	o Depth o (ft)	MATERIAL	_ DESCRIPTIO	ON	Graphic Log	Sample Depth	Sample No./Type	N 1st 6" G 2nd 6"	9 3rd 6" 6 1	A value		MC ⊖ ONTEN	LL ×	. 00
_	- 0.0	SLIGHTLY SILTY	SAND (SP-SM)			0.0	- SS	2 5	6 1	1) : : :	: :	: :	:
3	5.0	medium dense, bro		roots		2.5	SS	3 4	4 8	3				
2.0	7.5	٦				5.0	- SS	1 2	2 4	1 •	A	: :	: :	-:-
3	7.5				- 	7.5 10.0	- 66	1/18"					: :	:
-3.0	=	SLIGHTLY CLAYE		<u>:)</u>		10.0	- SS	1 1	1 2	2	A O			
3	15.0	very loose, brown a	and gray, fine			15.0	Ξ							
-8.0	13.0	CLAYEY SAND (S	<u>C)</u>		1//	13.0	- SS	1 1	2 3	3 • .	A : O :		: :	
Ι	20.0	very loose, gray to	dark gray, fine			20.0	Ξ.							
-13.0	20.0	with trace silt				20.0	- SS	WOH) • :				
3	3	-	TV CAND (OD CO			25.0	Ξ.							
-18.0	#	SLIGHTLY CLAYE		_		25.0	SS	WOH) • :		X	X: :	_
3	30.0	very loose, dark gr	ay, fine; organic	stained	<i>⅃‴</i>	30.0	Ξ.							i
-23.0	30.0	CLAY (CL)				30.0	- SS	WOH	() •	XX	C	A	-
3	35.0	very soft, gray; with	h trace roots			35.0	Ξ.							
-28.0	35.0	7				35.0	- SS	WOHWOH	1 1				1 1	-:-
=	3	SILT (ML)				40.0	3			:				:
-33.0	=	very soft, gray; with	n some fine sand]	<i>⅃‴</i>	40.0	- SS	WOH	1 () •	XX		0	÷
3	45.0	CLAY (CH)				45.0	Ξ.							:
-38.0	45.0	∖very soft, gray				45.0	SS	1 2	3 !	5 • i	A O		: :	-
3	3	with sand lense	es			50.0	Ξ.							÷
-43.0	#	SILTY SAND (SM)			_	30.0		WOH 1	1 2	2 • :				-
Ξ	3	loose, gray, fine; w		nto		55.0	Ξ						: :	:
-48.0	=		•	IIIS		33.0	- SS	4 8	12 2	0	• 0	: :	1 1	-
3	60.0	very loose; with				60.0	.]							
-53.0	00.0	√ medium dense	e; no roots		_/	00.0	SS	3 3	5 8	3				
Ε	=	COOPER MARL: S	SANDY SILT (ML	<u>.)</u>		65.0	Ξ.					: :		:
-58.0	‡	stiff, olive green				55.0	SS	2 3	5 8	3		: :	1 1	+
= =	=					70.0	, 🗦							
-63.0	=	firm				, 5.0	SS	1 1	5 6	<u> </u>	: : :	: :	: :	- :
=	=	firm			: . - ;	75.0	,=							:
-68.0	\exists					, 5.0	SS	1 2	4 6	<u> </u>				=
7 0 0	=				: . - :	80.0	,=							:
-73.0	3					55.0	SS	1 2	4 (5				- :
70 0	‡					85.0	1							_ :
-78.0	=						SS	1 1	6	<u>7</u> ●				-
92 1	‡					90.0	1_				<u> </u>	<u>i</u> _i	<u> </u>	
-83.0	3	very stiff					SS	1 4	12 1	6	•			
	‡					95.0	1				<u> </u>	<u>.i.</u> i	<u>.i</u> . i	_ :
-88.0	3	stiff					SS	2 4	6 1	0			: :	
=	=				<u> </u>	100.0	<u> </u>				<u> </u>	<u>i</u> _i	<u> </u>	<u> </u>
					LE	GENI					Con	tinued	Next	Pag
ST - S	Split Spo Shelby T	ube	NQ - Rock Core, CU - Cuttings			HS CF	SA - Hollo A - Conti	w Stem Au	iger			Vash		
ST - S AWG - F			CU - Cuttings CT - Continuous	Tube			A - Conti C - Drivir		ht Auger	s F	RC - Rock Co	ore		



File No. Site De	scriptic		ject No. T ACCE			1101	JU-JU	64 Cou	y.	1011	i/\t\L		ΓΟΝ	•	Eng./G	oute		OREE	
Boring		B-68 SPT A							(Offse	.t.				Align				
Elev.:		Latitu			3301	1 1	ongi	ındə.		9568		Г)ato	Start				/2008	_
Fotal D		50 ft	Soil De		ft			ore De		ft	773				plete	4.		/2008	_
		neter (in):	4			Confi				r Re	auir			(N)	<u> </u>		Used		(1
	achine:	CME-55		I Meth	oq.	MUL	ROT	ARY	Hamme	r Tv	ne:	Auto						56%	
Core Si		OWIE 00		ler:	sc		71101		Ground					V/A		241		N/A	_
			5,11		100	•			J. Ouric	amac	U. .			1// \				1 177 1	
															•	SPT N	VALU	E •	
Elevation (ft)	Depth (ft)	MATEF	RIAL DES	SCRIP'	TION		Graphic Log	Sample Depth (ft)	1	1st 6"	2nd 6"	3rd 6"	N Value	0 10		NES C		LL × NT (%) 70 80	9
	= =							105.0	SS	3	_3	8	11						
-98.0	=======================================							=	SS	3	4	7	11	•					
-103.0								110.0	SS	2	4	8	12	•		:			
-108.0	=======================================	very stiff						115.0 <u>-</u> 118.5 -	SS	4	6	11	17		•	:			
-113.0	4000	stiff					1. • • .	110.5- - - - -	SS	5	7	8	15		•	:			_
-118.0	#	BORING TE	ERMINATE	ED AT 1	20 FE	ET.		=								:			_
-123.0								=											
-128.0	=======================================							- - -								:			
-133.0								- - -								:			
=	#							=											
-138.0								=											
-143.0								- - -											
-148.0								=======================================											
-153.0								=											
-158.0								- -						:		:			
-163.0	=======================================							- - -								:			
-168.0								=======================================								:			
-173.0								=						:		:			
-178.0								=======================================								:			
-183.0								- - -						:		:			
-188.0								- - - - -											
=	=						<u> </u>	-							<u>: :</u>	-	<u> </u>	<u> </u>	
		0.4.1.1					LE	GEND						IO 145	TUCE				_
ST - S	Split Spoo Shelby Tul Rock Core	n be	CU -	E Rock Co Cuttings Continue	6			CFA	A - Hollo A - Conti - Drivir	nuous	s Fligh	ger		R	THOD W - R C - R				



File No	·.: 10	.224B	∣ Pr	oject	: NO. (PIN):	1	131-	-U8-55	4 Co	unty:	CI	HARL	.ES	ION		Eng./	Geo.:	: R	. BOL	LER
Site De	scription	on:	POF	RT AC	CCES	S RO	AD										Ĭ	Route):		
Boring	No.:	B-72	SPT	Boi	ring L	ocatio	on:					Offs	et:				Alig	nmen	t:		
Elev.:	4.5 ft	'	Latit			32.83		L	ongi	tude:	79	9.956	606	[Date	Start	ed:		9/1	5/200	8
Total D	epth:	120	ft	Soi	l Dep	th:	ft			re De	pth:	ft		[Date	Com	plete	ed:	_	6/200	
	ole Dia			4	•		pler C	onfi			•	er R	equir		Υ	(N)	•	Liner			
	achine:		E-550		Drill	Metho					Hamn				omat	$\overline{}$				5: 63%	
Core S					Drille		SCI				Grour			TOE		N/A			HR	1 ft	
							100.														
																		SPT I	N VAL	UE •	
_									1		0						PI		MC	- 11	
Elevation (ft)	epth (ft)	_		.	550	00107			Graphic Log	Sample Depth	Sample No./Type		_		Value		PL ×		MC —	X	
leva (ff	Deg	N	1A I E	RIAL	DES	CRIPT	ION		Sraphi Log	Sar Deg	Sar O.7	"9	2nd 6"	16"	×		▲ F	INES (CONT	ENT (%	<u>,</u>
Ш	0.0	7							0			1st	Zu.	3rd		0 10				0 70	
_	2.5	CLAYE								0.0		1	2	1_	3	•	Ė		:	: :	
-0.5	5.0	very loc	ose, da	ark bro	own an	d brow	n, fine	/		2.5 5.0		2	2	3	5	•	-		-		
=	7.5	SLIGH	TLY CI	_AYE	Y SAN	D (SP-S	SC)			7.5	SS	2	3	4	7				:		:
-5.5	10.0	loose, d						tled,		10.0	SS	2	1_	3	4				:	: :	
=]	fine			0 ,			.			SS	2	1	3	4	•	i		$\otimes \rightarrow$		
-10.5	15.0	SLIGH	TLY CI	AYE	Y SAN	D (SP-S	SC)			15.0	SS		WOH		0 (- :				- :
Ξ	l E	loose, g			. 0,	- (0. (50,					+	VVOH		0 1						
-15.5	20.0	_								20.0	- SS	2	3	4	7		- :	1 1	:		: :
=]	SILTY									=	+-					:		:		: :
-20.5		very loo	ose, gr	ay to ı	reddish	ı browr	n mottle	ed,		25.0	SS	3	5	12	17						
Ξ	Ε	line _										J		12	- 17	1 :	•		:	: :	
-25.5	1 =	SILT (N	<u>1H)</u>							30.0	SS	4	7	8	15	:	-	1 1	:	: :	: :
=]	soft, gra	ay to re	eddish	n browi	n mottle	ed; with	1				+ -			13	1 :					
-30.5	35.0	sand								35.0	- SS	8	10	13	23			<u> </u>		: :	-
=]	SLIGH"	TLY SI	LTY S	SAND (SP-SM	<u>)</u>					1	10	10	25			Ī	:	: :	
-35.5]	very lo	ose, gr	ay, fin	ie					40.0	SS	5	7	9	16		•	1 1			: :
=		SAND	'SD\							:						1 :	•		:	: :	
-40.5]	loose, g		no						45.0	SS	6	11	13	24	:		: :	- :	: :	: :
Ξ	1 =		-							50.0] :					
-45.5	Ε	me				rown				50.0	SS	9	14	12	26	:		: :	:	: :	:
=		ligh	t redd	ish bro	own] :				: :	:
-50.5]	SLIGH [*]								55.0	SS	7	8	7	15)	* A	<u>:</u> •				: :
=	= 00	mediun	n dens	e, ligh	ıt grayi	sh brov	vn			00.0											
-55.5	60.0	ligh	t brow	'n					111	60.0	SS	3	4	7	11	•	:	1 1	-		
=]	gra	у							65.0							:		:		
-60.5		dar	k gray					- 1		03.0	SS	6	8	8	16		•	-	A	: :	:
=]	COOPE	R MA	RL: S	ANDY	SILT (N	VIL)			70.0							i				
-65.5]	stiff, oli								70.0	SS	3	5	9	14)	1 1	:	: :	:
]	ver	_							75.0						:	:				
-70.5]	stif	-							70.0	SS	3	3	7	10	•	÷		:		
75.5		Otti								80.0	1					:	÷		:	: :	:
-75.5 <u> </u>	∃										SS	2	2	6	8	•	:	: :	:	: :	:
-80.5										85.0	1						į				
-60.5]										SS	3	4	8	12		1		:		
-85.5										90.0	1					<u> </u>	_ :		-		
-00.0]	ver	y stiff								SS	4	5	11	16	- :	•		:	: :	
-90.5										95.0						:	<u>:</u>		-		
-90.5	=										SS	4	5	9	14		•				
	<u> </u>									100.0	1						÷	<u> </u>	:	: :	:
									LE	GENE)								tinue	ed Ne	xt Pa
SS - S	Split Spoo	'n	SAM		TYPE	ock Co	re, 1-7/	8"		ПС	A - Holl	OW S+	مبر ۸۰۰	DI	RILLIN	IG ME	THO) Rotary '	Mach		
J - 1	Shur Shor	ibe			יזע- דל	JUN UU	ı c , ı-//	U		_ ⊓ა	rs - 110ll	UVV 316	un Au	y CI		L.	vv - 1	votal y	vvasn ore		



File No Site De	scription	224B n:	POR			PIN): S RC		1 10	-08-55	, ₁ 330	y.	101	./ \I \L		ΓΟΝ			Geo.: Route		BOLL	
Boring		B-72				ocati						Offse	et:					men			
Elev.:			Latitu		<u>.</u>	32.8			Longi	tude:		9566			Date	Starte				/2008	
Total D		120 f		Soil	Dep		ft			ore De		ft				Comp		d:		3/2008	
	ole Dia	neter (4	•		pler	Conf	igurati			er Re	qui			(N)			Used		(1
	achine:		-550	<u> </u>	Drill	Meth		MU	D ROT	ARY	Hamm	er Ty	pe:	Auto	omati	C				: 63%	
Core S	ize:	-		ı	Drille	er:	SC				Groun					I/A			HR	1 ft	
							•						·								
																	•	SPT I	VALU	JE •	
Elevation (ft)	Depth (ft)	M	IATER	IAL I	DES	CRIP	TION	I	Graphic Log	Sample Depth (ft)	1	1st 6"	ഹ2nd 6"	"9 p.z 12	N Value	0 10		NES (LL ** **NT (%) 0 70 80	9
_	=									-	SS	4	5	12	17	•	D				
-100.5]									105.0								- :			
											SS	5	8	8	16		'				
-105.5										110.0	SS	4	9	13	22		•	:	: :	: :	
=										115.0				. •		:	-	:			
-110.5										-	SS	6	8	14	22		•	:			
-115.5	120.0									118.5	SS	7	10	13	23		•	:			
-110.0		BOR	ING TE	RMIN	ATEC	AT 1	20 FE	ET.		:						:					
-120.5]									:						:			<u> </u>		
=]									:	†					:					
-125.5	=									:	}							- :	+ +		
400 =										:	1							:			
-130.5	=																	:			
-135.5											1										
	=										1					:					
-140.5	=										1					:		-			
, _ =	=										1					:		:			
-145.5											1					:					
-150.5										:	1					:		- :			
										:						:		:			
-155.5										:						:	: :	- :	<u> </u>		_
=											1					:					
-160.5											1					:					
-165.5										:						:	: :	<u>:</u>	: :	<u> </u>	
. 35.5										:						:		:			
-170.5										:						:		:	1 1	: :	
	=									:								:			
-175.5																		-:			
-180.5											1							:			
.50.5] :	1										
-185.5										:	1					:	: :	- :	: :		
=											1										
-190.5											1					:					
											1					:		<u> </u>	<u> </u>		
									LE	GEND											
SS - S	Split Spoo	n	SAMP			ock Co	ore, 1-	7/8"		HS	A - Hollo	w Ste	m Au	ger		IG MET RV		otary	 Wash		
	Shelby Tu				Ū - C			-		CE	A - Cont	inunus	s Flial	ht Διι	ners			ock C			



File No			■ SOI .224B			. (PIN):		121	08 5	54 Co	unty:		HARL	E0-	ΓΩNI		=na /	Geo.	. Б	BOL	LED
Site De						SS RO		131	-00-50)4 CU	unity.	CI	IANL	LS	ION	[Route		. BOL	LLK
		•									14	⊃ #	.4.								
Boring 			B-74 S			Location		_				Offse						nmen		2/000	
Elev.:				Latitud			32559			tude:		9577	/6		Date				_	6/200	
Total D			120 f		Soil De	-,	ft			ore D		ft			Date		-			6/200	
			meter (i	•	4		pler C						equir		Y	N		_iner			$\overline{}$
Drill M		ne:	CME	E-45		II Metho		ИUE	ROT	ARY	Hamm						En	ergy	Ratio		
Core S	ize:				Dri	iller:	SCI				Groun	dwat	ter:	TOE	1 8	N/A		24	HR	1.5	ft
										1					ı	ı					
																	•	SPT	N VAL	UE	
Elevation (ft)	Depth	(11)	M	ATERIA	AL DE	SCRIPT	ΓΙΟΝ		Graphic Log	Sample Depth	Sample No./Type	9	2nd 6"	3rd 6"	N Value		PL ⊁	INES (MC ONTE	LL × =NT (%	
Ш	0.	0							0	0) —	1	1st 6"	Zuc	370		0 10		0 40			80 90
=	1	4	SILTY S	AND (SI	<u>VI)</u>					0.0		1	2	2	4	•	:	O : 4	`	:	: :
0.0-	5.	٥		se, dark	brown	and black	k, fine; v	vith		2.5 5.0	. — — —		WOH		0		: ×	•	1	-:-	0
0.0	-	\exists	roots					,		7.5	; <u> </u>		WOH		0		- :				A
	1	#	SILTY C	LAY (CH						10.0	<u> </u>		WOH		0		:	X .	: :		
-5.0	3	\exists				k gray; wi	ith roots	i			SS		WOH		0			X		A	
40.0	15.	0	and fine	sand		J = J,				15.0	,=										
-10.0] .0.	1	\ blac	kish gra	v: with	clav			/	1	SS	5	7	4	11	•	:			:	
45.0	20.	0			-	,				20.0	<u>,</u> =						:			:	
-15.0		Ť	SILTY S							20.0	SS		WOH		0		:	X	: :		; O ; A
00.0	1	\exists	medium	uerise, (uark gra	ay, iirie				25.0	, =						:				
-20.0	1	\exists	CLAYEY	/ SILT (N	<u>ИН)</u>					20.0	SS_		WOH		0				- :		
<u> </u>	30.	0	very sof	t, greenis	sh gray					30.0	<u>,</u> =										
-25.0] 30.	* ‡	SVID (2D)					- / 1/1/	1 30.0	'SS	4	5	5	10	•	:		: :	:	
		\exists	SAND (S		ا۔ مائنیں	aolle				35.0	Ę						:				
-30.0	1	#	loose, g	iay, tine;	, with st	ielis				35.0	'- <u>ss</u>	3	3	4	7	•	:			:	: :
=	1	\exists								400						:	:	: :		:	: :
-35.0		=								40.0)SS	3	3	2	5 .	AO :		: :		-	: :
=	1	\exists								45.0				_							
-40.0	1	\exists								45.0)	4	5	4	9	•	- :	: :	- : :	- :	: :
=		<u>_</u>																			
-45.0	50.	맠	SILT (M	1.)						50.0)	1	1	2	3	•	-	. :	- :		1 1
=	†	#		 '	with a	ay and tra	ace ear	Н			_		•				:				
-50.0	}	=				-				55.0) <u>-</u> - SS	4	7	9	16		•	: :	- 	- :	: :
=	1	_ ‡	very sand	stiff, bro	ownish	green; wi	tn clay a	and			=		-							:	
-55.0	60.	4٥		D 144			.a. \		╫╃╃	60.0) <u>-</u> - SS	3	4	6	10	:	- :		- : :	- :	: :
	1	\exists			: SAND	Y SILT (I	VIL)					Ĭ	•		.,						
-60.0	1	\exists	stiff, oliv	e green						65.0) - SS	3	5	5	10	:	:	: :	- : :	:	: :
=	1	\exists							- : -			Ĭ				•	:	i i	: :	:	
-65.0	1	\exists								70.0) <u>-</u> - SS	3	3	5	8	:	:	: :	: :	:	1 1
=	1	\exists							- - - - -		1	Ĭ			Ĭ	-					
-70.0	1	\exists							: . - :	75.0) - <u>SS</u>	3	2	3	5		:	: :	: :	:	: :
=		=	soft								4	Ĭ			Ĭ		:	: :	: :	:	
-75.0]	\exists								80.0) - <u>SS</u>	2	1	5	6		-	: :	- :	- :	
	1	\exists	firm									1	•								
-80.0	1	\exists							: :	85.0) - - SS	2	3	5	8		:	<u>: </u>	0 :	:	<u> </u>
=	†	\exists	stiff									<u> </u>			Ĭ		:		<u> </u>	:	
-85.0	1	\exists	-						- : : -	90.0) SS	1	2	5	7		:	1 1	1 1	:	: :
=	†	\exists	firm						: . - :			T .			_ <u> </u>						
-90.0	1	#	~1:EF							95.0) - SS	4	5	9	14				- : :		
		\exists	stiff									-	<u> </u>	3	, , ,		•				
-	1	_							<u> </u>	100.0							<u>:</u>	<u>: :</u>	: :	<u>:</u>	<u>: i</u>
						_			LE	GENI)								ntinue	d Ne.	xt Page
SS -	Split S	Snor	n	SAMPL	ER TYF N∩	PE Rock Co	re 1-7/9	. "		н	SA - Hollo	w Ste	m Διι		RILLIN) Rotary	Wash		
ST -	Shelb	y Τι	ıbe		CU -	Cuttings				CF	A - Cont	inuou	s Fligh		gers			Rock C			
AWG -	Rock	Core	e, 1-1/8"		CT -	Continuo	ous Tube)		DO	C - Drivi	ng Ca	sing								



File No Site De		0.224B on:	POR		No. (-08-55	., 550	y ·	1 01	., ., .,	LES	I I			Geo.:		BOLL	=:`
Boring					ing L							Offse	et:					nmen			
Elev.:			Latitu				3255	9	Longi	tude:		9577		[ate	Start				/2008	
Total D		120			Dep		ft			re De		ft		_		Com		d:		/2008	
Bore H	ole Dia	meter	(in):	4		San	npler	Conf	igurati	on	Line	er Re	qui	red:		N	L	iner	Used	: Y	(1
Drill Ma	achine	: CM	E-45		Drill		od:	MUI	D ROT		Hamm					ic	En			: 76%	
Core Si	ize:				Drille	er:	SC) <u> </u>			Ground	dwat	er:	TOE	3 1	N/A		24	HR	1.5 ft	<u>:</u>
																		CDT	N VALU	IE 📤	
Elevation (ft)	₽ _								hic P	윤두	Sample No./Type				Ine		PL ×		MC —	$\overset{LL}{ o}$	
leva (ft)	Depth (ft)	N	MATER	RIAL	DES	CRIP	MOIT	l	Graphic Log	Sample Depth (ft)	sam o./T	1st 6"	1 9 p	3rd 6"	N Value		▲ F	INES (CONTE	NT (%)	
Ш									1	0)	SS	2 2	ന 2nd 6"	<u>ာ</u> 10	15	0 10				70 80	9
=	=									-		3	<u> </u>	10	15	1	1				
-100.0	=		a, atiff							105.0	SS	4	5	12	17		•		1 1	1 1	
=	=	ver	y Suii							110.0							:				
-105.0										110.0	SS	3	6	11	17	ļ ;	•				_
-110.0										115.0		<u> </u>	_		1.0						
- 75.5										-	SS	5	6	13	19	1					
-115.0	120.0								1.111.	-	1						:		<u>: i</u>	: :	—
=		BOF	RING TE	ERMIN	NATE	O AT 1	20 FE	ET.			1					:	:				
-120.0										-						:	:				
-125.0										-						:	:				
120.0										-	1					:	:				
-130.0										-						:	:		: :	: :	
]										-						i :	:		: :		
-135.0																:	:				
-140.0										=							-				
1,40.0											1										
-145.0																<u> </u>	-				
]										-							:				
-150.0										=	1										_
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-133.07											1										_
-160.0																:	:				
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-165.0										-						:	:		: :	: :	
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1, 0.0										-	1										
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100.0										=	1						:				
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			SAMF					7.6"							RILLIN	IG ME					
	Split Spo Shelby T				NQ - R CU - C		ore, 1- s	7/8"		HS/	A - Hollo A - Conti	w Ste	m Au s Flia	iger ht Au	gers			Rotary Rock C			
		re, 1-1/8"					ious Ti	ube		DC	- Drivir	ng Ca	sing								



File No.	. 10).224B	Dec	st B	No	(PIN):		112	1 00	2 55	64 Co	\under	. 1	Ch	۸Ы	EGT	ON		En~	./Ge	···	ь	BOLL	ED
Site De			POR					113	1-00)- 55	4 60	unity	•	CII	ANL	LOI	OIN		Liig		ute:	I.	DOLL	LIN
			SPT A										<u> </u>	ffse	٤.				A II			1		
Boring					ing L			_		!4	al a .						_ 4-	<u> </u>			ent:		/0000	,
Elev.:			Latitu		LDan		3256		LO		tude:		79.9		80			Star					/2008	
Total D	_	65 ft		-	l Dep		ft		<u> </u>		ore Do	<u> </u>		ft				Com	•				/2008	
Bore Ho				4	D '''		pler	_					iner		-		Y	N			er U			N
Drill Ma		CMI	E-45	_		Meth			אטו	RO I	ARY				_				E				76%	
Core Si	ize:				Drill	er:	SC	;				Gro	und	wate	er:	TOE	} I	N/A			24H	R	N/A	
Т																				• 01	T N.		ı	
																				● 51	YN TS	VALU		
E O	_								2.	<u> </u>	ے ہے	<u>o</u>	be				e		P	L —	M	Ç	LL X	
Elevation (ft)	Depth (ft)	M	1ATEF	RIAL	DES	CRIP	TION	l	2	apn -og	Sample Depth	(π) Sample	<u> </u>	<u>.</u>		<u>.</u>	N Value		·	•			, ,	
E E	0.0	-						-	Ċ	בֿב פֿב	Sa	Sa	<u> </u>	1st 6"	2nd 6"	3rd 6"	ź	0 10					NT (%)	
	0.0	WASH	ROTAR	RY TO) 8 FE	ET						+	-		- 7	က		0 10	- 20	30	40 5	9 60	70 8	0 90
=	=											=												
-0.5	=											. 🗦						- :	- :	:	: :	- :	:	
_ =	8.0 10.0	3" X 30	" FIXFI	D PIS	TON	SAMPI	E		+		8.0) 	г					1			X			*
-5.5	10.0	\PUSHE							$/\!$			<u> </u>							-	-				
<u> </u>	=	WASH	ROTAR	RY TC	65 F	EET			_			=						:	:	:		:		
-10.5	=											=												
15 =	‡											\exists						L	_ :		<u>:</u> :	_ :		_ :
-15.5	=											=						:	:	:		:		
-20.5	=											=						:	:			:		
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-50.5	‡											\exists						-	- :	- :	1 1	<u>:</u>		
3	3											=												
-55.5	Ė											\exists						-	- :	- :	-	- :		
=												(🗦												
-60.5	65.0 <u> </u>	3" X 30	" FIXFI	D PIS	TON	SAMPI	E		\pm		65.0							1	- :	- :	: :	- :		:
\exists	30.2	PUSHE							_/			- S	ľ							>	(; O 4	$\overset{\longleftarrow}{:}$		
-65.5	Ę	BOR	ING TE	RMIN	NATE	AT 6	6.2 FE	ET.	-			= _		_	_	1	_	:	:	1	: :	:	: :	:
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-85.5	3											3						:						
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-90.5	=											=												
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										LE	GENI	D												
	Split Spo	on	SAMF	PLER.	TYPE	oel: C	.r.a 1	7/0"				ς Λ ·	- دااء	Ct-	n A · ·	DF	RILLIN	IG ME	THO)D	. n. 14	204		
00 0	YOUR YOU	UN				Rock Co		1/Q.				SA - F FA - C					ore				ary W k Cor			
SS - S ST - S AWG - R	Shelby T	ube		,	UU - U	Cuttings	,				01	A - C	OHUH	uous	FIIQI	ii Auc	JCI S	- 17		1 100	K COI	E		



File No).224B		ect No. (<u> </u>		-08-55	54 Co	unty:	CH	ARLE	STON	1	Eng./		_	EICH	ELBE
	scripti			ACCES											Route			
Boring		B-75 S		Boring L						Offset					nmen			
Elev.:	15.0 ft		atitude	-	32.83		Longi			9599	82		Sta			_	/2009	
Total D		120 ft		Soil Dep		ft		ore De	<u> </u>	ft				nplete			/2009	
		meter (i	,	3	-	ler Conf					quire		<u>'</u>			Used		N
Drill Ma		CME	-550X		Metho		וטאט		Hamm					En			80%	
Core Si	ıze:			Drille	er:	S&ME			Ground	dwate	er: 10)B	N/A		24	HR	N/A	
															SPTI	N VALL	JE •	
Elevation (ft)	E _	_		:	~ - ·		Graphic Log	th (Sample No./Type		_	N Value		PL ×		MC O	${\rightarrow}$	
leva (ft	Depth (ft)	MA	ATERIA	AL DES	CRIPTI	ON	Sraphi Log	Sample Depth	Sam o./T	1st 6"	2nd 6"	. ≥		▲F	INES (CONTE	NT (%)	
Ш	0.0									131	2 Z	5	0 1				70 80	90
	=			SAND (SC				0.0 2.0		2		5 9 1 12						
10.0	=			d mottled,				4.0	- SS	2		3 6		- :	<u> </u>	<u> </u>		- : - :
=	=			ise, dark b		aturated;		6.0		2		8	= •					
5.0	\exists	gray	•	ics and sh	ICII			8.0	SS	4	5 6	3 11	 -	• : :		- :	- : :	- : :
=	13.5							13.5			4	, _	J	:				: :
0.0	=			YEY SANI		<u>C)</u>			SS -	3	4 3	3 7		:	0	: :		
=	18.5	loose, lig	nt gray,	fine, satu	urated		44	18.5	= 	WOHV	VOHW	DH ∪						
-5.0	= =	SILTY SA							-	V V OI IV	<u>, () 100(</u>	<u> </u>	7					
-10.0	23.5	very loos	e, gray,	fine, satu	urated			23.5	SS	WOH	1 '	2	-			<u>:</u> :	<u> </u>	
-10.0	=	SILTY C	LAY (CH	1)				20.5	7									
-15.0	=	very soft	, bluish g	 gray, satu	ırated; w	ith trace		28.5	SS	1	1 ′	2						
13.0	=	sand and	shell c		•			33.5	=				:	•				
-20.0	=							00.0	SS	WOH	1 ′	2	•	×			< <u>a</u>	- :
=	38.5							38.5										
-25.0	1	SILTY SA							SS	WOHV	VOH ′	1	•	:		: :	: :	- : :
=	43.5	very loos		grayish bi	rown, fin	ie,		43.5				1.						
-30.0	=						/		SS	6	6 4	10	<u>' </u>	<u>; </u>	: :	: :	: :	- : :
	=	_		Y SAND (48.5		6	13 1	7 30	_	: 1				
-35.0	=	medium	dense, g	gray, fine,	, saturate	ed			-		10 I	, 30		: "				
40.0	53.5	MARI · S	ΑΝΠΥ 9	SILT (ML)				53.5	SS	2	3 4	1 7	-					
-40.0	=			, fine, calc	="	trace		E0 F	7									
-45.0	=	phospha		, 5610	. J. Jouo,			58.5	SS	2	3 4	1 7						
.5.0	=							63.5	=					•				
-50.0	=							00.5	SS	3	4 4	8		<u>:</u>				- :
	=							68.5						:				
-55.0	=								SS	2	3 3	8 6	•	:	: :	: :	: :	: :
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-60.0	=								SS -	1	2 3	3 5	-	:		1 1		
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70.0	=							83.5	SS	2	2 !	5 7		:				:
-70.0	=							00.5	4	Ī								
-75.0	\pm							88.5	SS	2	3 4	1 7				: :		
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30.0	\pm							98.5	=					:				
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			CALADI				LE	GENE)			DD:::	INIO	<u> </u>		ntinue	d Next	Page
	Split Spo	on	SAMPLE	ER TYPE NQ - R	lock Core	e, 1-7/8"			A - Hollo		n Auge	r		ETHOD RW - F	Rotary			
ST - S	Shelby Tu	ube		CU - C	uttings			CF	A - Conti			Augers	1	RC - F	Rock C	ore		



File No Site De		0.224B				PIN): S ROA		1137-	-სგ-5	54 C (ounty:	U	IAK	LES1	IUN		Eng./G	ieo.: oute:		EICH	CLRE
Boring			SPT			ocatio						Offse	>t·				Alignr				
Elev.:			Latitu		iiig L	32.83			Opg	itude:		.9599		\dashv_{F}	Date					/2009	
					Deni		ft	· L				ft								/2009	
)Onfi													(N)
																$\overline{}$					
													-							N/A	
															<u>- '</u>						
											T						• 8	SPT N	VALU	JE ●	
vation (ft)	epth (ft)	Ŋ.	1ATFF	≀IAI	DESC	CRIPT	ION		aphic	mple epth	mple /Type		.g		/alue		PL X	Ì		X	
Ш										Sa	Sa No.	1st 6	2nd	3rd (ź	0 10					90
	=									103	5_										
-90.0	Ę	stifi	F								SS	3	4	5	9	•	-	- :		- : :	
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-95.0	∄	firm	า								<u> </u>	3	4	4	8	•	: :	-:-	<u>: :</u> :	: :	: -
_	=									113.5	5-	2	<u> </u>		Ω			:			: -
-100.0	=										4	 	<u> </u>	J	0			:			-
-105.0	120.0	VAr	v stiff							.] 118.	5= <u></u> SS	4	7	15	22		_	:	<u> </u>		_ :
- 100.0	Ţ		, 2011						`		=							:	<u> </u>		-
-110.0	=						o ==	_			=						- : :	- :		- : :	
	∄	BOF	KING TE	:KMII	NATEL	AT 12	v FEE	:1.			=							:			
-115.0	=										=								: :	- : :	
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-125.0	‡										=							-			-
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450.3	\exists										=							:			
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-155 n	\exists										=					:	<u> </u>	<u>:</u>	<u> </u>	<u>: :</u>	_ : :
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47.	\exists										=							:			: -
-1/0.0	∄										=							:			
Bore Hole Diameter (in): 3 Sampler Configuration Liner Required: Y N Liner U		<u> </u>																			
., 5.0	=										=							: _			
-180.0	=										=					<u> </u>	- : :		<u> </u>	-	
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	-								1 -	:CEVI	D <u></u>					<u> </u>	<u>: </u>	<u>:</u>	<u>: i</u>	<u>: i</u>	- : -
			SAME	²LER	TYPF				<u>L</u>					DF	RILLIN	IG MF	THOD				
SS - S	Split Spo	on	J. 11VII	1	NQ - R		e, 1-7/	/8"		H	SA - Hollo	w Ste	em Au	uger		R	:W - Ro				
							us Tuh	е						μιι AU(ger8	К	.o - K0	ick COI	· C		



File No Site De	scripti	.224B	PORT	ACCES	<u> </u>		31-08-5	J 4 CO	unity.	CH	ARLE	-010	/1 N		ng./Ged Rou		I. EICH	CLDE
Boring	•	B-76 S		Boring I					- 1	Offse	f ·			Δ	lignme			
Elev.:	14.5 ft		atitud		32.83		Longi	tude:		.9633		Da	te Sta				0/2009	
Γotal D		120 ft		Soil Dep		ft		ore De		ft		_			leted:		0/2009	
		meter (i		3			nfigurat			er Re	auire			(N)		r Use		(N)
	achine:		-550X		Metho				Hamm					$\overline{}$	Energy			
Core S		10		Drill		S&ME		7	Ground				13	_		4HR	8 ft	<u> </u>
													1				1	
															● SP1	ΓN VAL	UE •	
tion	₽ _						hic	e ∓ .	ple				en le		PL ×	MC	LL ×	
Elevation (ft)	Depth O (ft)	MA	ATERIA	AL DES	CRIPT	ION	Graphic	Sample Depth	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N value		▲ FINES			
	-	FILL: SIL	TY SAN	ND (SM)				0.0		2	3	4	7	D 2				:
0 =	3.5	loose, br	own,mo	ist, fine;	with trac	e roots		2.0 4.0		4			9			;	<u>. </u>	:
9.5	∄,	dark	brown.	organic s	stained; v	with	<i> </i> ₩₩	6.0		2			6			:		
4.5	‡	organics			,		⅃⋘	8.0	SS	2	3	4	7		<u> </u>		: : :	
4.5	1,, = 1,	FILL: CL	AYEY S	SAND (S	<u></u>			10.0		1	7	8 1	5	•				
-0.5	13.5	very loos				fine		13.5) <u></u>	WOH	1	2	3		0			
0.0	19.0	gray,	, red, an	nd brown	mottled			18.5	<u> </u>									
-5.5	19.0		ium den						SS	WOH	WOHW	ОН	0	: :		- :		- :
		POSSIBI	LE FILL	: SAND	(SP)			23.5	;= <u> </u> SS	WOHV	NO⊔	1	1		*			
-10.5		very loos	e, reddi	sh yellov	v, satura	ted, fine			-	VVONV	V U I 1	+			/X\			:
-15.5		SANDY S	SILT (MI	<u>L)</u>				28.5	5- - SS	1	1	2	3			:		- :
.0.0	33.5	soft, dark	cgray, fi	ine, satur	rated; wit	th trace		33.5	; =									:
-20.5		shell						3	SS	WOH	NOH	2	2					:
		very	soft					38.5	<u>;</u>	MOLL			4					
-25.5]	soft		N			→ 		-	WOH		2	4		X		X	· · ·
-30.5]	SILTY CI			rated: wit	th trace		43.5	5 <u></u>	WOH	1	2	3					
-30.5		shell	, yı	,, oatai	, WII			48.5	-									
-35.5]	soft						75.5	'ss	1	1	2	3					:
	53.5	gray;	, with tra	ace sand	and no	shell		53.5		2	1	5						
-40.5	=	MARL: S			<u>)</u>				SS -	3	4	5	9					
-45.5	=	stiff, olive	green,	tine				58.5	SS SS	3	3	4	7			:		:
-1 5.5	=	firm						63.5	; 									
-50.5		stiff						33.0	SS	4	4	6 1	0	•		:		:
		firm						68.5	;= <u> </u> SS	2	3	3	6					
-55.5 <u> </u>		firm						70.5	=							:		:
-60.5	=							73.5	SS	2	3	3	6)				:
==								78.5	; <u> </u>							:		:
-65.5									SS	3	3	4	7	D :				:
								83.5	;= 	4	3	3	6			:		:
-70.5									4	—	J	<u> </u>				:		:
-75.5								88.5	5- - SS	3	2	5	7			:		:
, 0.0	=							93.5	; =							:		:
-80.5									SS	3	3	4	7	D	X	<u> </u>	A	:
=	=							98.5	SS	2	3	3	6			:		:
							<u> </u>	GENI			<u>ა</u>	<u>s </u>	U	,	Cc	ontinue	ed Nex	t Page
			SAMPL	ER TYPE									LING		HOD			9
SS - S	Split Spoo Shelby Tu	on		NQ - F	Rock Core	e, 1-7/8"		HS	SA - Hollo	w Ster	n Auge	er		RW	 Rotar 	y Wash		



File No		0.224				No. (113′	1-08-5	54 C c	ounty:	C	HAR	LES	TON			Geo.:		EICHI	ELBE
Site De		_					S ROA						055	4 -					Route:			
Boring							ocatio		-	1		1-	Offs			2-4-	04		nment		10000	
Elev.: Total D			L 20 ft	atitud		I Dept	32.83	ft)	Long		/ epth:	9.963 f			Date		tea: iplete	٠d٠		/2009 /2009	
Bore H					3011				Conf	figurat			ner F			Jate			iner l			(Ñ)
Drill Ma				-550X			Metho			D RO									ergy F			<u></u>
Core Si			· · · · -			Drille		S&N			• •	Grou					13 ft		24F		8 ft	
																		•	SPT N	VALU	E●	
Elevation (ft)	Depth (ft)		MA	ATER	IAL	DESC	CRIPT	ION		aphic	Sample Depth	Sample) 10 10 10 10 10 10 10 1	9		N Value		PL ×		/C ⊖	—X	
Ele										ng I	Se	SS	1st 6"	2nd 6"	3rd 6"	z	0 10		INES C			90
=	_										103.5	5=					:	:				
-90.5	_		stiff									SS	3	3	7	10	•	:		: :	: :	- :
\exists	=		£:								108.5	5= SS	3	3	5	8		:				
-95.5	=			cemer	nted	layer 1	٥"					-	3	<u> </u>	<u> </u>	0						
-100.5	=					layer 3					113.5	5- - SS	2	50/3	3	0 (
100.0	_ 			CCITICI	iteu	layere	•				118.5	5 -										
-105.5	120.0	<u> </u>	stiff							\ 	1	SS	2	3	8	11	-	<u> </u>		<u>: :</u> :	<u>: :</u> :	: :
-110.5	=======================================	F	BORIN	NG TEI	RMI	NATED	AT 12	0 FEF	T.													
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=	=]										
-120.5	=											3					1	:		: :		
-125.5	=]										
-120.5																						
-130.5												=						:	: :			
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-135.5												=										
-140.5	_											=										
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-145.5	=											=					:	:		: :	: :	- : :
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-150.5	=											=										
-155.5	=											=						:	: :	: :	<u> </u>	- : :
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-160.5												=						- :				
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				SAMPI	LER	TYPF				LE	GEN	ט			DI	RILLIN	NG MF	THOD)			
	Split Spo Shelby T				1		ock Cor	e, 1-7	/8"			SA - Ho FA - Co			uger		R	RW - F	Rotary W Rock Co	Vash		
AWG - F			/8"				ontinuoi	us Tul	ре			C - Dr				9013	,	r	COOK OU			



File No. Site De:		.224B on:	PORT A	Ct No. (., 50	unty:	1 0.1	ARLI				ng./Ge Ro	ute:	M. EI	- · · L	
Boring			SPT A Bo								Offse	t:				Alignm				
Elev.:			atitude		32.83		L	onait	tude:		9633		С	ate S	Starte			/16/20	09	
Total D		66 ft		oil Dept		ft			ore D		ft		_			leted:		/16/20		
		meter (i			Samp		nfiç	_			r Re	quire	_	Υ	<u>N</u>		er Us			N
Drill Ma			-550X	Drill	Metho					Hamm				mati	C	Energ	y Ra	tio: 80)%	<u> </u>
Core Si	ze:	•		Drille	er:	S&MI				Ground	dwate	er: 1	ГОВ	3 1	0.5 ft		24HR	. N	/A	
									'											
																● SF	PT N V	ALUE •)	
uo	_ ا							. <u>e</u>	ع د	be e				e		PL X	MC	Į	L ×	
Elevation (ft)	Depth (ft)	M	ATERIAI	L DESC	CRIPTI	ION		Graphic Log	Sample Depth	Sample No./Type	-to	9		N Value		, ,	_		•	
E E	0.0							<u>ن</u> _	SS	l s S	1st 6"	2nd 6"	3rd 6"	z	0 10	▲ FINE 20 30 4				90
		WASH R	OTARY T	O 60 FE	ET					=	,	• •	`		- 10			33 70		=
9.5]									=							<u> </u>			<u> </u>
9.5	=									=				Ī					:	-
4.5	1	Z								=					:		<u> </u>	<u> </u>	:	<u> </u>
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-15.5	=									=										
-10.5	=									=				Ī						: =
-20.5	∄									=									:	===
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-25.5	=									=					:	: :	<u>: :</u>	<u> </u>	:	: -
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-40.5	=														- :				:	=
-10.5]									=										=
-45.5	60.0	2" V 20"	FIXED PI	CTON C	AMDIE	:			60.0							<u> </u>	: :		- :	! -
=	62.0 64.0 		FIXED PI 24" WITI				_		62.0 64.0						:	: X		<u>▲</u>	:	}
-50.5	66.0	1	FIXED PI				—/ _{[-}]	- ST				-	:		: :	: :	:	==
=	=		24" WIT												:				:	<u> </u>
-55.5	∄		FIXED PI							=				-	:	<u> </u>	<u> </u>	<u> </u>	:	-
-60.5	=		24" WIT							=					<u> </u>	<u> </u>				<u>:</u>
-50.5	7	BUK	ING TERM	/IINA I El	D AI DD	rcel.				=				Ī	:				:	=
-65.5	=									=				-	:		1 1	- : :	:	<u>: -</u>
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-70.5	\exists									=				ļ	:				:	! -
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-75.5	=									=				-		: :	: :		:	==
	=									=									:	į -
-80.5	=									=				ļ	:				:	= =
															<u>:</u>		<u> </u>		<u>:</u>	<u> </u>
								LE	GENI)										
SS - S	plit Spo		SAMPLE	R TYPE	ock Core	י2/7_1 ב			Ц	SA - Hollo	w Stor	m Aug	DF	RILLIN	G MET	HOD / - Rota	ary Ma	sh		
	helby Tu	ihe		CU - C		s, 1-110			CF	A - Holic	nuous	Flight	t Aug	gers		- Roc		J11		



File No Site De		0.224B on:	PORT A				`		., 20	unty:	1 - 11	ARLE	`			ng./Ge Ro	ute:	M. EIC	
Boring			PT ABO								Offset	t:				Alignm			
Elev.:			atitude		32.837		L	ongi	tude:		9536		Da	ate S		_		/4/2009	9
Total D		39 ft		oil Dept		ft			ore D		ft		_			leted:		/4/2009	
		meter (i	n): 4	1	Sampl	er Co	nfig	urati	ion	Line	r Re	quire	d:	Υ	N	Lin	er Us	ed:	Y (N)
Drill Ma	chine	CME	-850	Drill	Method	l: M	UD	ROT	ARY	Hamm	er Ty _l	pe: A	utor	natic		Energ	y Ra	tio: 74	%
Core Si	ize:	•		Drille	er:	SCI				Ground	dwate	er: T	ОВ	7.	5 ft		24HR	N/.	A
																• SF	PT N V	ALUE	
L.	_							<u>ي</u>	υ ₋	e e				ω l		PL X	MC	L	Ļ
Elevation (ft)	Depth (ft)	M	ATERIAI	L DESC	CRIPTIO	NC		Graphic Log	Sample Depth	Sample No./Type	<u>.</u>	. e		N Value		, ,	_	·	•
Ele	0.0				J. (11)			<u>2</u>	Sa	Sa No.	st 6"	2nd 6"	3rd b	ź ,	10			ITENT (
_	0.0	WASH R	OTARY T	O 34 FE	ET					=	_	N C	7	- 0	10	20 30 4	+0 50	60 70	<u> </u>
Ε	=									=									
6.0	<u>_</u>	7								=					:				
[,	‡	- -								=									
1.0	=									=									
-4.0	=									=						<u> </u>		<u> </u>	<u> </u>
~ - .0]	=									=									-
-9.0	=									=					:	: :	1 1	1 1	
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-14.0	=									=				-			: :	: :	: :
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-19.0	=									=				\vdash	- :	1 1	1 1	1 1	1 1
=	34.0								34.0						:				
-24.0	36.0	3" X 30"	FIXED PI	STON S	AMPLE				37.0	ST			\perp		:	$ \Delta \!$: :	: :
	37.0 39.0 	/	WITH 22				 /[_]	- ST					:	▲ ×	€		
-29.0	30.0		ROTARY T				_/			=									: :
24.0	‡	3" X 30"	FIXED PI WITH 20	STON S	AMPLE					\exists								<u> </u>	<u>i</u> i
-34.0	Ξ	1 COLLE		, 11200	· • LIVI					=									
-39.0	=									=					:				
	\pm									=									
-44.0	=									=				-	- :	: :	<u> </u>	1 1	: :
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-49.0	Ė									=				\vdash	:	: :	1 1	1 1	1 1
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-54.0	Ξ									=				-	:	: :	: :	: :	: :
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-59.0	=									=					:	: :	1 1	1 1	1 1
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-04.0	=									=									
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-74.0	=									=				<u> </u>	- :		: :	1 1	1 1
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-79.0	=									=				-	:	: :	: :	: :	: :
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-84.0	=									=				-	:	: :	: :	: :	: :
	=									=									
								LF	GENI)	<u> </u>				•				
			SAMPLE	R TYPE									DRI	LLING					
	Split Spo Shelby T			NQ - Ro	ock Core,	1-7/8"				SA - Hollo FA - Cont				ere		/ - Rota : - Rocl		sh	
		e, 1-1/8"			ontinuous	Tube				C - Drivii			90	-		. 1001	20.0		



File No		0.224B		t No. (1 3 1-0	ช- 55	94 CO	unty:	CH/	ARLE	-51	UN	E	ng./G		IVI. ⊢	ICHE	FLRF
Site De Boring		on: B-78	PORT A	oring L							Offset					_ Ro Nignn	oute:	4		
	8.0 ft		_atitude		32.84		1.0	nait	ude:		96037		<u> </u>	ato S	Starte			 3/25/2	nna	
Total D		15 ft		oil Dept		ft	L(ore De		ft	<u> </u>	-			u. leted:		3/25/2		
		meter (ir			Samp		nfia				er Req	uire		Y	(N)		ner U		Y	(N)
Drill Ma				_	Metho		UGE			Hamme				matio	$\overline{}$		gy Ra		l	<u></u>
Core Si		1 = 30		Drille		S&M		-		Ground			ОВ		ft		24HF		N/A	
												I								
																• S	SPT N \	/ALUE	•	
Elevation (ft)	Depth (ft)	M	ATERIA	L DES	CRIPT	ION		Graphic Log	Sample Depth	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	0 10 1		ES CO	NTEN		00
	0.0	FILL: S	LIGHTLY	SILTY S	SAND (S	P-SM)				_		C/	(7)		0 10 /	20 30	40 50	. 60 1	0 80	90
- - -	-	yellowish	n-brown, f		-	-				_								:		
3.0	5.0_		LE FILL:	CLAYE	/ SAND	(SC)				_				-	:	: :	: :	:		:
_	_		orown, fin				ţ	[]]		1					:			:		:
-2.0	_									_					:			:		
-2.0	-						k	[]]		-					:			:		
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-7.0 -	15.0							1//		7				-	:	1 1		:		- :
_	_		ER TERN was per							7					:			:		
_	_	prese	nce of de	bris. No	sampl	ing wa	s			1										
-12.0	_		p	erforme	d.					_								:		-
-	_									_					:					
- -17.0	_									-										
-17.0	_									-								:		
=	_									7								:		
-22.0	_									7				-	:	1 1	1 1	:	: :	
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-27.0	_ _									1				-	:			:		-
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-32.0 -	_									_					:			:		- :
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-37.0										_				-	:		: :	:		:
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-42.0	_									_									<u>i i</u>	<u>:</u>
-4 2.U =	-									-										
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			04145: -	D T /==				LE	GEN)			-		O = .					
	Split Spc		SAMPLE	NQ - R	ock Cor	e, 1-7/8				SA - Hollo			er			/ - Rot				
ST - 5	Shelby T			CU - C					CF	A - Conti	nuous	Flight		ers		- Ro				



File No.).224B	Projec				31-08-5	54 CC	ounty:	CHA	KLES	STON		ng./Ge		M. EIC	HELBE
Site De Boring		on: B-79	PORT A	ring L						Offset:			1	Ro Nignm	ute:		
			_atitude:		32.84		Long	itude:		9615		Dato	Starte			 /25/200	ιΩ
Total D		15 ft		il Dept		ft		ore D		ft			Comp			3/25/200	
		meter (ir					nfigurat			er Requ	ıirad:				ner Us		
Drill Ma					Metho		JGER		Hamme			toma	$\overline{}$			tio: 60°	
Core Si		15 00	<u> </u>	Drille		S&ME			Ground				6 ft		24HF		
														● S	PT N V	ALUE •	
Elevation (ft)	Depth O (ft)	M	ATERIAL	_ DES	CRIPT	ION	Graphic	Sample Depth	(π) Sample No./Type	1st 6" 2nd 6"	3rd 6"	N Value	0.10			XTENT (%	6)
	- 0.0	FILL: SII	LTY SAND) (SM)				*.		- (1 (1)		0 10	20 30	40 30		00 90
_			y, fine, mo					:	_								
5.0	4.0	POSSIB ✓(SP-SM)	LE FILL: S	SLIGHT	LY SILT	Y SANI	2		_								
-	-		y, fine, sat	urated					}								
[,	7		lish yellow						-				L				
0.0	7	shell	=						-								
7	7								7								
-5.0	15.0						<u> </u>	4	7					<u> </u>	<u> </u>		
1	1		ER TERM was perf				,		1								
_		prese	nce of del	oris. No	sampl	ing was	·		1								
-10.0	_		pe	erforme	d.				_					: :	: :		
_	_								}								
45.0	7								7								
-15.0	7								7								
-	-								7								
-20.0	1								1								
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]	_								-								
20.0	7								-				L	<u>:</u> :	<u>:</u> :	<u>:</u>	<u>:</u> :
-30.0	7								7								
7	7								7				:				
-35.0	=								7				:	: :	: :		<u> </u>
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99 7	Salit Car	on	SAMPLER	RTYPE	nok Carr	1 7/0"				w Stom] ^	DRILLI	NG MET		an/\^/-	ch	
	Split Spo Shelby T			CU - C	ock Core	s, 1-//8"			SA - Hollo FA - Conti			unare		V - Rota			



FIELD TESTING PROCEDURES

Soil Classifications

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our exploration, samples obtained during drilling operations are examined and visually classified according to color, texture, and relative density or consistency (based on standard penetration resistance). The consistency and relative density designations are as follows:

	SANDS	SILTS A	ND CLAYS
N (SPT)	Relative Density	N (SPT)	Consistency
0 - 4	Very Loose	0 - 2	Very Soft
5 - 10	Loose	3 - 4	Soft
11 - 30	Medium Dense	5 - 8	Firm
:		9 - 15	Stiff
31 - 50	Dense	16 - 30	Very Stiff
50+	Very Dense	31 - 50	Hard
		50+	Very Hard

Soil Test Borings

All boring and sampling operations were conducted in accordance with ASTM Designation D 1586. Initially, the borings were advanced by either mechanically augering or wash boring through the soils. Where necessary, a heavy drilling fluid is used below the water table to stabilize the side and bottom of the drill hole. At regular intervals soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-barrel sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140 pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Standard Penetration Resistance". The penetration resistance, when properly evaluated, is an index to the soil strength.



Drill Rig: Raleigh CME 550 ATV Hammer: Auto

Project No.: 1131-08-554

Date: 9/30/2008

Operator: R. Norwood

Location: Charleston, SC

Boring ID: B-23A

Drilling Method: Mud Rotary

Rod Type/ID: 71AW-1

1.21 AR:

ft

Depth: LE:

0.29

0.29 0.29

Dept Blow Con

th:		2	4		11
_E: _		3	0		_ fi
ınt• =	1	1	1	2	

Depui:	20	. IL
LE:	32	ft
Blow Count:	3, 3, 4, 3	

26

LE:	36
Blow Count:	WOH, 2

Depth:

	WOH, 2, 2, 2	
Blow No.	EFV Energy	

w Count:	WOH, 2, 2, 2
Blow No.	EFV Energy

Blow Count:	1, 2, 2, 2
Blow No.	EFV Energy
1	0.27
2	0.28
3	0.29

4

6

ow Count.	1, 1, 1, 4
Blow No.	EFV Energy
1	0.28
2	0.27
3	0.27
4	0.28
5	0.27
6	0.28
7	0.28
8	0.28

IC	ow Count:	5, 5, 4, 5
	Blow No.	EFV Energy
ſ	1	0.27
I	2	0.27
	3	0.28
	4	0.28
	5	0.28
	6	0.28
I	7	0.28
	8	0.29
	9	0.30
	10	0.28
	11	0.28
	12	0.28
	13	0.28
	11 12	0.28 0.28

Blow No.	EFV Energy	
1	0.28	
2	0.27	
3	0.29	
4	0.29	
5	0.29	
6	0.29	

7	0.04
	•

Avg. Energy: 0.27 ft-kips 0.35 Max. Rated Energy: Efficiency:

Std. Deviation:

ft-kips 78% 0.01 ft-kips

ft-kips 0.28 0.35

ft-kips 80% 0.01 ft-kips 0.28 ft-kips 0.35 ft-kips

81% ft-kips 0.01

0.29 ft-kips ft-kips 0.35 81% 0.01 ft-kips

Average efficiency from all tests 80%

Comments: The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft). N-value is addtion of the

	0	M	1	
3	CK.	18		

Date: 10/7/2008 Drill Rig: AE CME 750 ATV Project No.: 1131-08-554 Hammer: Auto Boring ID: B-11 Operator: Drilling Method: Mud Rotary Location: Charleston, SC

1.43 Rod Type/ID: NWJ2 AR:

Depth: ft

54.75 ft LE:

Blow Count:

Depth: ft 50 LE: 56.75 ft

Blow No. EFV Energy

Blow Count:

Depth:	52	ft
LE:	59.75	ft

1	Blow No.	EFV Energy
1 .	1	0.25
	2	0.31
	3	0.26
1	4	0.28
1	5	0.25
1	6	0.25
1	7	0.26
1		

Depth: 54 LE: 59.75

Blow Count: Blow No. EFV Energy 0.25 2 0.27 0.27 3 0.28 4 0.28 5 6 0.27 0.27 0.24 8 0.28 9 0.35 10 0.22 11 12 0.29 13 0.24 0.25 14 0.32 15 0.29 16 17 0.27 18 0.16 19 0.43

Blo	Blow Count:		
	Blow No.	EFV Energy	
	1	0.25	
	2	0.25	
	3	0.25	
	4	0.25	
	5 .	0.28	
	6	0.26	
	7	0.27	
	8	0.27	
	9	0.26	
	10	0.26	
	11	0.26	
	12	0.26	
	13	0.28	
	14	0.29	
	15	0.29	

Avg. Energy:

Std. Deviation:

Efficiency:

Max. Rated Energy:

1	0.25
2	0.25
3	0.26
4	0.25
5	0.27
6	0.27
7	0.27
8	0.26
9	0.28
10	0.27
11	0.27
12	0.26
13	0.31

0.27	ft-kips
0.35	ft-kips
76%	
0.02	ft-kips

0.27	ft-kips
0.35	ft-kips
76%	
0.02	ft-kips

0.27	ft-kips
0.35	ft-kips
78%	_
0.03	ft-kips

Average efficiency from all tests 76%

Comments: The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

ft-kips

ft-kips

ft-kips

0.27

0.35

76%

0.01

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft). N-value is addition of the

\$S&ME	
*	

Depth:

Drill Rig: SCI CME 850 Track	Date: 9/29/2008
Hammer: Auto	Project No.: 1131-08-554
Operator:	Boring ID: B-2
Location: Charleston, SC	Drilling Method: Mud Rotary

ft

Rod Type/ID: 102BW-1

ft

7.5

AR: 1.77 in²

40

Depth:

LE:

	2 op till	7.0	
	LE:	32	ft
Blo	ow Count:		
	Blow No.	EFV Energy	
	1	0.25	
	2	0:00	
	3	0.25	
	4	0.24	
	5	0.26	
	6	0.25	
	7	0.27	
	8	0.26	
	9	0.25	
	10.	0.26	
	11	0.26	
	12	0.26	
	13	0.25	
	14	0.25	
	15	0.26	
	16	0.27	
	17	0.27	

,,,,,,,	50	16	22.	
Blow Count:	3, 2, 1	Blo	ow Count:	WOH, WOH, 2
Blow No.	EFV Energy		Blow No.	EFV Energy
1	0.14		1	0.27
2	0.24		2	0.27
3	0.24			
4	0.23			
- 5	0.23			
6	0.23			
				·
		1		
		1		
		1		

Depeni	
LE:	40
Blow Count:	
Blow No.	EFV Energy
1	0.26
2	0.27
3 4	0.27
4	0.28

Depth:

LE:	40
Blow Count:	3, 5, 6
Blow No.	EFV Energy
1	0.29
2 3	0.27
3	0.28
4	0.27
5	0.28
6	0.28
7	0.28
8	0.28
9	0.27
10	0.27
11	0.27
12	0.27
13	0.27
14	0.27

Depth:

Avg. Energy:	0.26	ft-kips
Max. Rated Energy:	0.35	ft-kips
Efficiency:	74%	_
Std. Deviation:	0.01	_ ft-kips

0.22	ft-kips
0.35	ft-kips
62%	
0.04	ft-kips

0.27	ft-kips
0.35	ft-kips
76%	
0.00	ft-kips

	0.27	ft-kips
_	0.35	ft-kips
	77%	
	0.01	ft-kips

0.27	ft-kips
0.35	ft-kips
78%	
0.01	ft-kips

Average efficiency from all tests 73%

Comments: The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

Depth:

LE:

36

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft). N-value is addition of the

\$ S	R.	M	E
		音品 胃	

Depth:

Drill Rig: SCI CME 55 Truck	Date: 9/22/2008
Hammer: Auto	Project No.: 1131-08-554
Operator:	Boring ID: B-68 ALT 1
Location: Charleston SC	Drilling Method: Mud Rotary

Rod Type/ID: 102BW-1

85

ft

AR:	1.77	in^2

Depth:

	K		
	LE:	88.75	ft
Ble	ow Count:	1, 1, 6	
	Blow No.	EFV Energy	
	1	0.19	
	2	0.18	
	3	0.19	
	4	0.19	
	5	0.20	
	6	0.19	
	7	0.20	
٠			
			3

Ble	ow Count:	1, 4, 12
	Blow No.	EFV Energy
	1	0.20
	2	0.18
	3	0.19
	4	0.21
	5	0.21
	6	0.20
	7	0.20
	8	0.20
	9	0.21
	10	0.20
	11	0.21
	12	0.20
	13	0.20
	14	0.20
	15	0.21
	16	0.21
	17	0.21

Depth:

LE:

93.75

ow Count:	3, 3, 8	
Blow No.	EFV Energy	
1	0.10	
2	0.10	
3	0.10	
4	0.19	
5	0.19	
6	0.20	
7	0.20	
8	0.20	
9	0.20	ŀ
10	0.20	
11	0.20	
12	0.20	
13	0.21	
14	0.20	
15	0.26	

LE:	108.75
Blow Count:	3, 4, 7
Blow No.	EFV Energy
1	0.21
2	0.21
3	0.22
4	0.22
5	0.22
6	0.21
7 .	0.21
8	0.20
9	0.21
10	0.20
11	0.21
12	0.21
13	0.21
14	0.21

Depth:

Avg. Energy:	0.19	ft-kips
Max. Rated Energy:	0.35	ft-kips
Efficiency:	55%	
Std. Deviation:	0.00	ft-kips

0.20	ft-kips
0.35	ft-kips
58%	
0.01	ft-kips

0.18	ft-kips
0.35	ft-kips
52%	
0.04	ft-kips

0.21	ft-kips
0.35	ft-kips
60%	
0.01	ft-kips

Average efficiency from all tests 56%

Comments: The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft). N-value is addition of the

_					
		(C)	風		TENNES.
		e w	BW	4	
125	-	4	M M	*	61000

Date: 10/17/2008 Drill Rig: MAD CME 45C Barge Project No.: 1131-08-554 Hammer: Safety Boring ID: B-29 Alt 1 Operator: Drilling Method: Mud Rotary Location: Charleston, SC

Rod Type/ID: 71AW-1

 in^2 AR: 1.21

Depth*: 54

ft Depth*: 46.5 LE: 54 3, 6, 9 Blow Count:

Depth*: 48 ft LE: 56 ft

Depth*: 109

3, 3, 7 Blow Count:

JVV Coulli.	2, 2, 7
Blow No.	EFV Energy
1	0.24
2	0.24
3	0.23
4	0.23
.5	0.22
6	0.23
7	0.19
8	0.20
9	0.20
10	0.21
11	0.21
12	0.20
13	0.21

Blow No. EFV Energy 1 to 6 7 0.23 8 0.24 9 0.25 0.24 10 11 0.25 0.26 12 13 0.25 14 0.26 15 0.24 0.24 16 17 0.25 18 0.24

Blow Count: Blow No. EFV Energy 0.27 2 0.25 3 0.25 4 0.26 5 0.26 6 0.24 7 0.25 8 0.24 9 0.24 10 0.26 11 0.25 12 0.26 13 0.26 14 0.26 15 0.25 16 0.24 17 0.25 18 0.24 19 0.25

0.24

0.26 0.26

20 21

Blow Count:			
Blow No.	EFV Energy		
1	0.26		
2	0.26		
3 .	0.27		
4	0.26		
5	0.27		
6	0.26		
7	0.26		
8	0.27		
9	0.27		
10	0.27		
11	0.27		
12	0.25		
13	0.25		
14	0.26		
15	0.27		

*Depth is referenced to mudline

Avg. Energy: 0.22 ft-kips 0.25 ft-kips 0.25 ft-kips Max. Rated Energy: 0.35 ft-kips 0.35 ft-kips 0.35 ft-kips 70% 72% Efficiency: 62% Std. Deviation: 0.02 0.01 ft-kips 0.01 ft-kips ft-kips

0.26 ft-kips 0.35 ft-kips 75% 0.01 ft-kips

Average efficiency from all tests 70%

Comments: The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft). N-value is addition of the



Drill Rig: S&ME Diedrich D-50 Track Rig

Hammer: Automatic

Oper./Engr.: H. Forbes **Location:** Charleston, SC Boring ID: **B-63**

Drilling Method: Mud Rotary

Rod Type/ID: 71AW-2

 in^2 AR: 1.21

Depth: 53.5 LE: 59.4 ft

Depth:	58.5	1
LE:	64.4	1
Blow Count:	3, 3, 5	
Blow No	FFV Energy	l

11

ft ft

Depth:	63.5	f
LE:	69.4	f

Date: 2/19/2009

Project No.: 1131-08-554

Depth:

Blow Count: 3, 4, 6

Blow No.	EFV Energy
1	0.32
2	0.30
3	0.26
4	0.24
5	0.22
6	0.24
7	0.24
8	0.22
9	0.22
10	0.23
11	0.21
12	0.20
13	0.20

Blow No. EFV Energy 0.15 2 0.26 3 0.21 4 0.25 5 0.20 6 0.20 0.25 8 0.21 0.20 10 0.26

0.25

Blow Count: 4, 4, 7 Blow No. EFV Energy 0.23 2 0.20 3 0.15 4 0.21 5 0.22 6 0.20 0.20 8 0.20 9 0.21 10 0.19 11 0.22 12 0.18 13 0.23 14 0.19 15 0.19

16

Bl	ow Count:	3, 3, 3
	Blow No.	EFV Energy
	1	0.22
	2	0.21
	3	0.21
	4	0.21
	5	0.15
	6	0.17
	7	0.17
	8	0.15
	9	0.17

Avg. Energy: 0.24 ft-kips Max. Rated Energy: 0.35 ft-kips **Efficiency:** 68% 0.04 **Std. Deviation:** ft-kips 0.22 ft-kips 0.35 ft-kips 63% 0.03 ft-kips 0.20 ft-kips 0.35 ft-kips 57% 0.02 ft-kips

0.17

0.18 ft-kips 0.35 ft-kips 53% 0.03 ft-kips

Average efficiency from all tests 60%

Comments: LE = length from gages to end of sampler. EFV method used for energy.

The maximum rated energy of 0.35 ft-kips is calculated based on an assumed hammer weight of

140 lbs (0.14 kips) and an assumed drop height of 30 in. (2.5 ft).

 Drill Rig:
 SCI CME 550
 Test Date:
 12/22/08
 Boring ID:
 TB-6

 Hammer:
 Safety Hammer
 Project No.:
 05226
 Rod Type:
 BW

 Rig Operator:
 Williams/Benbow
 Location:
 Meeting Street
 Analyzer ID:
 216BW

 Engineer:
 Henderson
 Drilling Method:
 Mud Rotary
 Analyzer Rod Area:
 1.81 in²

 Depth:
 35
 ft
 Depth:
 45

 LE:
 38
 ft
 LE:
 48

 Blow Count:
 1,2,4
 Blow Count:
 14,14,12

Blow No.	Energy	Blow No.	Energy
1	0.220	26	
2	0.234	27	
3	0.233	28	
4	0.240	29	
5	0.231	30	
6	0.226	31	
7	0.227	32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.216	26	0.251	51	
2	0.210	27	0.252	52	
3	0.248	28	0.255	53	
4	0.236	29	0.252	54	
5	0.196	30	0.252	55	
6	0.241	31	0.252	56	
7	0.232	32	0.252	57	
8	0.250	33	0.255	58	
9	0.249	34	0.242	59	
10	0.257	35	0.249	60	
11	0.228	36	0.250	61	
12	0.231	37	0.246	62	
13	0.261	38	0.229	63	
14	0.227	39	0.254	64	
15	0.242	40	0.252	65	
16	0.255	41		66	
17	0.248	42		67	
18	0.236	43		68	
19	0.225	44		69	
20	0.253	45		70	
21	0.256	46		71	
22	0.258	47		72	
23	0.247	48		73	
24	0.264	49		74	
25	0.247	50		75	

 Average Energy:
 0.230
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 66%
 kip-ft

 Std. Deviation:
 0.006
 kip-ft

 Average Energy:
 0.244
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 70%

 Std. Deviation:
 0.014
 kip-ft

Average efficiency from all tests: 68%

Comments: Safety hammer operated by Williams

LE = length of rod from below gages to bottom of sampler.

 Drill Rig:
 SCI CME 550
 Test Date

 Hammer:
 Safety Hammer
 Project Notes

 Rig Operator:
 Nelson/Grimball
 Location

 Engineer:
 Henderson
 Drilling Mether

 Test Date:
 12/22/08
 Boring ID: TB-4

 Project No.:
 05226
 Rod Type: BW

 Location:
 Meeting Street
 Analyzer ID: 216BW

 Drilling Method:
 Mud Rotary
 Analyzer Rod Area: 1.81 in²

 $\begin{array}{c|cccc} \text{Depth:} & 40 & \text{ft} \\ \text{LE:} & 43 & \text{ft} \\ \\ \text{Blow Count:} & 2,2,4 & \end{array}$

Depth: 57 ft LE: 50 ft Blow Count: 14,30,31

Blow No.	Energy	Blow No.	Energy
1	0.199	26	
2	0.207	27	
3	0.212	28	
4	0.215	29	
5	0.221	30	
6	0.224	31	
7	0.218	32	
8	0.225	33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.211	26	0.218	51	0.204
2	0.230	27	0.220	52	0.205
3	0.238	28	0.223	53	0.216
4	0.236	29	0.209	54	0.218
5	0.236	30	0.218	55	0.201
6	0.234	31	0.214	56	0.204
7	0.233	32	0.225	57	0.197
8	0.233	33	0.205	58	0.190
9	0.239	34	0.216	59	0.217
10	0.247	35	0.211	60	0.199
11	0.230	36	0.213	61	0.187
12	0.234	37	0.208	62	0.225
13	0.237	38	0.196	63	0.209
14	0.219	39	0.211	64	0.199
15	0.220	40	0.196	65	0.197
16	0.234	41	0.201	66	0.205
17	0.218	42	0.214	67	0.200
18	0.219	43	0.191	68	0.196
19	0.216	44	0.197	69	0.188
20	0.226	45	0.215	70	0.206
21	0.218	46	0.206	71	0.204
22	0.218	47	0.205	72	0.193
23	0.222	48	0.211	73	0.211
24	0.224	49	0.190	74	0.200
25	0.212	50	0.204	75	0.199

Average Energy: 0.215 kip-ft

Max. Rated Energy: 0.350 kip-ft

Efficiency: 61%

Std. Deviation: 0.009 kip-ft

 Average Energy:
 0.213
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 61%
 kip-ft

 Std. Deviation:
 0.014
 kip-ft

Average efficiency from all tests: 61%

Comments: Safety hammer operated by Nelson

LE = length of rod from below gages to bottom of sampler.

Drill Rig: SCI CME 550 Test Date: 12/22/08
Hammer: Safety Hammer Project No.: 05226
Rig Operator: Grimball/Nelson Location: Meeting Sengineer: Henderson Drilling Method: Mud Rote

 Project No. :
 05226
 Rod Type:
 BW

 Location:
 Meeting Street
 Analyzer ID:
 216BW

 Drilling Method:
 Mud Rotary
 Analyzer Rod Area:
 1.81 in²

Boring ID: TB-4

Depth: 35 ft

LE: 38 ft

Blow Count: 2,3,3

Depth: 45 ft LE: 48 ft Blow Count: 4,15,46

Blow No.	Energy	Blow No.	Energy
1	0.215	26	
2	0.215	27	
3	0.208	28	
4	0.210	29	
5	0.204	30	
6	0.210	31	
7	0.214	32	
8	0.213	33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.191	26	0.220	51	0.219
2	0.218	27	0.232	52	0.217
3	0.220	28	0.206	53	0.190
4	0.219	29	0.243	54	0.224
5	0.217	30	0.246	55	0.223
6	0.219	31	0.235	56	0.209
7	0.233	32	0.224	57	0.212
8	0.219	33	0.237	58	0.226
9	0.218	34	0.224	59	0.262
10	0.220	35	0.223	60	0.2
11	0.241	36	0.213	61	0.229
12	0.218	37	0.245	62	0.199
13	0.228	38	0.214	63	0.222
14	0.239	39	0.205	64	0.214
15	0.228	40	0.222	65	0.217
16	0.223	41	0.223	66	
17	0.230	42	0.206	67	
18	0.249	43	0.210	68	
19	0.241	44	0.224	69	
20	0.251	45	0.216	70	
21	0.226	46	0.220	71	
22	0.248	47	0.231	72	
23	0.207	48	0.212	73	
24	0.235	49	0.224	74	
25	0.228	50	0.221	75	

Average Energy: 0.211 kip-ft

Max. Rated Energy: 0.350 kip-ft

Efficiency: 60%

Std. Deviation: 0.004 kip-ft

 Average Energy:
 0.223
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 64%
 kip-ft

 Std. Deviation:
 0.014
 kip-ft

Average efficiency from all tests: 62%

Comments: Safety hammer operated by Grimball

LE = length of rod from below gages to bottom of sampler.

Drill Rig: SCI CME 550

Hammer: Safety Hammer

Rig Operator: Benbow/Williams

Engineer: Henderson

Test Date: 12/22/08

Boring ID: TB-6

12/22/08

Boring ID: TB-6

Rod Type: BW

Reting Street

Analyzer ID: 216BW

Analyzer Rod Area: 1.81 in²

 Depth:
 40
 ft
 Depth:
 47

 LE:
 43
 ft
 LE:
 50

 Blow Count:
 2,4,4
 Blow Count:
 16,25,20

Blow No.	Energy	Blow No.	Energy
1	0.230	26	
2	0.223	27	
3	0.227	28	
4	0.217	29	
5	0.241	30	
6	0.247	31	
7	0.240	32	
8	0.248	33	
9	0.251	34	
10	0.265	35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.253	26	0.256	51	0.240
2	0.235	27	0.249	52	0.254
3	0.240	28	0.254	53	0.261
4	0.249	29	0.250	54	0.245
5	0.253	30	0.269	55	0.258
6	0.249	31	0.255	56	0.255
7	0.256	32	0.259	57	0.249
8	0.221	33	0.249	58	0.253
9	0.228	34	0.242	59	0.229
10	0.225	35	0.248	60	0.234
11	0.239	36	0.253	61	0.245
12	0.241	37	0.257	62	
13	0.249	38	0.251	63	
14	0.243	39	0.246	64	
15	0.253	40	0.254	65	
16	0.251	41	0.259	66	
17	0.268	42	0.257	67	
18	0.260	43	0.254	68	
19	0.245	44	0.267	69	
20	0.257	45	0.252	70	
21	0.265	46	0.241	71	
22	0.255	47	0.260	72	
23	0.279	48	0.250	73	
24	0.280	49	0.262	74	
25	0.276	50	0.252	75	

 Average Energy:
 0.239
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 68%

 Std. Deviation:
 0.015
 kip-ft

 Average Energy:
 0.251
 kip-ft

 Max. Rated Energy:
 0.350
 kip-ft

 Efficiency:
 72%
 kip-ft

 Std. Deviation:
 0.012
 kip-ft

Average efficiency from all tests: 70%

Comments: Safety hammer operated by Benbow

LE = length of rod from below gages to bottom of sampler.

Drill Rig:	SCI CME 55
Hammer:	Automatic
Rig Operator:	Benbow/Heath
Engineer	Handarson

Test Date: 12/17/08
Project No.: 05226
Location: Meeting Street
Drilling Method: Mud Rotary

Boring ID: <u>TB-1</u>
Rod Type: <u>BW</u>

Analyzer ID: <u>216BW</u>

Rod Area: <u>1.81 in²</u>

Depth: 35 ft
LE: 38 ft
Blow Count: 2,2,3

Depth: 40 ft

LE: 43 ft

Blow Count: 1,1,4

Depth: 45 ft

LE: 48 ft

Blow Count: 15,20,17

Blow No.	Energy	Blow No.	Energy
1	0.270	26	
2	0.277	27	
3	0.291	28	
4	0.274	29	
5	0.291	30	
6	0.290	31	
7	0.273	32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy
1	0.275	26	
2	0.274	27	
3	0.275	28	
4	0.283	29	
5	0.281	30	
6	0.288	31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.230	26	0.285	51	0.268
2	0.280	27	0.289	52	0.258
3	0.284	28	0.291	53	
4	0.279	29	0.292	54	
5	0.274	30	0.285	55	
6	0.271	31	0.277	56	
7	0.266	32	0.280	57	
8	0.281	33	0.288	58	
9	0.279	34	0.279	59	
10	0.279	35	0.281	60	
11	0.284	36	0.289	61	
12	0.274	37	0.284	62	
13	0.281	38	0.287	63	
14	0.274	39	0.288	64	
15	0.283	40	0.272	65	
16	0.281	41	0.280	66	
17	0.271	42	0.280	67	
18	0.275	43	0.292	68	
19	0.290	44	0.271	69	
20	0.288	45	0.298	70	
21	0.282	46	0.288	71	
22	0.285	47	0.285	72	
23	0.290	48	0.287	73	
24	0.285	49	0.287	74	
25	0.279	50	0.283	75	

Average Energy:	0.281	kip-ft
Max. Rated Energy:	0.350	kip-ft
Efficiency:	80%	
Std. Deviation:	0.009	kip-ft

Average Energy:	0.279	kip-ft
Max. Rated Energy:	0.350	kip-ft
Efficiency:	80%	
Std. Deviation:	0.006	kip-ft

Average Energy: 0.281 kip-ft

Max. Rated Energy: 0.350 kip-ft

Efficiency: 80%

Std. Deviation: 0.010 kip-ft

Average efficiency from all tests: 80%

Drill Rig:	SCI Gyrotrack
Hammer:	Automatic
Rig Operator:	Williams/Benbow
Engineer:	Henderson

Depth:	35	ft
LE:	38	ft
w Count	113	

Blow No.	Energy	Blow No.	Energy
1	0.259	26	
2	0.265	27	
3	0.273	28	
4	0.265	29	
5	0.266	30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25	-	50	

0.266	kip-ft
0.350	kip-ft
76%	_
0.005	kip-ft
	0.350 76%

Test Date:	12/17/08
Project No.:	05226
Location:	Meeting Street
Drilling Method:	Mud Rotary

Depth:	40	ft
LE:	43	ft
Blow Count:	1,2,3	

Blow No.	Energy	Blow No.	Energy
1	0.263	26	
2	0.267	27	
3	0.266	28	
4	0.268	29	
5	0.265	30	
6	0.267	31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Average Energy:	0.266	kip-ft
Max. Rated Energy:	0.350	kip-ft
Efficiency:	76%	_
Std. Deviation:	0.002	kip-ft

Average efficiency from all tests: 76%

Boring ID:	TB-3	
Rod Type:	BW	
Analyzer ID:	216BW	
Rod Area:	1.81 in ²	

Depth:	45	ft
LE:	48	ft
Blow Count:	13,23,23	,

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.273	26	0.265	51	0.269
2	0.266	27	0.266	52	0.270
3	0.263	28	0.267	53	0.268
4	0.267	29	0.269	54	0.266
5	0.263	30	0.270	55	0.271
6	0.268	31	0.268	56	0.270
7	0.266	32	0.269	57	0.271
8	0.262	33	0.269	58	0.271
9	0.263	34	0.269	59	0.264
10	0.265	35	0.268	60	
11	0.264	36	0.266	61	
12	0.265	37	0.265	62	
13	0.266	38	0.268	63	
14	0.266	39	0.270	64	
15	0.265	40	0.270	65	
16	0.267	41	0.266	66	
17	0.267	42	0.269	67	
18	0.265	43	0.269	68	
19	0.265	44	0.266	69	
20	0.265	45	0.267	70	
21	0.266	46	0.270	71	
22	0.268	47	0.269	72	
23	0.269	48	0.271	73	
24	0.268	49	0.270	74	
25	0.267	50	0.270	75	

Average Energy: 0.267 kip-ft

Max. Rated Energy: 0.350 kip-ft

Efficiency: 76%

Std. Deviation: 0.002 kip-ft



GEOTECHNICAL GROUTING FIELD LOG

								Boring No.:	B-3 SPT B
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-3 SPT B		CLIENT:		SCDOT		Consultant REP.	:
DRILLER:		Soil Consultants		RIG TYPE:	CME 850		DATE:	10/1/2	2008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation		-	- *34 = 2.96 ft ³ feet and 34 indic	cates the length of	grout.
DATE DRILLED:	:	10/1/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix tha	t was replicated
SURF. ELEVATI	ON:	6.5 ft	PUMP TYPE:			in the field. On	e batch of grout w	as used to grout the	e hole to the top.
G.W. LEVEL:		Not Measured	VOLUME (HC	DLE) gal	22.1	Tremie pipe wa	s lowered to the b	oottom of the hole a	nd raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole was	s grouted. Grout v	was observed flowin	g out of the
DEPTH:		34	TREMIE DEP	TH ft	34	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	34			-	

GEOTECHNICAL GROUTING FIELD LOG

								Boring No.:	B-2 SPT
JOB NAME:	Port Access Road		JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_1	_	
LOCATION:		B-2 SPT		CLIENT:		SCDOT		Consultant REP.:	Ron Boller
DRILLER:		Soil Consultants		RIG TYPE:	CME 850		DATE:	9/29/20	800
	BenSeal- Water-	37.5 lbs 30 gal		Calculation	Hole Volume=	4	*50 = 4.36 ft ³ feet and 50 indic	ates the length of g	rout.
DATE DRILLED:		9/29/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that	was replicated
SURF. ELEVATIO	N:	6.5 ft	PUMP TYPE:	:		in the field. On	e batch of grout w	as used to grout the l	hole to the top.
G.W. LEVEL:		Ground Surface	VOLUME (HO	DLE) gal	32.6	Tremie pipe wa	s lowered to the b	oottom of the hole and	d raised
HOLE DIAMETER	! :	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole was	grouted. Grout v	vas observed flowing	out of the
DEPTH:		50	TREMIE DEP	TH ft	50	top of the hole	-		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAMETE	ER:	1in.	GROUT DEP	TH ft	50				

GEOTECHNICAL GROUTING FIELD LOG

								Boring No.:	B-2A SPT
JOB NAME:		Port Access Roa	ad	JOB NO.:	1131	-08-554	PAGE NO.:	_1_/_	1_
LOCATION:		B-2A SPT		CLIENT:		SCDOT		Consultant REP.:	Ron Boller
DRILLER:		Soil Consultant	S	RIG TYPE:	CME 850		DATE:	9/30/2	800
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation 333 indicates the	Hole Volumes	4	*37= 3.2 ft ³	dicates the length o	of grout.
DATE DRILLED:		9/30/2008	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that	was replicated
SURF. ELEVATIO	ON:	6.5 ft	PUMP TYPE	:		in the field. C	One batch of grout v	vas used to grout the	hole to the to
G.W. LEVEL:		4.5ft	VOLUME (H	OLE) gal	24.1	Tremie pipe v	was lowered to the l	bottom of the hole an	d raised
HOLE DIAMETER	₹:	4-in	VOLUME (G	ROUT) gal	Not Recorded	as the hole w	as grouted. Grout	was observed flowing	g out of the
DEPTH:		37 ft	TREMIE DEI	PTH ft	37	top of the ho	le.		
DRILL MUD:		Kaolin	CASING DE	PTH ft	NONE				
TREMIE DIAMET	ER:	1in.	GROUT DEF	PTH ft	37				

								Boring No.:	B-3 SPT
JOB NAME:	E: Port Access Road			JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_1	1_
LOCATION:		B-3 SPT		CLIENT:		SCDOT		Consultant REP.:	Ron Boller
DRILLER:		Soil Consultants		RIG TYPE:	CME 850		DATE:	9/30/20	008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation			- *50 = 4.36 ft ³ feet and 50 indic	ates the length of g	rout.
DATE DRILLED:	:	9/30/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that	was replicated
SURF. ELEVATI	ON:	6.5 ft	PUMP TYPE:			in the field. On	e batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:		Not Measured	VOLUME (HO	DLE) gal	32.6	Tremie pipe wa	as lowered to the b	ottom of the hole and	d raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole was	s grouted. Grout v	vas observed flowing	out of the
DEPTH:		50	TREMIE DEF	TH ft	50	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	50				

							Boring No.:	B-3 SPT A
JOB NAME:	Port Access Roa	d	JOB NO.:	1131-	-08-554	PAGE NO.:	_1_/_	1_
LOCATION:	B-3 SPT A		CLIENT:		SCDOT	-	Consultant REP.:	RB/ME
DRILLER:	Soil Consultants		RIG TYPE:	CME 850		DATE:	10/1/2	800
Grout Mix: BenSEal Water-	- 37.5 lbs 30 gal		Calculation	Hole Volume=	4	*40= 3.5 ft ³	dicates the length o	f grout.
DATE DRILLED:	10/1/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that	was replicated
SURF. ELEVATION:	6.5 ft	PUMP TYPE:			in the field.	One batch of grout v	was used to grout the	hole to the to
G.W. LEVEL:	Not Measured	VOLUME (HC	DLE) gal	26.1	Tremie pipe	was lowered to the	bottom of the hole an	d raised
HOLE DIAMETER:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole w	vas grouted. Grout	was observed flowing	out of the
DEPTH:	40 ft	TREMIE DEP	TH ft	40	top of the ho	ole.		
DRILL MUD:	Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAMETER:	1in.	GROUT DEP	TH ft	40				

								Boring No.:	B-18 SPT A
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	-08-554	PAGE NO.:	_1_	/_1_
LOCATION:		B-18 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 55		DATE:	3/11/	/2009
Grout Mix:	Bentonite Water-	- 50 lb 55 gal		Calculation	Hole Volume=		- *100 = 8.72 ft ³ feet and 100 indi		of grout.
DATE DRILLED	:	3/11/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix th	at was replicated
SURF. ELEVATI	ON:	9 FT	PUMP TYPE		Honda 4.0	in the field. On	e batch of grout w	as used to grout ti	ne noie to the
G.W. LEVEL:		3.5 FT	VOLUME (HO	DLE) gal	65.3	too.	as lowered to the b	ottom of the hole	and raised
HOLE DIAMETE	R:	4-in	VOLUME (GI	ROUT) gal	60	as the hole was	s grouted. Grout w	vas observed flowi	ng out of the
DEPTH:		100 ft	TREMIE DEF	TH ft	100	top of the hole	ı <u>.</u>		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	100				

								Boring No.:	B-20 SPT Alt
JOB NAME:		Port Access Roa	ıd	JOB NO.:	1131-08-554		PAGE NO.:	PAGE NO.: _1_/_1_	
LOCATION:	B-20 SPT Alt 1			CLIENT:		SCDOT	3	Consultant REP.:	P. Baumstark
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	2/24	/2009
	Bentonite Water-	- 50 lbs 55 gal		Calculation		7	- *120= 10.45 ft ³ feet and 120 indi		of grout.
DATE DRILLED:		2/24/2009	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is an ap	oproximate mix th	at was replicated
SURF. ELEVATIO	ON:	12.5 FT	PUMP TYPE	:	Mono Pump	in the field. Tw	o batches of grout	were used to gro	ut the hole to the
G.W. LEVEL:		4 FT	VOLUME (HO	OLE) gal	78.2		as lowered to the b	ottom of the hole	and raised
HOLE DIAMETER	R:	4-in	VOLUME (GI	ROUT) gal	91	as the hole was	s grouted. Grout w	as observed flow	ing out of the
DEPTH:		120 ft	TREMIE DEF	PTH ft	120	top of the hole			
DRILL MUD:		Bentonite	CASING DEF	PTH ft	NONE				
	ER:	1in.	GROUT DEP	T116	120				

								Boring No.:	B-4 SPT
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_	.1_
LOCATION:		B-4 SPT		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME, Inc.		RIG TYPE:	CME 550X		DATE:	2/24/2	
Grout Mix:	Bentonite	- 8 lb Cement- 192 lb	Example	Calculation	Hole Volume=	∏*(0.25) ² 4	*120 = 5.89 ft ³		
	Water-	30 gal	Where 0.2	25 indicates the	diameter of the	e borehole in	feet and 120 indic	cates the length of	grout.
DATE DRILLED	:	2/24/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix tha	t was replicated
SURF. ELEVAT	ION:	6.5 ft	PUMP TYPE:		Honda 4.0	in the field. C	one batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:		3 ft	VOLUME (HO	DLE) gal	44	Tremie pipe v	vas lowered to the b	oottom of the hole ar	nd raised
HOLE DIAMETE	ER:	3-in	VOLUME (GF	ROUT) gal	45	as the hole w	as grouted. Grout v	was observed flowing	g out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the ho	le.		
DRILL MUD:		Bentonite	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

							Boring No.:	B-14 SPT
JOB NAME:	Port Access R	oad	JOB NO.:	1131	-08-554	PAGE NO.:	_1_/_	1_
LOCATION:	B-14 SPT		CLIENT:		SCDOT	-	Consultant REP.:	M. Eichelberg
DRILLER:	S&ME		RIG TYPE:	D 50		DATE:	2/24/09-2	/25/09
Grout Mix:	Bentonite- 10 lbs Portland Cement- 240 lb Water- 35 gal	·	Calculation 25 indicates the	Hole Volume	4	*120= 5.89 ft ³	cates the length of	grout.
DATE DRILLED): 2/24/09-	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix that	was replicate
SURF. ELEVAT		PUMP TYPE	:		in the field. Or	ne batch of grout w	as used to grout the	hole to the to
0.14/ 1.5//51		VOLUME (H	OLE) and		Transia nina w			
G.W. LEVEL:		VOLUME (III	JLE) gai	44	remie pipe w	as lowered to the b	oottom of the hole an	d raised
	ER: 3-in	VOLUME (G		50			oottom of the hole an	
HOLE DIAMETI	ER: 3-in 120 ft	,	ROUT) gal			s grouted. Grout v		
G.W. LEVEL: HOLE DIAMETI DEPTH: DRILL MUD:		VOLUME (G	ROUT) gal	50	as the hole wa	s grouted. Grout v		

								Boring No.:	B-16 SPT
JOB NAME:		Port Access Road	i	JOB NO.:	1131-08	-554	PAGE NO.:	_1_/_	.1_
LOCATION:		B-16 SPT		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:		Soil Consultants, Ir	IC.	RIG TYPE:	CME 55		DATE:	10/19/2	2008
Grout Mix:	BenSeal- Water-	75 lbs 60 gal	·	Calculation	Hole Volume=			ft ³ cates the length of gr	out.
DATE DRILLED:		10/19/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix tha	at was replicated
SURF. ELEVATI	ON:	11 ft	PUMP TYPE:			in the field. C	one patch of g	rout was used to grout	t the noie to the
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	78.3	Tremie pipe	was lowered to	the bottom of the hole	e and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole w	as grouted. G	Frout was topped with	12.5 gal of gravel
DEPTH:		120 ft	TREMIE DEP	TH ft	120	and 6 in. of a	sphalt cold pa	tch.	
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

							Boring No.:	B-18 SPT
JOB NAME:	Port Access Roa	d	JOB NO.:	1131-08	-554	PAGE NO.:	_1_/	_1_
LOCATION:	B-18 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Baumstark
DRILLER:	S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/18/2	2008
Grout Mix: Grout W Water-	ell- 100 lbs 48 gal		Calculation	Hole Volume=	-		ft ³ cates the length of c	urout
DATE DRILLED:	10/19/2008		E DIAMETER:	3 in.	Notes:		an approximate mix th	
SURF. ELEVATION:	9 ft	PUMP TYPE:		3 In.			rout was used to grou	•
G.W. LEVEL:	3.5 FT	VOLUME (HC		78.3	top. Tremie pipe	was lowered to	o the bottom of the ho	le and raised
HOLE DIAMETER:	4-in	VOLUME (GR	ROUT) gal	Not Recorded	as the hole v	was grouted. G	Grout was topped with	12.5 gal of grave
DEPTH:	120 ft	TREMIE DEP	TH ft	120	and 6 in. nor	n-shrink concre	ete patch.	
DRILL MUD:	Kaolin	CASING DEP	TH ft	70 ft				
TREMIE DIAMETER:	1in.	GROUT DEP	TH ff	120				

								Boring No.:	B-19 SPT
JOB NAME:		Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_	1_
LOCATION:	: B-19 SPT			CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:		Soil Consultants	i	RIG TYPE:	CME 55		DATE:	9/24/20	008
Grout Mix:	BenSeal- Water-	75 lbs 60 gal		Calculation		-	- *120 = 10.5 ft ³ feet and 120 ind	icates the length of ç	grout.
DATE DRILLED:	•	9/24/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that w	as replicated
SURF. ELEVATI	ION:	10.5 ft	PUMP TYPE:			in the field. On	e batch of grout w	vas used to grout the h	ole to the top.
G.W. LEVEL:		4 ft	VOLUME (HC	DLE) gal	78.3	Tremie pipe wa	as lowered to the b	oottom of the hole and	raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole was	s grouted. Grout	was observed flowing	out of the
DEPTH:		120	TREMIE DEP	TH ft	120	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

							Boring No.:	B-23 SPT Alt
JOB NAME:	Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_	_/_1_
LOCATION:	B-23 SPT Alt 1		CLIENT: SCDOT			Consultant REP	.: P. Baumstark	
DRILLER:	S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/30)/2008
Grout Mix: Grout We Water-	ill- 100 lbs 48 gal	·	Calculation 33 indicates the	Hole Volume=	4	*120= 10.5 ft ³ feet and 120 ind	icates the length	of grout.
DATE DRILLED:	9/30/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an	approximate mix t	hat was replicated
SURF. ELEVATION:	12 ft	PUMP TYPE:			in the field. O	ne batch of grout w	as used to grout th	ne hole to the top.
G.W. LEVEL:	6 FT	VOLUME (HC	DLE) gal	78.3	Tremie p	ipe was lowered to	the bottom of the h	nole and raised
HOLE DIAMETER:	4-in	VOLUME (GR	ROUT) gal	Not Recorded	as the hole wa	as grouted. Grout v	vas observed flowi	ng out of the
DEPTH:	120 ft	TREMIE DEP	TH ft	120	top of the hole	е.		
DRILL MUD:	Kaolin	CASING DEP	TH ft	70 ft				
TREMIE DIAMETER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-21 SPT Alt 1
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_1_	
LOCATION:		B-21 SPT Alt 1		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME		RIG TYPE:	CME 550X		DATE:	2/2	23/2009
Grout Mix:	Bentonite Portland	e- 8 lb Cement- 192 lb	Example	Calculation	Hole Volume=	∏*(0.25) ² 4	- *120 = 5.89) ft ³	
	Water-	35 gal	Where 0.25	indicates the dia	ameter of the b	orehole in fee	t and 120 indi	cates the length o	of grout.
DATE DRILLED):	2/22/09-	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate m	nix that was replicated
SURF. ELEVAT	ION:	12.5 FT	PUMP TYPE:		Trash Pump	in the field. Or	ne batch of grou	ut was used to grou	t the hole to the top.
G.W. LEVEL:		8 ft	VOLUME (HO	DLE) gal	44	Tremie pipe was lowered to the bottom of the		ne bottom of the ho	le and raised
HOLE DIAMETE	ER:	3-in.	VOLUME (GF	ROUT) gal	45	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hole).		
DRILL MUD:		Bentonite	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-21 SPT Alt 1 A
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-21 SPT Alt 1 A	,	CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3.	/4/2009
Grout Mix:	Bentonite Water-	- 75 lbs 40 gal	·	Calculation	Hole Volume=	-		3 dicates the lengt	h of grout.
DATE DRILLED:	:	3/4/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	ın approximate mix	that was replicated
SURF. ELEVATI	ION:	12.5 FT	PUMP TYPE:		Mono Pump	in the field. Or	ne batch of grou	ut was used to grou	ut the hole to the top.
G.W. LEVEL:		8 FT	VOLUME (HC	DLE) gal	21	Tremie pipe wa	as lowered to th	ne bottom of the ho	ole and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	30	as the hole wa	s grouted. Gro	ut was observed fl	owing out of the
DEPTH:		32 ft	TREMIE DEP	TH ft	32	top of the hole).		
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE	_			
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	32				

								Boring No.:	B-27 SPT Alt 1
JOB NAME:		Port Access Road		JOB NO.:	1131-	08-554	PAGE NO.:	AGE NO.: _1_/_1_	
LOCATION:		B-27 SPT Alt 1		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3/	3/2009
Grout Mix:	Grout Mix: Bentonite- 50 lb Water- 50 gal			Calculation	Hole Volume=	4	- *120= 10.5 feet and 120	ft ³ indicates the len	ath of arout.
DATE DRILLED:	:	3/3/2009	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	an approximate n	nix that was replicated
SURF. ELEVATI	ON:	12 FT	PUMP TYPE:		mono pump	in the field. Tw	o batches of gr	rout were used to g	grout the hole to the top.
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	78.3	Tremie pipe wa	s lowered to th	e bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GF	ROUT) gal	85	as the hole was	grouted. Gro	ut was observed flo	owing out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-27 SPT Alt 1 A
JOB NAME:		Port Access Road	j	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-27 SPT Alt 1 A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:	DRILLER: SCI			RIG TYPE:	CME 850		DATE:	3	/3/2009
Grout Mix:	Bentonite Water-	- 50 lbs 50 gal	Example	Calculation	Hole Volume=	$\frac{\prod^*(0.333)^2}{4}$	- *38= 3.3 ft ³		
			Where 0.3	333 indicates the	diameter of th	e borehole in	feet and 38 in	dicates the lengt	n of grout.
DATE DRILLED:		3/3/2009	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATION	ON:	12 ft	PUMP TYPE	:	Honda 4.0	in the field. Or	ne batch of grou	it was used to gro	ut the hole to the top.
G.W. LEVEL:		Not Recorded	VOLUME (H	OLE) gal	24.8	Tremie pipe w	as lowered to th	e bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GI	ROUT) gal	30	as the hole wa	s grouted. Gro	ut was observed fl	owing out of the
DEPTH:		38 ft	TREMIE DEF	PTH ft	38	top of the hole	9.		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAMET	ren.	1 in.	GROUT DEP	TH ft	38				

								Boring No.:	B-31 SPT
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/	/_1_
LOCATION:		B-31 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:	RILLER: Soil Consultants			RIG TYPE:			DATE:	10/8/	2008
Grout Mix:	BenSeal- Water-	75 lbs 60 gal	Example Ca Where 0.333			4	*120 = 10.5 ft ³ feet and 120 indic	cates the length of	grout.
DATE DRILLED	:	10/8/2008	GROUT HOSE I	DIAMETER:	3 in.	Notes:	Grout mix is ar	n approximate mix th	at was replicated
SURF. ELEVATI	ION:	3 ft	PUMP TYPE:			in the field. On	e batch of grout wa	as used to grout the l	hole to the top.
G.W. LEVEL:		Ground Surface	VOLUME (HOLE	E) gal	78.3	Tremie pipe wa	s lowered to the be	ottom of the hole and	d raised
HOLE DIAMETE	R:	4-in	VOLUME (GRO	UT) gal	Not Recorded	as the hole was	grouted. Grout w	as observed flowing	out of the
DEPTH:		120 ft	TREMIE DEPTH	l ft	120	top of the hole	-		
DRILL MUD:		Kaolin	CASING DEPTH	l ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEPTH	ft	120				

								Boring No.:	B-33 SPT
JOB NAME:		Port Access Roa	d	JOB NO.:	1131	-08-554	PAGE NO.:	_1_,	/_1_
LOCATION:		B-33 SPT		CLIENT:		SCDOT	•	Consultant REP ·	R. Boller
DRILLER:		S&ME, Inc.		RIG TYPE: CME 550 DATE:		DATE:	9/25/	/2008	
Grout Mix:	Grout Mix: Grout Well- 50 lbs Water- 24 gal			Calculation 333 indicates the		$= \frac{\prod^* (0.333)^2}{4}$ the borehole in	*70= 6.1 ft ³	ates the length of g	grout.
DATE DRILLED:		9/25/2008	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix that	was replicated
SURF. ELEVATIO	ON:	4 ft	PUMP TYPE	:		in the field. O	ne batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:		Tidal	VOLUME (HO	OLE) gal	45.6	Tremie pipe w	as lowered to the b	ottom of the hole and	d raised
HOLE DIAMETER	₹:	4-in	VOLUME (GF	ROUT) gal	45	as the hole wa	as grouted. Grout	was observed flowing	g out of the
DEPTH:		70 ft	TREMIE DEF	PTH ft	70	top of the hole	Э.		
DRILL MUD:		Bentonite	CASING DEF	PTH ft	NONE				
TREMIE DIAMET	ER:	1in.	GROUT DEP	TH ft	70				

								Boring No.:	B-28 SPT Alt 1
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-08-554		PAGE NO.:	-	1_/_1_
LOCATION:		B-28 SPT Alt 1		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME		RIG TYPE:	CME 550X		DATE:	2/	18/2009
Grout Mix:	Bentonite Portland	e- 8 lb Cement- 192 lb	Example	Calculation	Hole Volume=	П*(0.333) ²	_ *67 +	∏*(0.25) ² *5.	3 = 8.44 ft ³
	Water-	30 gal	Where 0.25 arout.	and 0.333 indica	ates the diamet	er of the boreh	nole in feet	and 67 and 53 ir	ndicates the length of
DATE DRILLED	:	2/18/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix	is an approximate	mix that was replicated
SURF. ELEVAT	ION:	7 ft	PUMP TYPE:		Honda 4.0	in the field. Tw	o patcnes o	or grout were used	to grout the hole to the
G.W. LEVEL:		7 ft	VOLUME (HO	DLE) gal	63.2	Tremie pipe wa	as lowered t	o the bottom of the	hole and raised
HOLE DIAMETE	R:	4-in/3- in	VOLUME (GF	ROUT) gal	70	as the hole was	s grouted.	Grout was observe	d flowing out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hole			
DRILL MUD:		Bentonite	CASING DEF	PTH ft	67				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-43 SPT Alt 1 A
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO:	_	1_/_1_
LOCATION:		B-43 SPT Alt 1 A	i	CLIENT:		SCDOT	<u>-</u>	Consultant REP.:	P. Baumstark
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3/	12/2009
	Bentonite Water-	- 50 lbs 55 gal	·	Calculation	Hole Volume=	4		6 ft ³ 20 indicates the I	ength of
DATE DRILLED:		3/12/2009	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix	is an approximate	mix that was replicated
SURF. ELEVATIO	DN:	9 ft	PUMP TYPE	:	Mono Pump	in the field. C	One batch of	grout was used to	grout the hole to the to
G.W. LEVEL:		Not Recorded	VOLUME (H	OLE) gal	27.4	Tremie pipe v	was lowered t	to the bottom of the	e hole and raised
HOLE DIAMETER	₹:	4-in	VOLUME (GI	ROUT) gal	30	as the hole w	as grouted.	Grout was observe	ed flowing out of the
DEPTH:		42 ft	TREMIE DEF	PTH ft	42	top of the ho	le.		
DRILL MUD:		Bentonite	CASING DEF	PTH ft	NONE				
						1			

							Boring No.:	B-33 SPT A
JOB NAME:		Port Access Road	JOB NO.	.: 1131-	08-554	PAGE NO.:	NO.: _1_/_1_	
LOCATION:		B-33 SPT A	CLIENT	:	SCDOT		Consultant REP.:	P. Baumstark
DRILLER:	DRILLER: S&ME, Inc.		RIG TYPE	RIG TYPE: CME 550 DATE:		DATE:	9/24	1/2008
Grout Mix:	Grout We	ell- 50 lbs 24 gal	Example Calculation Where 0.333 indicates		-	- *52 = 4.5 ft ³ feet and 52 indic	ates the length of	grout.
DATE DRILLED	:	9/24/2008	GROUT HOSE DIAMETE	R: 3 in.	Notes:	Grout mix is a	n approximate mix t	hat was replicated
SURF. ELEVAT	ION:	4 ft	PUMP TYPE:		in the field. Or	ne batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:		Not Recorded	VOLUME (HOLE) gal	33.9	Tremie pipe wa	as lowered to the b	ottom of the hole ar	nd raised
HOLE DIAMETE	R:	4-in	VOLUME (GROUT) gal	38	as the hole wa	s grouted. Grout w	vas observed flowing	g out of the
DEPTH:		52 ft	TREMIE DEPTH ft	52	top of the hole).		
DRILL MUD:		Kaolin	CASING DEPTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEPTH ft	52				

								Boring No.:	B-37 SPT
JOB NAME:		Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_	/_1_
LOCATION:		B-37 SPT		CLIENT:		SCDOT		Consultant REP	P. Oree
DRILLER:		Mid Atlantic Drillin	g	RIG TYPE: CME 45 DATE:		DATE:	10/13	3/2008	
Grout Mix:	Portland Water-	Cement- 50 lbs 30 gal		Calculation		$\frac{\prod^*(0.333)^2}{4}$ ne borehole in	*120=10.5 ft ³ feet and 120 indi	cates the length of	grout.
DATE DRILLED:		10/13/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix that	was replicated
SURF. ELEVATI	ON:		PUMP TYPE:			in the field. O	ne batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:		Tidal	VOLUME (HO	DLE) gal	78.3	Tremie pipe w	as lowered to the b	ottom of the hole and	d raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	55	as the hole wa	s grouted. Grout	was observed flowing	g out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hole	9.		
DRILL MUD:		Bentonite	CASING DEF	PTH ft	40 ft				
TREMIE DIAMET	ΓER:	1in.	GROUT DEP	TH ft	120		_	_	

								Boring No.:	B-34 SPT A
JOB NAME:		Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:		1_/_1_
LOCATION:		B-34 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850 DATE: 3/5/2				5/2009
Grout Mix:	Bentonite	- 50 lb 50 gal		Calculation	Hole Volume=	7			
			Where 0.3	333 indicates th	e diameter of t	ne borehole in	feet and 26 in	ndicates the lengt	h of grout.
DATE DRILLED	:	3/5/2009	GROUT HOS	E DIAMETER:		Notes:		• • •	nix that was replicated
SURF. ELEVAT	ION:		PUMP TYPE:		mana numa	in the field. On the top.	e nair or a bato	on or grout was use	a to grout the hole to
G.W. LEVEL:			VOLUME (HO	DLE) gal	29	Tremie pipe wa	s lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GF	ROUT) gal	40	as the hole was	grouted. Gro	ut was observed flo	owing out of the
DEPTH:		44 ft	TREMIE DEF	TH ft	44	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	44				

								Boring No.:	B-46 SPT A
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_1_	
LOCATION:		B-46 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:	ORILLER: SCI			RIG TYPE:	CME 850		DATE:	3/	5/2009
Grout Mix:	Bentonite- Water-	50 lbs 50 gal	Example	Calculation	Hole Volume=	∏*(0.333) ²	- *26=2.27 ft ³		
			Where 0.3	33 indicates the	diameter of th	e borehole in t	feet and 26 inc	dicates the length	of grout.
DATE DRILLED:		3/5/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATI	ON:		PUMP TYPE:		Honda (III)	in the field. On the top.	e half of a batc	n of grout was use	d to grout the hole to
G.W. LEVEL:			VOLUME (HO	DLE) gal	17		as lowered to th	e bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GF	ROUT) gal	35	as the hole was	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		26 ft	TREMIE DEF	TH ft	26	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAME	TFR [.]	1 in.	GROUT DEP	TH ft	26				

								Boring No.:	B-39 SPT	
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_1_		
LOCATION:		B-39 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Baumstark	
DRILLER:		S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/25	/2008	
Grout Mix:	Grout We Water-	il- 50 lbs 24 gal	·	Calculation	Hole Volume=		*70 = 6.1 ft ³ eet and 70 indica	ates the length of	grout.	
DATE DRILLED:		9/25/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is ar	n approximate mix th	nat was replicated	
SURF. ELEVATI	ON:	2.5 ft	PUMP TYPE:			in the field. On	e batch of grout wa	as used to grout the	hole to the top.	
G.W. LEVEL:		Ground	VOLUME (HC	DLE) gal	45.6	Tremie pipe wa	s lowered to the b	ottom of the hole an	d raised	
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole was	grouted. Grout w	as observed flowing	out of the	
DEPTH:		70 ft	TREMIE DEP	TH ft	70	top of the hole.				
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE					
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	70					

								Boring No.:	B-39 SPT A
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	1131-08-554		_1.	_/_1_
LOCATION:		B-39 SPT A		CLIENT:	SCDOT		•	Consultant REP ·	P. Baumstark
DRILLER:		S&ME, Inc.		RIG TYPE: CME 550 DATE:				9/25	5/2008
Grout Mix:	Grout We	ell- 50 lbs 24 gal	·	Calculation	Hole Volume=	4	*30=2.6 ft ³ feet and 30 indicates	ates the length of	grout.
DATE DRILLED:		9/25/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix that	was replicated
SURF. ELEVATIO	DN:	2.5 ft	PUMP TYPE:			in the field. O	ne batch of grout w	as used to grout the	e hole to the top.
G.W. LEVEL:		Ground	VOLUME (HO	DLE) gal	19.5	Tremie pipe w	as lowered to the b	ottom of the hole ar	nd raised
HOLE DIAMETER	₹:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole wa	s grouted. Grout	was observed flowir	ng out of the
DEPTH:		30 ft	TREMIE DEF	TH ft	30	top of the hole	э.		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAMET	ER:	1in.	GROUT DEP	TH ft	30				

							Boring No.:	B-42 SPT Alt 1
JOB NAME:		Port Access Roa	d JOB	NO.:	1131-08-554	PAGE NO.:	_1	_/_1_
LOCATION:		B-42 SPT Alt 1	CLIE	ENT:	SCDOT		Consultant REP.:	P. Oree
DRILLER:	R: Mid Atlantic Drilling		g RIG 1	RIG TYPE: CME 45 DATE:		DATE:	10/1	5/2008
Grout Mix:	Portland Water-	Cement- 200 lbs	Example Calculat Where 0.333 indic		olume= $\frac{\prod^*(0.333)^6}{4}$ ter of the borehole i			of grout.
DATE DRILLED):	10/15/2008	GROUT HOSE DIAM	ETER: 3	in. Notes:	Grout mix is an a	pproximate mix that	t was replicated
SURF. ELEVAT	ION:		PUMP TYPE:		in the field. (One batch of grout w	as used to grout the	e hole to the top.
G.W. LEVEL:		Tidal	VOLUME (HOLE) gal	78	Tremie pipe	was lowered to the b	ottom of the hole a	nd raised
HOLE DIAMETE	ER:	4-in	VOLUME (GROUT) g	al 5	as the hole w	as grouted. Grout w	as observed flowin	g out of the
DEPTH:		120 ft	TREMIE DEPTH ft	1:	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEPTH ft	20) ft			
TREMIE DIAME	TER:	1in.	GROUT DEPTH ft	1:	20			

								Boring No.:	B-43 SPT A lt 1
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1	_/_1_
LOCATION:		B-43 SPT A lt 1		CLIENT:		SCDOT		Consultant REP	R. Boller
DRILLER:		S&ME, Inc.		RIG TYPE:	CME 850 DATE:		DATE:	10/2	2/2008
Grout Mix:	Water- 60 gal			Calculation	Hole Volume=	4	*120=10.5 ft ³ feet and 120 indi	cates the length o	of grout.
DATE DRILLED:		10/2/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix tha	t was replicated
SURF. ELEVATIO	ON:	9.1 ft	PUMP TYPE:			in the field. O	ne batch of grout wa	as used to grout the	e hole to the top.
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	78.3	Tremie pipe w	as lowered to the b	ottom of the hole a	nd raised
HOLE DIAMETER	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole wa	as grouted. Grout v	was observed flowi	ng out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hol	е.		
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAMET	ER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-43 SPT Alt 2
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1.	_/_1_
LOCATION:		B-43 SPT Alt 2		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:	LLER: Mid Atlantic Drilling		g	RIG TYPE:	Jack-u	Jack-up Barge DATE:		10/1	6/2008
Grout Mix:	Portland (Cement- 200 lbs 60 gal	·	Calculation	Hole Volume=		*120 = 10.5 ft ³ feet and 120 indi	cates the length o	f grout.
DATE DRILLED:	:	10/16/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is ar	n approximate mix t	hat was replicated
SURF. ELEVATI	ON:		PUMP TYPE:	:		in the field. On	e batch of grout wa	as used to grout the	hole to the top.
G.W. LEVEL:		Tidal	VOLUME (HO	DLE) gal	783	Tremie pipe wa	s lowered to the b	ottom of the hole ar	nd raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	65	as the hole was	grouted. Grout w	as observed flowin	g out of the
DEPTH:		120 ft	TREMIE DEF	PTH ft	120	top of the hole	-		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	20 ft				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

							Boring No.:	B-46 SPT
JOB NAME:	Port Access Roa	ad	JOB NO.:	1131-	08-554	PAGE NO.:	_1_	/_1_
LOCATION:	B-46 SPT		CLIENT:		SCDOT	•	Consultant REP ·	P. Oree
DRILLER:	Soil Consultants,	Inc.	RIG TYPE:	Gyr	otrac DATE:		10/6	/2008
Grout Mix: BenS Water	eal- 75 lbs 60 gal		Calculation 33 indicates the	Hole Volume=	4	*120=10.5 ft ³	cates the length of	grout.
DATE DRILLED:	10/2/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	pproximate mix that	was replicated
SURF. ELEVATION:	11.2 ft	PUMP TYPE:			in the field. (One batch of grout w	as used to grout the	hole to the top.
G.W. LEVEL:	7 ft	VOLUME (HO	LE) gal	78.3	Tremie pipe	was lowered to the b	ottom of the hole an	d raised
HOLE DIAMETER:	4-in	VOLUME (GR	OUT) gal	125	as the hole w	as grouted. Grout	was observed flowing	g out of the
DEPTH:	120 ft	TREMIE DEP	TH ft	120	top of the ho	le.		
DRILL MUD:	Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAMETER:	1in.	GROUT DEPT	ΓH ft	120				

								Boring No.:	B-47 SPT
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-47 SPT		CLIENT:		SCDOT		Consultant REP.	: P. Baumstark
DRILLER:		S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/29/2	2008
Grout Mix:	Grout We Water-	ell- 50 lbs 24 gal		Calculation 33 indicates the	Hole Volume=	-	- *50 = 4.36 ft ³ et and 50 indicate	es the length of gro	out.
DATE DRILLED:	•	9/29/2008	GROUT HOSE	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix that	was replicated
SURF. ELEVATI	ON:	11.5 FT	PUMP TYPE:			in the field. Or	ne batch of grout w	vas used to grout the	hole to the top.
G.W. LEVEL:		4.5ft	VOLUME (HO	LE) gal	32.6	Tremie pipe wa	as lowered to the b	oottom of the hole ar	nd raised
HOLE DIAMETE	R:	4-in	VOLUME (GR	OUT) gal	25	as the hole wa	s grouted. Grout	was observed flowin	g out of the
DEPTH:		50	TREMIE DEP	TH ft	50	top of the hole).		
DRILL MUD:		Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEPT	ΓH ft	50				

							Boring No.:	B-47 SPT A
JOB NAME:	Port Access Road	d	JOB NO.:	1131-	-08-554	PAGE NO.:	_1_/	_1_
LOCATION:	B-47 SPT A		CLIENT:		SCDOT		Consultant REP	.: P. Baumstar
DRILLER:	S&ME, Inc.		RIG TYPE:	CME 550	CME 550		9/29/2	2008
Grout Mix: Grout W Water-	'ell- 50 lbs 24 gal	·	Calculation	Hole Volume=	4	*25.5= 2.2 ft ³ et and 25.5 indica	ates the length of	grout.
DATE DRILLED:	9/29/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an a	approximate mix tha	t was replicated
SURF. ELEVATION:	11.5 FT	PUMP TYPE:			in the field. O	ne batch of grout w	vas used to grout the	e hole to the top
G.W. LEVEL:	4.5ft	VOLUME (HC	DLE) gal	17	Tremie pipe w	as lowered to the b	oottom of the hole a	nd raised
HOLE DIAMETER:	4-in	VOLUME (GR	ROUT) gal	25	as the hole wa	as grouted. Grout	was observed flowin	g out of the
DEPTH:	25.5 ft	TREMIE DEP	TH ft	25.5	top of the hol	е.		
DRILL MUD:	Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAMETER:	1in.	GROUT DEP	TH ft	25.5	1			

								Boring No.:	B-50 SPT	
JOB NAME:		Port Access Road	I	JOB NO.:	1131-	1131-08-554		_1_	/_1_	
LOCATION:		B-50 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Baumstark	
DRILLER:		S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/29/	/2008	
Grout Mix:	Grout We	ell- 50 lbs 24 gal		Calculation	Hole Volume=		- *50 = 4.4 ft ³ et and 50 indica	0 = 4.4 ft ³ d 50 indicates the length of grout.		
DATE DRILLED	•	9/29/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an	approximate mix t	hat was replicated	
SURF. ELEVAT	ION:	9.5 ft	PUMP TYPE:			in the field. Or	ne patch of grout	was used to grout	tne noie to tne	
G.W. LEVEL:		4.5ft	VOLUME (HO	DLE) gal	32.6	Tremie pipe	e was lowered to	the bottom of the I	nole and raised	
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole wa	s grouted. Grout	was observed flov	ving out of the	
DEPTH:		50	TREMIE DEF	TH ft	50	top of the hole				
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE					
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	50					

							Boring No.:	B-51 SPT Alt 2
JOB NAME:	Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1	_/_1_
LOCATION:	B-51 SPT Alt 2		CLIENT:		SCDOT		Consultant REP :	M. Eichelberge
DRILLER:	S&ME, Inc.		RIG TYPE:	CME 550		DATE:	9/29	9/2008
Grout Mix: Grout Wo	ell- 50 lbs 24 gal		Calculation 33 indicates the	Hole Volume=	4	*50= 4.4 ft ³ et and 50 indica	tes the length of	grout.
DATE DRILLED:	9/29/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is an	approximate mix	that was replicated
SURF. ELEVATION:	7 ft	PUMP TYPE:			in the field. O	ne patch of grout	was used to grou	tne noie to tne
G.W. LEVEL:	4.5ft	VOLUME (HC	LE) gal	32.6		e was lowered to	the bottom of the	hole and raised
HOLE DIAMETER:	4-in	VOLUME (GR	OUT) gal	Not Recorded	as the hole wa	as grouted. Grout	was observed flo	wing out of the
DEPTH:	50 ft	TREMIE DEP	TH ft	50	top of the hol	e.		
DRILL MUD:	Kaolin	CASING DEP	TH ft	NONE				
		GROUT DEP						

								Boring No.:	B-51 SPT Alt 2 A
JOB NAME:		Port Access Road	i	JOB NO.:	1131-	08-554	PAGE NO.:	_1	_/_1_
LOCATION:		B-51 SPT Alt 2 A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:	S&ME, Inc.			RIG TYPE:	CME 550		DATE:	10/1	0/2008
Grout Mix:	Grout We Water-	ell- 50 lbs 24 gal		Calculation	Hole Volume=	•			of grout.
DATE DRILLED:		10/9/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mi	x that was replicated
SURF. ELEVATION	ON:	6.9 ft	PUMP TYPE:			in the field. Or top.	ne batch of grou	t was used to grou	ut the noie to the
G.W. LEVEL:		4.5ft	VOLUME (HC	DLE) gal	17		e was lowered to	o the bottom of the	e hole and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole wa	s grouted. Grou	ut was observed fl	owing out of the
DEPTH:		26 ft	TREMIE DEP	TH ft	26	top of the hole).		
DRILL MUD:		Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAMET	ΓER:	1in.	GROUT DEP	TH ft	26				

								Boring No.:	B-52 SPT
JOB NAME:		Port Access Road	I	JOB NO.:	1131-	08-554	PAGE NO.:	_1_,	/_1_
LOCATION:		B-52 SPT		CLIENT:		SCDOT	•	Consultant REP ·	P. Oree
DRILLER:		Soil Consultants, In	C.	RIG TYPE:	CME 850		DATE:	10/7/	2008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal		Calculation 333 indicates the	Hole Volume=	4	*50= 4.4 ft ³	ates the length of	grout.
DATE DRILLED:	:	10/7/2008	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicate
SURF. ELEVATI	ION:	16.0 ft	PUMP TYPE	:		in the field. C	ne patch of grou	t was used to grout	tne noie to tne
G.W. LEVEL:		Not Recorded	VOLUME (H	OLE) gal	32.6		oe was lowered to	o the bottom of the	hole and raised
HOLE DIAMETE	R:	4-in	VOLUME (GI	ROUT) gal	Not Recorded	as the hole wa	as grouted. Grou	ut was observed flow	wing out of the
DEPTH:		50 ft	TREMIE DEF	PTH ft	50	top of the hol	e.		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TFR:	1in.	GROUT DEF	PTH ft	50				

								Boring No.:	B-52 SPT B
JOB NAME:		Port Access Road		JOB NO.:	1131-0	8-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-52 SPT B		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:	Soil Consultants, Inc.		RIG TYPE:	CME 850	CME 850 DATE:		10/7/2	2008	
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal		Calculation	Hole Volume=	•		3 licates the length of	grout.
DATE DRILLED	:	10/7/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix th	at was replicated
SURF. ELEVAT	ION:	16.0 ft	PUMP TYPE:			in the field. (one patch of g	rout was used to grou	t the noie to the
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	17.6	Tremie pipe	was lowered to	the bottom of the hol	le and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recordedd	as the hole w	as grouted. G	Frout was observed flo	owing out of the
DEPTH:		27 ft	TREMIE DEP	TH ft	27	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	27				

								Boring No.:	B-53 SPT
JOB NAME:		Port Access Ro	ad	JOB NO.:	1131-0	8-554	PAGE NO.:	_1_/_	1_
LOCATION:		B-53 SPT		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:		Soil Consultants,	Inc.	RIG TYPE:	CME 850 DA		DATE:	9/17/2	008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal		Calculation	Hole Volume=	4	*50= 4.4 ft ³		
			Where 0.	333 indicates the o	diameter of the b	orehole in f	eet and 50 ind	icates the length of	grout.
DATE DRILLED:	:	9/17/2008	GROUT HOS	GROUT HOSE DIAMETER:		Notes:		an approximate mix that	•
SURF. ELEVATI	ION:	13.1 ft	PUMP TYPE:			in the field.	One patch of g	rout was used to grou	tne noie to the
G.W. LEVEL:		Not Recorde	d VOLUME (H	OLE) gal	32.6	Tremie pipe was lowered		the bottom of the hol	e and raised
HOLE DIAMETE	R:	4-in	VOLUME (GI	ROUT) gal	Not Recorded	as the hole	was grouted. G	Frout was observed flo	wing out of the
		50 ft	TREMIE DEF	OTH ff	50	top of the h	ole.		
DEPTH:		50 11		11111	• • • • • • • • • • • • • • • • • • • •				
DEPTH: DRILL MUD:		Kaolin	CASING DEF	-	NONE				

								Boring No.:	B-53 SPT A
JOB NAME:		Port Access Road		JOB NO.:	1131-0	8-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-53 SPT A		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:	Soil Consultants, Inc.		c.	RIG TYPE:	CME 850	DATE:		9/19/2	8008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal		Calculation		•	- *34 = 3.0 ft	3 icates the length of	grout.
DATE DRILLED:		9/19/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix the	at was replicated
SURF. ELEVATI	ON:	13.0 ft	PUMP TYPE:	:		in the field. (One patch of g	rout was used to grou	t the hole to the
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	22.1	Tremie pipe	was lowered to	the bottom of the hol	e and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	22.1*	as the hole w	vas grouted. G	Frout was observed flo	wing out of the
DEPTH:		34 ft	TREMIE DEF	PTH ft	34	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE	*Volume of g	rout not record	ded in the field.	
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	34		•		

								Boring No.:	B-55 SPT
JOB NAME:		Port Access Road		JOB NO.:	1131-08	8-554	PAGE NO.:	_1_/_	1_
LOCATION:		B-55 SPT		CLIENT:	SCDOT			Consultant REP.:	R. Boller
DRILLER:		Soil Consultants, In	C.	RIG TYPE:	CME	850	DATE:	9/18/20	008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation 333 indicates the o	Hole Volume=	4	*50= 4.4 ft ³	icates the length of g	grout.
DATE DRILLED:		9/18/2008	CBOLIT HOS			-			
		5, 15, 200	GROUT HOS	SE DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix tha	at was replicate
		12 ft	PUMP TYPE:		0	in the field.		an approximate mix tha rout was used to grout	•
SURF. ELEVATION		12 ft		:	0	in the field. top.	One patch of g	• •	tne noie to the
SURF. ELEVATI G.W. LEVEL:	ON:	12 ft	PUMP TYPE:	: DLE) gal	0 111.	in the field. top. Tremie pipe	One patch of g	rout was used to grout	tne noie to the
SURF. ELEVATI G.W. LEVEL: HOLE DIAMETE	ON:	12 ft Not Recorded	PUMP TYPE: VOLUME (HO	: DLE) gal ROUT) gal	32.6	in the field. top. Tremie pipe	one patch or g was lowered to was grouted. G	rout was used to grout	and raised
SURF. ELEVATION G.W. LEVEL: HOLE DIAMETE DEPTH: DRILL MUD:	ON:	12 ft Not Recorded 4-in	PUMP TYPE: VOLUME (HO VOLUME (GF	: DLE) gal ROUT) gal PTH ft	32.6 Not Recorded	in the field. top. Tremie pipe as the hole	one patch or g was lowered to was grouted. G	rout was used to grout	tne noie to the

								Boring No.:	B-55 SPT B
JOB NAME:		Port Access Road		JOB NO.:	1131-08	-554	PAGE NO.:	_1_/_	1_
LOCATION:		B-55 SPT B		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:	Soil Consultants, Inc.			RIG TYPE:	CME 850		DATE:	9/22/2	800
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal		Calculation	Hole Volume=	•		ates the length of gro	out.
DATE DRILLED:	•	9/22/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix tha	at was replicated
SURF. ELEVATI	ION:	12 ft	PUMP TYPE:	:		in the field. (One patch of g	rout was used to grout	tne noie to tne
G.W. LEVEL:		Not Recorded	VOLUME (HO	DLE) gal	24.1	Tremie pipe	was lowered to	the bottom of the hole	e and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	24.1*	as the hole v	vas grouted. G	Frout was observed flo	wing out of the
DEPTH:		37 ft	TREMIE DEF	PTH ft	37	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE	*Volume of g	rout not record	ded in the field.	
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	37				

								Boring No.:	B-58 SPT
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-08	-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-58 SPT		CLIENT:		SCDOT		Consultant REP.:	J. Burns
DRILLER:	Soil Consultants, Inc		nc.	RIG TYPE: CME 850 DATE:				10/19/2	2008
	BenSeal- 75 Water- 6	i lbs 0 gal		Calculation	Hole Volume=	4		ft ³	rout
DATE DRILLED:		10/19/2008		SE DIAMETER:		Notes:		an approximate mix that	
SURF. ELEVATION	N:	14.5 ft	PUMP TYPE		3 in.			rout was used to grou	•
G.W. LEVEL:		Not Recorded	VOLUME (H	OLE) gal	78.3		was lowered to	the bottom of the hol	e and raised
HOLE DIAMETER:	:	4-in	VOLUME (G	ROUT) gal	Not Recorded	as the hole	was grouted. C	Grout was observed flo	wing out of the
DEPTH:		120 ft	TREMIE DEF	PTH ft	120	top of the h	nole.		
ORILL MUD:		Kaolin	CASING DE	PTH ft	NONE				
TREMIE DIAMETE	R:	1in.	GROUT DEF	TH ft	120				

								Boring No.:	B-57 SPT
JOB NAME:		Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-57 SPT		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME		RIG TYPE:	D 50		DATE:	2/2	27/2009
Grout Mix:		Cement- 98 lb	·	Calculation	Hole Volume=		- *120 = 5.89		of availa
	Water-	45 gal	vvnere 0.25	indicates the dia	ameter of the b	orenoie in teet	and 120 indic	cates the length c	or grout.
DATE DRILLED	:	2/26/09-	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate m	nix that was replicated
SURF. ELEVAT	ION:	10 ft	PUMP TYPE:		Trash Pump	in the field. Or	ne batch of grou	ut was used to grou	t the hole to the top.
G.W. LEVEL:		3 ft	VOLUME (HO	DLE) gal	44	Tremie pipe wa	as lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	3-in.	VOLUME (GF	ROUT) gal	48	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the hole	١.		
DRILL MUD:		Bentonite	CASING DEF	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-57 SPT A
JOB NAME:		Port Access Road	t	JOB NO.:	1131-	08-554	PAGE NO.:		1_/_1_
LOCATION:		B-57 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3/1	1/2009
Grout Mix:	Bentonite Water-	- 50 lbs 55 gal	·	Calculation	Hole Volume=	•		3 indicates the leng	th of grout.
DATE DRILLED:	:	3/11/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATI	ION:	10 ft	PUMP TYPE:		Mono Pump	in the field. Or	ne batch of grou	ut was used to grou	t the hole to the top.
G.W. LEVEL:		3 ft	VOLUME (HC	DLE) gal	20	Tremie pipe w	as lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	30	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		30 ft	TREMIE DEP	TH ft	30	top of the hole	9.		
DRILL MUD:	•	Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	30				

								Boring No.:	B-63 SPT
JOB NAME:		Port Access Road		JOB NO.:	1131-	08-554	PAGE NO.:		1_/_1_
LOCATION:		B-63 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Baumstark
DRILLER:	S&ME			RIG TYPE:	D 50		DATE:	2/2	20/2009
Grout Mix:	Bentonite	- 50 lb Cement- 192 lb	Example	Calculation	Hole Volume=	∏*(0.333) ²	- *120 = 10.5	5 ft ³	
	Water-	70 gal	Where 0.333	indicates the c	liameter of the	borehole in fee	et and 120 inc	dicates the length	of grout.
DATE DRILLED);	2/19/09-2/20/09	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate m	nix that was replicated
SURF. ELEVAT	ION:	10 ft	PUMP TYPE:	:	Trash Pump	in the field. On	e batch of grou	ut was used to grou	t the hole to the top.
G.W. LEVEL:		5 ft	VOLUME (HO	DLE) gal	78.3	Tremie pipe wa	as lowered to the	ne bottom of the hol	le and raised
HOLE DIAMETE	ER:	4 in.	VOLUME (GF	ROUT) gal	80	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		120 ft	TREMIE DEF	PTH ft	120	top of the hole			
DRILL MUD:		Bentonite	CASING DEF	PTH ft	4 ft				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

							Boring No.:	B-75 SPT
JOB NAME:	Port Access Road		JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:	B-75 SPT		CLIENT:				Consultant REP.:	M. Eichelberge
DRILLER:	SCI		RIG TYPE:	CME 550 X		DATE: 2/19/2		19/2009
Grout Mix: Bent Wate	tonite- 50 lbs er- 55 gal	·	Calculation 25 indicates the	Hole Volume=	4			h of grout
					boronolo in i	cct and 120 iii	idicates the length	n or grout.
DATE DRILLED:	2/19/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:			that was replicated
	2/19/2009 15 ft	GROUT HOS	E DIAMETER:		Notes:	Grout mix is a	n approximate mix	
SURF. ELEVATION:			E DIAMETER:	3 in.	Notes: in the field. Or	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATION: G.W. LEVEL:	15 ft	PUMP TYPE:	E DIAMETER: CLE) gal	3 in. Honda 4.0	Notes: in the field. Or Tremie pipe w	Grout mix is an e batch of ground as lowered to the	an approximate mix	that was replicated at the hole to the top. le and raised
SURF. ELEVATION: G.W. LEVEL: HOLE DIAMETER:	15 ft Not Recorded	PUMP TYPE: VOLUME (HO	EE DIAMETER: DLE) gal ROUT) gal	3 in. Honda 4.0 44	Notes: in the field. Or Tremie pipe w	Grout mix is an e batch of grout as lowered to the segment of the	an approximate mix at was used to groune bottom of the ho	that was replicated at the hole to the top. le and raised
DATE DRILLED: SURF. ELEVATION: G.W. LEVEL: HOLE DIAMETER: DEPTH: DRILL MUD:	15 ft Not Recorded 3 in.	PUMP TYPE: VOLUME (HO VOLUME (GF	EE DIAMETER: DLE) gal ROUT) gal PTH ft	3 in. Honda 4.0 44 38	Notes: in the field. Or Tremie pipe w as the hole wa	Grout mix is an e batch of grout as lowered to the segment of the	an approximate mix at was used to groune bottom of the ho	that was replicated at the hole to the top. le and raised

								Boring No.:	B-65 SPT
JOB NAME:		Port Access Road	k	JOB NO.:	1131-0	8-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-65 SPT		CLIENT:		SCDOT		Consultant REP.:	T. Henderson
DRILLER:	Soil Consultants, Inc.		nc.	RIG TYPE:	CME 850	50 DATE:		9/18/2	2008
Grout Mix:	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation	Hole Volume=	•		licates the length of	grout.
DATE DRILLED	:	9/18/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix th	nat was replicated
SURF. ELEVAT	ION:	8.5 ft	PUMP TYPE:			in the field. (one patch of g	rout was used to grou	at the noie to the
G.W. LEVEL:		Not Recorded	VOLUME (HC	DLE) gal	32.6	Tremie pipe	was lowered to	the bottom of the ho	le and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole w	vas grouted. G	Grout was observed flo	owing out of the
DEPTH:		50 ft	TREMIE DEP	TH ft	50	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	50				

									Boring No.:	B-66 SPT
JOB NAME:		Port Access	Road		JOB NO.:	1131	-08-554	PAGE NO.:	_1_/_	1_
LOCATION:		B-66 SP	Γ		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:		Soil Consultants, Inc.			RIG TYPE:	CM	CME 850		11/10/2	2008
Grout Mix:			Example	Calculation	Hole Volume	e= \frac{\precedent*(0.333)}{4}	*120= 10.5	ft ³		
				Where 0.3	333 indicates the	diameter of the	e borehole in	feet and 120 ir	ndicates the length o	f grout.
DATE DRILLED:		11/10/200	⁰⁸ GR	OUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix tha	at was replicate
SURF. ELEVATIO	ON:	2.5 ft	PU	MP TYPE:			in the field.	One batch of g	rout was used to grou	t the hole to the
G.W. LEVEL:		Ground	VO	LUME (HC	DLE) gal	78.3		e was lowered to	the bottom of the hole	e and raised
HOLE DIAMETER	R:	4-in	VO	LUME (GF	ROUT) gal	69	as the hole	was grouted. C	Grout was observed flo	wing out of the
EPTH:		120 ft	TRI	MIE DEP	TH ft	120	top of the l	nole.		
ORILL MUD:		Kaolin	CA	SING DEP	TH ft	NONE				
	ER:	1in.	CD	OUT DEP	T⊔ #	120				

							Boring No.:	B-66 SPT A
JOB NAME:	Port Access Roa	d	JOB NO.:	1131-08	3-554	PAGE NO.:	_1_/_1_	
LOCATION:	B-66 SPT A		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:	R: Soil Consultants, Inc.		RIG TYPE:	CME 850		DATE:	11/11/2	2008
	enSeal- 37.5 lbs /ater- 30 gal		Calculation	Hole Volume=			cates the length of g	rout.
DATE DRILLED:	11/11/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix the	at was replicated
SURF. ELEVATION	I: 2.5 ft	PUMP TYPE:			in the field. (one patch of g	rout was used to grou	t the hole to the
G.W. LEVEL:	Ground	VOLUME (HO	DLE) gal	14.3	Tremie pipe	was lowered to	the bottom of the hol	e and raised
HOLE DIAMETER:	4-in	VOLUME (GF	ROUT) gal	41	as the hole w	as grouted. G	Grout was observed flowing out of th	
DEPTH:	22 ft	TREMIE DEF	TH ft	22	top of the ho	le.		
DRILL MUD:	Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAMETER	R: 1in.	GROUT DEP	TH ft	22				

							Boring No.:	B-68 SPT Alt
JOB NAME:	Port Access Roa	ıd	JOB NO.:	1131-08	3-554	PAGE NO.:	_1_	/_1_
LOCATION:	B-68 SPT Alt 1		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:	Soil Consultants,	nc.	RIG TYPE:	CME	850	DATE:	9/23	/2008
Grout Mix: BenSea Water-	l- 75 lbs 60 gal		Calculation	Hole Volume=	•		ft ³ licates the length o	of grout.
DATE DRILLED:	9/23/2008		E DIAMETER:	3 in.	Notes:		an approximate mix	
SURF. ELEVATION:	7 ft	PUMP TYPE:			in the field.	One patch of g	rout was used to gro	out the noie to the
G.W. LEVEL:	Ground	VOLUME (HC	OLE) gol					
O.VV. LL VLL.	^ ′	VOLOWIE (ITC	JLE) gai	78.3	i remie pipe	was lowered to	the bottom of the h	ole and raised
	4-in	VOLUME (GF	, 6	78.3 Not Recorded			Grout was observed	
HOLE DIAMETER:		`	ROUT) gal			was grouted.		
HOLE DIAMETER: DEPTH: DRILL MUD:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole top of the h	was grouted. G		lowing out of the

								Boring No.:	B-72 SPT
JOB NAME:		Port Access Road	d	JOB NO.:	1131-08	3-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-72 SPT		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:		Soil Consultants, Ir	nc.	RIG TYPE:	CME 550		DATE:	9/16/2	2008
Grout Mix:	BenSeal- Water-	75 lbs 60 gal		Calculation	Hole Volume=	•		ft ³ dicates the length of	grout.
DATE DRILLED:		9/16/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix the	at was replicated
SURF. ELEVATI	ON:	4.3 ft	PUMP TYPE:			in the field. (one patch of g	rout was used to grou	t the hole to the
G.W. LEVEL:		1 ft	VOLUME (HC	DLE) gal	78.3	Tremie pipe	was lowered to	the bottom of the hol	e and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole w	as grouted. G	Grout was observed flo	wing out of the
DEPTH:		120 ft	TREMIE DEP	TH ft	120	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEF	TH ft	NONE				
TREMIE DIAMET	ΓER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-74 SPT
JOB NAME:	Port A	Access Road	d	JOB NO.:	1131-08	8-554	PAGE NO.:	_1_/_	1_
LOCATION:	В	3-74 SPT		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:	Soil Co	nsultants, Ir	IC.	RIG TYPE:	CME	850	DATE:	9/16/2	008
	enSeal- 75 lbs Vater- 60 gal		·	Calculation 33 indicates the o	Hole Volume=	•		ft ³	arout.
ATE DRILLED:	9	/16/2008		E DIAMETER:	3 in.	Notes:		an approximate mix that	
SURF. ELEVATION	N:	4.9 ft	PUMP TYPE:				One patch or g	rout was used to grout	tne noie to the
G.W. LEVEL:		20 in.	VOLUME (HO	LE) gal	78.3	Tremie pipe	was lowered to	the bottom of the hole	e and raised
IOLE DIAMETER:		4-in	VOLUME (GR	OUT) gal	Not Recorded	as the hole	was grouted. G	Grout was observed flo	wing out of the
EPTH:		120 ft	TREMIE DEP	TH ft	120	top of the h	nole.		
		Kaolin	CASING DEP	TH ft	NONE				
RILL MUD:		Naoiin							

								Boring No.:	B-74 SPT A
JOB NAME:		Port Access Road	t	JOB NO.:	1131-08	3-554	PAGE NO.:	_1_/_	_1_
LOCATION:		B-74 SPT A		CLIENT:		SCDOT		Consultant REP.:	R. Boller
DRILLER:		Soil Consultants, Ir	nc.	RIG TYPE:	CME 550		DATE:	9/16/2	2008
	BenSeal- Water-	37.5 lbs 30 gal	·	Calculation	Hole Volume=	•		dicates the length of	grout.
DATE DRILLED:		9/16/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	an approximate mix th	at was replicated
SURF. ELEVATIO	DN:	5 ft	PUMP TYPE:			in the field. (One patch of g	rout was used to grou	t the noie to the
G.W. LEVEL:		20 in.	VOLUME (HC	DLE) gal	41.7	Tremie pipe	was lowered to	the bottom of the ho	le and raised
HOLE DIAMETER	₹:	4-in	VOLUME (GF	ROUT) gal	Not Recorded	as the hole w	vas grouted. G	Frout was observed flo	owing out of the
DEPTH:		64 ft	TREMIE DEP	TH ft	64	top of the ho	ole.		
DRILL MUD:		Kaolin	CASING DEP	TH ft	NONE				
TREMIE DIAMET	ER:	1in.	GROUT DEP	TH ft	64				

								Boring No.:	B-29 SPT Alt 1
JOB NAME:		Port Access Road	d	JOB NO.:	1131-08	3-554	PAGE NO.:	_1_	/_1_
LOCATION:		B-29 SPT Alt 1		CLIENT:		SCDOT		Consultant REP.:	P. Oree
DRILLER:		Mid Atlantic Drillin	g	RIG TYPE:	CME	45	DATE:	10/17	7/2008
Grout Mix:	Portland Water-	Cement- 50 lbs 24 gal	·	Calculation	Hole Volume=	4	*120 = 10.5	licates the length c	of grout.
DATE DRILLED:		10/17/2008	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is	an approximate mix	that was replicated
SURF. ELEVATI	ON:		PUMP TYPE:	:		in the field.	One patch of gi	rout was used to gro	out the noie to the
G.W. LEVEL:		Tidal	VOLUME (HO	DLE) gal	783	Tremie pipe	was lowered to	the bottom of the h	ole and raised
HOLE DIAMETE	R:	4-in	VOLUME (GF	ROUT) gal	65	as the hole v	was grouted. G	Frout was observed f	lowing out of the
DEPTH:		120 ft	TREMIE DEF	TH ft	120	top of the h	ole.		
DRILL MUD:		Kaolin	CASING DEF	TH ft	20 ft				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120				

								Boring No.:	B-76 SPT
JOB NAME:		Port Access Road	i	JOB NO.:	1131-	08-554	PAGE NO.:		1_/_1_
LOCATION:		B-76 SPT		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME		RIG TYPE:	CME 550 X		DATE:	2/1	10/2009
Grout Mix:		50 lb ement- 192 lb 28 gal		Calculation indicates the dia	Hole Volume=	$\frac{\prod^*(0.25)^2}{4}$ orehole in feet	- *120 = 5.89	oft ³	of grout.
DATE DRILLED		2/9/09-2/10/09	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate m	nix that was replicated
SURF. ELEVAT		14.5 FT	PUMP TYPE:			in the field. On	ne batch of grou	ut was used to grou	it the hole to the top.
G.W. LEVEL:		10 ft	VOLUME (HC	DLE) gal	44	Tremie pipe wa	as lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	3 in.	VOLUME (GF	ROUT) gal	40	as the hole was	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		120 ft	TREMIE DEP	TH ft	120	top of the hole	١.		
DRILL MUD:		Bentonite	CASING DEP	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	120		•		

								Boring No.:	B-76 SPT A
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_1	1_/_1_
LOCATION:		B-76 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 550 X		DATE:	2/1	16/2009
Grout Mix:	Bentonite- Portland (Water-	- 8 lbs Cement- 192 lb 28 gal		Calculation 5 indicates the	Hole Volume=	4	= 00= 0.70 it	dicates the length	n of grout.
DATE DRILLED):	2/16/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
DATE DRILLED SURF. ELEVAT		2/16/2009 14.5 FT	GROUT HOS PUMP TYPE:		0 11 11			• • • • • • • • • • • • • • • • • • • •	•
					0 11 11	in the field. To	vo batches of gr	• • • • • • • • • • • • • • • • • • • •	rout the hole to the to
SURF. ELEVAT	ION:	14.5 FT	PUMP TYPE:	DLE) gal	Honda 4.0	in the field. To	vo batches of gr as lowered to th	out were used to g	rout the hole to the to
SURF. ELEVAT G.W. LEVEL:	ION:	14.5 FT 10 ft	PUMP TYPE: VOLUME (HC	DLE) gal ROUT) gal	Honda 4.0 43.1	in the field. To	wo batches of grass lowered to the s grouted. Grown	out were used to g e bottom of the hol	rout the hole to the to
SURF. ELEVAT G.W. LEVEL: HOLE DIAMETE	ION:	14.5 FT 10 ft 4 in.	PUMP TYPE: VOLUME (HO VOLUME (GR	DLE) gal ROUT) gal TH ft	Honda 4.0 43.1 56	in the field. To Tremie pipe was the hole wa	wo batches of grass lowered to the s grouted. Grown	out were used to g e bottom of the hol	rout the hole to the to

								Boring No.:	B-77 CPT A
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-77 SPT A		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3/	/4/2009
Grout Mix:	Bentonite Water-	- 50 lb 50 gal	·	Calculation 333 indicates th	Hole Volume=	4		t ³	th of grout.
DATE DRILLED:	·	3/3/2009	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate n	nix that was replicated
SURF. ELEVATI	ON:	11 FT	PUMP TYPE:		mono pump	in the field. On the top.	e nair or a batc	on or grout was use	ea to grout the hole to
G.W. LEVEL:		7.5 FT	VOLUME (HO	DLE) gal	22	Tremie pipe wa	as lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GF	ROUT) gal	30	as the hole was	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		34 ft	TREMIE DEF	TH ft	34	top of the hole			
DRILL MUD:		Kaolin	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	34				

								Boring No.:	B-77 CPT B
JOB NAME:		Port Access Roa	ıd	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-77 SPT B		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		SCI		RIG TYPE:	CME 850		DATE:	3/	4/2009
Grout Mix:	Bentonite Water-	- 50 lbs 50 gal	Example	Calculation	Hole Volume=	$\frac{\prod^*(0.333)^2}{4}$	- *39= 3.4 ft ³		
			Where 0.2	5 indicates the	diameter of the	borehole in fe	et and 39 ind	icates the length	of grout.
DATE DRILLED:	•	3/4/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATI	ION:	11 FT	PUMP TYPE:		Honda 10	in the field. Or the top.	ne half of a bato	n of grout was use	d to grout the hole to
G.W. LEVEL:		7.5 FT	VOLUME (HC	LE) gal	25.5		as lowered to th	e bottom of the ho	le and raised
HOLE DIAMETE	R:	4 in.	VOLUME (GR	OUT) gal	35	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
		20.4	TREMIE DEP	TH ft	39	top of the hole	ı.		
DEPTH:		39 ft							
DEPTH: DRILL MUD:		Kaolin	CASING DEP	TH ft	NONE				

								Boring No.:	B-78
JOB NAME:		Port Access Road	d	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-78		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME, Inc.		RIG TYPE:	D 50		DATE:	3/2	25/2009
Grout Mix:	Bentonite Portland Water-	e- 10 lb Cement- 92 lbs 25 gal	·	Calculation 5 indicates the	Hole Volume=	4	*15 = 2.9 ft ² eet and 15 indi	cates the length o	of grout.
DATE DRILLED:	:	3/25/2009	GROUT HOS	E DIAMETER:	1 in.	Notes:	Grout mix is	s an approximate m	nix that was replicated
SURF. ELEVATI	ION:	8 ft	PUMP TYPE:		Trash Pump	in the field. Or	ne batch of grou	ut was used to grou	t the hole to the top.
G.W. LEVEL:		5 ft	VOLUME (HO	DLE) gal	22	Tremie pipe w	as lowered to th	ne bottom of the ho	le and raised
HOLE DIAMETE	R:	6 in.	VOLUME (GF	ROUT) gal	30	as the hole wa	s grouted. Gro	ut was observed flo	owing out of the
DEPTH:		15 ft	TREMIE DEF	TH ft	15	top of the hole). 		
DRILL MUD:		NONE	CASING DEF	PTH ft	NONE				
TREMIE DIAME	TER:	1in.	GROUT DEP	TH ft	15				

								Boring No.:	B-79
JOB NAME:		Port Access Roa	d	JOB NO.:	1131-	08-554	PAGE NO.:	_	1_/_1_
LOCATION:		B-79		CLIENT:		SCDOT		Consultant REP.:	M. Eichelberger
DRILLER:		S&ME, Inc.		RIG TYPE:	D 50		DATE:	3/2	25/2009
Grout Mix:	Bentonite Portland (Water-	- 10 lb Cement- 80 lbs 25 gal		Calculation 5 indicates the d	Hole Volume=	4	 *15=2.9 ft³ et and 15 indic 	cates the length c	of grout.
DATE DRILLED:									
		3/25/2009	GROUT HOS	E DIAMETER:	3 in.	Notes:	Grout mix is a	n approximate mix	that was replicated
SURF. ELEVATI		3/25/2009 10 ft	GROUT HOS		0 11 11			• • • • • • • • • • • • • • • • • • • •	that was replicated ut the hole to the top.
					0 111.	in the field. O	ne batch of grou	• • • • • • • • • • • • • • • • • • • •	ut the hole to the top.
SURF. ELEVATI G.W. LEVEL: HOLE DIAMETE	ION:	10 ft	PUMP TYPE:	DLE) gal	Trash Pump	in the field. O	ne batch of grou	it was used to grou	ut the hole to the top.
G.W. LEVEL:	ION:	10 ft 6 ft	PUMP TYPE: VOLUME (HO	DLE) gal ROUT) gal	Trash Pump	in the field. O	ne batch of grou as lowered to the s grouted. Grou	it was used to grou	ut the hole to the top.
G.W. LEVEL: HOLE DIAMETE	ION:	10 ft 6 ft 6 in.	PUMP TYPE: VOLUME (HO VOLUME (GF	DLE) gal ROUT) gal PTH ft	Trash Pump 22 30	in the field. On Tremie pipe was the hole was	ne batch of grou as lowered to the s grouted. Grou	it was used to grou	ut the hole to the top.

Table II-1: Bulk and Undisturbed Sample Locations and Depths

	SAMPLE			SUBSURFACE PROFILE UNIT	
S&ME BORING ID	DEPTH (ft)	RECOVERY (inches)	SOIL TYPE	NO.	CONSISTENCY (N)
B-02A	24	22	Clay/Silt	2C	2
B-02A	36	24	Clay/Silt	2C	2
B-03A	27	10	Clay/Silt	2C	4
B-03A	39	23	Clay/Silt	2C	2
B-18 A	75-77	24	Marl	5	3
B-18 A	100-102	24	Marl	5	3
B-21 ALT-1 A	25-27	22	Clay/Silt	2C	3
B-21 ALT-1 A	30-32	22	Clay/Silt	2C	3
B-23 ALT 1A	51	24	Marl	5	6
B-27 ALT-1 A	30-32	18	Pre-Marl	4	3
B-27 ALT-1 A	33-35	24	Pre-Marl	4	3
B-27 ALT-1 A	36-38	24	Pre-Marl	4	11
B-33A	21	24	Clay/Silt	1B	0
B-33A	31	24	Clay/Silt	1B	0
B-33A	51	19	Marl	5	7
B-34 A	8ft-10ft	13	Clay/Silt	1B	N/A
B-34 A	26-28	17	Clay/Silt	1B	N/A
B-34 A	42-44	17	Clay/Silt	1B	N/A
B-39A	16	24	Clay/Silt	1B	0
B-39A	29	24	Clay/Silt	1B	0
B-40A	24	24	Clay/Silt	1B	2
B-40A	39	24	Clay/Silt	1B	2
B-43 ALT-1 A	26-28	24	Pre-Marl	4	2
B-43 ALT-1 A B-46 A	40-42 20-22	24	Marl	5 3	5 2
B-46 A	24-26	24	Clay/Silt Clay/Silt	3	11
B-47A	24-26	21	Clay/Silt Clay/Silt	3	2
B-51 ALT 2A	25	24	Silty Sand	3	2
B-52B	25	23	Clayey Sand	3 2A	2
B-53A	33	24	Clay/Silt	2C	1
B-55A	25	21	Clay/Silt	2B	2
B-55B	36	13	Clay/Silt	2C	2
B-57 A	20-22	24	Clay/Silt	2C	0
B-57 A	30-32	24	Clay/Silt	2C	2
B-66A	21	24	Clay/Silt	2C	1
B-74A	9	23	Clay/Silt	1C	0
B-74A	66	14	Marl	5	10
B-76 A	60-62	24	Marl	5	7
B-76 A	62-64	24	Marl	5	10
B-77 B	34-36	22	Pre-Marl	4	N/A
B-77 B	37-39	20	Pre-Marl	4	N/A





Cone Penetration Test-01 CPT

Date: Sep. 30, 2008

Estimated Water Depth: 2 ft

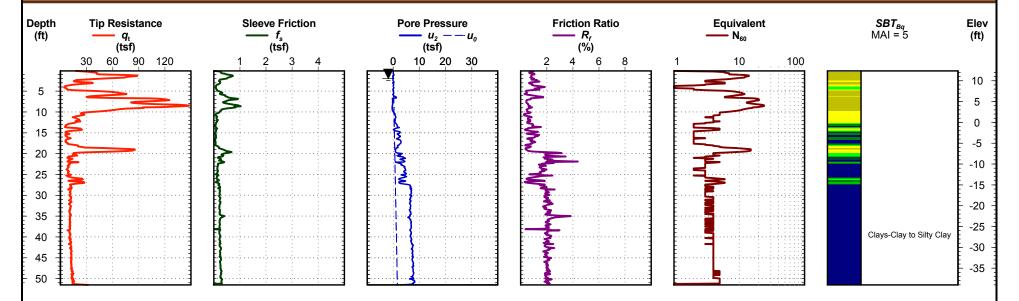
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.840334 **Longitude:** 79.967662

Elevation: 12.5 NAVD 88

Total Depth: 51.5 ft
Termination Criteria: Target Depth

Cone Size: 1.44





Cone Penetration Test-06 CPT

Date: Feb. 19, 2009

Estimated Water Depth: 4.5 ft

Rig/Operator: ATV/M. Cox

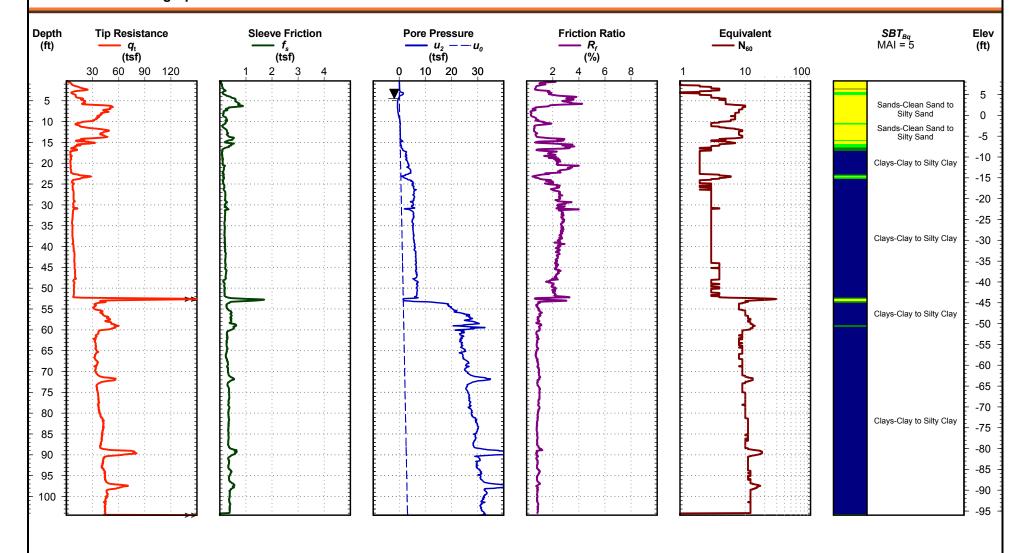
Latitude: 32.836681 **Longitude:** 79.962377

Elevation: 8.5 NAVD 88

Total Depth: 104.5 ft

Termination Criteria: Maximum Reaction Force

Cone Size: 1.75



B-06 CPT

Electronic Filename: e19f0901c.dat



Cone Penetration Test-07 CPT

Date: Feb. 18, 2009

Estimated Water Depth: 4 ft

Rig/Operator: ATV/ M. Cox

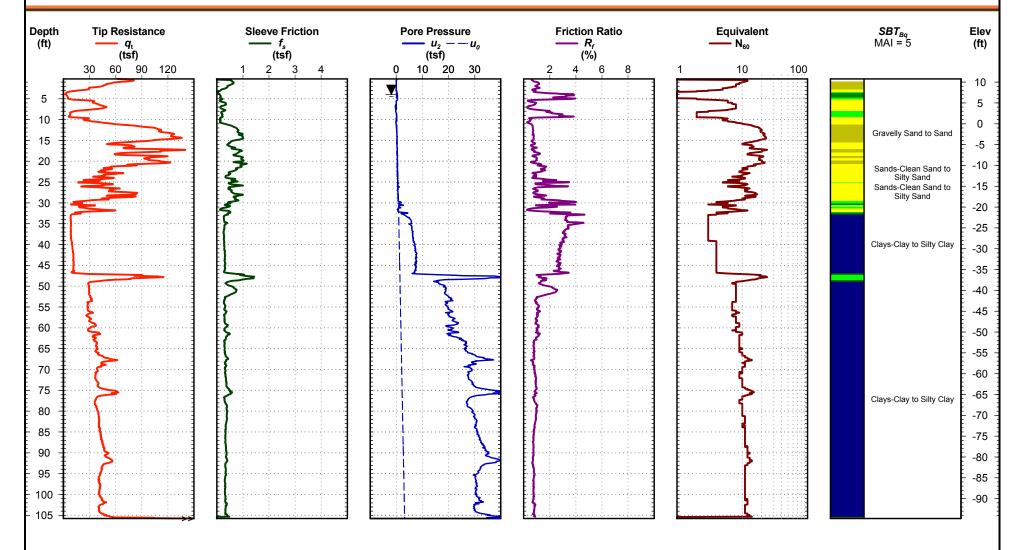
Latitude: 32.836077 **Longitude:** 79.961577

Elevation: 11 NAVD 88

Total Depth: 105.8 ft

Termination Criteria: Maximum Reaction Force

Cone Size: 1.75



B-07 CPT

Electronic Filename: e18f0902c.dat



Cone Penetration Test-08 CPT

Date: Sep. 18, 2008

Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

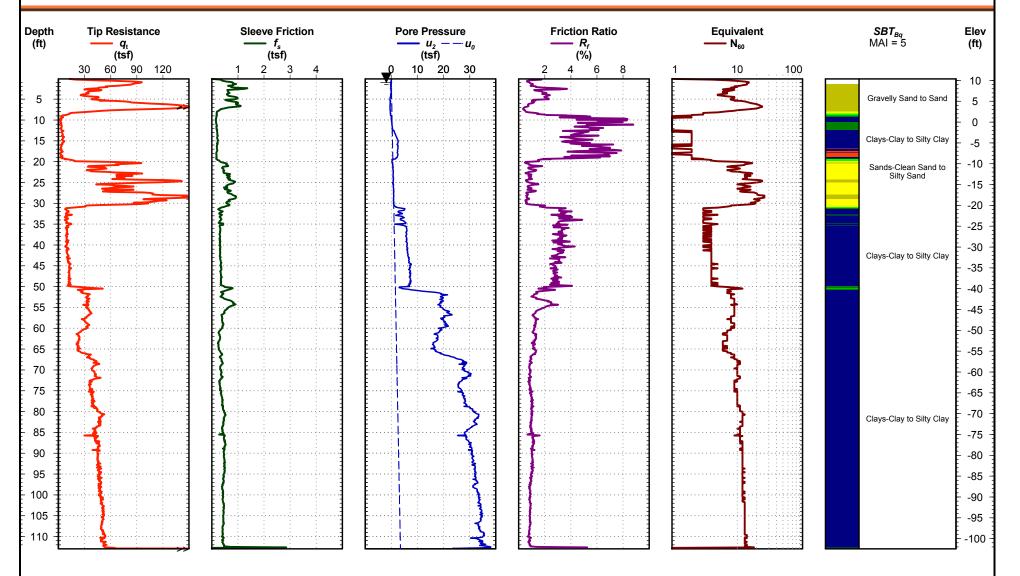
Latitude: 32.835301

Longitude: 79.960428 **Elevation:** 10.5 NAVD 88

Total Depth: 113.0 ft

Termination Criteria: Maximum Reaction Force

Cone Size: 1.44



B-08 CPT

Electronic Filename: f18s0804c.ecp



Cone Penetration Test-10 CPT

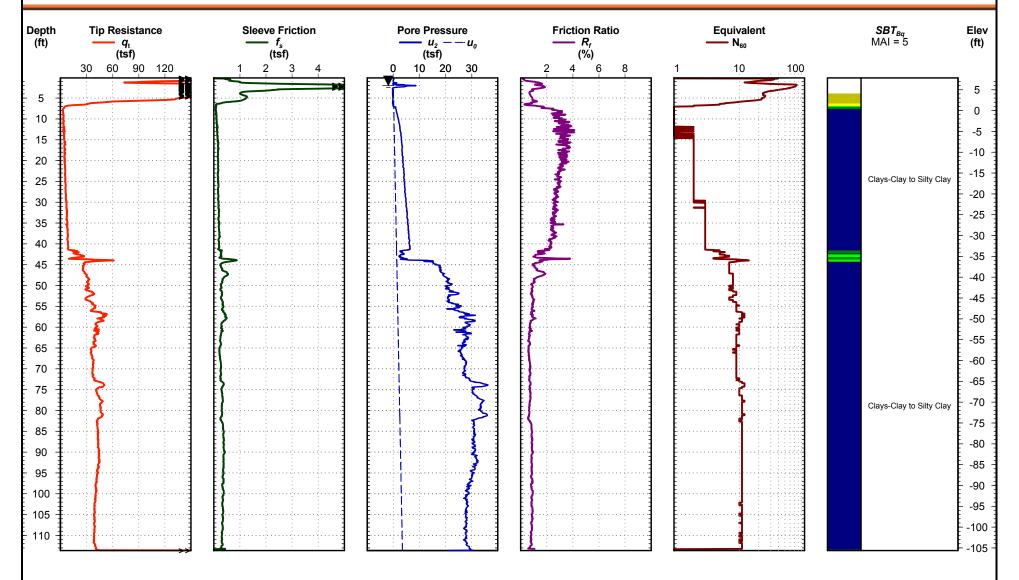
Date: Oct. 6, 2008

Estimated Water Depth: 2 ft

Rig/Operator: Truck/M. Cox

Latitude: 32.834032 Longitude: 79.959589 Elevation: 8 NAVD 88 Total Depth: 113.6 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-10 CPT

Electronic Filename: e06o0802c.ecp



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Port Access Road North Charleston, SC S&ME Project No: 1131-08-554

Cone Penetration Test 2 SCPT

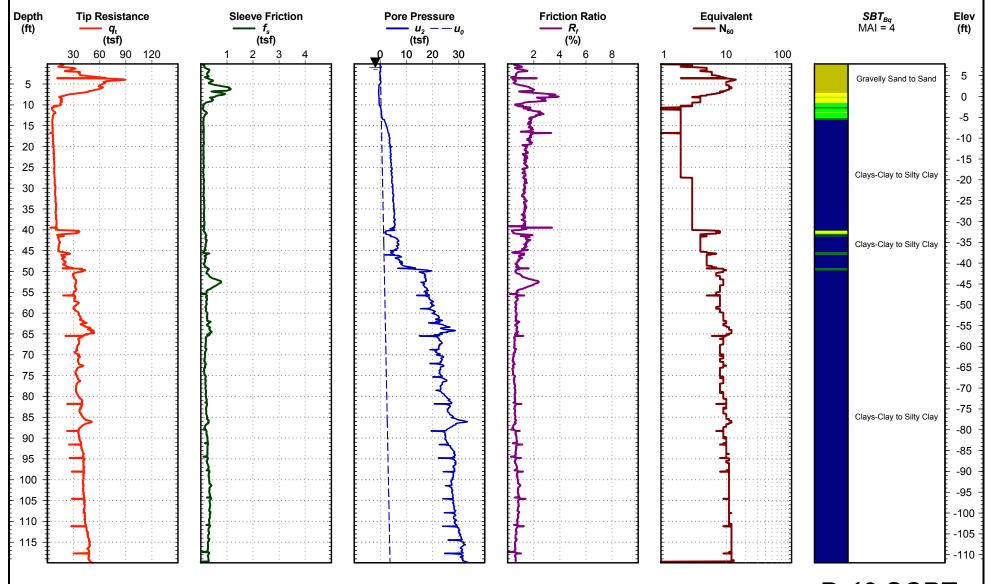
Date: Oct. 27, 2008

Estimated Water Depth: 1 ft

Rig/Operator: ATV/M. Cox

Latitude: 32.833586 Longitude: 79.958457 Elevation: 8 NAVD 88 Total Depth: 120.0 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-12 SCPT

Electronic Filename: e27o0801c.ecp



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Port Access Road North Charleston, SC S&ME Project No: 1131-08-554

Cone Penetration Test-13 CPT

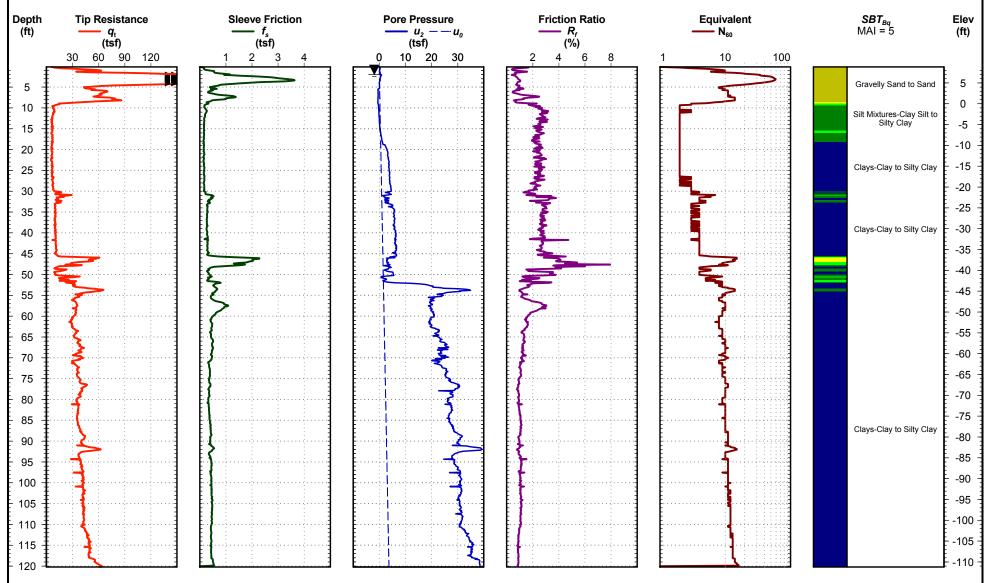
Date: Sep. 17, 2008

Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.833796 Longitude: 79.957743 Elevation: 9 NAVD 88 Total Depth: 120.2 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-13 CPT

Electronic Filename: f17s0803c.ecp



Cone Penetration Test-15 CPT

Date: Oct. 9, 2008

Estimated Water Depth: 4 ft

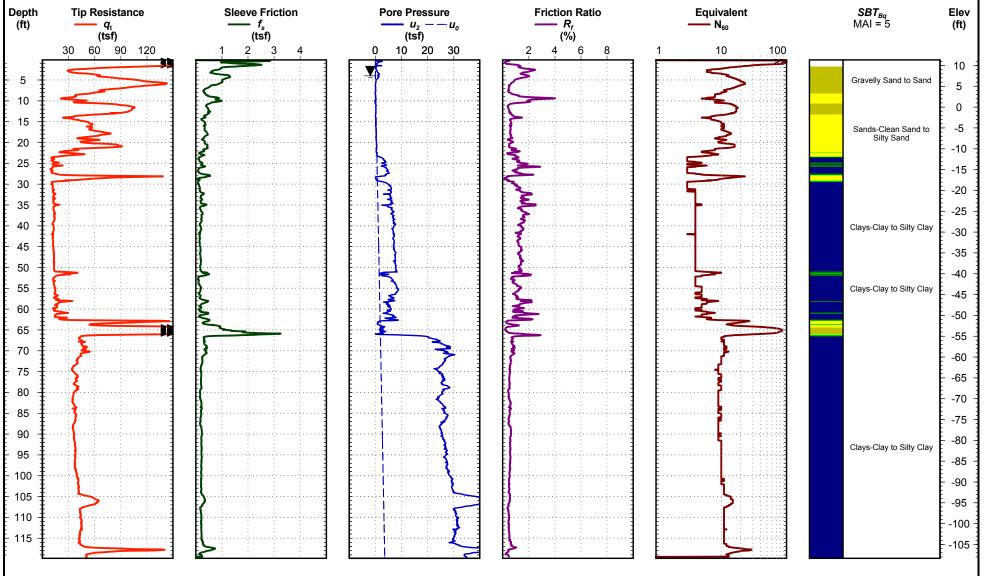
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.834548 **Longitude:** 79.956464

Elevation: 11.5 NAVD 88

Total Depth: 119.8 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-15 CPT

Electronic Filename: f09o0801c.ecp

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Cone Penetration Test-17 CPT

Date: Oct. 9, 2008

Estimated Water Depth: 4 ft

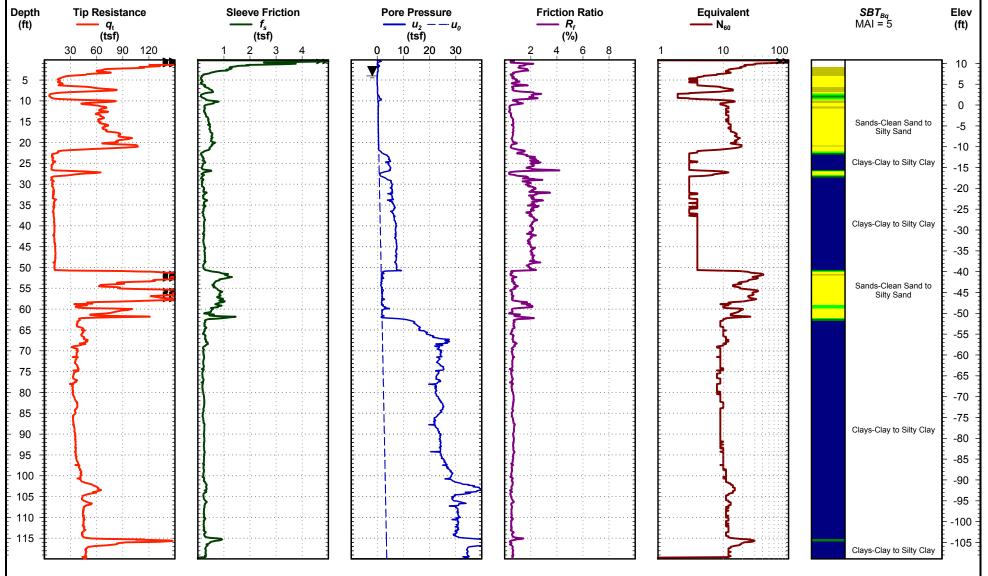
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.834292 **Longitude:** 79.95604

Elevation: 11 NAVD 88

Total Depth: 119.9 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-17 CPT

Electronic Filename: f09o0807c.ecp

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Cone Penetration Test2 SCPT

Date: Oct. 1, 2008

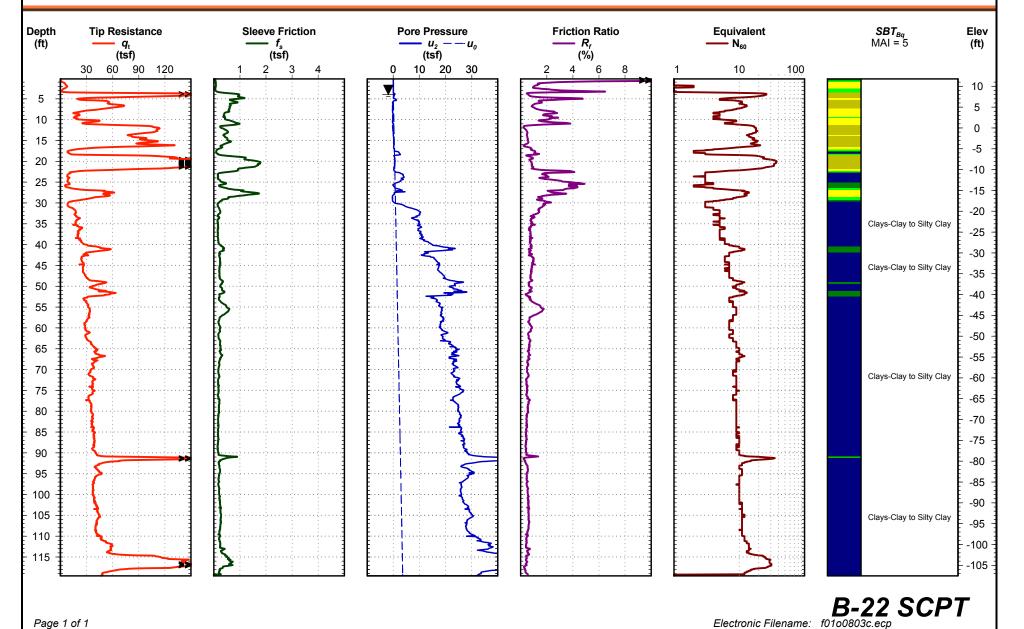
Estimated Water Depth: 4 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.838328 **Longitude:** 79.952978

Elevation: 12 NAVD 88

Total Depth: 119.5 ft
Termination Criteria: Target Depth





Cone Penetration Te- ₹30-CPT

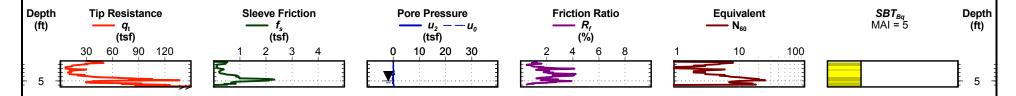
Date: Oct. 8, 2008

Estimated Water Depth: 5 ft

Rig/Operator: Gyrotrac/M. Cox

Latitude: Longitude: Elevation: Total Depth: 6.4 ft

Termination Criteria: Maximum Reaction Force





Cone Penetration Tes84 SCPT

Date: Sep. 23, 2008

Estimated Water Depth: 1 ft

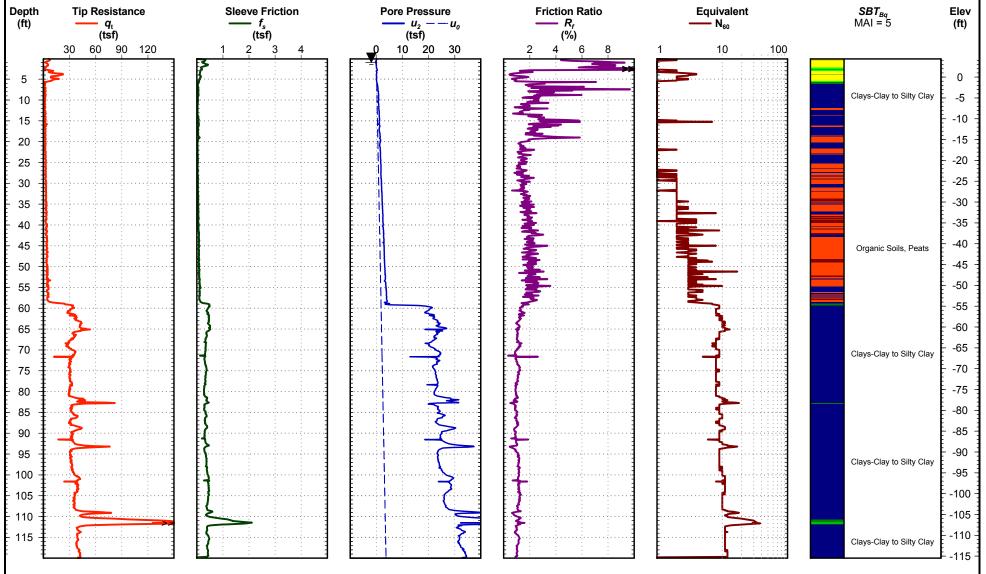
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.843438 **Longitude:** 79.94806

Elevation: 4.5 NAVD 88

Total Depth: 120.0 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-34 SCPT

Electronic Filename: f23s0802c.ecp

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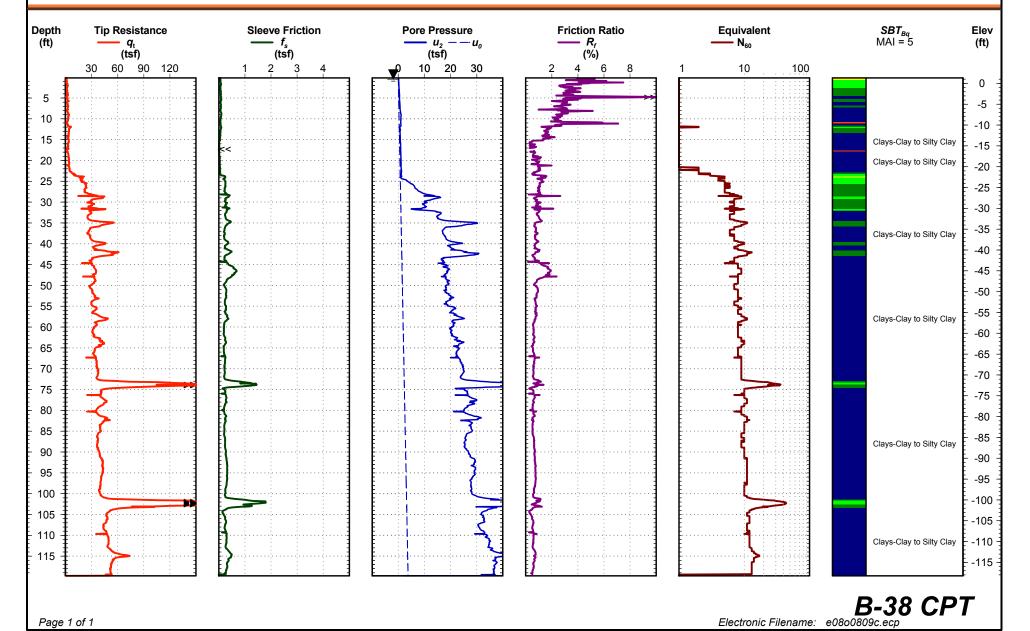
Cone Penetration Test-38 CPT

Date: Oct. 8, 2008 Estimated Water Depth: 0.5 ft

Rig/Operator: Truck/M. Cox

Latitude: 32.842467 **Longitude:** 79.949692 **Elevation:** 1.5 NAVD 88

Total Depth: 119.7 ft
Termination Criteria: Target Depth





Cone Penetration Test-40 CPT

Date: Sep. 23, 2008

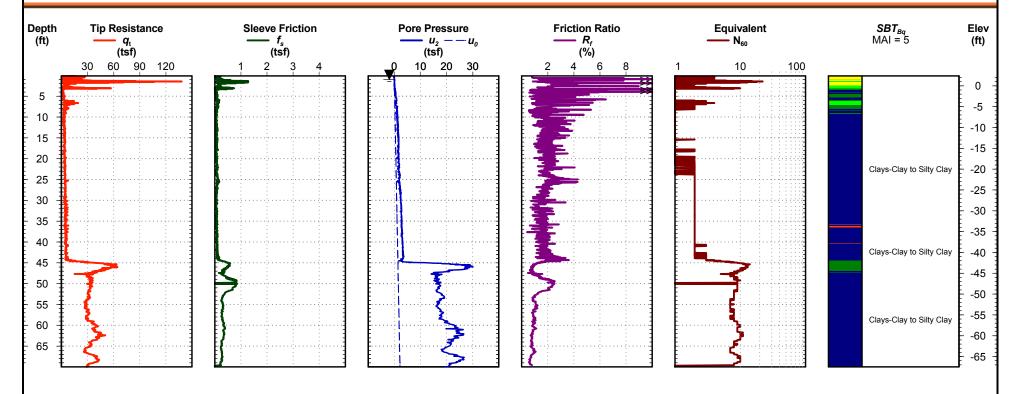
Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.84198 **Longitude:** 79.947978 **Elevation:** 2.5 NAVD 88

Total Depth: 70.0 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-40 CPT

Electronic Filename: f23s0801c.ecp



Cone Penetration Tes#4 SCPT

Date: Oct. 1, 2008

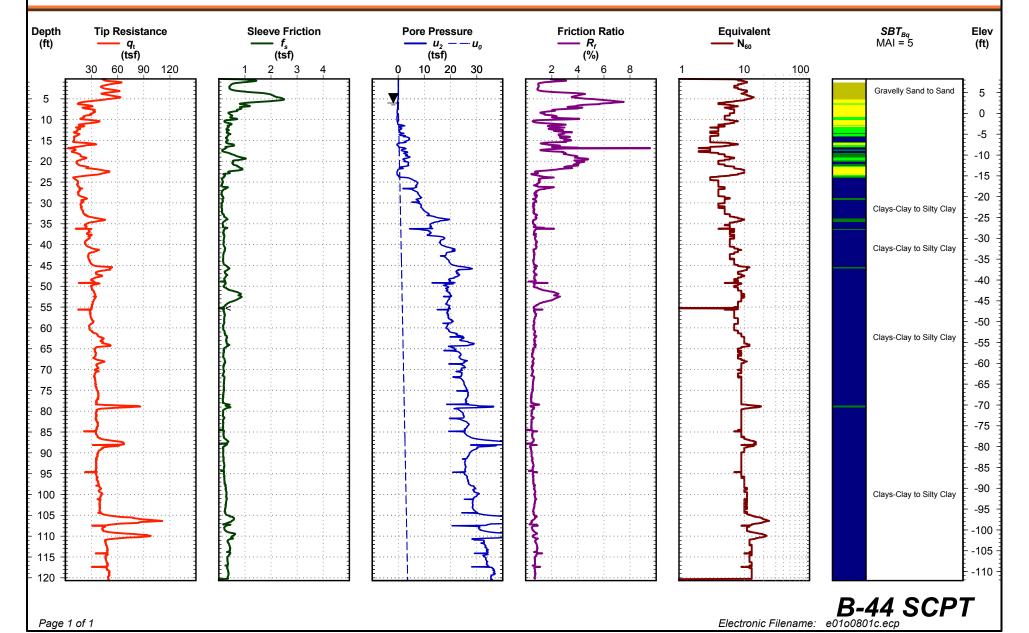
Estimated Water Depth: 6 ft

Rig/Operator: Truck/M. Cox

Latitude: 32.844947 **Longitude:** 79.953772

Elevation: 8.5 NAVD 88

Total Depth: 120.7 ft
Termination Criteria: Target Depth





Cone Penetration Test-48 CPT

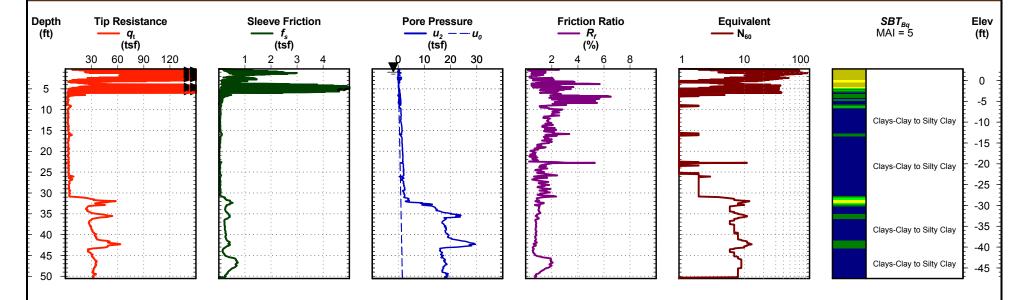
Date: Sep. 22, 2008

Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.849066 Longitude: 79.955477 Elevation: 3 NAVD 88 Total Depth: 50.5 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-48 CPT

Electronic Filename: f22s0802c.ecp



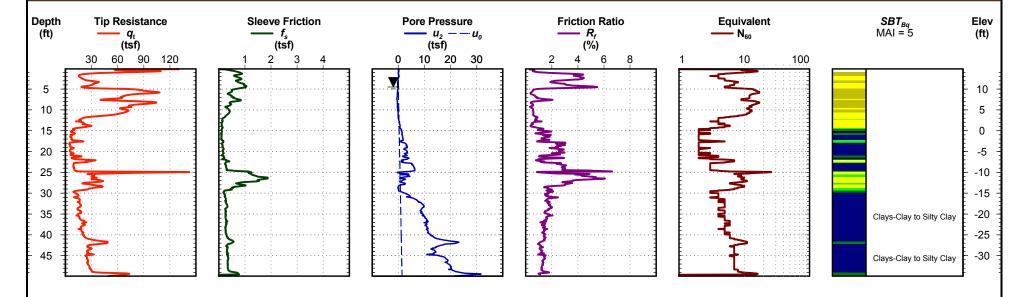
Cone Penetration Test-49 CPT

Date: Sep. 18, 2008

Estimated Water Depth: 4.5 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.842451 Longitude: 79.96427 Elevation: 15 NAVD 88 Total Depth: 49.9 ft
Termination Criteria: Target Depth





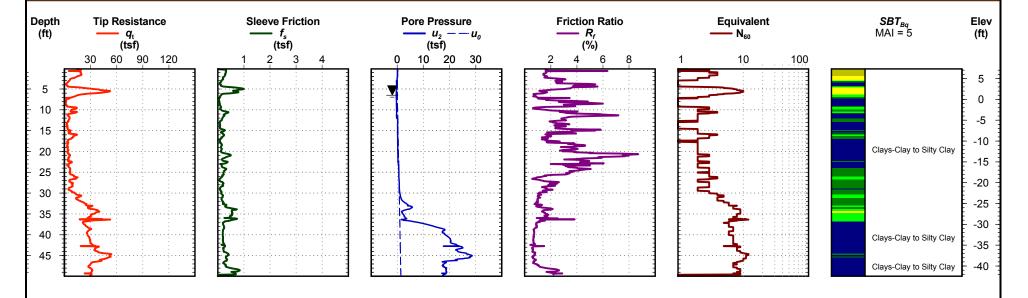
Cone Penetration Test-51 CPT

Date: Oct. 1, 2008 Estimated Water Depth: 6.5 ft

Rig/Operator: Truck/A. Feix

Latitude: 32.845086 **Longitude:** 79.959216 **Elevation:** 7.5 NAVD 88

Total Depth: 49.9 ft
Termination Criteria: Target Depth





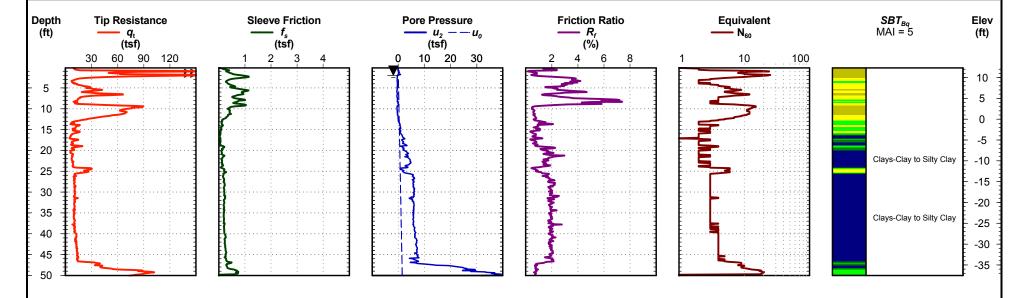
Cone Penetration Test-54 CPT

Date: Sep. 18, 2008

Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.83889 Longitude: 79.965152 Elevation: 12.5 NAVD 88 Total Depth: 50.0 ft
Termination Criteria: Target Depth





Cone Penetration Test-56 CPT

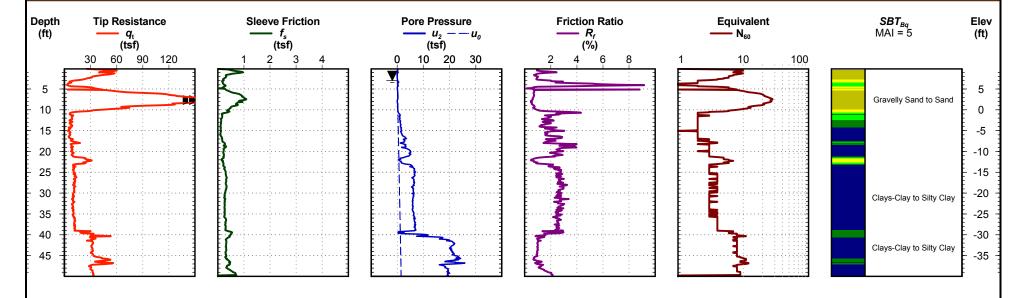
Date: Sep. 18, 2008

Estimated Water Depth: 3 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.837441 **Longitude:** 79.962355 **Elevation:** 10 NAVD 88

Total Depth: 50.0 ft
Termination Criteria: Target Depth





Cone Penetration Test-59 CPT

Date: Sep. 30, 2008

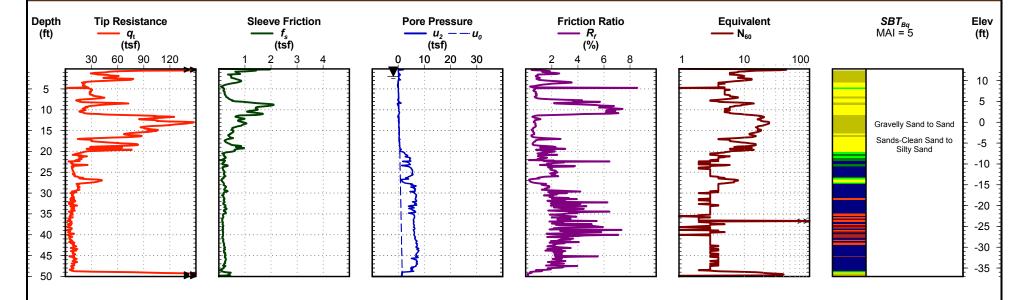
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.836866 **Longitude:** 79.961633

Elevation: 13 NAVD 88

Total Depth: 50.0 ft
Termination Criteria: Target Depth





Cone Penetration Tes60 SCPT

Date: Sep. 30, 2008

Estimated Water Depth: 2.5 ft

Rig/Operator: Gyrotrac/A. Feix

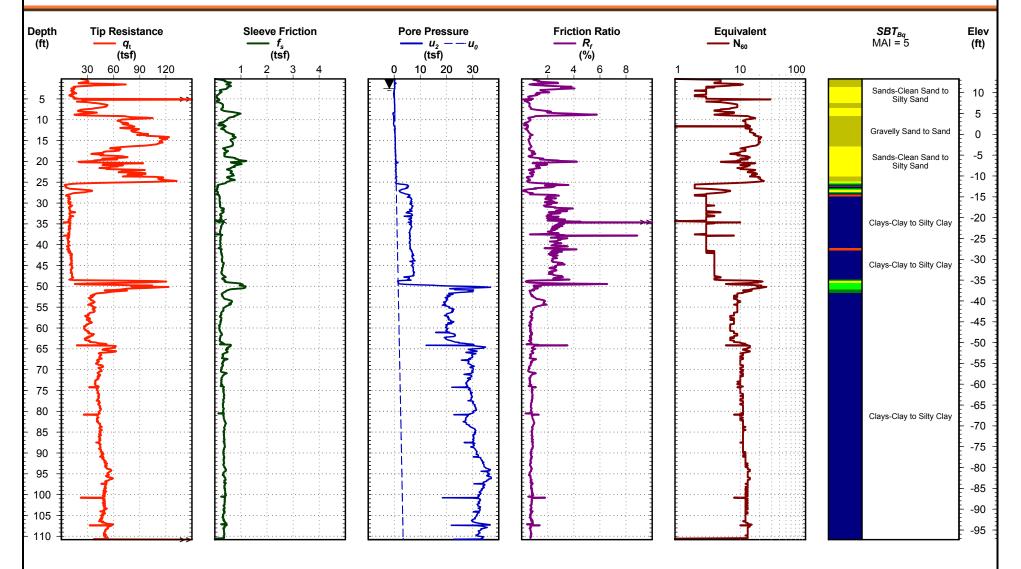
Latitude: 32.836514 **Longitude:** 79.961155

Elevation: 13.5 NAVD 88

Total Depth: 110.8 ft

Termination Criteria: Maximum Reaction Force

Cone Size: 1.44



B-60 SCPT

Electronic Filename: f30s0804c.ecp



Cone Penetration Test-61 CPT

Date: Feb. 18, 2009

Estimated Water Depth: 4.5 ft

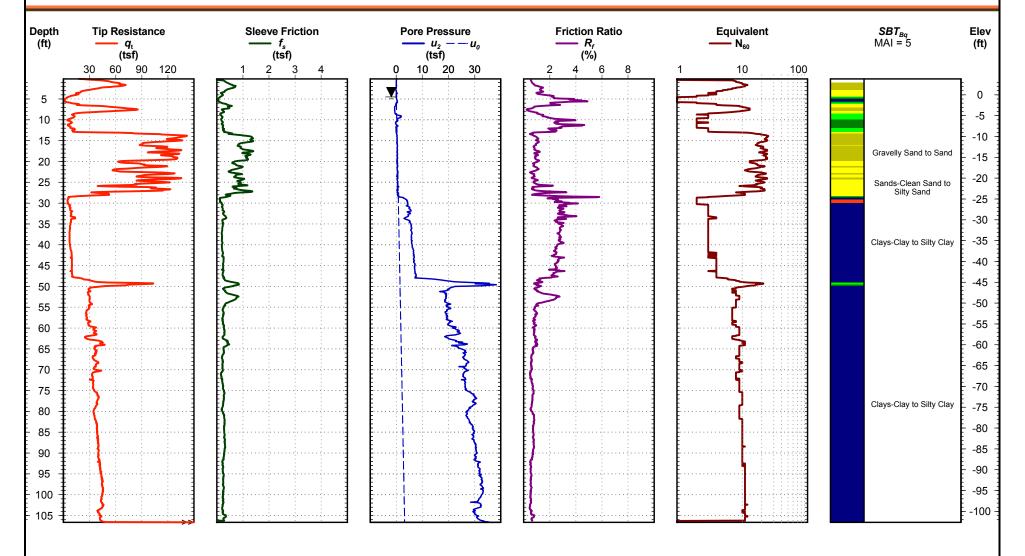
Rig/Operator: ATV/ M. Cox

Latitude: 32.835896 **Longitude:** 79.960432

Elevation: 4 NAVD 88

Total Depth: 106.6 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-61 CPT

Electronic Filename: e18f0901c.dat



Cone Penetration Test-62 CPT

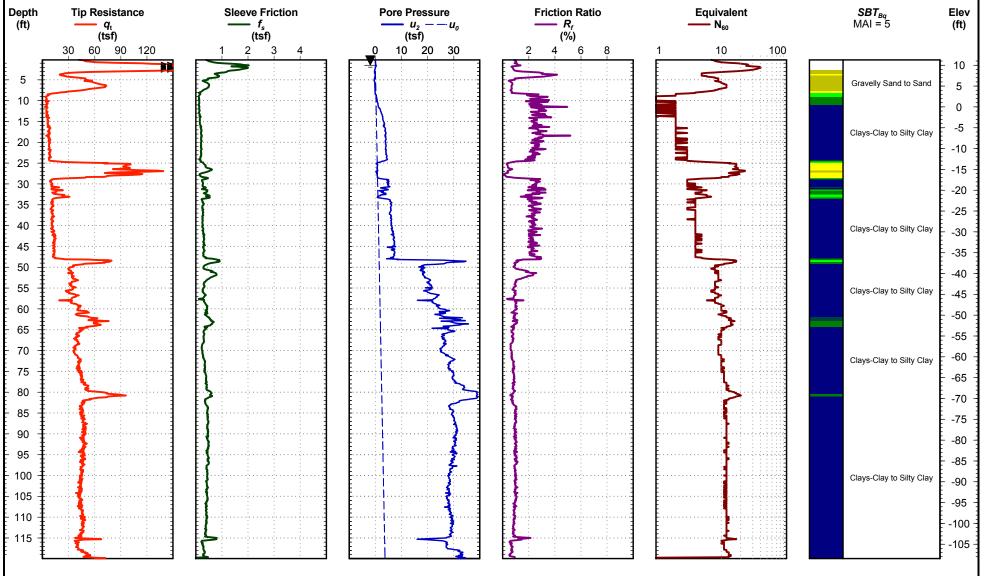
Date: Sep. 18, 2008

Estimated Water Depth: 1.5 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.835147 Longitude: 79.959541 Elevation: 11.5 NAVD 88 Total Depth: 119.9 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-62 CPT

Electronic Filename: f18s0803c.ecp

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Cone Penetration Test-64 CPT

Date: Sep. 17, 2008

Estimated Water Depth: 2 ft

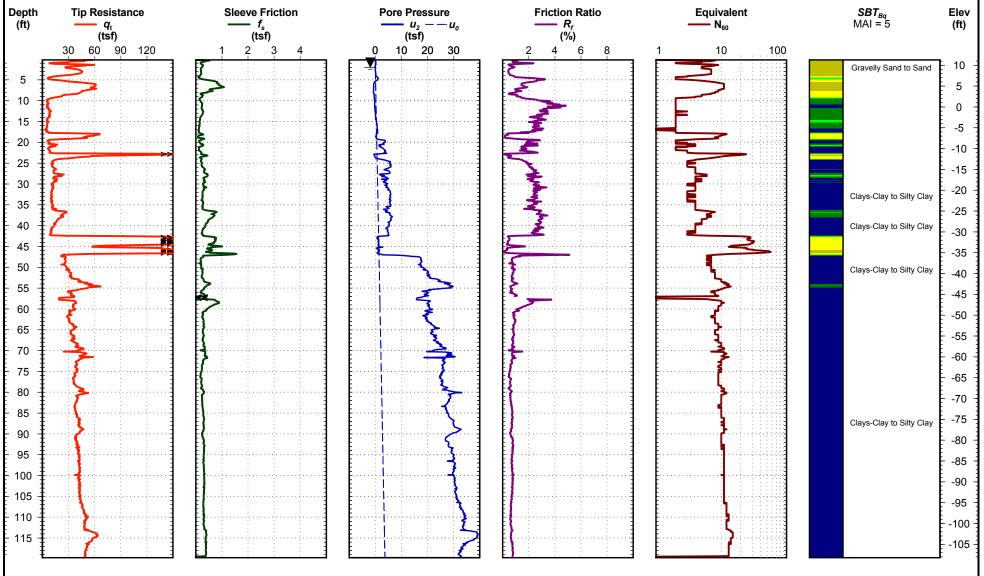
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.83447 **Longitude:** 79.957609

Elevation: 11.5 NAVD 88

Total Depth: 119.7 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-64 CPT

Electronic Filename: f17s0802c.ecp



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Port Access Road North Charleston, SC S&ME Project No: 1131-08-554

Cone Penetration Tes67 SCPT

Date: Feb. 10, 2009

Estimated Water Depth: 6 ft

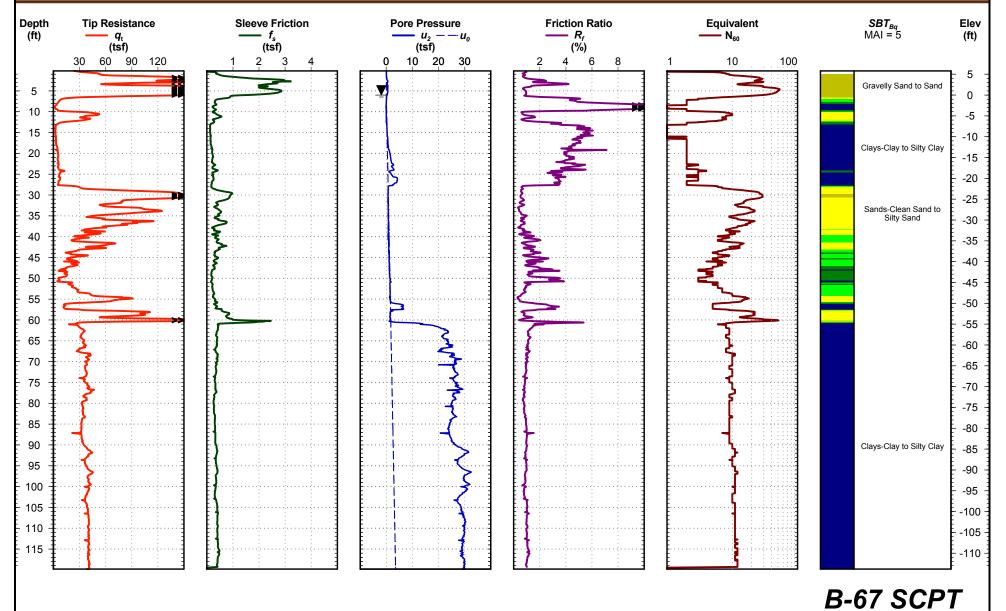
Rig/Operator: Truck/ A. Feix

Latitude: 32.831033 **Longitude:** 79.955904

Elevation: 6 NAVD 88

Total Depth: 119.8 ft
Termination Criteria: Target Depth

Cone Size: 1.75



Electronic Filename: f10f0902c.dat



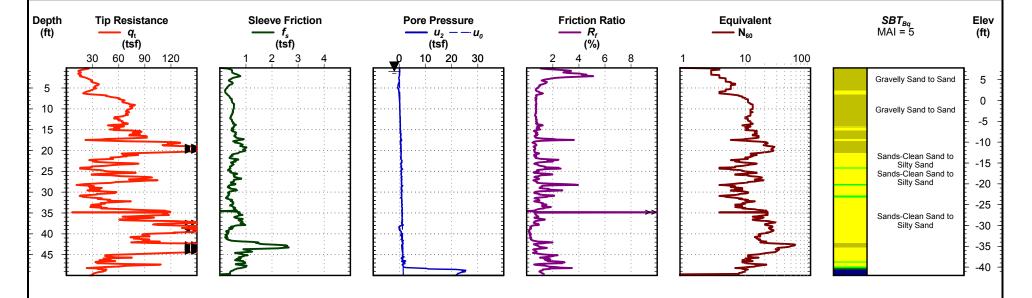
Cone Penetration Test-69 CPT

Date: Sep. 15, 2008

Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.828555 **Longitude:** 79.955149 Elevation: 8 NAVD 88 Total Depth: 50.0 ft
Termination Criteria: Target Depth





Cone Penetration Te- €-71 CPT

Date: Sep. 15, 2008

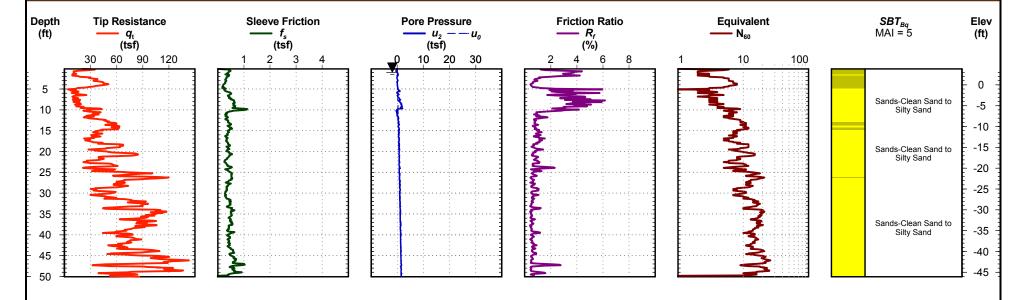
Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.830651 Longitude: 79.956387 Elevation: 4 NAVD 88

Total Depth: 50.1 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-71 CPT

Electronic Filename: f15s0801c.ecp



Cone PenetraBid® SeRT ALT 1

Date: Sep. 15, 2008

Estimated Water Depth: 1 ft

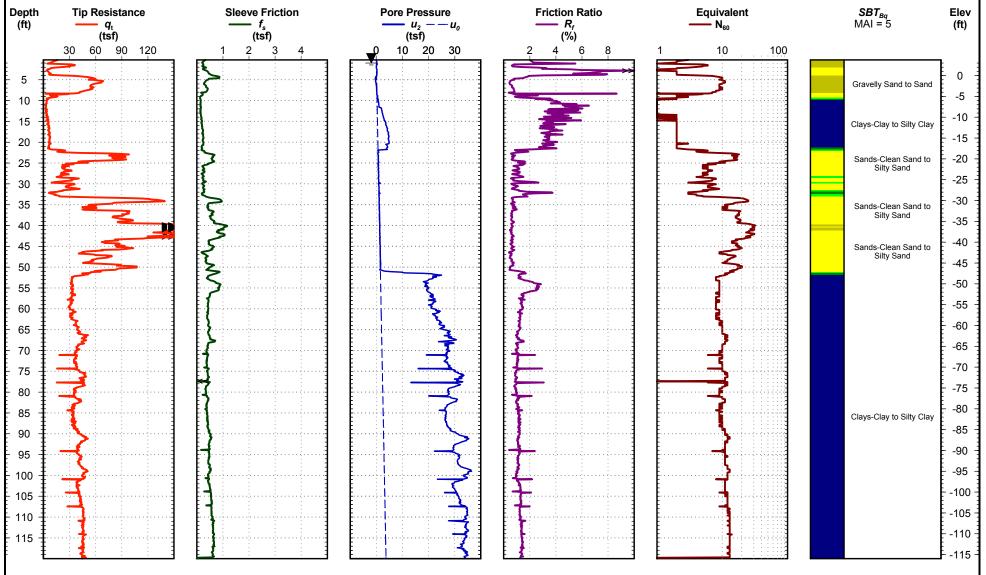
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.831791 **Longitude:** 79.957274

Elevation: 4 NAVD 88

Total Depth: 120.0 ft
Termination Criteria: Target Depth

Cone Size: 1.44



B-73 SCPT ALT 1

Electronic Filename: f15s0803c.ecp



Cone Penetration Test-77 CPT

Date: Feb. 23, 2009

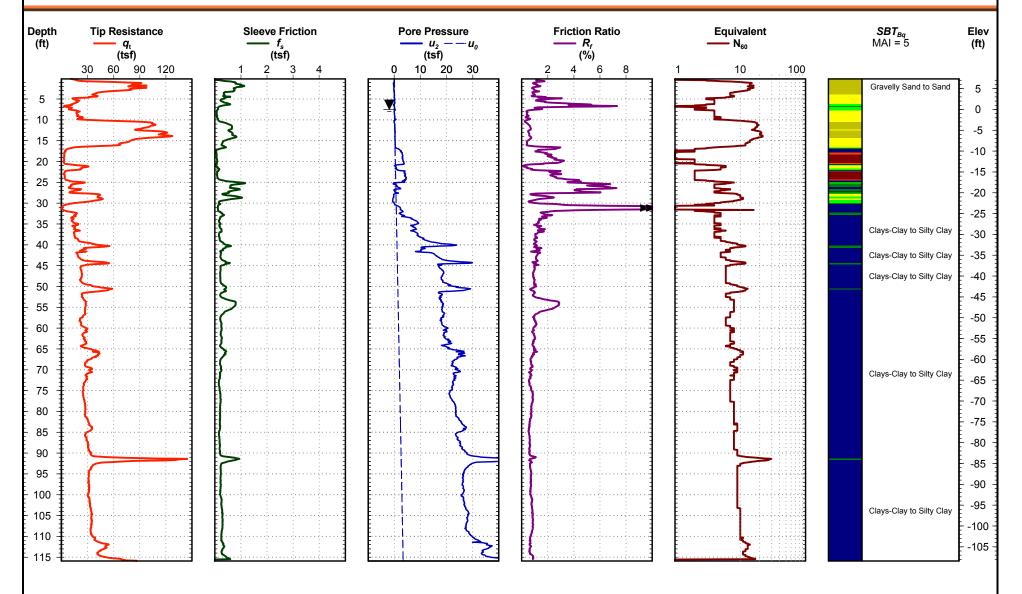
Estimated Water Depth: 7.5 ft

Rig/Operator: Gyrotrac/ A. Feix

Latitude: 32.837882 **Longitude:** 79.953696 **Elevation:** 7.5 NAVD 88

Total Depth: 115.9 ft
Termination Criteria: Target Depth

Cone Size: 1.75



B-77 CPT

Electronic Filename: e23f0901c.dat



FIELD TESTING PROCEDURES

Cone Penetrometer Test (CPT) Sounding

The cone penetrometer test soundings (ASTM D 5778) were performed by hydraulically pushing an electronically instrumented cone penetrometer through the soil at a constant rate. As the cone penetrometer tip was advanced through the soil, nearly continuous readings of point stress, sleeve friction and pore water pressure were recorded and stored in the on-site computers. Using theoretical and empirical relationships, CPT data can be used to determine soil stratigraphy and estimate soil properties and parameters such as effective stress, friction angle, Young's Modulus and undrained shear strength.

The consistency and relative density designations, which are based on the cone tip resistance, q_t for sands and cohesive soils (silts and clays) are as follows:

<u>SANDS</u>		SILTS AND CLAYS	
Cone Tip Resistance, q _t (tsf)	Relative Density	Cone Tip Resistance, q _t (tsf)	Consistency
<20	Very Loose	<5	Very Soft
20 – 40	Loose	5 – 10	Soft
40 – 120	Medium Dense	10 – 15	Firm
		15 – 30	Stiff
120 – 200	Dense	30 –60	Very Stiff
>200	Very Dense	>60	Hard

CPT Correlations

References are in parenthesis next to the appropriate equation.

General

```
p_a = atmospheric pressure (for unit normalization)
```

 q_t = corrected cone tip resistance (tsf)

 f_s = friction sleeve resistance (tsf)

 $R_f = 100\% * (f_s/q_t)$

 u_2 = pore pressure behind cone tip (tsf)

 u_0 = hydrostatic pressure

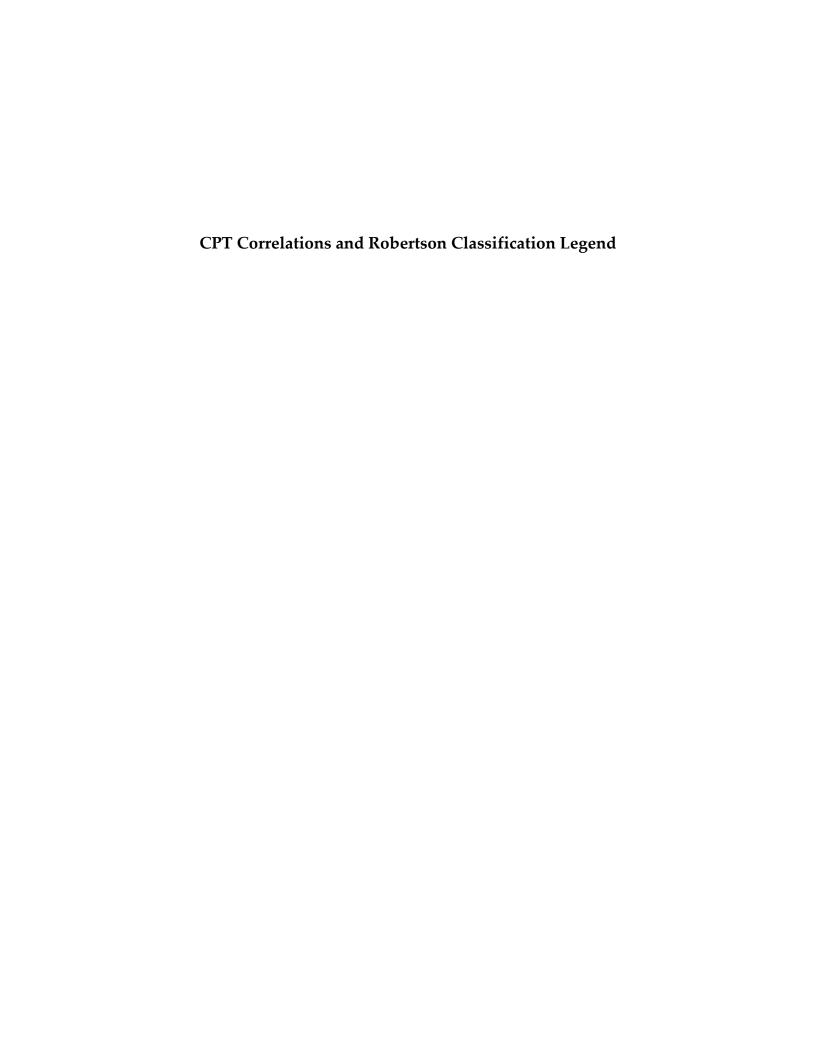
 $B_q = (u_2 - u_0)/(q_t - \sigma_{v0})$

 $Q_t = (q_t - \sigma_{v0}) / \sigma'_{v0}$

 $F_r = 100\% * f_s/(q_t - \sigma_{v0})$ $I_c = ((3.47 - \log Q_t)^2 + (\log F_r + 1.22)^2)^{0.5}$

$$N_{60} = (q_1/pa)/[8.5(1-l_0/4.6)]$$
 (6)

(6) Jefferies, M.G. and Davies, M.P., (1993), "Use of CPTu to estimate equivalent SPT N60", ASTM Geotechnical Testing Journal, Vol. 16, No. 4



CPT Soil Classification Legend

Zone	Qt/N	Description
1	2	Sensitive, Fine Grained
2	1	Organic Soils-Peats
3	1.5	Clays-Clay to Silty Clay
4	2	Silt Mixtures-Clayey Silt to Silty Clay
5	3	Sand Mixtures-Silty Sand to Sandy Silt
6	4.5	Sands-Clean Sand to Silty Sand
7	6	Gravelly Sand to Sand
8	1	Very Stiff Clay to Clayey Sand*
9	2	Very Stiff, Fine Grained*

Robertson's Soil Behavior Type (SBT), 1990					
Group #	Description	lc			
	Description	Min	Max		
1	Sensitive, fine grained	N/A			
2	Organic soils - peats	3.60	N/A		
3	Clays - silty clay to clay	2.95	3.60		
4	Silt mixtures - clayey silt to silty clay	2.60	2.95		
5	Sand mixtures - silty sand to sandy silt	2.05	2.60		
6	Sands - clean sand to silty sand	1.31	2.05		
7	Gravelly sand to dense sand	N/A	1.31		
8	Very stiff sand to clayey sand (High OCR or cemented)	N	/A		
9	Very stiff, fine grained (High OCR or cemented) N/A		/A		

Soil behavior type is based on empirical data and may not be representative of soil classification based on plasticity and grain size distribution.

Relative Density and Consistency Table						
SANDS		SILTS and CLAYS				
Cone Tip Stress, qt (tsf)	Relative Density	Cone Tip Stress, qt (tsf)	Consistency			
Less than 20	Very Loose	Less than 5	Very Soft			
20 - 40	Loose	5 - 15	Soft to Firm			
40 - 120	Medium Dense	15 - 30	Stiff			
120 - 200	Dense	30 - 60	Very Stiff			
Greater than 200	Very Dense	Greater than 60	Hard			





Dilatometer Test

B-05 DMT

Date: Feb. 19, 2009

Estimated Water Depth: 3.5 ft

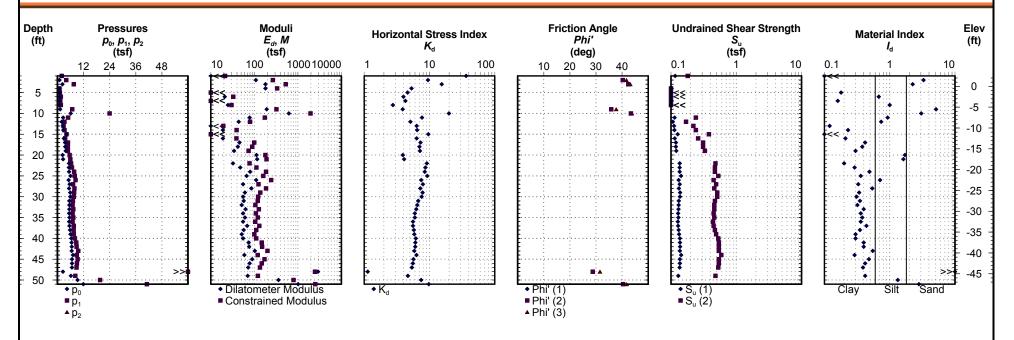
Rig/Operator: ATV/ M. Cox

Latitude: 32.836891 **Longitude:** 79.962714

Elevation: 3.5 NAVD 88

Total Depth: 51.0 ft

Termination Criteria: Maximum Reaction Force





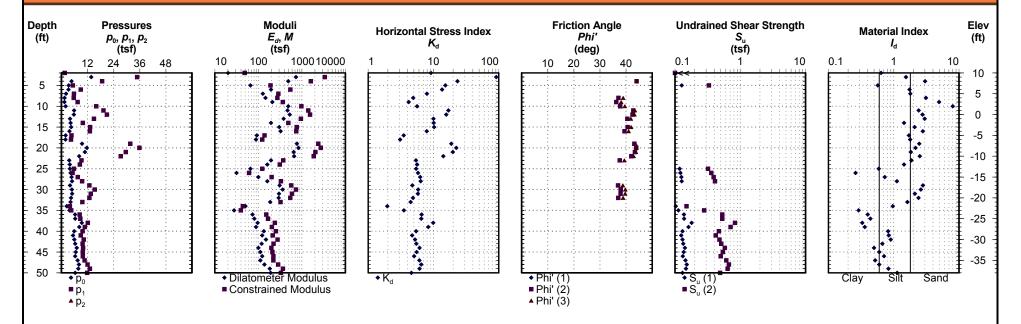
Dilatometer Test B-24 DMT

Date: Oct. 1, 2008

Estimated Water Depth: 4 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.838324 **Longitude:** 79.953015 Elevation: 12 NAVD 88 **Total Depth:** 50.0 ft **Termination Criteria:** Target Depth





Dilatometer TesB-26 DMT Alt 1

Date: Feb. 20, 2009

Estimated Water Depth: 3 ft

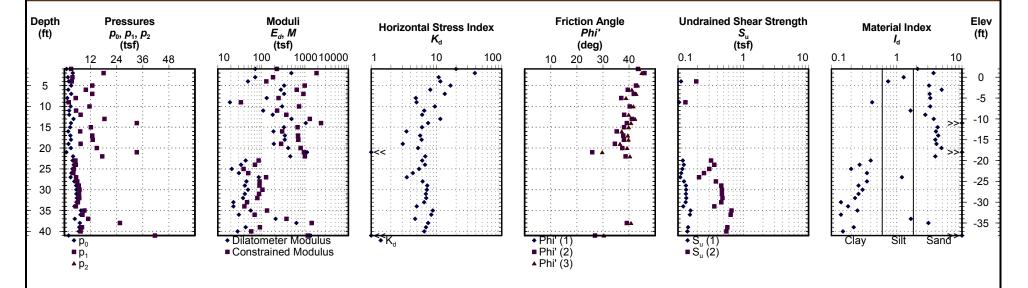
Rig/Operator: ATV/ M. Cox

Latitude: 32.835417 **Longitude:** 79.953739

Elevation: 3 NAVD 88

Total Depth: 41.0 ft

Termination Criteria: Maximum Reaction Force





Dilatometer Test

B-32 DMT

Date: Sep. 23, 2008

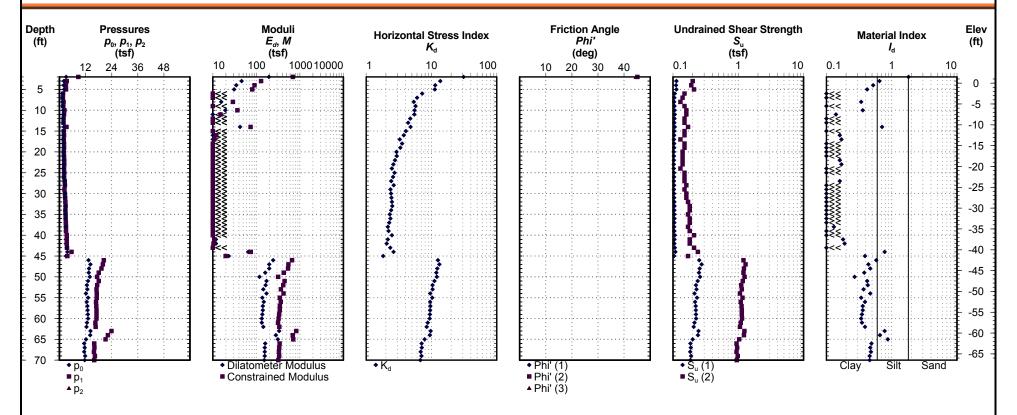
Estimated Water Depth: 3 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.842993 **Longitude:** 79.949117

Elevation: 3.5 NAVD 88

Total Depth: 70.0 ft **Termination Criteria:** Target Depth





Dilatometer Test B-45 DMT

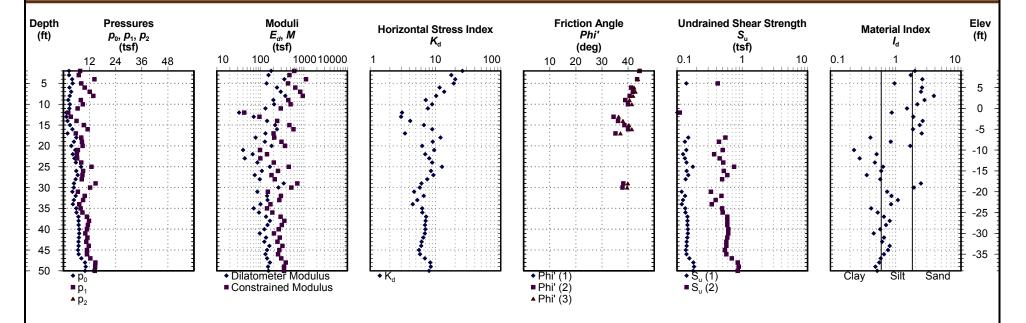
Date: Sep. 15, 2008

Estimated Water Depth: 4 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.845567 Longitude: 79.95384 Elevation: 11 NAVD 88

Total Depth: 50.0 ft
Termination Criteria: Target Depth





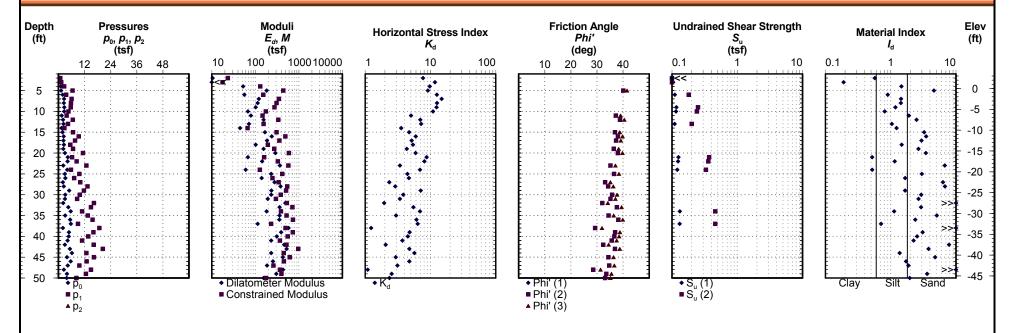
Dilatometer Test B-70 DMT

Date: Sep. 15, 2008

Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.830574 Longitude: 79.956331 Elevation: 4.5 NAVD 88 **Total Depth:** 50.0 ft **Termination Criteria:** Target Depth Membrane Type: Soft





DMT CORRELATIONS

DMT $p_0 = 1.05(A-Z_M+\Delta A)-0.05(B-Z_M-\Delta B)$ $p_1 = B - Z_M - \Delta B$ $I_D = (p_1 - p_0)/(p_0 - u_0)$ $K_D = (p_0 - u_0) / \sigma'_{vo}$ $E_D = 34.7(p_1 - p_0)$ $R_M = function(K_D, I_D) - see table$ $K_o = (K_D/1.5)^{0.47}$ -0.6 (DMT) 5 $OCR = (0.5K_D)^{1.56}$ 5 $\sigma_{p}' = 0.51(p_{o} - u_{o})$ **Undrained Shear Strength** $S_{\rm u}(1) = 0.22 \, \sigma_{\rm vo}' \, (0.5 \, \rm K_D)^{1.5}$ 5 $S_u(2) = (p_o - u_o)/10$ 12 **Drained Friction Angle** $\overline{\phi'(1)} = 37.3[(K_D-0.8)/(K_o+0.8)]^{0.082}$ 15 where: $K_0 = (K_D/1.5)^{0.47} - 0.6$ $\varphi'(2) = 28 + 14.6 \text{Log}(K_D) - 2.1 \text{Log}^2(K_D)$ 16 $\varphi'(3) = 31 + \frac{1}{\frac{0.236}{K_D - 1} + 0.066}$ 16 $\frac{\text{Unit Weight}}{\rho = 1.12 (E_D/p_a)^{0.1} I_D^{-0.05}}$ 17 Relative Density and Void Ratio $D_R = 100[(K_D-1)/7]^{1/2}$ 19

Compressibility

$$M = R_m E_D$$
 where $R_m = function(I_D, K_D)$

References

- 5 Marchetti, S. (1980), "In-situ tests by flat dilatometer.", *Journal of Geotechnical Engineering*, Vol. 107, GT3
- 8 Mayne, P. W., (1995), "Profiling yield stresses in clays by in situ tests.", Transportation Research Record No. 1479: Engineering Properties and Practice in Overconsolidated Clays. National Academy Press, Washington, D.C.
- 12 Schmertmann, J. H., (1988) Guidelines for Using the CPT, CPTu, and Marchetti DMT for Geotechnical Design: Volume III DMT Test Methods and Data Reduction. FHWA-PA-87-024+84-24
- Marchetti, S. (1997), "The flat Dilatometer design applications", Third Geotechnical Engineering Conference, Cairo University
- 17 Mayne (2006) Enhanced Site Characterization Course Notes
- 19 Reyna & Chameau (1991)





Pore Pressure Dissipation

Date: Sep. 30, 2008

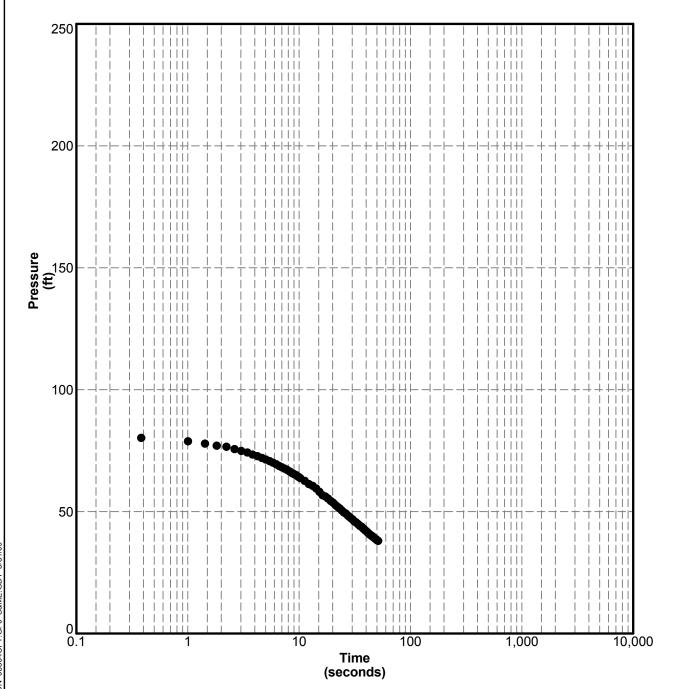
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.840334 Longitude: 79.967662 Elevation: 12.5 NAVD 88 **Depth:** 22.0 ft

Termination Criteria: Target Depth

Cone Size: 1.44



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

Electronic Filename: f30s0801d.22.txt



Pore Pressure Dissipation

Date: Sep. 30, 2008

Estimated Water Depth: 2 ft

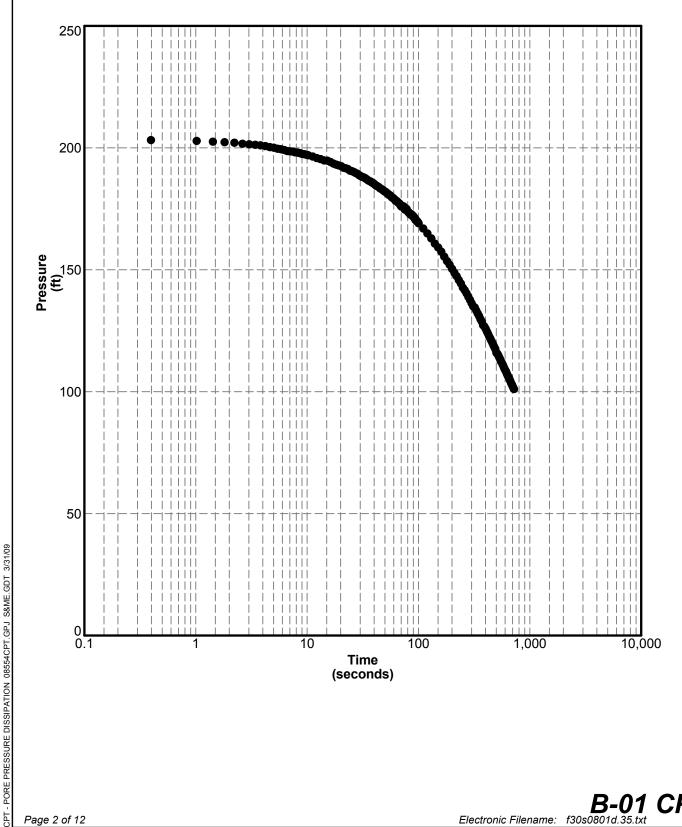
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.840334 Longitude: 79.967662

Elevation: 12.5 NAVD 88

Depth: 35.1 ft Termination Criteria: Target Depth

Cone Size: 1.44



Electronic Filename: f30s0801d.35.txt



Pore Pressure Dissipation

Date: Sep. 17, 2008

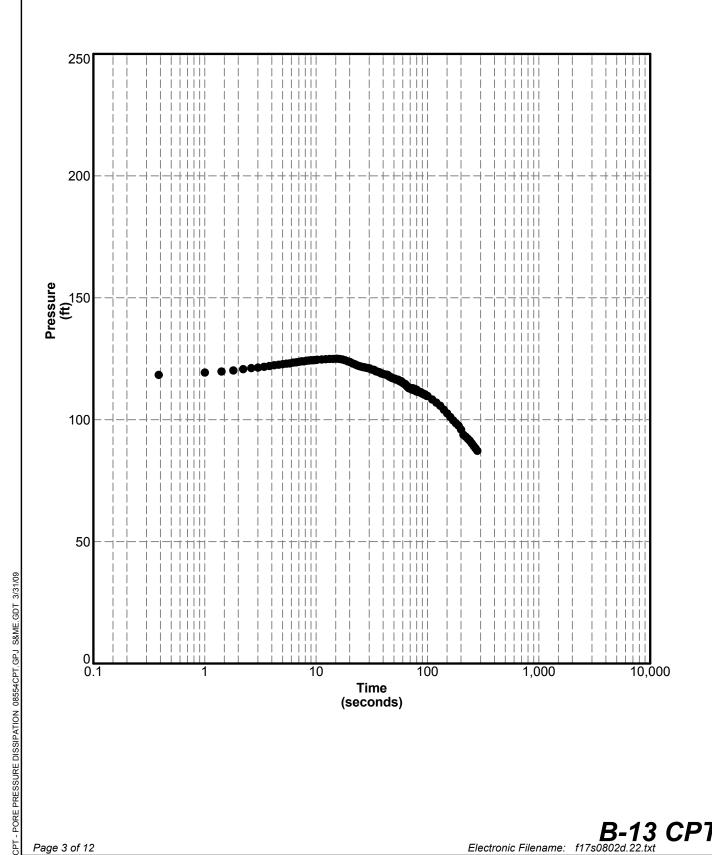
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.833796 Longitude: 79.957743 Elevation: 9 NAVD 88

Depth: 22.3 ft Termination Criteria: Target Depth

Cone Size: 1.44



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Electronic Filename: f17s0802d.22.txt



Pore Pressure Dissipation

Date: Sep. 24, 2008

Estimated Water Depth: 1 ft

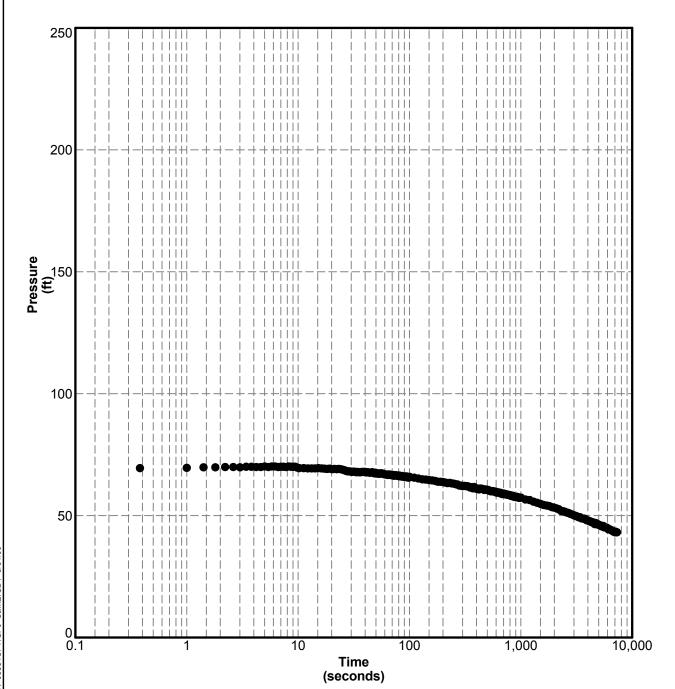
Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.84198 Longitude: 79.947978

Depth: 28.6 ft Termination Criteria: Target Depth

Cone Size: 1.44





CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

Electronic Filename: f24s0801d.29.txt



Pore Pressure Dissipation

Date: Sep. 22, 2008

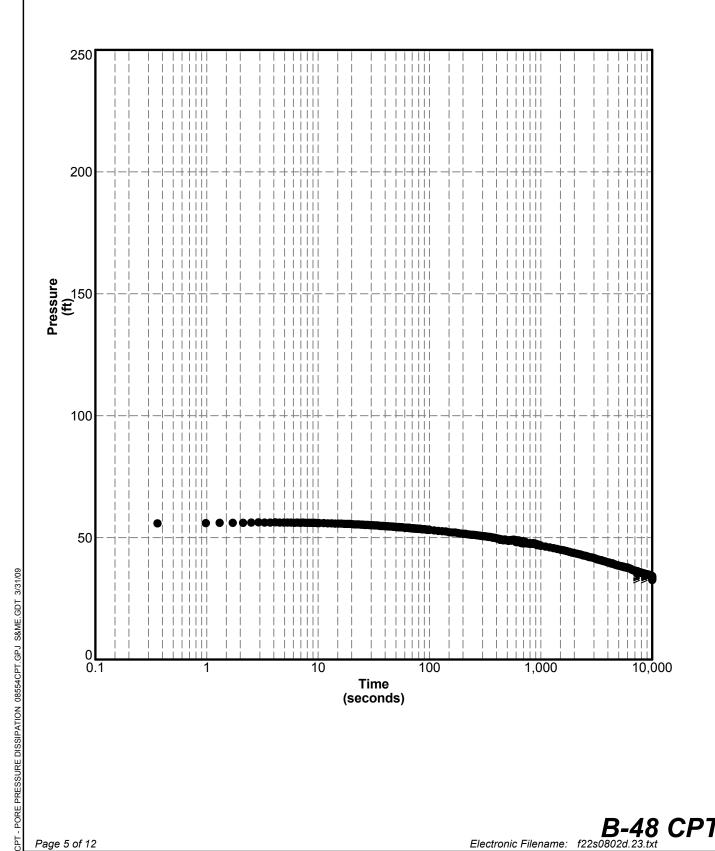
Estimated Water Depth: 1 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.849066 Longitude: 79.955477 Elevation: 3 NAVD 88

Depth: 22.8 ft Termination Criteria: Target Depth

Cone Size: 1.44



Electronic Filename: f22s0802d.23.txt

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Pore Pressure Dissipation

Date: Sep. 18, 2008

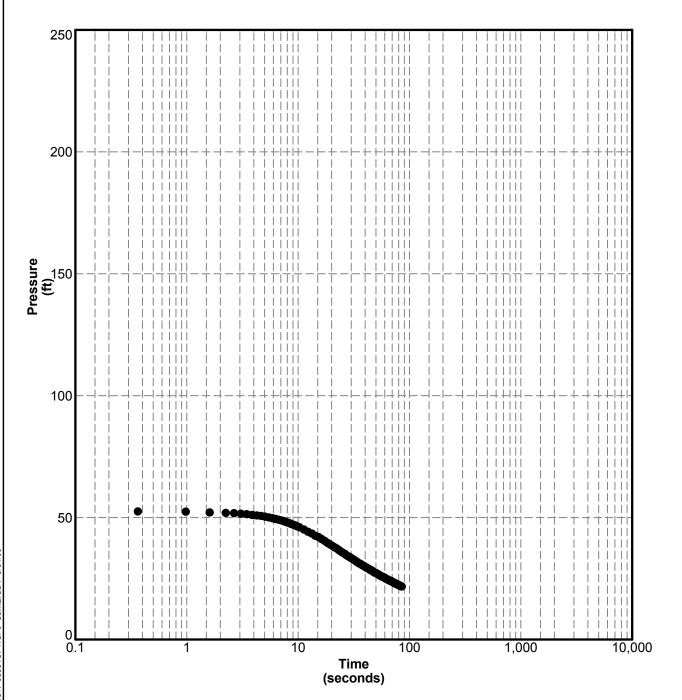
Estimated Water Depth: 4.5 ft

Water Depth: 4.5 ft Longito Rig/Operator: Gyrotrac/A. Feix Elevat

Latitude: 32.842451 **Longitude:** 79.96427 **Elevation:** 15 NAVD 88

Depth: 17.3 ft **Termination Criteria:** Target Depth

Cone Size: 1.75



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

B-49 CPT

Electronic Filename: e18s0801d.17.txt



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Port Access Road North Charleston, SC S&ME Project No: 1131-08-554

Pore Pressure Dissipation

Date: Sep. 18, 2008

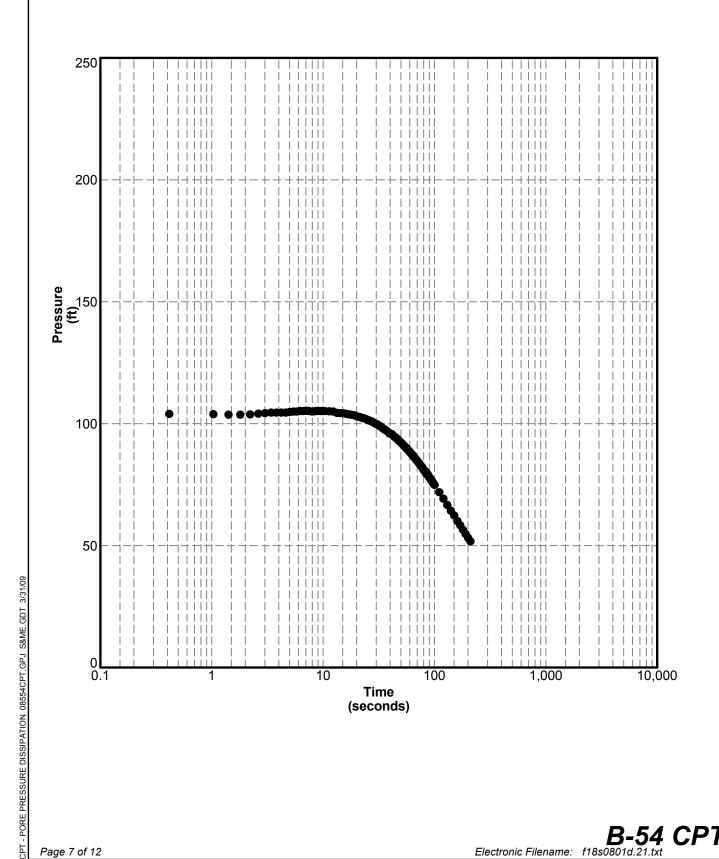
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.83889 Longitude: 79.965152 Elevation: 12.5 NAVD 88

Depth: 21.4 ft Termination Criteria: Target Depth

Cone Size: 1.44



Electronic Filename: f18s0801d.21.txt



Pore Pressure Dissipation

Date: Sep. 18, 2008

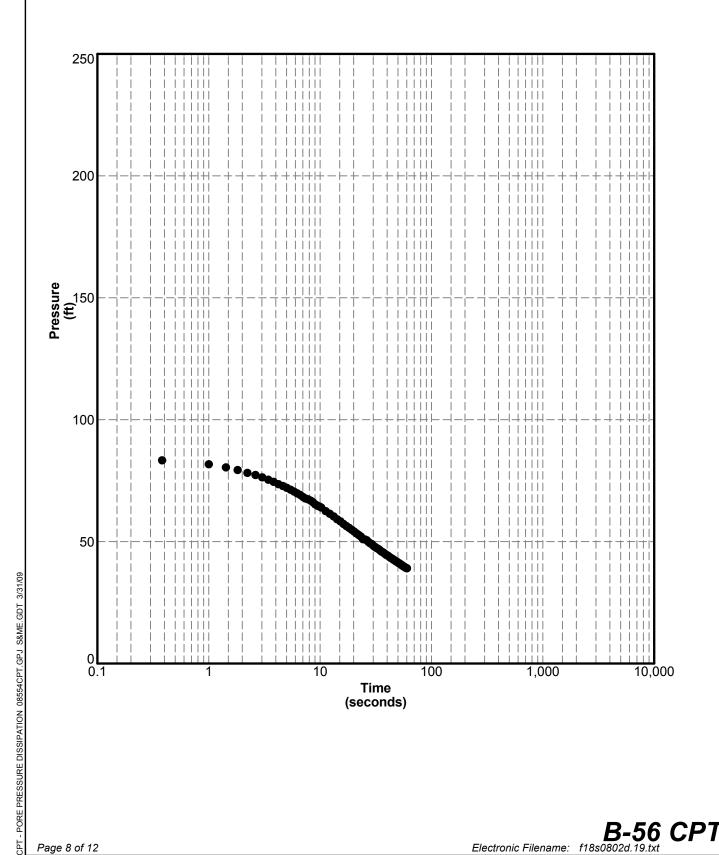
Estimated Water Depth: 3 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.837441 Longitude: 79.962355 Elevation: 10 NAVD 88

Depth: 19.0 ft Termination Criteria: Target Depth

Cone Size: 1.44



Electronic Filename: f18s0802d.19.txt



Pore Pressure Dissipation

Date: Sep. 30, 2008

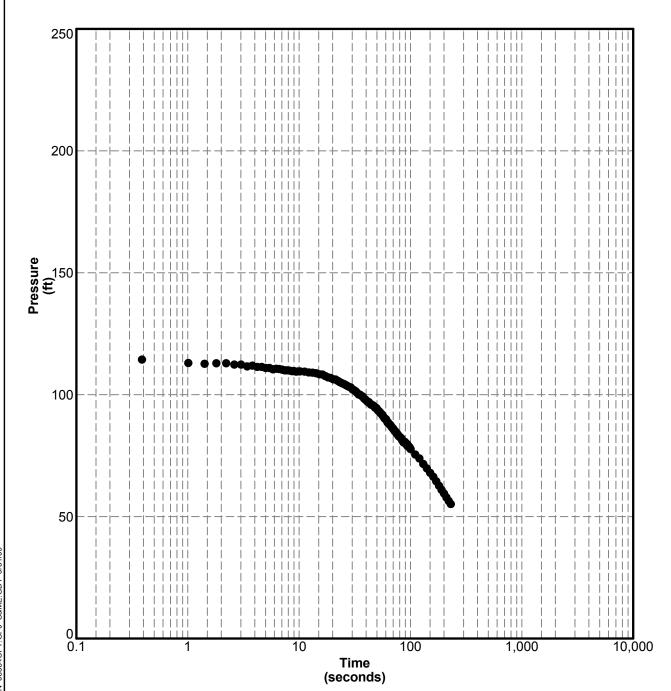
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.836866 Longitude: 79.961633 Elevation: 13 NAVD 88 **Depth:** 22.4 ft

Termination Criteria: Target Depth

Cone Size: 1.44



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

Electronic Filename: f30s0802d.22.txt



Pore Pressure Dissipation

Date: Sep. 30, 2008

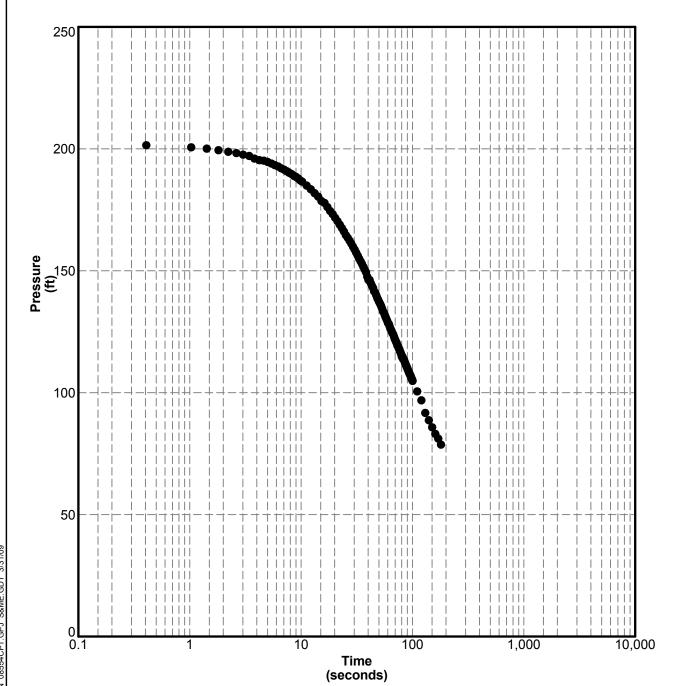
Estimated Water Depth: 2 ft

Rig/Operator: Gyrotrac/A. Feix

Latitude: 32.836866 Longitude: 79.961633 Elevation: 13 NAVD 88 **Depth:** 29.6 ft

Termination Criteria: Target Depth

Cone Size: 1.44



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

Electronic Filename: f30s0802d.30.txt



Rig/Operator:

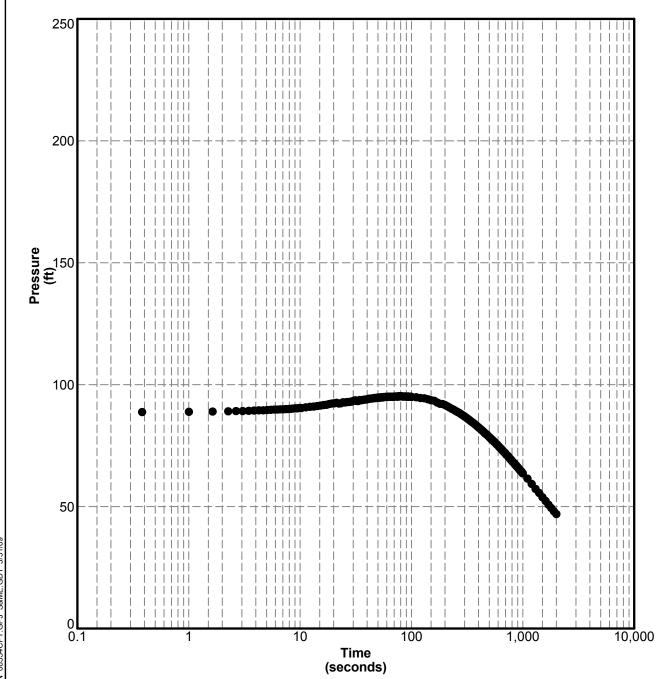
Port Access Road North Charleston, SC S&ME Project No: 1131-08-554

Pore Pressure Dissipation

Date: Feb. 10, 2009 Estimated Water Depth:

Latitude: Longitude: Elevation: **Depth:** 22.9 ft **Termination Criteria**:

Cone Size:



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

B-67SCPT

Electronic Filename: f10f0902d.txt

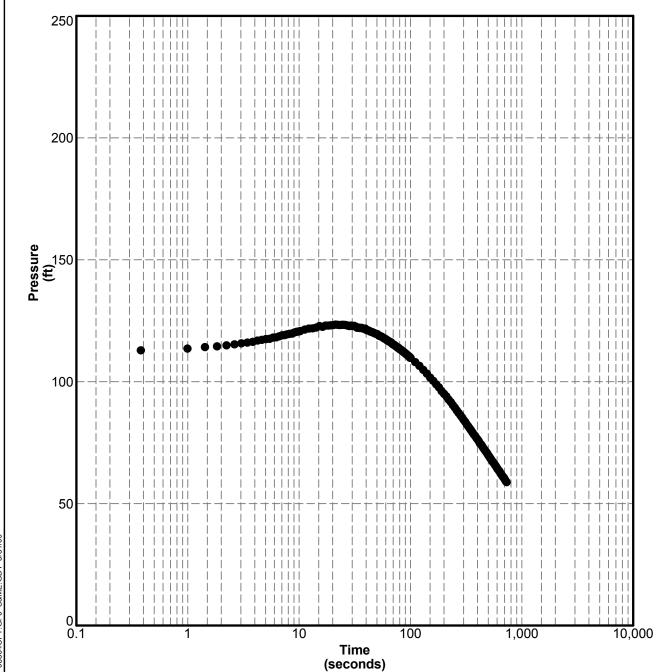


Pore Pressure Dissipation

Date: Feb. 19, 2009

Estimated Water Depth: Rig/Operator: Latitude: Longitude: Elevation: **Depth:** 20.8 ft **Termination Criteria**:

Cone Size:



CPT - PORE PRESSURE DISSIPATION 08554CPT.GPJ S&ME.GDT 3/31/09

B-6CPT

Electronic Filename: e19f0901d.txt



Exploration: B-3B Date: 10/1/2008

Surface El.: 6.95 feet Engineer: MLE

Test Depth: 34 feet
Test El.: -27.1 feet

Soil Data*: Summary of Test Results:

Liquid Limit:	70		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	40	Undisturbed S_u (psf):	580	464	0.8
Plasticity Index:	30	Remolded S _u (psf):	230	184	<u>Sensitivity</u>
%-Passing 200:	86	Effective Vertical Stress (psf):	1,108	1,108	2.5
Classification:	МН	S_u/p'_o	0.52	0.42	
Moisture Content:	75				

*Note: Soil data was gathered from B-3 SPT at a depth of 30 ft.

Field Vane Shear Test Results 700 600 500 **Undrained Shear Strength** 400 300 ----- 200 -O- Undisturbed $-\!\Box$ - Remolded 100 0 0 5 10 40 15 20 25 Angular Displacement (deg)



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FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-3B Date: 10/1/2008

Surface El.: 6.95 feet Engineer: MLE

Test Depth: 34 feet
Test El.: -27.1 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 34 ft

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 1.5 ft

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Co	ndition		Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
0.5	0	0	0	16	44	0	478	
1	12	0	130	17		0	0	
1.5	18	0	195	18		0	0	
2	24	0	261	19		0	0	
3	30	0	326	20		0	0	
4	35	0	380	21		0	0	
5	40	0	434	22		0	0	
6	45	0	489	23		0	0	
7	50	0	543	24		0	0	
8	53	0	576	25		0	0	
9	53	0	576	26		0	0	
10	51	0	554	27		0	0	
11	50	0	543	28		0	0	
12	48	0	521	29		0	0	
13	45	0	489	30		0	0	
14	44	0	478	31		0	0	
15	44	0	478	32		0	0	
		0	0	33		0	0	



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-3B Date: 10/1/2008

Surface El.: 6.95 feet Engineer: MLE

Test Depth: 34 feet
Test El.: -27.1 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 34

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 34

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Condition				Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)		
1	0	0	0	18	17	0	185		
2	6	0	65	19	17	0	185		
3	19	0	206	20	17	0	185		
4	20	0	217	21		0	0		
5	21	0	228	22		0	0		
6	20	0	217	23		0	0		
7	19	0	206	24		0	0		
8	19	0	206	25		0	0		
9	19	0	206	26		0	0		
10	18	0	195	27		0	0		
11	18	0	195	28		0	0		
12	18	0	195	29		0	0		
13	17	0	185	30		0	0		
14	17	0	185	31		0	0		
15	17	0	185	32		0	0		
16	17	0	185	33		0	0		
17	17	0	185	34		0	0		
				35		0	0		



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: MLE

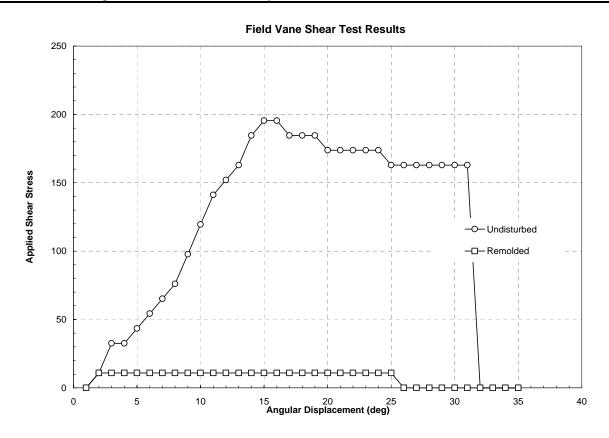
Test Depth: 8.5 feet
Test El.: -0.7 feet

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S_u (psf):	195	162	0.83
Plasticity Index:	24	Remolded S _u (psf):	11	9	Sensitivity
%-Passing 200:	93	Effective Vertical Stress (psf):	277	277	17.7
Classification:	МН	S_u/p'_o	0.70	0.58	

Moisture Content: 148

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.





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FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: MLE

Test Depth: 8.5 feet
Test El.: -0.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 8.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition	·	Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
0.5	0	0	0	16	17	0	185	
1	1	0	11	17	17	0	185	
1.5	3	0	33	18	16	0	174	
2	3	0	33	19	16	0	174	
3	4	0	43	20	16	0	174	
4	5	0	54	21	16	0	174	
5	6	0	65	22	16	0	174	
6	7	0	76	23	15	0	163	
7	9	0	98	24	15	0	163	
8	11	0	119	25	15	0	163	
9	13	0	141	26	15	0	163	
10	14	0	152	27	15	0	163	
11	15	0	163	28	15	0	163	
12	17	0	185	29	15	0	163	
13	18	0	195	30		0	0	
14	18	0	195	31		0	0	
15	17	0	185	32		0	0	
		0	0	33		0	0	



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: MLE

Test Depth: 8.5 feet
Test El.: -0.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 8.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Con	dition		Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
1	0	0	0	18	1	0	11	
2	1	0	11	19	1	0	11	
3	1	0	11	20	1	0	11	
4	1	0	11	21	1	0	11	
5	1	0	11	22	1	0	11	
6	1	0	11	23	1	0	11	
7	1	0	11	24	1	0	11	
8	1	0	11	25	1	0	11	
9	1	0	11	26		0	0	
10	1	0	11	27		0	0	
11	1	0	11	28		0	0	
12	1	0	11	29		0	0	
13	1	0	11	30		0	0	
14	1	0	11	31		0	0	
15	1	0	11	32		0	0	
16	1	0	11	33		0	0	
17	1	0	11	34		0	0	
				35		0	0	



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Tel 843.884.0005 Fax 843.881.6149 FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 17.5 feet
Test El.: -9.7 feet

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S _u (psf):	174	144	0.83
Plasticity Index:	24	Remolded S _u (psf):	22	18	Sensitivity
%-Passing 200:	93	Effective Vertical Stress (psf):	571	571	7.9

 S_u/p'_o

Moisture Content: 148

МН

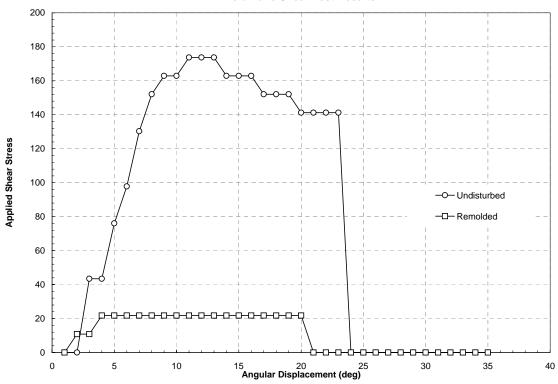
Classification:

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.

Field Vane Shear Test Results

0.30

0.25





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FIELD VANE SHEAR TEST REPORT | 1 of 3

Project No.: 1131-08-554
Project Name: Port Access Road
Location: Charleston, SC
Client: SCDOT

•

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 17.5 feet
Test El.: -9.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 17.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition		Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
0.5	0	0	0	16	14	0	152	
1	0	0	0	17	14	0	152	
1.5	4	0	43	18	13	0	141	
2	4	0	43	19	13	0	141	
3	7	0	76	20	13	0	141	
4	9	0	98	21	13	0	141	
5	12	0	130	22		0	0	
6	14	0	152	23		0	0	
7	15	0	163	24		0	0	
8	15	0	163	25		0	0	
9	16	0	174	26		0	0	
10	16	0	174	27		0	0	
11	16	0	174	28		0	0	
12	15	0	163	29		0	0	
13	15	0	163	30		0	0	
14	15	0	163	31		0	0	
15	14	0	152	32		0	0	
		0	0	33		0	0	



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/21/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 17.5 feet
Test El.: -9.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 17.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Cond	dition		Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
1	0	0	0	18	2	0	22	
2	1	0	11	19	2	0	22	
3	1	0	11	20	2	0	22	
4	2	0	22	21		0	0	
5	2	0	22	22		0	0	
6	2	0	22	23		0	0	
7	2	0	22	24		0	0	
8	2	0	22	25		0	0	
9	2	0	22	26		0	0	
10	2	0	22	27		0	0	
11	2	0	22	28		0	0	
12	2	0	22	29		0	0	
13	2	0	22	30		0	0	
14	2	0	22	31		0	0	
15	2	0	22	32		0	0	
16	2	0	22	33		0	0	
17	2	0	22	34		0	0	
				35		0	0	



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 26.5 feet
Test El.: -18.7 feet

Soil Data: Summary of Test Results:

Liquid Limit: 71 **Chandler Correction Factor** Uncorrected Corrected Plastic Limit: 47 Undisturbed S_u (psf): 217 180 0.83 54 Plasticity Index: 24 Remolded S_u (psf): 45 Sensitivity 864 864 4.0 %-Passing 200: 93 Effective Vertical Stress (psf):

Classification: MH S_u/p'_o 0.25 0.21

Moisture Content: 148

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.



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FIELD VANE SHEAR TEST REPORT | 1 of 3

Project No.: 1131-08-554
Project Name: Port Access Road
Location: Charleston, SC

Client: SCDOT

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 26.5 feet
Test El.: -18.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 26.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition		Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
0.5	0	0	0	16	15	0	163	
1	8	0	87	17	15	0	163	
1.5	13	0	141	18	15	0	163	
2	13	0	141	19	14	0	152	
3	16	0	174	20	14	0	152	
4	18	0	195	21	14	0	152	
5	19	0	206	22	14	0	152	
6	20	0	217	23	14	0	152	
7	18	0	195	24	14	0	152	
8	18	0	195	25	14	0	152	
9	18	0	195	26		0	0	
10	17	0	185	27		0	0	
11	16	0	174	28		0	0	
12	16	0	174	29		0	0	
13	16	0	174	30		0	0	
14	15	0	163	31		0	0	
15	15	0	163	32		0	0	
		0	0	33		0	0	



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 26.5 feet
Test El.: -18.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 26.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Con-	dition		Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf	
1	0	0	0	18	4	0	43	
2	3	0	33	19	4	0	43	
3	3	0	33	20	4	0	43	
4	3	0	33	21	5	0	54	
5	3	0	33	22	5	0	54	
6	4	0	43	23	5	0	54	
7	4	0	43	24	5	0	54	
8	4	0	43	25	5	0	54	
9	4	0	43	26	5	0	54	
10	4	0	43	27	5	0	54	
11	4	0	43	28	5	0	54	
12	4	0	43	29	5	0	54	
13	4	0	43	30	5	0	54	
14	4	0	43	31	5	0	54	
15	4	0	43	32		0	0	
16	4	0	43	33		0	0	
17	4	0	43	34		0	0	
				35		0	0	



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

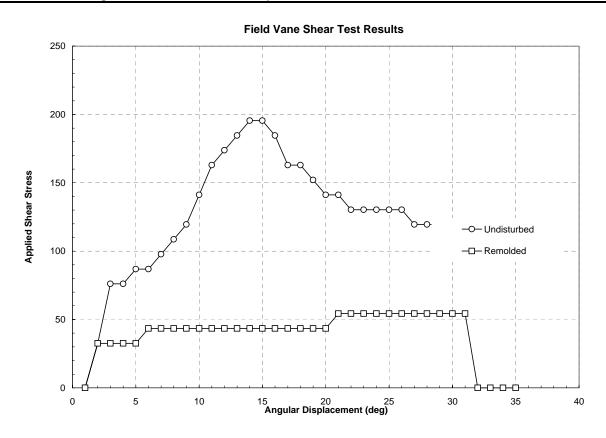
Test Depth: 35.5 feet
Test El.: -27.7 feet

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S_u (psf):	217	180	0.83
Plasticity Index:	24	Remolded S _u (psf):	54	45	<u>Sensitivity</u>
%-Passing 200:	93	Effective Vertical Stress (psf):	1,157	1,157	4.0
Classification:	MH	S _u /p' _o	0.19	0.16	

Moisture Content: 148

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.





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FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 35.5 feet
Test El.: -27.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 35.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

Undisturbed Condition				Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)	
0.5	0	0	0	16	15	0	163	
1	3	0	33	17	14	0	152	
1.5	7	0	76	18	13	0	141	
2	7	0	76	19	13	0	141	
3	8	0	87	20	12	0	130	
4	8	0	87	21	12	0	130	
5	9	0	98	22	12	0	130	
6	10	0	109	23	12	0	130	
7	11	0	119	24	12	0	130	
8	13	0	141	25	11	0	119	
9	15	0	163	26	11	0	119	
10	16	0	174	27	11	0	119	
11	17	0	185	28	11	0	119	
12	18	0	195	29	11	0	119	
13	18	0	195	30	11	0	119	
14	17	0	185	31	11	0	119	
15	15	0	163	32	10	0	109	
		0	0	33	10	0	109	



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 35.5 feet
Test El.: -27.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 35.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Condition				Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)		
1	0	0	0	18	4	0	43		
2	3	0	33	19	4	0	43		
3	3	0	33	20	4	0	43		
4	3	0	33	21	5	0	54		
5	3	0	33	22	5	0	54		
6	4	0	43	23	5	0	54		
7	4	0	43	24	5	0	54		
8	4	0	43	25	5	0	54		
9	4	0	43	26	5	0	54		
10	4	0	43	27	5	0	54		
11	4	0	43	28	5	0	54		
12	4	0	43	29	5	0	54		
13	4	0	43	30	5	0	54		
14	4	0	43	31	5	0	54		
15	4	0	43	32		0	0		
16	4	0	43	33		0	0		
17	4	0	43	34		0	0		
				35		0	0		



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 44.5 feet
Test El.: -36.7 feet

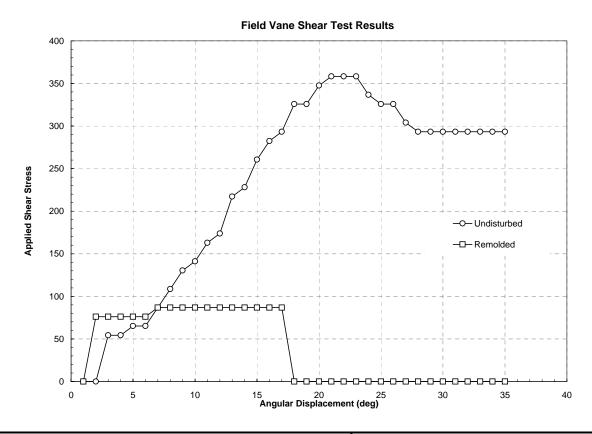
Soil Data: Summary of Test Results:

Liquid Limit: 71 Uncorrected Corrected **Chandler Correction Factor** Plastic Limit: 47 Undisturbed S_u (psf): 358 297 0.83 Plasticity Index: 24 Remolded S_u (psf): 87 72 Sensitivity 1,451 4.1 %-Passing 200: 93 Effective Vertical Stress (psf): 1,451

Classification: MH S_u/p'_o 0.25 0.20

Moisture Content: 148

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.





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FIELD VANE SHEAR TEST REPORT | 1 of 3

Project No.: 1131-08-554

Project Name: Port Access Road

Location: Charleston, SC

Client: SCDOT

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 44.5 feet
Test El.: -36.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 44.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Condition				Undisturbed Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)		
0.5	0	0	0	16	30	0	326		
1	0	0	0	17	30	0	326		
1.5	5	0	54	18	32	0	348		
2	5	0	54	19	33	0	358		
3	6	0	65	20	33	0	358		
4	6	0	65	21	33	0	358		
5	8	0	87	22	31	0	337		
6	10	0	109	23	30	0	326		
7	12	0	130	24	30	0	326		
8	13	0	141	25	28	0	304		
9	15	0	163	26	27	0	293		
10	16	0	174	27	27	0	293		
11	20	0	217	28	27	0	293		
12	21	0	228	29	27	0	293		
13	24	0	261	30	27	0	293		
14	26	0	282	31	27	0	293		
15	27	0	293	32	27	0	293		
		0	0	33	27	0	293		



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 44.5 feet
Test El.: -36.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 44.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Condition				Remolded Condition				
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)		
1	0	0	0	18		0	0		
2	7	0	76	19		0	0		
3	7	0	76	20		0	0		
4	7	0	76	21		0	0		
5	7	0	76	22		0	0		
6	7	0	76	23		0	0		
7	8	0	87	24		0	0		
8	8	0	87	25		0	0		
9	8	0	87	26		0	0		
10	8	0	87	27		0	0		
11	8	0	87	28		0	0		
12	8	0	87	29		0	0		
13	8	0	87	30		0	0		
14	8	0	87	31		0	0		
15	8	0	87	32		0	0		
16	8	0	87	33		0	0		
17	8	0	87	34		0	0		
				35		0	0		



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

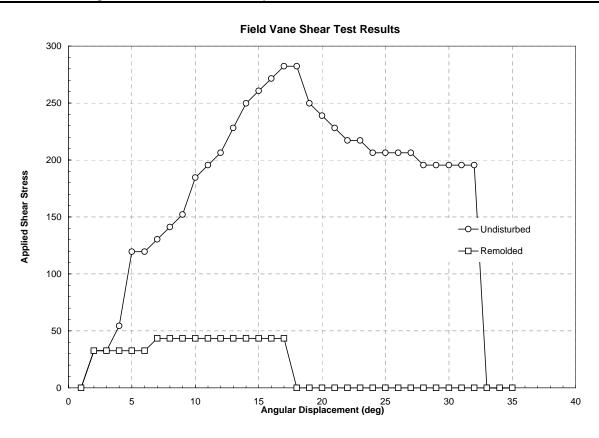
Test Depth: 51.5 feet
Test El.: -43.7 feet

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S_u (psf):	358	297	0.83
Plasticity Index:	24	Remolded S _u (psf):	43	36	<u>Sensitivity</u>
%-Passing 200:	93	Effective Vertical Stress (psf):	1,679	1,679	8.3
Classification:	МН	S_u/p'_o	0.21	0.18	

Moisture Content: 148

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.





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FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 51.5 feet
Test El.: -43.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 51.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition		Undisturbed Condition							
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)				
0.5	0	0	0	16	26	0	282				
1	3	0	33	17	23	0	250				
1.5	3	0	33	18	22	0	239				
2	5	0	54	19	21	0	228				
3	11	0	119	20	20	0	217				
4	11	0	119	21	20	0	217				
5	12	0	130	22	19	0	206				
6	13	0	141	23	19	0	206				
7	14	0	152	24	19	0	206				
8	17	0	185	25	19	0	206				
9	18	0	195	26	18	0	195				
10	19	0	206	27	18	0	195				
11	21	0	228	28	18	0	195				
12	23	0	250	29	18	0	195				
13	24	0	261	30	18	0	195				
14	14 25		272	31		0	0				
15	26	0	282	32		0	0				
		0	0	33		0	0				



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FIELD VANE SHEAR TEST REPORT | 2 of 3

Exploration: B-34SCPT Date: 10/22/2008

Surface El.: 7.8 feet Engineer: RCB

Test Depth: 51.5 feet
Test El.: -43.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 51.5

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 18 in.

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Con	dition		Remolded Condition							
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)				
1	0	0	0	18		0	0				
2	3	0	33	19		0	0				
3	3	0	33	20		0	0				
4	3	0	33	21		0	0				
5	3	0	33	22		0	0				
6	3	0	33	23		0	0				
7	4	0	43	24		0	0				
8	4	0	43	25		0	0				
9	4	0	43	26		0	0				
10	4	0	43	27		0	0				
11	4	0	43	28		0	0				
12	4	0	43	29		0	0				
13	4	0	43	30		0	0				
14	4	0	43	31		0	0				
15	4	0	43	32		0	0				
16	4	0	43	33		0	0				
17	4	0	43	34		0	0				
				35		0	0				



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Exploration: B-40 Date: 10/2/2008

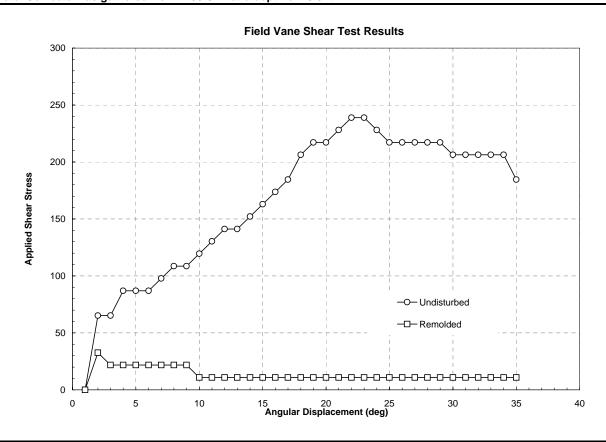
Surface El.: 2.3 feet Engineer: MLE

Test Depth: 15 feet
Test El.: -12.7 feet

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S_u (psf):	240	199	0.83
Plasticity Index:	24	Remolded S _u (psf):	30	25	<u>Sensitivity</u>
%-Passing 200:	93	Effective Vertical Stress (psf):	489	489	8.0
Classification:	MH	S_u/p'_o	0.49	0.41	
Moisture Content:	148				

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.





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Tel 843.884.0005 Fax 843.881.6149

FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-40 Date: 10/2/2008
Surface El.: 2.3 feet Engineer: MLE

Test Depth: 15 feet
Test El.: -12.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 15 ft

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 1.5 ft

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition		Undisturbed Condition							
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)				
0.5	0	0	0	16	19	0	206				
1	6	0	65	17	20	0	217				
1.5	6	0	65	18	20	0	217				
2	8	0	87	19	21	0	228				
3	8	0	87	20	22	0	239				
4	8	0	87	21	22	0	239				
5	9	0	98	22	21	0	228				
6	10	0	109	23	20	0	217				
7	10	0	109	24	20	0	217				
8	11	0	119	25	20	0	217				
9	12	0	130	26	20	0	217				
10	13	0	141	27	20	0	217				
11	13	0	141	28	19	0	206				
12	14	0	152	29	19	0	206				
13	15	0	163	30	19	0	206				
14	16	16 0 1		31	19	0	206				
15	17	0	185	32	19	0	206				
	18	0	195	33	17	0	185				



620 Wando Park Boulevard

Mt. Pleasant, South Carolina 29464

Tel 843.884.0005 Fax 843.881.6149

FIELD VANE SHEAR TEST REPORT | 2 of 3

Project No.: 1131-08-431

Project Name: Spring/Fishburne Outfall Project

Location: Charleston, SC Client: Black and Veatch

Exploration: B-40 Date: 10/2/2008
Surface El.: 2.3 feet Engineer: MLE

Test Depth: 15 feet
Test El.: -12.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 15

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 1.5

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Con-	dition					
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)
1	0	0	0	18	1	0	11
2	3	0	33	19	1	0	11
3	2	0	22	20	1	0	11
4	2	0	22	21	1	0	11
5	2	0	22	22	1	0	11
6	2	0	22	23	1	0	11
7	2	0	22	24	1	0	11
8	2	0	22	25	1	0	11
9	2	0	22	26	1	0	11
10	1	0	11	27	1	0	11
11	1	0	11	28	1	0	11
12	1	0	11	29	1	0	11
13	1	0	11	30	1	0	11
14	1	0	11	31	1	0	11
15	1	0	11	32	1	0	11
16	1	0	11	33	1	0	11
17	1	0	11	34	1	0	11
				35	1	0	11



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Tel 843.884.0005 Fax 843.881.6149

FIELD VANE SHEAR TEST REPORT | 3 of 3

Project No.: 1131-08-431

Project Name: Spring/Fishburne Outfall Project

Location: Charleston, SC Client: Black and Veatch

Exploration: B-40 Date: 10/2/2008
Surface El.: 2.3 feet Engineer: MLE

Test Depth: 33 feet
Test El.: -30.7 feet

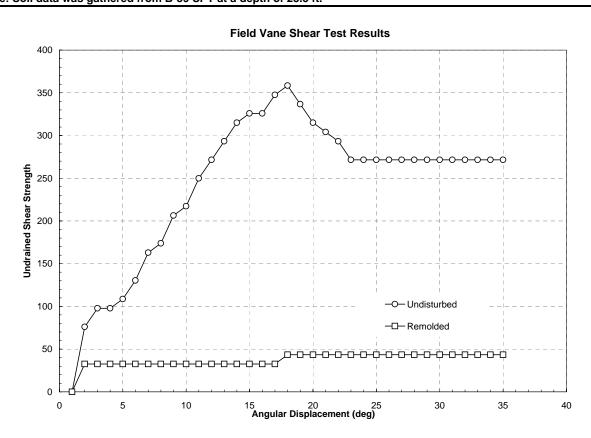
Moisture Content:

Soil Data: Summary of Test Results:

Liquid Limit:	71		<u>Uncorrected</u>	Corrected	Chandler Correction Factor
Plastic Limit:	47	Undisturbed S_u (psf):	360	299	0.83
Plasticity Index:	24	Remolded S _u (psf):	50	42	<u>Sensitivity</u>
%-Passing 200:	93	Effective Vertical Stress (psf):	1,076	1,076	7.2
Classification:	MH	S_u/p'_o	0.33	0.28	

*Note: Soil data was gathered from B-39 SPT at a depth of 23.5 ft.

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FIELD VANE SHEAR TEST REPORT | 1 of 3

Exploration: B-40 Date: 10/2/2008
Surface El.: 2.3 feet Engineer: MLE

Test Depth: 33 feet
Test El.: -30.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 33 ft

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 1.5 ft

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Undisturbed Cor	ndition		Undisturbed Condition							
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)				
0.5	0	0	0	16	33	0	358				
1	7	0	76	17	31	0	337				
1.5	9	0	98	18	29	0	315				
2	9	0	98	19	28	0	304				
3	10	0	109	20	27	0	293				
4	12	0	130	21	25	0	272				
5	15	0	163	22	25	0	272				
6	16	0	174	23	25	0	272				
7	19	0	206	24	25	0	272				
8	20	0	217	25	25	0	272				
9	23	0	250	26	25	0	272				
10	25	0	272	27	25	0	272				
11	27	0	293	28	25	0	272				
12	29	0	315	29	25	0	272				
13	30	0	326	30	25	0	272				
14	30	0	326	31	25	0	272				
15	5 32 0 348		348	32	25	0	272				
		0	0	33	25	0	272				



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Tel 843.884.0005 Fax 843.881.6149

FIELD VANE SHEAR TEST REPORT | 2 of 3

Project No.: 1131-08-431

Project Name: Spring/Fishburne Outfall Project

Location: Charleston, SC Client: Black and Veatch

Exploration: B-40 Date: 10/2/2008

Surface El.: 2.3 feet Engineer: MLE

Test Depth: 33 feet
Test El.: -30.7 feet

Vane and Test Data:

Vane Diameter: 3 5/8 inches Vane Type: Standard Vane

Vane Constant, k: 0.905 Depth of Vane Tip: 33 ft

Torque Arm Length: 12 inches Depth of Vane Tip Below Bottom of Hole: 1.5 ft

Torque Rate - Undisturbe 0.1 deg/sec
Torque Rate - Remolded: 0.1 deg/sec

	Remolded Con-	dition		Remolded Condition							
Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	S _u (psf)	Degrees of Rotation	Dial Reading (lbs)	Friction (lbs)	Su (psf)				
1	0	0	0	18	4	0	43				
2	3	0	33	19	4	0	43				
3	3	0	33	20	4	0	43				
4	3	0	33	21	4	0	43				
5	3	0	33	22	4	0	43				
6	3	0	33	23	4	0	43				
7	3	0	33	24	4	0	43				
8	3	0	33	25	4	0	43				
9	3	0	33	26	4	0	43				
10	3	0	33	27	4	0	43				
11	3	0	33	28	4	0	43				
12	3	0	33	29	4	0	43				
13	3	0	33	30	4	0	43				
14	3	0	33	31	4	0	43				
15	3	0	33	32	4	0	43				
16	3	0	33	33	4	0	43				
17	3	0	33	34	4	0	43				
				35	4	0	43				



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FIELD VANE SHEAR TEST REPORT | 3 of 3

Project No.: 1131-08-431

Project Name: Spring/Fishburne Outfall Project

Location: Charleston, SC Client: Black and Veatch

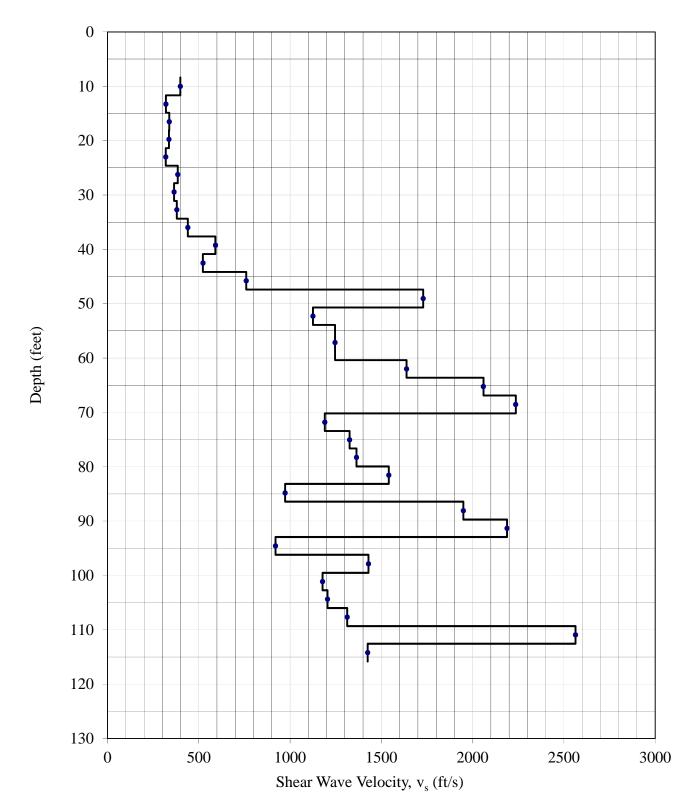




Port Access Road Charleston, SC

Sounding ID: B-12 SCPT Project Number: 1131-08-554

Date: 10/27/08

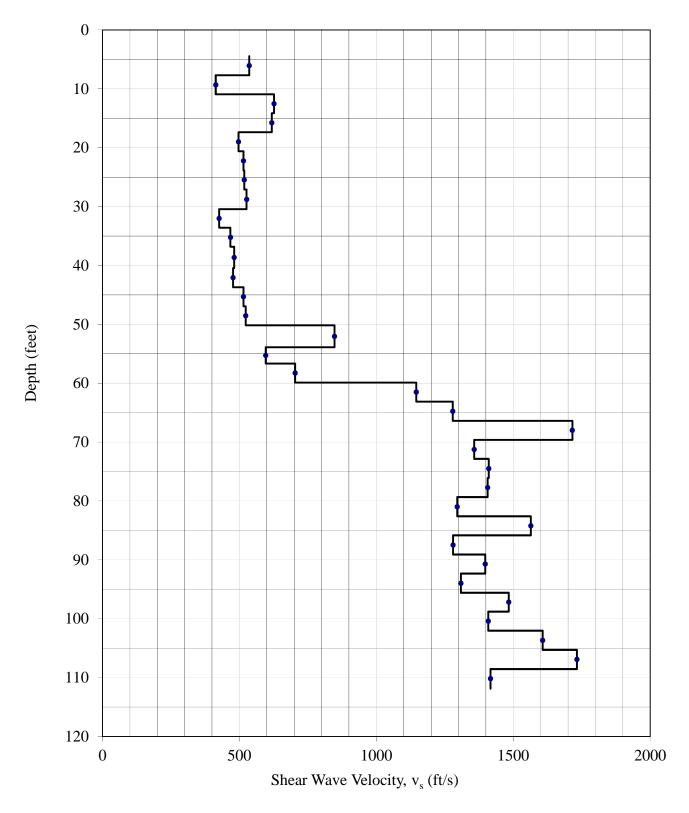




Port Access Road
North Charleston, SC

Sounding ID: B-17SCPT Project Number: 1131-08-554

Date: 10/09/08



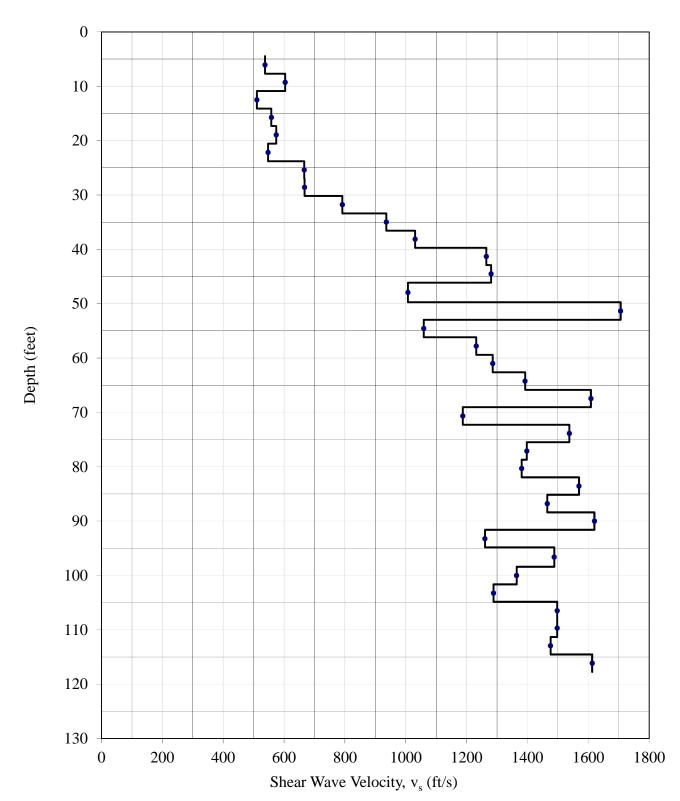
^{*} Site Class based on 2003 International Building Code - Table 1615.1 - SITE CLASS DEFINITIONS



Port Access Road
North Charleston, SC

Sounding ID: B-22SCPT Project Number: 1131-08-554

Date: 10/01/08

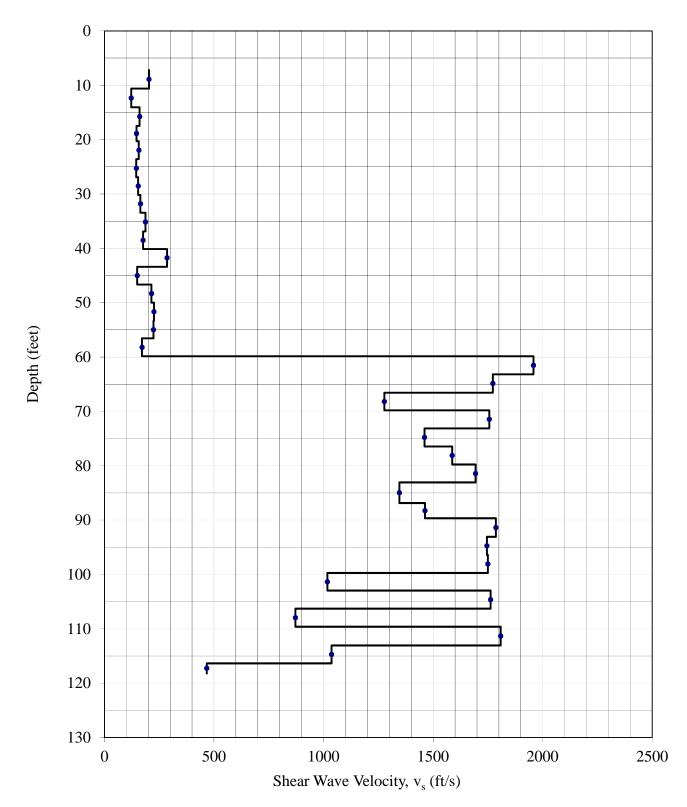




Port Access Road
North Charleston, SC

Sounding ID: B-34SCPT Project Number: 1131-08-554

Date: 09/23/08

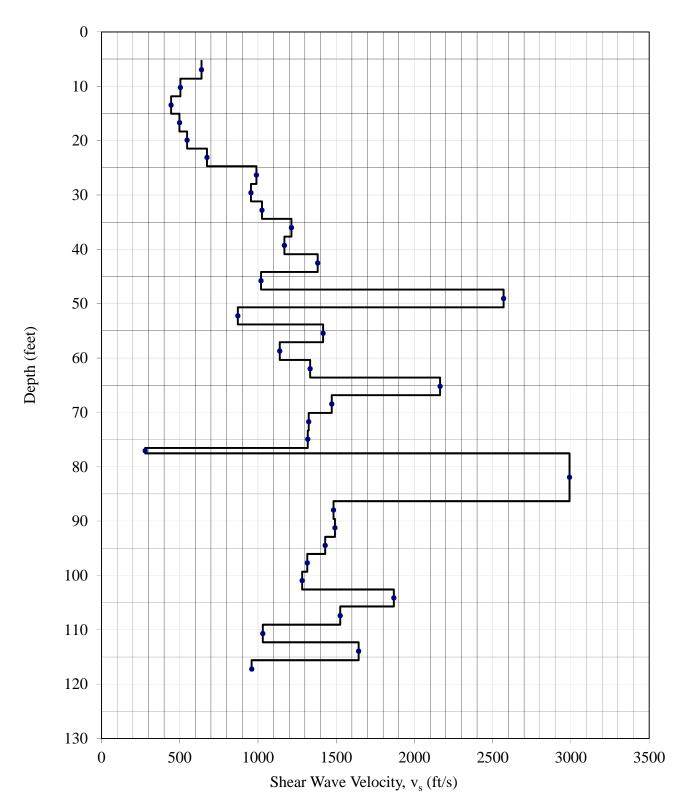




Port Access Road N. Charleston, SC

Sounding ID: B-44SCPT Project Number: 1131-08-554

Date: 10/01/08

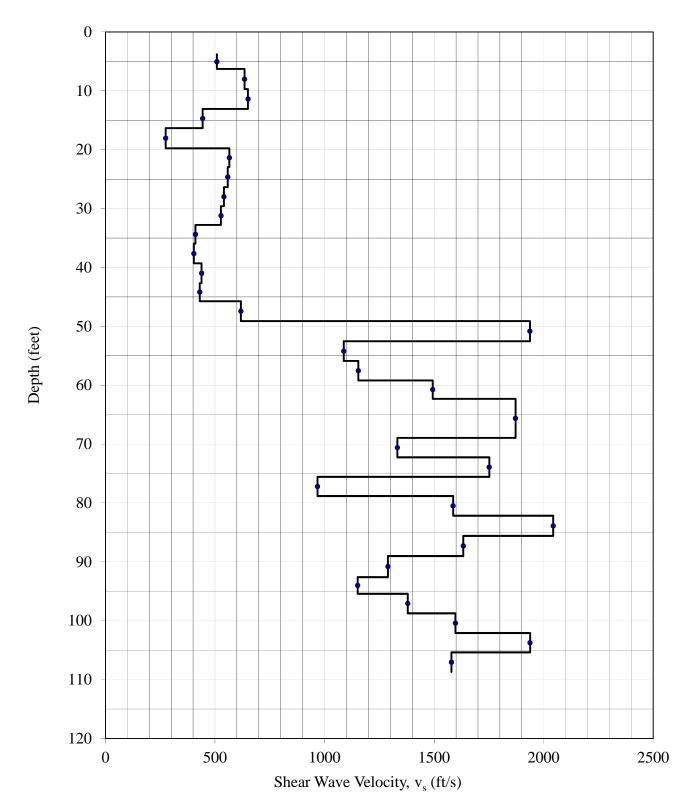




Port Access Road
North Charleston, SC

Sounding ID: **B-60SCPT** Project Number: **1131-08-554**

Date: 09/30/08

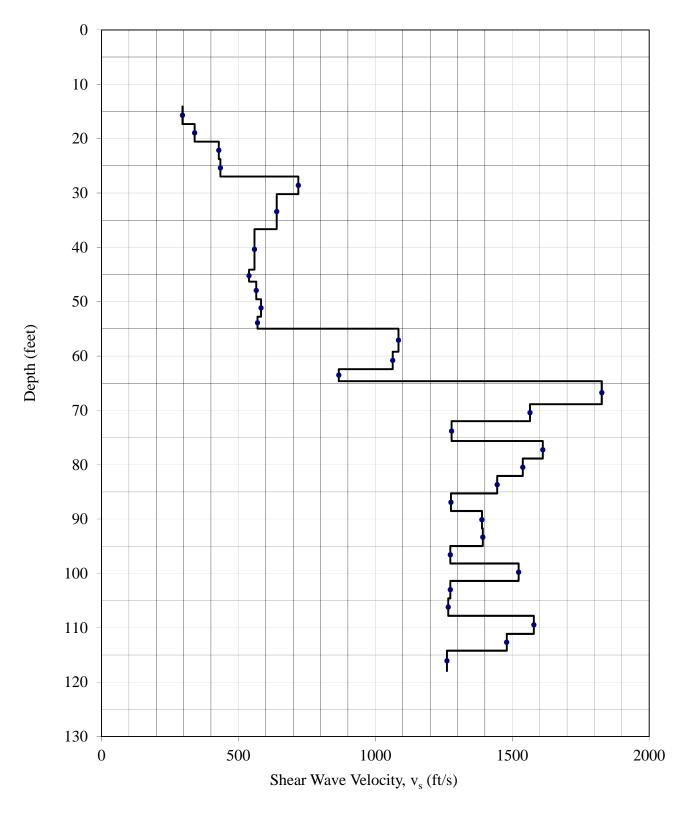




Port Access Road
North Charleston, SC

Sounding ID: **B-67SCPT** Project Number: **1131-08-554**

Date: 02/10/09



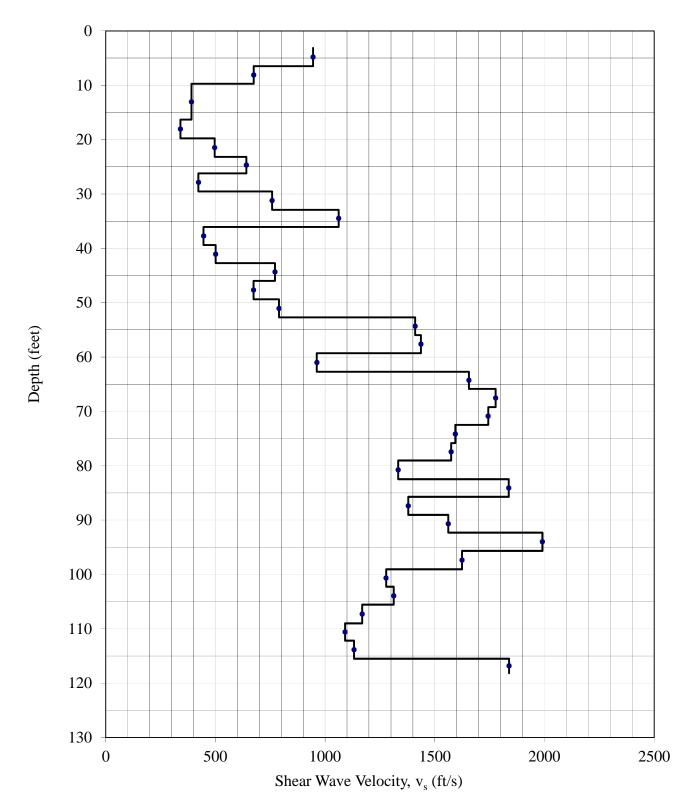
^{*} Site Class based on 2003 International Building Code - Table 1615.1 - SITE CLASS DEFINITIONS



Port Access Road
North Charleston, SC

Sounding ID: B-73SCPT Project Number: 1131-08-554

Date: 09/15/08



TYPICAL CPT – SHEAR WAVE RESULTS

Test ID: B-73SCPT, 18.18 ft **Date:** 15/Sep/2008

Site: Port Access Road

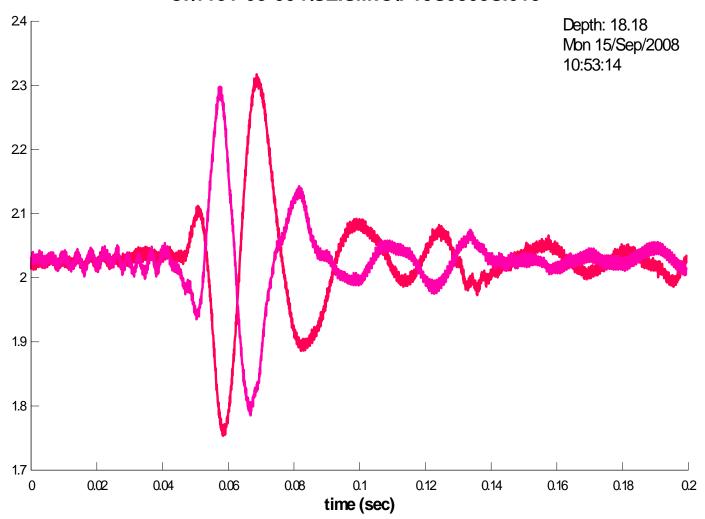
Location: North Charleston, SC

Project: 1131-08-554 **Client:** SCDOT

Interpretation: Peak Interval Travel Time

S-Wave 1 (sec): 0. 06874 S-Wave 2 (sec): 0. 06875

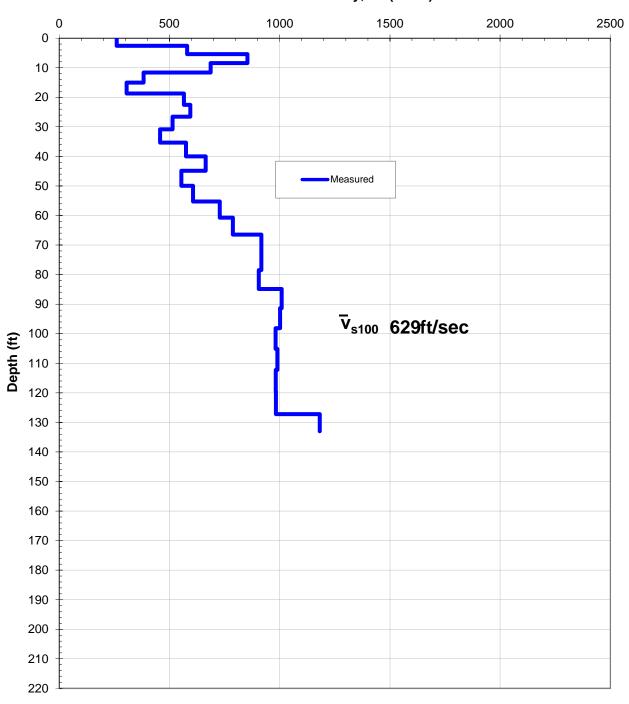
C:\1131-08-554\SEISMIC\F15S0803S.018





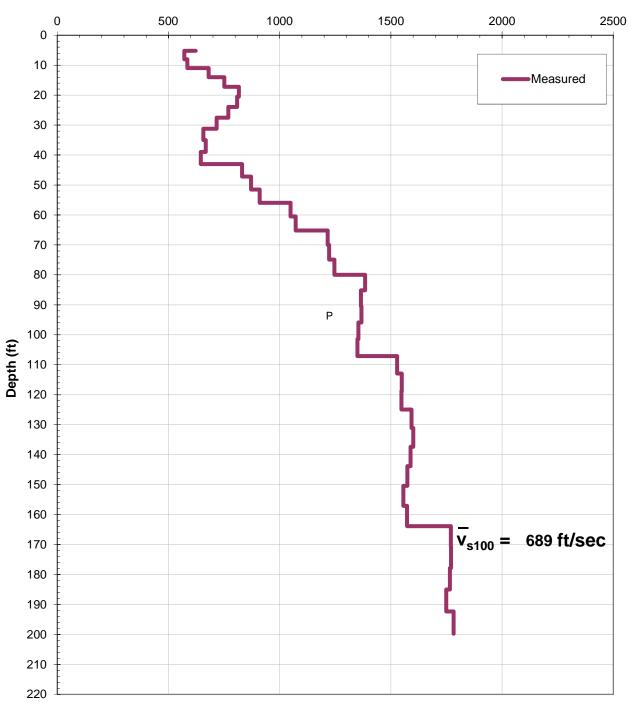


Shear Wave Velocity Profile R-1 Port Access Road Charleston, South Carolina 1131-08-554



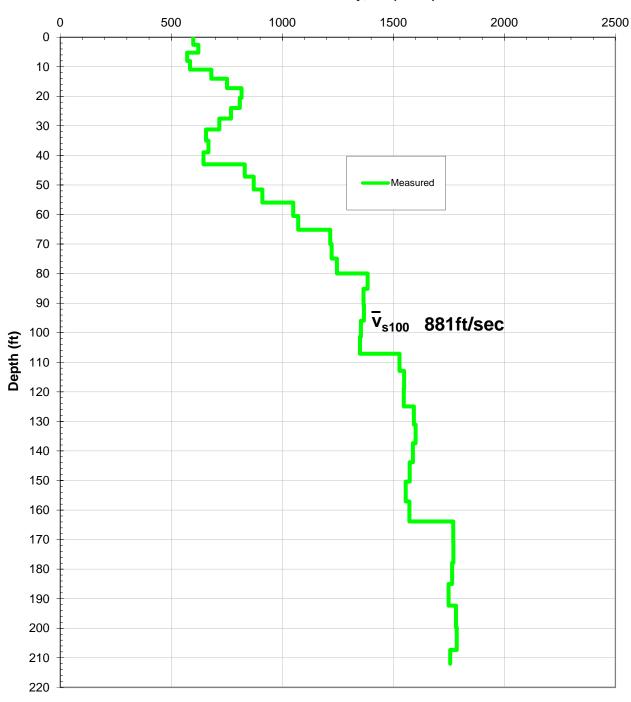


Shear Wave Velocity Profile R-2 Port Access Road Charleston, South Carolina 1131-08-554



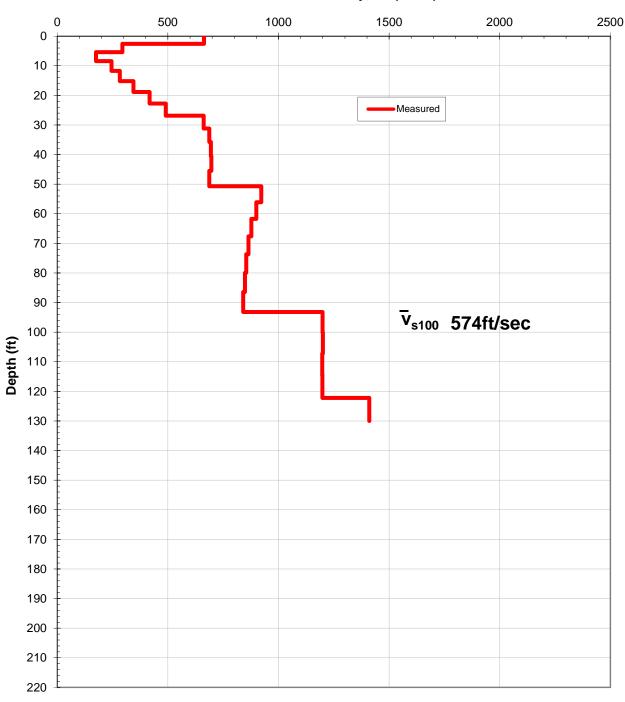


Shear Wave Velocity Profile R-3 Port Access Road Charleston, South Carolina 1131-08-554



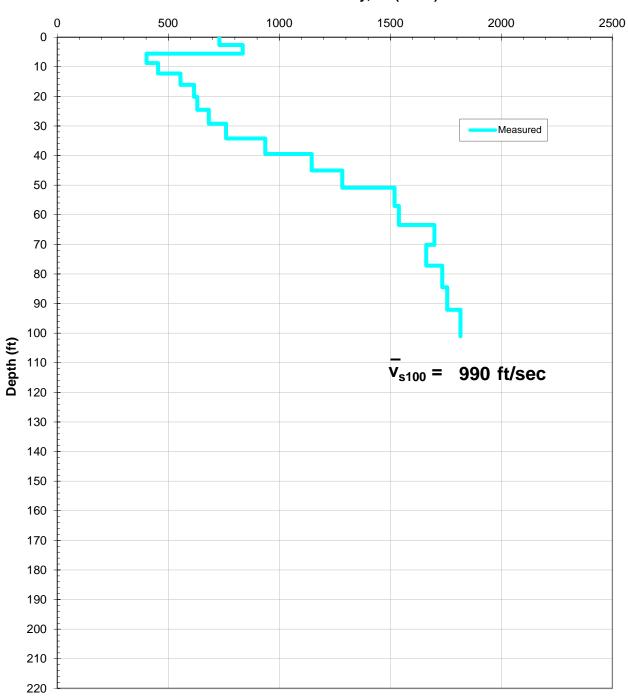


Shear Wave Velocity Profile R-4 Port Access Road Charleston, South Carolina 1131-08-554



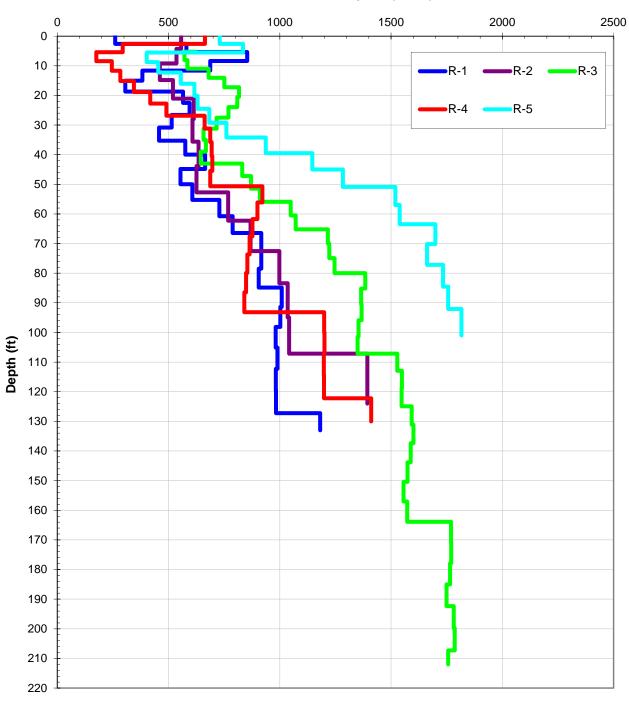


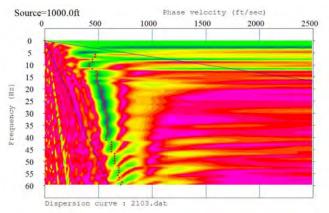
Shear Wave Velocity Profile R-5 Port Access Road Charleston, South Carolina 1131-08-554

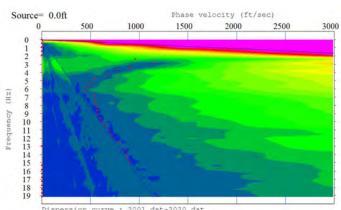




Shear Wave Velocity Profiles Port Access Road Charleston, South Carolina 1131-08-554

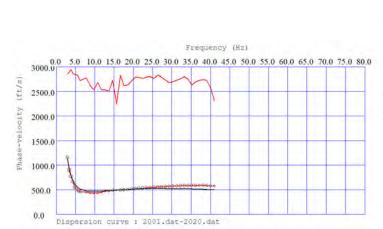




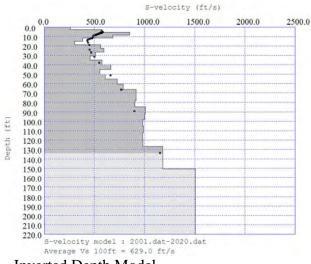


Active Surface Wave data, 7' geophone spacing

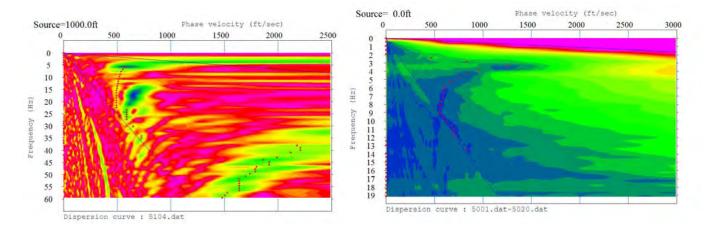
Passive Surface Wave Data: Linear array, 30' geophone spacing



Combined Dispersion Curve

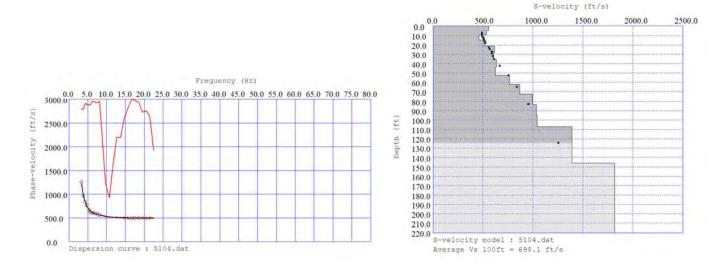


Inverted Depth Model



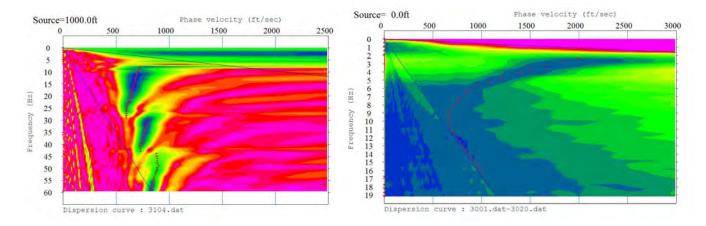
Active Surface Wave data, 7' geophone spacing

Passive Surface Wave Data: Linear array, 30' geophone spacing



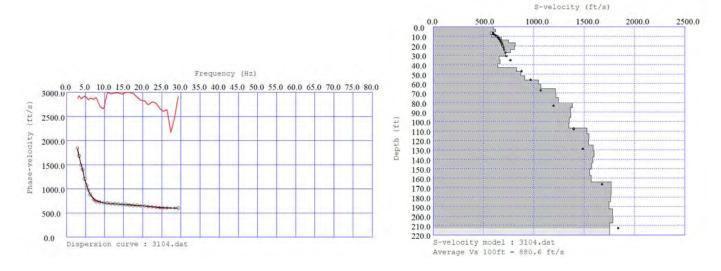
Combined Dispersion Curve

Inverted Depth Model



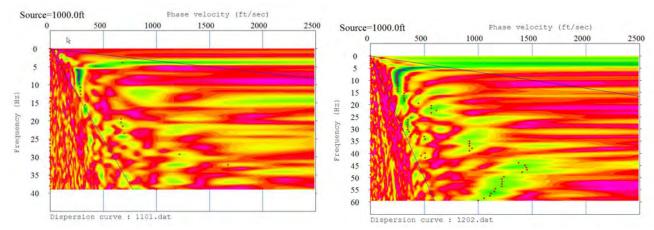
Active Surface Wave data, 7' geophone spacing

Passive Surface Wave Data: Linear array, 30' geophone spacing



Combined Dispersion Curve

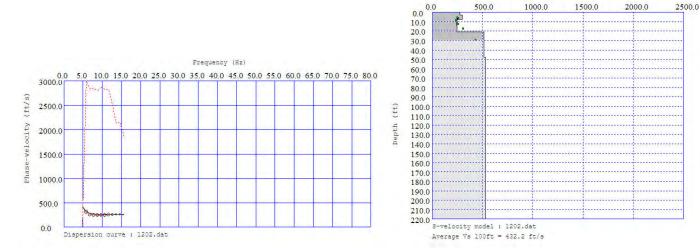
Inverted Depth Model



Active Surface Wave data, 10' geophone spacing

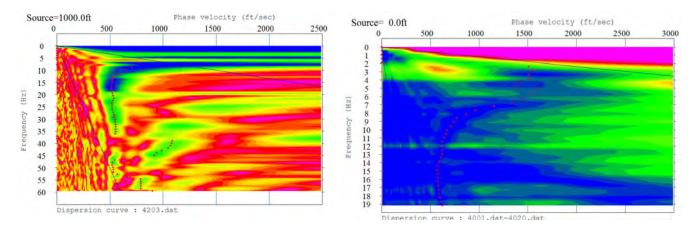
Active Surface Wave data, 5' geophone spacing

S-velocity (ft/s)



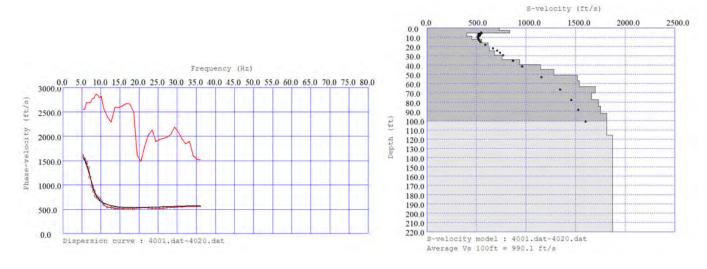
Combined Dispersion Curve

Inverted Depth Model



Active Surface Wave data, 7' geophone spacing

Passive Surface Wave Data: Linear array, 30' geophone spacing



Combined Dispersion Curve

Inverted Depth Model



PROJECT:		NOTES:	NOTES:									E	BORING LOG: B-11 GEO									
DATE DRILLED:	10/6/2008	DRILLING MET	HOD: Mud Rotar	у			LOGGED BY: MLE								DRILLER:							
ELEVATION: 8.9	5 FEET	BORING DEPT	H: 800 FEET				WATER LEVEL @ TOB: NOT OBTAINED								WATER LEVEL @ 24 hrs: NOT OBTAINED							
feet)	MATERIAL DESCRIPTION	ELEVATION (feet) SAMPLE NO.		SISTIVITY (o		FL	UID TEMI	PERAT	URE (degree	s C)		FLUID RI	ESISTIVIT	ΓΥ (ohm-	GAMMA (CPS) SP (mv) ————————————————————————————————————						
DEPTH (feet) GRAPHIC LOG LOG LITHOLOGIC UNIT	DEPTH (feet) CRAPHIC LOG LITHOLOGIC UNIT UNIT UNIT UNIT UNIT UNIT UNIT UNIT		R8	R1	6 R32																SP	
	H .	ELEV, (fe SAMPI	0 25	50	75 100	16 17	18 19 2	0 21	22 23	24 25	5 26 27	0	25	50	75		100	0 2	50 50	7	50	1000
55— 10— 15— 20— 25— 30— 35— 40— 45— 50— 65— 70— 75— 80— 85— 90—	SLIGHTLY SILTY SAND (SP-SM) loose, gray and brown, fine; with trace organics SLIGHTLY CLAYEY SAND (SP-SC) very loose, gray and brown, fine; with trace organics and silt CLAYEY SAND (SC) very loose, gray and brown, fine; with debris SLIGHTLY CLAYEY SAND (SP-SC) very loose, gray, fine SILTY SAND (SM) very loose, gray and brown, fine gray SILTY CLAY (CL) very soft, gray; with trace fine sand and organics with trace fine sand, no organics with trace organics no organics soft; with sand and shell COOPER MARL: SANDY SILT(ML) soft, olive green	-2- -7- -12- -17- -22- -27- -32- -37- -42- -47- -52- -57- -62- -67- -72- -77- -82-																The part of the pa				
95		-87							 									*	 			

- 1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
- 2. GEOTECHNICAL BORING AND SAMPLING OPERATIONS WERE CONDUCTED IN GENERAL ACCORDANCE WITH ASTM D 5783 AND ASTM D 2113.
- 3. THE GEOPHYSICAL LOGGING DATA WAS OBTAINED USING MOUNT SOPRIS INSTRUMENTS GEOPHYSICAL LOGGING EQUIPMENT.
- 4. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
- 5. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



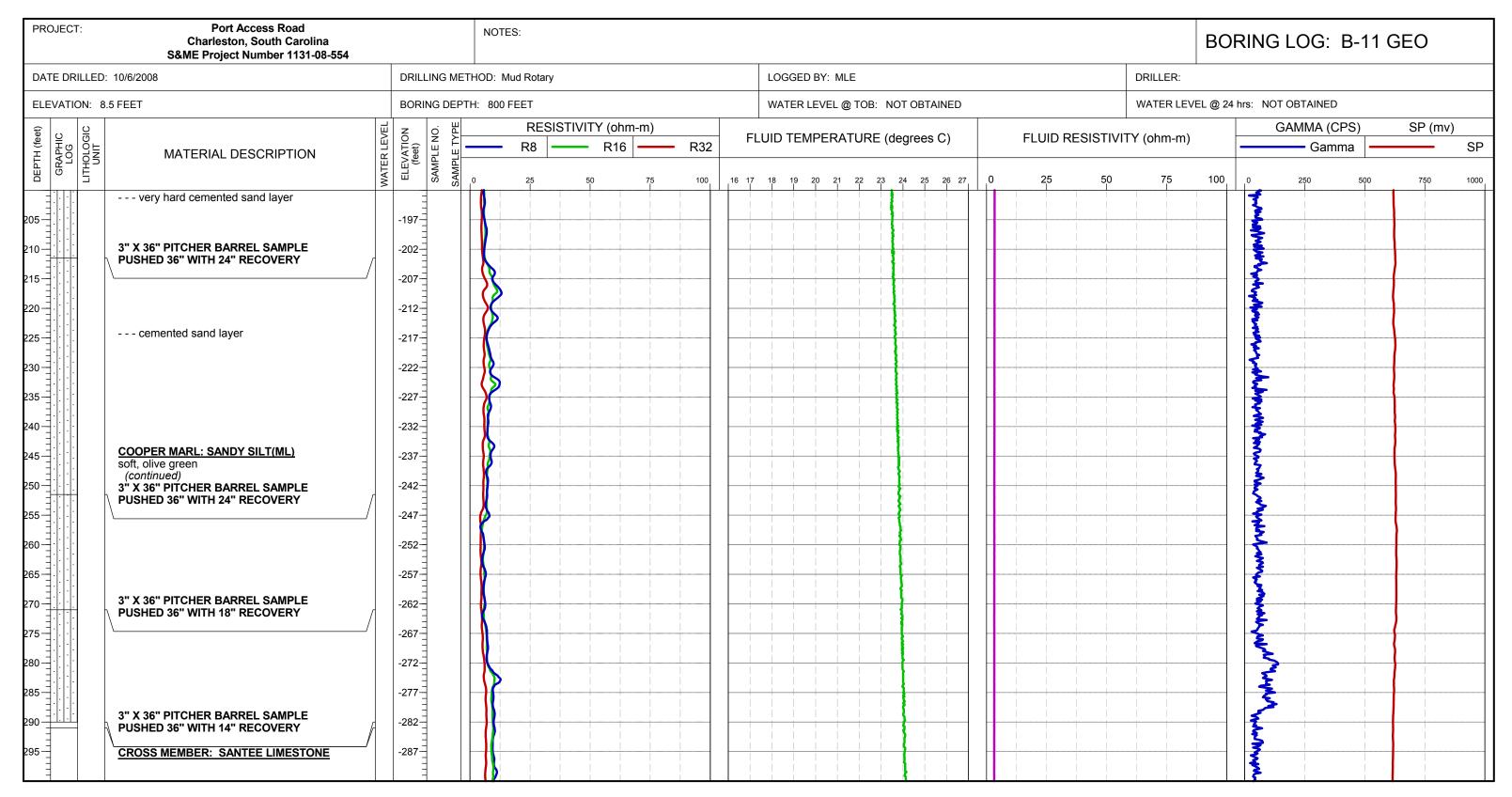
Page 1 of 9

PROJECT:	Port Access Road Charleston, South Carolina S&ME Project Number 1131-08-554		NOTES:									BORING LOG: B-11 GEO							
DATE DRILLED:	10/6/2008	DRILLING MET	ETHOD: Mud Rotary		LOGGED	BY: ML	E					DRILLER:							
ELEVATION: 8.5		BORING DEPT	PTH: 800 FEET		WATER LEVEL @ TOB: NOT OBTAINED								WATER LEVEL @ 24 hrs: NOT OBTAINED						
(feet)	MATERIAL DESCRIPTION	TYPE	RESISTIVITY (ohm-m)	FL	.UID TEM	PERA	ΓURE	(degree	es C)	FLUID	RESISTIVI	TY (ohm-m	1)		AMMA (Cl		SP (m	ıv) SP	
DEPTH (feet) GRAPHIC LOG LITHOLOGIC UNIT	MATERIAL DESCRIPTION	ELEVATION (feet) SAMPLE NO.														iia			
-1111	≥	- S AS	0 25 50 75 100	16 17	18 19	20 21	22 23	3 24 2	25 26 27	0 25	50	75	100		250	500	750	1000	
110-		-97 -102												4	 				
115— 	firm	-107												1					
125—		-117-					 					 	 		 	<u> </u>	<u> </u>		
130 - 1 1 1 1 1 1 1 1 1 1	3" X 30" FIXED PISTON SAMPLE PUSHED 24" WITH 30" RECOVERY	-122-												3					
140		-132					 	 					 	SAN MAN		<u> </u>	<u> </u>		
145 —	COOPER MARL: SANDY SILT(ML) soft, olive green	-137 												**************************************					
155	soft, olive green (continued)	-147																	
160 — :		-152												1 3					
165 - 1 1 1 1 1 1 1 1 1 1	3" X 36" PITCHER BARREL SAMPLE PUSHED 36" WITH 12" RECOVERY	-157 												1					
175	PUSHED 36 WITH 12 RECOVERY	-167												1					
180 - 		-172 - -177 - -177 -												A CONTRACTOR					
190 =		-182												1					
195		-187												Skel Jan					

- 1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
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- 3. THE GEOPHYSICAL LOGGING DATA WAS OBTAINED USING MOUNT SOPRIS INSTRUMENTS GEOPHYSICAL LOGGING EQUIPMENT.
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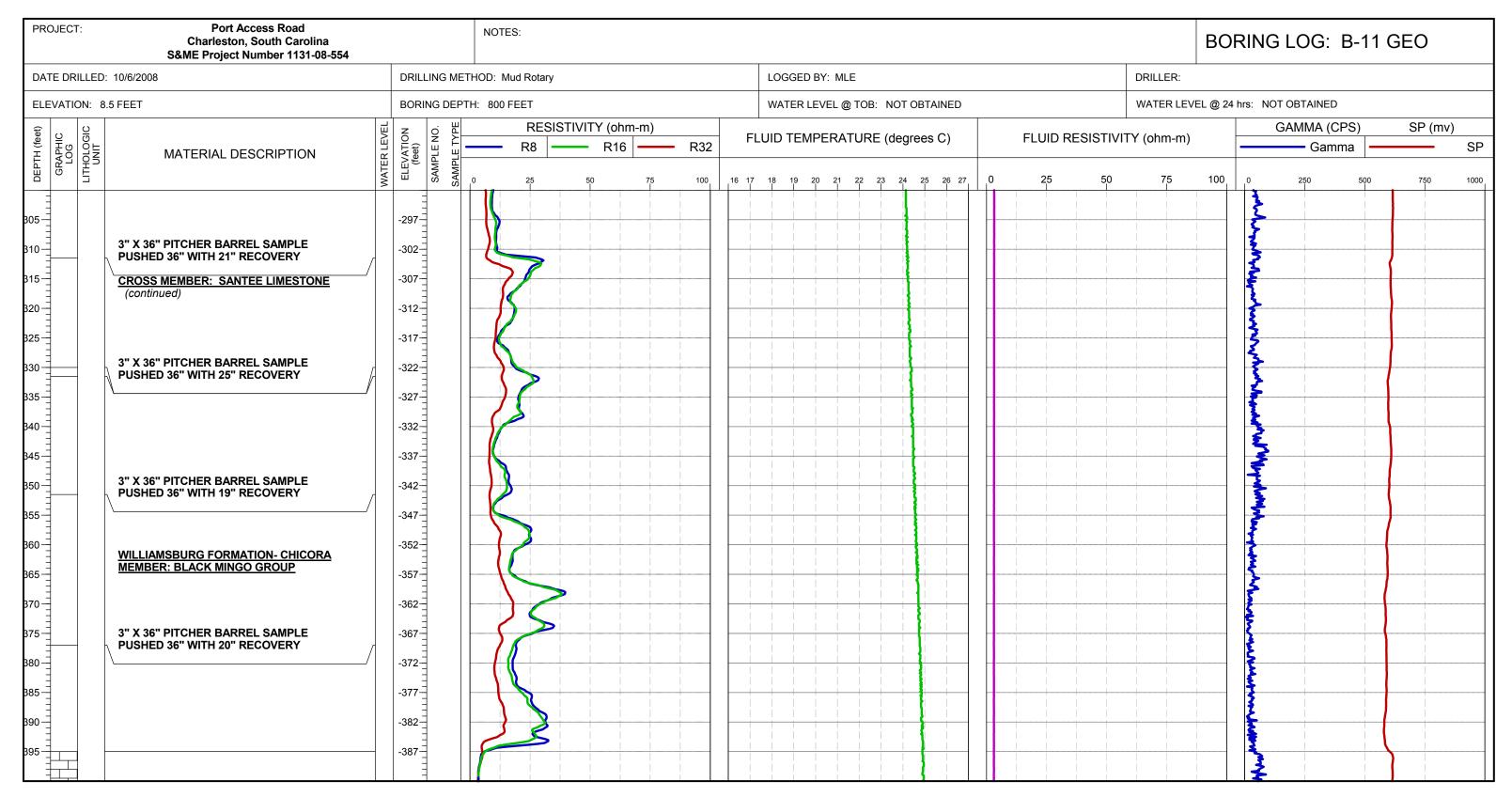
Page 2 of 9



- 1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
- 2. GEOTECHNICAL BORING AND SAMPLING OPERATIONS WERE CONDUCTED IN GENERAL ACCORDANCE WITH ASTM D 5783 AND ASTM D 2113.
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- 4. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
- 5. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



Page 3 of 9



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- 2. GEOTECHNICAL BORING AND SAMPLING OPERATIONS WERE CONDUCTED IN GENERAL ACCORDANCE WITH ASTM D 5783 AND ASTM D 2113.
- 3. THE GEOPHYSICAL LOGGING DATA WAS OBTAINED USING MOUNT SOPRIS INSTRUMENTS GEOPHYSICAL LOGGING EQUIPMENT.
- 4. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
- 5. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



Page 4 of 9

PROJECT: Port Access Road Charleston, South Carolina S&ME Project Number 1131-08-554		NOTES:										ВО	RING L	OG: E	8-11 G	iΕΟ	
DATE DRILLED: 10/6/2008	DRILLING METI	HOD: Mud Rotary			LOGGED BY:	MLE					DRILLER:						
ELEVATION: 8.5 FEET	BORING DEPTI	H: 800 FEET			WATER LEVE	L @ TOB: N	NOT OBTAI	INED			WATER LE	VEL @ 24	hrs: NOT Of	BTAINED			
GIC GIC	NO.	RESISTIVITY		FL	UID TEMPE	RATURE (degrees	C)	FLUID RE	ESISTIVIT	Y (ohm-m))	GAI	MMA (CP		SP (m	
GRAPHIC LITHOLOGIC UNIT UNIT UNIT WATER LEVEL		R8	R16 R32			- (- ,	,			,		- Gamm	a		SP
LITI G B	ELEV, (fe SAMPL	0 25 50	75 100	16 17	18 19 20	21 22 23	24 25	26 27 0	25	50	75	100	0	250	500	750	1000
405	-397						<u> </u>						Ž				
]												\$				
	-402 -												3				
415	-407 -										-ii		\$		i		
420	-412												3				
WILLIAMSBURG FORMATION- LOWER BRIDGE MEMBER: BLACK MINGO GROUP	-417-						<u> </u>				<u> </u>		3		<u> </u>		
(continued) 3" X 36" PITCHER BARREL SAMPLE	-422												\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				
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Page 5 of 9

PROJECT: Port Access Road Charleston, South Carolina S&ME Project Number 1131-08-554		NOTES:					BORING LOG: B-11 GEO										
DATE DRILLED: 10/6/2008	DRILLING MET	ΓΗΟD: Mud Rotary			LOGGED BY:	MLE					DRILLER:						
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Page 6 of 9

PROJECT: Port Access Road Charleston, South Carolina S&ME Project Number 1131-08-554		NOTES:					ВО	BORING LOG: B-11 GEO										
DATE DRILLED: 10/6/2008	DRILLING MET	HOD: Mud Rotar	у			LOGGED BY	MLE					DRILLER:						
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PROJECT: Port Access Road Charleston, South Carolina S&ME Project Number 1131-08-554		NOTES:					ВО	BORING LOG: B-11 GEO								
DATE DRILLED: 10/6/2008	DRILLING MET	THOD: Mud Rotary			LOGGED BY:	MLE					DRILLER:					
ELEVATION: 8.5 FEET	BORING DEPT	H: 800 FEET			WATER LEVE	L @ TOB: 1	NOT OBTAIN	IED			WATER LE	EVEL @ 24	hrs: NOT OBTA	INED		
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Charlestor	Access Road n, South Carolina Number 1131-08-554			NOTES:														ВС	ORIN	G LC)G: B-	-11 G	EO	
DATE DRILLED: 10/6/2008		DRIL	LING METI	HOD: Mud Rota	ary				LOC	GGED BY:	MLE						DRILLER:							
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feet)	EVEL	NO (RESISTIVITY (ohm-m) R8 R8 R16 R32 R16 R32 R16 R32 R17 R32 R18 R18 R18 R32 R18 R19 R32							MA (CPS)		SP (mv												
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REPORT

P-S SUSPENSION LOGGING BOREHOLE B-11GEO

PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA

Report 8456-01 Rev 1

December 22, 2008

REPORT

P-S SUSPENSION LOGGING BOREHOLE B-11GEO

PORT ACCESS ROAD NORTH CHARLESTON, SOUTH CAROLINA

Report 8456-01 Rev 1 Prepared for:

S&ME, Inc. 620 Wando Park Boulevard Mt. Pleasant SC 29464

Prepared by

GEOVision Geophysical Services 1124 Olympic Drive Corona, California 92881 (951) 549-1234

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INTRODUCTION

OYO suspension velocity measurements were performed in a single borehole adjacent to I-26 off Austin Road, in North Charleston, South Carolina, as a component of the geotechnical investigation of the Port Access Road. Suspension logging data acquisition was performed on October 17 and December 11, 2008 by John Diehl of GEOVision. The analysis and report were prepared by John Diehl and all work was reviewed by Antony Martin, also of GEOVision. The work was performed under subcontract with S&ME of Charleston, with Aaron Goldberg as the point of contact for S&ME.

This report presents the results of suspension velocity measurements collected in the uncased boring designated B-11GEO, as detailed below. The purpose of this study was to acquire shear wave velocities and compressional wave velocities as a function of depth.

BORING DESIGNATION	DATES LOGGED	GENERAL LOCATION	GROUND SURFACE ELEVATION +	COORD	INATES*
			(FT)	LAT (North)	LONG (West)
B-11GEO 60-500ft	10-17-08	Charleston, SC	8.5	32.833599	79.958476
B-11GEO 500-800ft	12-11-08	Charleston, SC	8.5	32.833599	79.958476

^{*}coordinates are in NAD 83 latitudes and longitudes

Table 1 Boring locations and logging dates

The OYO Model 170 Suspension Logging Recorder and Suspension Logging Probe were used to obtain in-situ horizontal shear and compressional wave velocity measurements at 1.64 ft intervals. The acquired data was analyzed and a profile of velocity versus depth was produced for both compressional and horizontally polarized shear waves.

⁺ vertical datum NAVD88, feet

INSTRUMENTATION AND PROCEDURES

The **GEO***Vision* Procedure for Oyo P-S Suspension Seismic Velocity Logging (Appendix A) was followed during this investigation. This procedure was supplied and approved in advance of the field work. Following is a summary.

OYO P-S Suspension Instrumentation

Suspension soil velocity measurements were performed using the Model 170 P- and S_H -wave suspension logging system, manufactured by OYO Corporation. A 7-conductor version of this OYO system was used during the first logging run, and a 4-conductor version for the second run. Otherwise the probe for both tests was identical.

Calibration records for both recorders are presented in Appendix B. The suspension logging system directly determines the average velocity of a segment of the soil column surrounding the borehole of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the borehole producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source (S_H) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 1. The separation of the two receivers is approximately 1 meter allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in this survey is 5.8m with the center point of the receiver pair 3.7m above the bottom end of the probe. The probe receives control signals from, and sends the amplified receiver signals to, instrumentation on the surface via an armored 4 or 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured via encoder to provide probe depth data.

The entire probe is suspended by the cable and approximately centered in the borehole.

Therefore, source motion is not coupled directly to the borehole walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the borehole and

surrounding the source. This pressure wave is converted to P and S_H -waves in the surrounding soil and rock as it impinges upon the borehole wall. These waves propagate through the soil and rock surrounding the borehole, in turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P- and S_H -waves at the receivers is achieved as follows:

- 1. Orientation of the horizontal receivers is maintained parallel to the axis of the source, thereby maximizing the amplitude of the recorded SH-wave signals.
- 2. At each depth, S_H -wave signals are recorded with the source actuated in opposite directions, producing S_H -wave signals of opposite polarity, providing a characteristic S_H -wave signature distinct from the P-wave signal.
- 3. The 2.1m separation of source and first receiver permits the P-wave signal to pass and damp significantly before the slower S_H -wave signal arrives at the receiver. In faster soils or rock, the isolation tube is extended to allow greater separation of the P- and S_H -wave signals.
- In saturated soils, the received P-wave signal is typically of much higher frequency than the received S_H-wave signal, permitting additional separation of the two signals by low pass filtering.
- 5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (meter versus centimeter scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

- 1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
- 2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
- 3. The source is fired again and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S_H -wave arrivals. Reversal of the source changes the polarity of the S_H -wave pattern but not the P-wave pattern.

The data gathered from each receiver during the source activation is recorded as a different channel on the recording system. The Model 170 digital recorder has six channels (two simultaneous recording channels), each with a 12 bit, 1024 sample record. The recorded data is displayed on a CRT display and transferred via GPIB interface to hard disk for further processing. Up to 8 sampling sequences can be summed to improve the signal to noise ratio of the signals.

Review of the displayed data on the CRT allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and summing number to optimize the quality of the data before recording. Verification of the calibration of the Model 170 digital recorder is performed every twelve months using a NIST traceable frequency source and counter.

Field Measurement Procedures

10-17-08

The borehole probe was first positioned with the center of the receivers at ground surface. The electronic depth counters were set to 0m. The probe was then lowered below the surface to below the surface casing for the first measurement, at about 61ft. Subsequent measurements were made at 0.5m intervals as the probe was lowered down the borehole. At each measurement depth a measurement sequence of two opposite horizontal records and one vertical record was performed while the probe was stationary. Gains and record lengths were adjusted as required. The data record from each depth was checked, accepted or repeated, recorded on diskette, and printed before moving to the next depth. This continued until the last measurement at the bottom of the borehole.

12-11-08

The procedure for the second logging run was nearly identical, except that measurements began at approximately 480ft below the surface, providing a small overlap of data.

DATA ANALYSIS

The OYO Model 170 P-S Suspension Logger system can be used to measure ground velocity in two ways using the same data. The standard method is to measure the velocity from the travel time between the two receivers, as described under "Instrumentation" in the previous section. A second method is to use the travel time from the source to the first receiver. The difference between these methods is summarized as follows:

- 1. The receiver-to-receiver (R1-R2) method is normally more accurate, because the picks are made from the peak of the arrival waveform. The analyst picks the arrival waveform and software is used to find the peaks. Travel time is then from peak-to-peak.
- 2. R1-R2 data has higher resolution, because the travel time is averaged over the nominal 1m between receivers. The greater scatter in velocities is attributed to the changes in material from one measurement location to another. These measurements are very repeatable.
- 3. Averaging the "normal" and "reverse" travel times eliminates errors due to hysteresis of the source (difference in actuation pulses).
- 4. Source-to-receiver (S-R1) measurements are subject to a source delay, nominally 4 milliseconds for the 7-conductor system, and 3 milliseconds for the 4-conductor system. This source delay is independently verifiable, but subject at times to change due to degradation of source springs during the measurement program.
- 5. The S-R1 results are subject to larger errors as the analyst must select the first S_H-wave arrival (first motion) often in the presence of P-wave contamination rather that the first peak of the waveform. These errors are less significant, however, since the total travel path is twice as long.
- 6. The S-R1 results exhibit less scatter, since the velocity is averaged over the greater distance from the source to the first receiver, 2.1m compared to 1m.
- 7. The S-R1 results are less subject to possible effects of attenuation and dispersion, if present, because first arrivals are picked. However, if the horizontal waveforms exhibit significantly different frequency content at the near and far receivers then the R1-R2 data is interpreted using first arrival picks rather than peak to peak travel time.

8. The S-R1 data set extends about 1.5m deeper than the R1-R2 data set. The reason is that the depth reference location between the source and the first receiver is about 2.1m below the depth reference between R1 and R2.

For the above considerations, R1-R2 results are typically considered "primary" results, and S-R1 results are used only to check the validity of the R1-R2 results for quality assurance purposes.

P-Wave Analysis

The recorded digital records were analyzed to locate the first minima or first arrival on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals was used to calculate the P-wave velocity for that 1m segment of the soil column. When observable, P-wave arrivals on the horizontal axis records were used to verify the velocities determined from the vertical axis data. P-wave arrival data was generally of excellent quality in the borehole.

The P-wave velocity calculated from the travel time over the 2.1m interval from source to receiver 1 (S-R1) was calculated and plotted for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 1.5m to correspond to the mid-point of the 2.1m S-R1 interval, as illustrated in Figure 1. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting the source delay; approximately 3 or 4 milliseconds (see above), the calculated and experimentally verified delay from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of acceleration of the solenoid before impact.

S_H-Wave Analysis

The recorded digital records were studied to establish the presence of clear S_H -wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the S_H -wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT - IFFT low-pass filtering was used to remove the higher frequency P-wave signal from the S_H -wave signal. Different filter cutoffs were used to separate P- and S_H -waves at different depths.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in the actuation time of the solenoid source. This is caused by constant mechanical bias in the source or by borehole inclination. This variation does not affect the R1-R2 velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

The S_H -wave velocity calculated from the travel time over the 2.1m interval from source to receiver 1 (S-R1) was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 1.5m to correspond to the mid-point of the 2.1m S-R1 interval, as illustrated in Figure 1. Travel times were obtained by picking the first break of the S_H -wave signal at the near receiver and subtracting approximately 4 or 3 milliseconds (see above), the source delay.

RESULTS

Discussion of OYO P-S Suspension Velocity Log Results

Suspension R1-R2 P- and S_H-wave velocities for borehole B-11GEO is plotted in Figure 2. The suspension velocity data presented in Figure 2 are presented in Table 2.

P and S_H -wave velocity data from quality assurance analysis for borehole B-11GEO using S-R1 data is plotted together with R1-R2 analysis in Figure 3 to aid in visual comparison. It must be noted that R1-R2 data is an average velocity over a 1m segment of the soil column whereas S-R1 data is an average over 2.1m. S-R1 data are, therefore somewhat smoother. S-R1 data are presented in tabular format in Table 3.

The overall data quality in this borehole was excellent. Good correspondence between the shapes of the P- and S_H-wave velocity curves are observed for all data sets and velocities derived from S-R1 and R1-R2 data are generally in good agreement for the borehole, providing verification of the higher resolution R1-R2 data. The agreement is quite good, and the velocities are reasonable for these materials.

OYO P-S Suspension Data Reliability

P- and S_H -wave velocity measurement using the suspension method averages velocity over a 1m depth interval. This high resolution results in the scatter of velocity values shown in the plots. Individual measurements are very reliable with estimated precision of +/- 5%.

Standardized field procedures (Appendix A) and quality assurance checks add to the reliability of these data. P and S_H -wave data quality is generally excellent.

Quality Assurance

These velocity measurements were performed using industry-standard or better methods for both measurements and analyses. All work was performed under **GEO***Vision* quality assurance procedures, which include:

- Use of before and after NIST-traceable calibrations, where applicable, for field and laboratory instrumentation.
- Use of standard field data logs
- Use of independent verification of data by comparison of receiver-to-receiver and sourceto-receiver velocities.
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

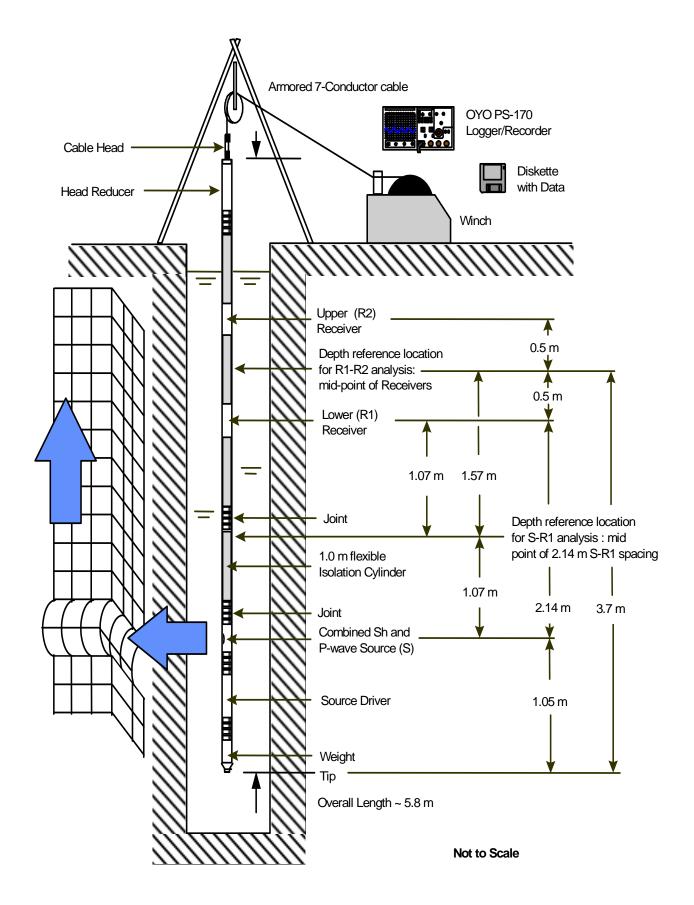


Figure 1: Concept Illustration of P-S Logging System

B-11GEO PORT ACCESS ROAD Receiver to Receiver V_s and V_p Analysis

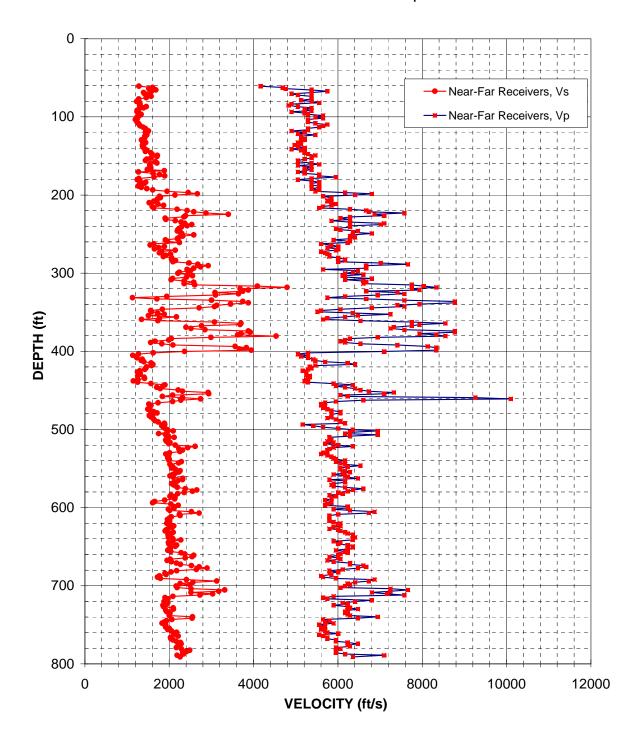


Figure 2: Borehole B-11GEO, Suspension Receiver to Receiver P- and S_{H} -wave Velocities

Table 2: Summary of Shear and Compressional Wave Velocity Based on Receiver-to-Receiver Travel Time Data - Borehole B-11GEO, Port Access Road, North Charleston

,	Americar	n Units	
Depth at	Vel	ocity	
Midpoint			
Between	١,,	.,	Poisson's
Receivers	V _s	V _p	Ratio
(ft)	(ft/s)	(ft/s)	
60.7	1280	4170	0.45
62.3	1610	4690	0.43
64.0	1520	4760	0.44
65.6	1680	5380	0.45
67.3	1580	5750	0.46
68.9	1390	5380	0.46
70.5	1420	4900	0.45
72.2	1520	5050	0.45
73.8	1570	5380	0.45
75.5	1460	5380	0.46
77.1	1280	5380	0.47
78.7	1260	5130	0.47
80.4	1230	5380	0.47
82.0	1300	5560	0.47
83.7	1310	4900	0.46
85.3	1300	4830	0.46
86.9	1460	5050	0.45
88.6	1390	5380	0.46
90.2 91.9	1280 1240	5210 5380	0.47
93.5	1240	4900	0.47 0.47
95.1	1280	5210	0.47
96.8	1330	5290	0.47
98.4	1300	5650	0.47
100.1	1240	5460	0.47
101.7	1250	5650	0.47
103.4	1200	5290	0.47
105.0	1230	5290	0.47
106.6	1240	5290	0.47
108.3	1270	5460	0.47
109.9	1290	5750	0.47
111.6	1310	5650	0.47
113.2	1380	5560	0.47
114.8	1430	5290	0.46
116.5	1460	5290	0.46
118.1	1510	4900	0.45
119.8	1440	5210	0.46
121.4	1470	5050	0.45
123.0	1470	5460	0.46
124.7	1420	5130	0.46
126.6	1420	5130	0.46

	Metric L	Metric Units									
Depth at	Velo	city									
Midpoint											
Between	\ \ <u>\</u>	V	Poisson's								
Receivers	V _s	V _p	Ratio								
(m)	(m/s)	(m/s)	0.45								
18.5	390	1270	0.45								
19.0	490	1430	0.43								
19.5	460	1450	0.44								
20.0	510	1640	0.45								
20.5	480	1750	0.46								
21.0	430	1640	0.46								
21.5	430	1490	0.45								
22.0	460	1540	0.45								
22.5	480	1640	0.45								
23.0	440	1640	0.46								
23.5	390	1640	0.47								
24.0	380	1560	0.47								
24.5	370	1640	0.47								
25.0	400	1690	0.47								
25.5	400	1490	0.46								
26.0	400	1470	0.46								
26.5	440	1540	0.45								
27.0	430	1640	0.46								
27.5	390	1590	0.47								
28.0	380	1640	0.47								
28.5	380	1490	0.47								
29.0	390	1590	0.47								
29.5	410	1610	0.47								
30.0	400	1720	0.47								
30.5	380	1670	0.47								
31.0	380	1720	0.47								
31.5	370	1610	0.47								
32.0	370	1610	0.47								
32.5	380	1610	0.47								
33.0	390	1670	0.47								
33.5	390	1750	0.47								
34.0	400	1720	0.47								
34.5	420	1690	0.47								
35.0	440	1610	0.46								
35.5	440	1610	0.46								
36.0	460	1490	0.45								
36.5	440	1590	0.46								
37.0	450	1540	0.45								
37.5	450	1670	0.46								
38.0	430	1560	0.46								
38.6	430	1560	0.46								

Д	mericar	n Units	
Depth at	Vel	ocity	
Midpoint			
Between	V	V	Poisson's
Receivers	V _s	V _p	Ratio
(ft)	(ft/s)	(ft/s)	
128.0	1400	5210	0.46
129.6	1340	5210	0.46
131.2	1370	5130	0.46
132.9	1440	5050	0.46
134.5	1400	5130	0.46
136.2	1370	4980	0.46
137.8	1370	5050	0.46
139.4	1390	5210	0.46
141.1	1420	4900	0.45
142.7	1470	5130	0.46
144.4	1440	5210	0.46
146.0	1560	5210	0.45
147.6	1590	5290	0.45
149.3	1720	5460	0.45
150.9	1710	5380	0.44
152.6	1570	5380	0.45
154.2	1470	5210	0.46
155.8	1440	5050	0.46
157.5	1670	5050	0.44
159.1	1710	5380	0.44
160.8	1540	5560	0.46
162.4	1540	5050	0.45
164.0	1560	5380	0.45
165.7	1560	5210	0.45
167.3	1480	5380	0.46
169.0	1880	5210	0.42
170.6	1270	5050	0.47
172.2	1620	5210	0.45
173.9	1770	5560	0.44
175.5	1890	5560	0.43
177.2	1640	5950	0.46
178.8	1280	5380	0.47
180.5	1240	5050	0.47
182.1	1310	5380	0.47
183.7	1440	5560	0.46
185.4	1410	5380	0.46
187.0	1290	5380	0.47
188.7	1270	5560	0.47
190.3	1340	5560	0.47
191.9	1470	5380	0.46
193.6	1610	5560	0.45
195.2	1950	5460	0.43
196.9	2450	6170	0.41

	Metric U	Jnits	
Depth at	Velo	ocity	
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
39.0	430	1590	0.46
39.5	410	1590	0.46
40.0	420	1560	0.46
40.5	440	1540	0.46
41.0	430	1560	0.46
41.5	420	1520	0.46
42.0	420	1540	0.46
42.5	430	1590	0.46
43.0	430	1490	0.45
43.5	450	1560	0.46
44.0	440	1590	0.46
44.5	480	1590	0.45
45.0	490	1610	0.45
45.5	520	1670	0.45
46.0	520	1640	0.44
46.5	480	1640	0.45
47.0	450	1590	0.46
47.5	440	1540	0.46
48.0	510	1540	0.44
48.5	520	1640	0.44
49.0	470	1690	0.46
49.5	470	1540	0.45
50.0	470	1640	0.45
50.5	480	1590	0.45
51.0	450	1640	0.46
51.5	570	1590	0.42
52.0	390	1540	0.47
52.5	490	1590	0.45
53.0	540	1690	0.44
53.5	580	1690	0.43
54.0	500	1810	0.46
54.5	390	1640	0.47
55.0	380	1540	0.47
55.5	400	1640	0.47
56.0	440	1690	0.46
56.5	430	1640	0.46
57.0	390	1640	0.47
57.5	390	1690	0.47
58.0	410	1690	0.47
58.5	450	1640	0.46
59.0	490	1690	0.45
59.5	590	1670	0.43
60.0	750	1880	0.41

American Units			
Depth at	-		
Midpoint Between	\ \ \	v	Poisson's Ratio
Receivers	V _s	V _p	Ratio
(ft)	(ft/s)	(ft/s)	0.44
198.5	2670	6800	0.41
200.1	2140	6410	0.44
201.8	1770	5650	0.45
203.4	1790	5850	0.45
205.1	1720	5850	0.45
206.7	1710	5750	0.45
208.0	1630	5750	0.46
210.0	1530	5850	0.46
211.6	1730	5950	0.45
213.3	1870	5850	0.44
214.9	1600	5650	0.46
216.5	1630	5560	0.45
218.2	2190	6290	0.43
219.8	2420	6670	0.42
221.5	2580	6730	0.41
223.1	2870	7580	0.42
224.7	3400	6870	0.34
226.4	2390	7090	0.44
228.0	2350	6290	0.42
229.7	1900	6060	0.45
231.3	1920	6290	0.45
232.9	2140	5850	0.42
234.6	2280	6290	0.42
236.2	2370	7090	0.44
237.9	2530	7020	0.42
239.5	2420	6290	0.41
241.1	2290	6290	0.42
242.8	2240	5950	0.42
244.4	2210	6060	0.42
246.1	2190	6470	0.44
247.7	2270	6350	0.43
249.3	2300	6800	0.44
251.0	2580	6350	0.40
252.6	2320	6290	0.42
254.3	2240	6410	0.43
255.9	2190	6290	0.43
257.6	1910	5900	0.44
259.2	1960	6290	0.45
260.8	2240	6230	0.43
262.5	1630	5600	0.45
264.1	1550	5850	0.46
265.8	1890	6010	0.45
267.4	1750	5750	0.45

	Metric L	Jnits	
Depth at	Depth at Velocity		
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
60.5	810	2070	0.41
61.0	650	1950	0.44
61.5	540	1720	0.45
62.0	550	1780	0.45
62.5	530	1780	0.45
63.0	520	1750	0.45
63.4	500	1750	0.46
64.0	460	1780	0.46
64.5	530	1810	0.45
65.0	570	1780	0.44
65.5	490	1720	0.46
66.0	500	1690	0.45
66.5	670	1920	0.43
67.0	740	2030	0.42
67.5	790	2050	0.41
68.0	880	2310	0.42
68.5	1040	2090	0.34
69.0	730	2160	0.44
69.5	720	1920	0.42
70.0	580	1850	0.45
70.5	590	1920	0.45
71.0	650	1780	0.42
71.5	700	1920	0.42
72.0	720	2160	0.44
72.5	770	2140	0.42
73.0	740	1920	0.41
73.5	700	1920	0.42
74.0	680	1810	0.42
74.5	670	1850	0.42
75.0	670	1970	0.44
75.5	690	1940	0.43
76.0	700	2070	0.44
76.5	790	1940	0.40
77.0	710	1920	0.42
77.5	680	1950	0.43
78.0	670	1920	0.43
78.5	580	1800	0.44
79.0	600	1920	0.45
79.5	680	1900	0.43
80.0	500	1710	0.45
80.5	470	1780	0.46
81.0	580	1830	0.45
81.5	530	1750	0.45

Δ			
Depth at	Vel	ocity	
Midpoint			
Between	.,		Poisson's
Receivers	V _s	V _p	Ratio
(ft)	(ft/s)	(ft/s)	
269.0	1650	6010	0.46
270.7	2140	5950	0.43
272.3	1820	5600	0.44
274.0	1770	5700	0.45
275.6	2030	5750	0.43
277.2	1920	5800	0.44
278.9	1860	5800	0.44
280.5	2060	6010	0.43
282.2	2060	6170	0.44
283.8	2150	6170	0.43
285.4	2090	6010	0.43
287.1	2470	7020	0.43
288.7	2680	7660	0.43
290.4	2920	6670	0.38
292.0	2740	6670	0.40
293.6	2580	6670	0.41
295.3	2420	5650	0.39
296.9	2510	6470	0.41
298.9	2240	6350	0.43
300.2	2210	6170	0.43
301.8	2430	6600	0.42
303.5	2550	6120	0.39
305.1	2420	6170	0.41
306.8	2080	6800	0.45
308.4	2040	6170	0.44
310.0	2360	6600	0.43
311.7	2580	6670	0.41
313.3	2360	6600	0.43
315.0	2600	7750	0.44
316.6	4090	8030	0.32
318.2	4800	8330	0.25
319.9	3680	7750	0.35
321.5	3880	7940	0.34
323.2	3750	6670	0.27
324.8	3090	7410	0.39
326.4	3640	7580	0.35
328.1	3100	6940	0.38
329.7	1940	6170	0.44
331.4	1130	5750	0.48
333.0	1710	6670	0.46
334.7	3000	7580	0.41
336.3	3750	8770	0.39
337.9	3880	8770	0.38

	Metric L	Jnits	
Depth at	Velo	city	
Midpoint			
Between			Poisson's
Receivers	V _s	V_p	Ratio
(m)	(m/s)	(m/s)	
82.0	500	1830	0.46
82.5	650	1810	0.43
83.0	560	1710	0.44
83.5	540	1740	0.45
84.0	620	1750	0.43
84.5	580	1770	0.44
85.0	570	1770	0.44
85.5	630	1830	0.43
86.0	630	1880	0.44
86.5	660	1880	0.43
87.0	640	1830	0.43
87.5	750	2140	0.43
88.0	820	2340	0.43
88.5	890	2030	0.38
89.0	840	2030	0.40
89.5	790	2030	0.41
90.0	740	1720	0.39
90.5	760	1970	0.41
91.1	680	1940	0.43
91.5	670	1880	0.43
92.0	740	2010	0.42
92.5	780	1860	0.39
93.0	740	1880	0.41
93.5	640	2070	0.45
94.0	620	1880	0.44
94.5	720	2010	0.43
95.0	790	2030	0.41
95.5	720	2010	0.43
96.0	790	2360	0.44
96.5	1250	2450	0.32
97.0	1460	2540	0.25
97.5	1120	2360	0.35
98.0	1180	2420	0.34
98.5	1140	2030	0.27
99.0	940	2260	0.39
99.5	1110	2310	0.35
100.0	950	2120	0.38
100.5	590	1880	0.44
101.0	340	1750	0.48
101.5	520	2030	0.46
102.0	920	2310	0.41
102.5	1140	2670	0.39
103.0	1180	2670	0.38

American Units			
Depth at	-		
Midpoint Between			Poisson's
Receivers	V _s	V_p	Ratio
(ft)	(ft/s)	(ft/s)	1333
339.6	3450	7940	0.38
341.2	3130	7410	0.39
342.9	3070	7580	0.40
344.5	2710	6800	0.41
346.1	1840	6060	0.45
347.8	1560	5600	0.46
349.4	1580	5510	0.45
351.1	1730	6350	0.46
352.7	1880	7250	0.46
354.3	1510	6470	0.47
356.0	2170	6170	0.43
357.6	1770	5750	0.45
359.3	1340	5650	0.47
360.9	1730	6540	0.46
362.5	3070	7750	0.41
364.2	3700	8550	0.38
365.8	3680	7940	0.36
367.5	2770	7750	0.43
369.1	2400	7330	0.44
370.7	2520	7250	0.43
372.4	2850	7580	0.42
374.0	3880	8770	0.38
375.7	3920	8770	0.38
377.3	3700	7940	0.36
378.9	3620	8330	0.38
380.6	4540	8550	0.30
382.2	2990	6940	0.39
383.9	2050	6290	0.44
385.5	1990	6170	0.44
387.1	1670	6060	0.46
388.8	1560	6170	0.47
390.4	1830	6540	0.46
392.1	2090	7410	0.46
393.7	3570	8130	0.38
395.3	3830	8330	0.37
397.0	3660	8330	0.38
398.6	3940	8330	0.36
400.3	2360	7090	0.44
401.9	1620	5290	0.45
403.5	1270	5050	0.47
405.2	1140	5290	0.48
406.8	1220	5130	0.47
408.5	1230	5290	0.47

	Metric L	Jnits	
Depth at	Velo		
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
103.5	1050	2420	0.38
104.0	950	2260	0.39
104.5	940	2310	0.40
105.0	830	2070	0.41
105.5	560	1850	0.45
106.0	480	1710	0.46
106.5	480	1680	0.45
107.0	530	1940	0.46
107.5	570	2210	0.46
108.0	460	1970	0.47
108.5	660	1880	0.43
109.0	540	1750	0.45
109.5	410	1720	0.47
110.0	530	1990	0.46
110.5	940	2360	0.41
111.0	1130	2610	0.38
111.5	1120	2420	0.36
112.0	840	2360	0.43
112.5	730	2230	0.44
113.0	770	2210	0.43
113.5	870	2310	0.42
114.0	1180	2670	0.38
114.5	1200	2670	0.38
115.0	1130	2420	0.36
115.5	1100	2540	0.38
116.0	1380	2610	0.30
116.5	910	2120	0.39
117.0	630	1920	0.44
117.5	610	1880	0.44
118.0	510	1850	0.46
118.5	480	1880	0.47
119.0	560	1990	0.46
119.5	640	2260	0.46
120.0	1090	2480	0.38
120.5	1170	2540	0.37
121.0	1120	2540	0.38
121.5	1200	2540	0.36
122.0	720	2160	0.44
122.5	490	1610	0.45
123.0	390	1540	0.47
123.5	350	1610	0.48
124.0	370	1560	0.47
124.5	380	1610	0.47

American Units			
Depth at	Vel	ocity	
Midpoint Between Receivers	V _s	V _p	Poisson's Ratio
(ft)	(ft/s)	(ft/s)	7100
410.1	1360	5420	0.47
411.8	1340	5460	0.47
413.4	1400	5700	0.47
415.0	1570	6230	0.47
416.7	1610	6410	0.47
418.3	1580	5460	0.45
420.0	1470	5330	0.46
421.6	1450	5380	0.46
423.2	1420	5290	0.46
424.9	1300	5170	0.47
426.5	1250	5250	0.47
428.2	1310	5250	0.47
429.8	1290	5250	0.47
431.4	1260	5330	0.47
433.1	1410	5330	0.46
434.7	1420	5290	0.46
436.4	1260	5250	0.47
438.0	1150	5210	0.47
439.6	1250	5290	0.47
441.3	1570	5900	0.46
442.9	1900	6350	0.45
444.6	1850	5950	0.45
446.2	1710	6170	0.46
447.8	1790	6410	0.46
449.5	2210	6540	0.44
451.1	2310	6730	0.43
452.8	2920	7330	0.41
454.4	2940	7090	0.40
456.0	2080	6060	0.43
457.7	1840	6230	0.45
459.3	2310	9260	0.47
461.0	2740	10100	0.46
462.6	2280	6600	0.43
464.2	2080	5950	0.43
465.9	1740	5700	0.45
467.5	1520	5600	0.46
469.2	1570	5600	0.46
470.8	1540	5700	0.46
472.4	1540	5650	0.46
474.1	1490	5750	0.46
475.7	1540	5850	0.46
477.4	1630	6060	0.46
479.0	1710	6060	0.46

	Metric L	Jnits	
Depth at	Velo		
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
125.0	410	1650	0.47
125.5	410	1670	0.47
126.0	430	1740	0.47
126.5	480	1900	0.47
127.0	490	1950	0.47
127.5	480	1670	0.45
128.0	450	1630	0.46
128.5	440	1640	0.46
129.0	430	1610	0.46
129.5	400	1580	0.47
130.0	380	1600	0.47
130.5	400	1600	0.47
131.0	390	1600	0.47
131.5	380	1630	0.47
132.0	430	1630	0.46
132.5	430	1610	0.46
133.0	380	1600	0.47
133.5	350	1590	0.47
134.0	380	1610	0.47
134.5	480	1800	0.46
135.0	580	1940	0.45
135.5	560	1810	0.45
136.0	520	1880	0.46
136.5	540	1950	0.46
137.0	680	1990	0.44
137.5	710	2050	0.43
138.0	890	2230	0.41
138.5	900	2160	0.40
139.0	640	1850	0.43
139.5	560	1900	0.45
140.0	710	2820	0.47
140.5	840	3080	0.46
141.0	690	2010	0.43
141.5	640	1810	0.43
142.0	530	1740	0.45
142.5	460	1710	0.46
143.0	480	1710	0.46
143.5	470	1740	0.46
144.0	470	1720	0.46
144.5	450	1750	0.46
145.0	470	1780	0.46
145.5	500	1850	0.46
146.0	520	1850	0.46

American Units					
Depth at	Depth at Velocity				
Midpoint					
Between	\ \ \	V	Poisson's		
Receivers	V _s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
480.6	1610	5850	0.46		
482.3	1530	5850	0.46		
483.9	1560	5850	0.46		
485.6	1610	5750	0.46		
487.2	1640	5950	0.46		
488.9	1660	6060	0.46		
490.5	1740	6060	0.46		
492.1	1890	6170	0.45		
493.8	1890	5170	0.42		
495.4	1830	5420	0.44		
497.1	1860	5650	0.44		
498.7	1900	6010	0.44		
500.3	1960	6350	0.45		
502.0	2100	6940	0.45		
503.6	1950	6290	0.45		
505.3	1750	6170	0.46		
506.9	1920	6940	0.46		
508.5	1980	6290	0.45		
510.2	2120	5800	0.42		
511.8	1970	5800	0.43		
513.5	1920	5850	0.44		
515.1	1930	5750	0.44		
516.7	2020	5900	0.43		
518.4	1990	5700	0.43		
520.0	2140	6010	0.43		
521.7	2610	6350	0.40		
523.3	2440	5900	0.40		
524.9	2230	5800	0.41		
526.6	2310	5750	0.40		
528.2	2250	5750	0.41		
529.9	2010	5650	0.43		
531.5	1920	5600	0.43		
533.1	1990	5750	0.43		
534.8	1970	5850	0.44		
536.4	1970	5900	0.44		
538.1	2000	5950	0.44		
539.7	2000	6170	0.44		
541.3	2290	5950	0.41		
543.0	2220	6060	0.42		
544.6	2020	6170	0.44		
546.3	2040	6540	0.45		
547.9	2090	6230	0.44		
549.5	2060	6060	0.43		

Metric Units			
Depth at	Velo		
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
146.5	490	1780	0.46
147.0	470	1780	0.46
147.5	480	1780	0.46
148.0	490	1750	0.46
148.5	500	1810	0.46
149.0	510	1850	0.46
149.5	530	1850	0.46
150.0	580	1880	0.45
150.5	580	1580	0.42
151.0	560	1650	0.44
151.5	570	1720	0.44
152.0	580	1830	0.44
152.5	600	1940	0.45
153.0	640	2120	0.45
153.5	590	1920	0.45
154.0	530	1880	0.46
154.5	580	2120	0.46
155.0	600	1920	0.45
155.5	650	1770	0.42
156.0	600	1770	0.43
156.5	580	1780	0.44
157.0	590	1750	0.44
157.5	620	1800	0.43
158.0	610	1740	0.43
158.5	650	1830	0.43
159.0	800	1940	0.40
159.5	740	1800	0.40
160.0	680	1770	0.41
160.5	710	1750	0.40
161.0	690	1750	0.41
161.5	610	1720	0.43
162.0	590	1710	0.43
162.5	610	1750	0.43
163.0	600	1780	0.44
163.5	600	1800	0.44
164.0	610	1810	0.44
164.5	610	1880	0.44
165.0	700	1810	0.41
165.5	680	1850	0.42
166.0	620	1880	0.44
166.5	620	1990	0.45
167.0	640	1900	0.44
167.5	630	1850	0.43

American Units			
Depth at	Vel	ocity	
Midpoint			
Between		.,	Poisson's
Receivers	V _s	V _p	Ratio
(ft)	(ft/s)	(ft/s)	
551.2	2150	6060	0.43
552.8	2260	6170	0.42
554.5	2230	6290	0.43
556.1	2140	6120	0.43
557.7	2080	5900	0.43
559.4	2020	6170	0.44
561.0	2100	6230	0.44
562.7	2320	6470	0.43
564.3	2310	5800	0.41
565.9	2200	6170	0.43
567.6	2120	6170	0.43
569.2	2060	5900	0.43
570.9	2100	5850	0.43
572.5	2160	5900	0.42
574.2	2190	6170	0.43
575.8	2380	6600	0.43
577.4	2660	6350	0.39
579.1	2550	6230	0.40
580.7	2360	6010	0.41
582.4	2200	6120	0.43
584.0	2040	5800	0.43
585.6	2020	5950	0.43
587.3	2140	5850	0.42
588.9	2130	5850	0.42
590.6	1890	5700	0.44
592.2	1660	5850	0.46
593.8	1610	5850	0.46
595.5	2040	5750	0.43
597.1	2210	5700	0.41
598.8	2110	6230	0.44
600.4	2120	6230	0.43
602.0	1980	5900	0.44
603.7	2010	6290	0.44
605.3	2530	6870	0.42
607.0	2710	6730	0.40
608.6	2240	6010	0.42
610.2	2260	5800	0.41
611.9	2050	5800	0.43
613.5	2010	5800	0.43
615.2	1960	5800	0.44
616.8	2010	5800	0.43
618.4	2010	5900	0.43
620.1	1940	6060	0.44

	Metric L	Jnits	
Depth at	Depth at Velocity		
Midpoint			
Between			Poisson's
Receivers	V _s	V _p	Ratio
(m)	(m/s)	(m/s)	
168.0	660	1850	0.43
168.5	690	1880	0.42
169.0	680	1920	0.43
169.5	650	1860	0.43
170.0	640	1800	0.43
170.5	620	1880	0.44
171.0	640	1900	0.44
171.5	710	1970	0.43
172.0	710	1770	0.41
172.5	670	1880	0.43
173.0	650	1880	0.43
173.5	630	1800	0.43
174.0	640	1780	0.43
174.5	660	1800	0.42
175.0	670	1880	0.43
175.5	730	2010	0.43
176.0	810	1940	0.39
176.5	780	1900	0.40
177.0	720	1830	0.41
177.5	670	1860	0.43
178.0	620	1770	0.43
178.5	620	1810	0.43
179.0	650	1780	0.42
179.5	650	1780	0.42
180.0	580	1740	0.44
180.5	510	1780	0.46
181.0	490	1780	0.46
181.5	620	1750	0.43
182.0	680	1740	0.41
182.5	640	1900	0.44
183.0	650	1900	0.43
183.5	600	1800	0.44
184.0	610	1920	0.44
184.5	770	2090	0.42
185.0	830	2050	0.40
185.5	680	1830	0.42
186.0	690	1770	0.41
186.5	630	1770	0.43
187.0	610	1770	0.43
187.5	600	1770	0.44
188.0	610	1770	0.43
188.5	610	1800	0.43
189.0	590	1850	0.44

American Units					
Depth at Velocity					
Midpoint					
Between	.,	V	Poisson's		
Receivers	V _s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
621.7	2010	6010	0.44		
623.4	2110	6060	0.43		
625.0	2070	5900	0.43		
627.0	1980	5800	0.43		
628.3	1940	6010	0.44		
629.9	1900	6060	0.45		
631.6	2100	6170	0.43		
633.2	2050	6230	0.44		
634.8	1970	6350	0.45		
636.5	1990	6350	0.45		
638.1	1980	6410	0.45		
639.8	2090	6350	0.44		
641.4	2280	6350	0.43		
643.0	2090	5900	0.43		
644.7	1980	6060	0.44		
646.3	1990	6010	0.44		
648.0	2180	6230	0.43		
649.6	2140	6350	0.44		
651.3	2030	6350	0.44		
652.9	2000	6230	0.44		
654.5	1970	5950	0.44		
656.2	2040	6170	0.44		
657.8	2280	6230	0.42		
659.5	2370	6060	0.41		
661.1	2580	6010	0.39		
662.7	2540	5800	0.38		
664.4	2380	6010	0.41		
666.0	2030	6060	0.44		
667.7	1950	5750	0.44		
669.3	2050	5900	0.43		
670.9	2170	6290	0.43		
672.6	2270	6290	0.43		
674.2	2530	6600	0.41		
675.9	2710	6670	0.40		
677.5	2900	6470	0.37		
679.1	2650	6120	0.38		
680.8	2180	5800	0.42		
682.4	2040	6010	0.43		
684.1	1900	5800	0.44		
685.7	1930	5850	0.44		
687.3	1770	5600	0.44		
689.0	1720	5650	0.45		
690.6	1790	5950	0.45		
030.0	1730	0900	0.40		

Metric Units				
Depth at	Velo	city		
Midpoint				
Between			Poisson's	
Receivers	V _s	V _p	Ratio	
(m)	(m/s)	(m/s)		
189.5	610	1830	0.44	
190.0	640	1850	0.43	
190.5	630	1800	0.43	
191.1	600	1770	0.43	
191.5	590	1830	0.44	
192.0	580	1850	0.45	
192.5	640	1880	0.43	
193.0	630	1900	0.44	
193.5	600	1940	0.45	
194.0	610	1940	0.45	
194.5	600	1950	0.45	
195.0	640	1940	0.44	
195.5	690	1940	0.43	
196.0	640	1800	0.43	
196.5	600	1850	0.44	
197.0	610	1830	0.44	
197.5	660	1900	0.43	
198.0	650	1940	0.44	
198.5	620	1940	0.44	
199.0	610	1900	0.44	
199.5	600	1810	0.44	
200.0	620	1880	0.44	
200.5	700	1900	0.42	
201.0	720	1850	0.41	
201.5	790	1830	0.39	
202.0	780	1770	0.38	
202.5	730	1830	0.41	
203.0	620	1850	0.44	
203.5	590	1750	0.44	
204.0	630	1800	0.43	
204.5	660	1920	0.43	
205.0	690	1920	0.43	
205.5	770	2010	0.41	
206.0	830	2030	0.40	
206.5	880	1970	0.37	
207.0	810	1860	0.38	
207.5	660	1770	0.42	
208.0	620	1830	0.43	
208.5	580	1770	0.44	
209.0	590	1780	0.44	
209.5	540	1710	0.44	
210.0	530	1720	0.45	
210.5	550	1810	0.45	

American Units					
Depth at	-				
Midpoint Between	.,	.,	Poisson's		
Receivers	V _s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
692.3	2410	6870	0.43		
693.9	3130	6730	0.36		
695.5	2560	6410	0.40		
697.2	2260	6230	0.42		
698.8	2490	6290	0.41		
700.5	2160	6170	0.43		
702.4	2190	6060	0.43		
703.7	2520	7250	0.43		
705.4	3320	7660	0.38		
707.0	3170	7250	0.38		
708.7	2520	6800	0.42		
710.3	3030	7170	0.39		
711.9	2730	7580	0.43		
713.6	2090	5900	0.43		
715.2	1900	5650	0.44		
716.9	1970	5750	0.43		
718.5	1940	6800	0.46		
720.1	1880	6410	0.45		
721.8	1970	6120	0.44		
723.4	1940	6230	0.45		
725.1	1850	5900	0.45		
726.7	1870	6230	0.45		
728.4	2100	6290	0.44		
730.0	2100	6470	0.44		
731.6	1920	6230	0.45		
733.3	1940	6170	0.44		
734.9	2020	6170	0.44		
736.6	2000	6230	0.44		
738.2	2000	6290	0.44		
739.8	2550	6940	0.42		
741.5	2540	6470	0.41		
743.1	2060	5650	0.42		
744.8	1940	5800	0.44		
746.4	1880	5700	0.44		
748.0	1830	5900	0.45		
749.7	1920	5560	0.43		
751.3	1910	5700	0.44		
753.0	1920	5700	0.44		
754.6	2000	5600	0.43		
756.2	1970	5600	0.43		
757.9	2060	5700	0.43		
759.5	2180	5750	0.42		
761.2	2110	6010	0.43		

Metric Units				
Depth at	Velo	city		
Midpoint				
Between			Poisson's	
Receivers	V _s	V _p	Ratio	
(m)	(m/s)	(m/s)		
211.0	730	2090	0.43	
211.5	950	2050	0.36	
212.0	780	1950	0.40	
212.5	690	1900	0.42	
213.0	760	1920	0.41	
213.5	660	1880	0.43	
214.1	670	1850	0.43	
214.5	770	2210	0.43	
215.0	1010	2340	0.38	
215.5	970	2210	0.38	
216.0	770	2070	0.42	
216.5	920	2180	0.39	
217.0	830	2310	0.43	
217.5	640	1800	0.43	
218.0	580	1720	0.44	
218.5	600	1750	0.43	
219.0	590	2070	0.46	
219.5	570	1950	0.45	
220.0	600	1860	0.44	
220.5	590	1900	0.45	
221.0	560	1800	0.45	
221.5	570	1900	0.45	
222.0	640	1920	0.44	
222.5	640	1970	0.44	
223.0	590	1900	0.45	
223.5	590	1880	0.44	
224.0	620	1880	0.44	
224.5	610	1900	0.44	
225.0	610	1920	0.44	
225.5	780	2120	0.42	
226.0	780	1970	0.41	
226.5	630	1720	0.42	
227.0	590	1770	0.44	
227.5	570	1740	0.44	
228.0	560	1800	0.45	
228.5	580	1690	0.43	
229.0	580	1740	0.44	
229.5	580	1740	0.44	
230.0	610	1710	0.43	
230.5	600	1710	0.43	
231.0	630	1740	0.43	
231.5	660	1750	0.42	
232.0	640	1830	0.43	

American Units				
Depth at	Vel	ocity		
Midpoint Between Receivers	V _s	V_{p}	Poisson's Ratio	
(ft)	(ft/s)	(ft/s)	rtatio	
762.8	2160	5560	0.41	
764.4	2210	5650	0.41	
766.1	2030	5750	0.43	
767.7	2040	5750	0.43	
769.4	2090	5950	0.43	
771.0	2160	5950	0.42	
772.6	2270	6230	0.42	
774.3	2280	6470	0.43	
775.9	2240	6230	0.43	
777.6	2200	6290	0.43	
779.2	2170	5950	0.42	
780.8	2290	6060	0.42	
782.5	2490	5950	0.39	
784.1	2420	5950	0.40	
785.8	2320	5950	0.41	
787.4	2340	6170	0.42	
789.0	2190	7090	0.45	
791.0	2260	6350	0.43	

Metric Units				
Depth at	Velo	city		
Midpoint Between			Poisson's	
Receivers	Vs	V _p	Ratio	
(m)	(m/s)	(m/s)		
232.5	660	1690	0.41	
233.0	680	1720	0.41	
233.5	620	1750	0.43	
234.0	620	1750	0.43	
234.5	640	1810	0.43	
235.0	660	1810	0.42	
235.5	690	1900	0.42	
236.0	700	1970	0.43	
236.5	680	1900	0.43	
237.0	670	1920	0.43	
237.5	660	1810	0.42	
238.0	700	1850	0.42	
238.5	760	1810	0.39	
239.0	740	1810	0.40	
239.5	710	1810	0.41	
240.0	710	1880	0.42	
240.5	670	2160	0.45	
241.1	690	1940	0.43	

Notes: "-" means no data available at that particular interval of depth.

B-11GEO PORT ACCESS ROAD Source to Receiver and Receiver to Receiver Analysis

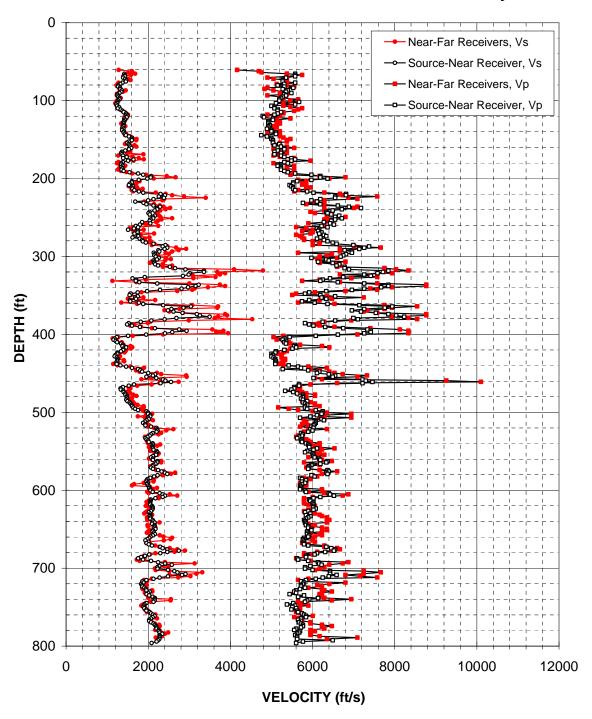


Figure 3: Borehole B-11GEO, Suspension Source to Receiver P- and S_{H} -wave Velocities

Table 3: Summary of Shear and Compressional Wave Velocity Based on Source-to-Receiver Travel Time Data - Borehole B-11GEO, Port Access Road, North Charleston

American Units					
Depth at Midpoint	Velo	city			
Between Source and Near Receiver	V_{s}	V _p	Poisson's Ratio		
(ft)	(ft/s)	(ft/s)			
65.7	1420	5580	0.47		
67.4	1440	5580	0.46		
69.0	1440	5580	0.46		
70.7	1390	5360	0.46		
72.3	1440	5270	0.46		
73.9	1470	5270	0.46		
75.6	1460	5270	0.46		
77.2	1370	5580	0.47		
78.9	1320	5310	0.47		
80.5	1280	5150	0.47		
82.1	1270	5310	0.47		
83.8	1320	5530	0.47		
85.4	1320	5270	0.47		
87.1	1360	5400	0.47		
88.7	1350	5360	0.47		
90.3	1300	5490	0.47		
92.0	1250	5310	0.47		
93.6	1250	5360	0.47		
95.3	1270	5270	0.47		
96.9	1300	5230	0.47		
98.5	1300	5190	0.47		
100.2	1270	5190	0.47		
101.8	1250	5670	0.47		
103.5	1250	5110	0.47		
105.1	1230	5580	0.47		
106.8	1240	5000	0.47		
108.4	1290	5080	0.47		
110.0	1260	5080	0.47		
111.7	1330	5150	0.46		
113.3	1370	5150	0.46		
115.0	1400	5230	0.46		
116.6	1460	5150	0.46		
118.2	1480	5080	0.45		
119.9	1500	4790	0.45		
121.5	1480	4820	0.45		
123.2	1420	5040	0.46		
124.8	1430	5040	0.46		
126.4	1410	4930	0.46		
128.1	1400	4930	0.46		
129.7	1400	4930	0.46		

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
20.0	430	1700	0.47	
20.5	440	1700	0.46	
21.0	440	1700	0.46	
21.5	420	1630	0.46	
22.0	440	1610	0.46	
22.5	450	1610	0.46	
23.0	440	1610	0.46	
23.5	420	1700	0.47	
24.0	400	1620	0.47	
24.5	390	1570	0.47	
25.0	390	1620	0.47	
25.5	400	1690	0.47	
26.0	400	1610	0.47	
26.5	420	1650	0.47	
27.0	410	1630	0.47	
27.5	400	1670	0.47	
28.0	380	1620	0.47	
28.5	380	1630	0.47	
29.0	390	1610	0.47	
29.5	400	1590	0.47	
30.0	400	1580	0.47	
30.5	390	1580	0.47	
31.0	380	1730	0.47	
31.5	380	1560	0.47	
32.0	370	1700	0.47	
32.5	380	1520	0.47	
33.0	390	1550	0.47	
33.5	380	1550	0.47	
34.0	410	1570	0.46	
34.5	420	1570	0.46	
35.0	430	1590	0.46	
35.5	450	1570	0.46	
36.0	450	1550	0.45	
36.5	460	1460	0.45	
37.0	450	1470	0.45	
37.5	430	1540	0.46	
38.0	440	1540	0.46	
38.5	430	1500	0.46	
39.0	430	1500	0.46	
39.5	430	1500	0.46	

American Units					
Depth at	•				
Midpoint Between Source	Velocity		velocity		
and Near			Poisson's		
Receiver	V_s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
131.7	1400	4960	0.46		
133.0	1400	4930	0.46		
134.6	1370	4930	0.46		
136.3	1400	4890	0.46		
137.9	1370	5000	0.46		
139.6	1410	5000	0.46		
141.2	1400	5110	0.46		
142.8	1430	5110	0.46		
144.5	1460	4750	0.45		
146.1	1530	4890	0.45		
147.8	1610	5000	0.44		
149.4	1600	5000	0.44		
151.0	1600	5040	0.44		
152.7	1520	5040	0.45		
154.3	1490	5040	0.45		
156.0	1520	5190	0.45		
157.6	1540	5080	0.45		
159.2	1570	5230	0.45		
160.9	1590	5310	0.45		
162.5	1530	5310	0.45		
164.2	1450	5150	0.46		
165.8	1360	5080	0.46		
167.4	1340	5230	0.46		
169.1	1360	5080	0.46		
170.7	1390	5230	0.46		
172.4	1480	5310	0.46		
174.0	1390	5490	0.47		
175.6	1640	5580	0.45		
177.3	1510	5490	0.46		
178.9	1390	5310	0.46		
180.6	1350	5400	0.47		
182.2	1340	5150	0.46		
183.9	1370	5150	0.46		
185.5	1350	5230	0.46		
187.1	1370	5230	0.46		
188.8	1350	5230	0.46		
190.4	1400	5310	0.46		
192.1	1540	5400	0.46		
193.7	1750	5580	0.45		
195.3	1880	5970	0.45		
197.0	2080	6190	0.44		
198.6	2060	6190	0.44		

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
40.1	430	1510	0.46	
40.5	430	1500	0.46	
41.0	420	1500	0.46	
41.5	430	1490	0.46	
42.0	420	1520	0.46	
42.5	430	1520	0.46	
43.0	430	1560	0.46	
43.5	440	1560	0.46	
44.0	440	1450	0.45	
44.5	470	1490	0.45	
45.0	490	1520	0.44	
45.5	490	1520	0.44	
46.0	490	1540	0.44	
46.5	460	1540	0.45	
47.0	450	1540	0.45	
47.5	460	1580	0.45	
48.0	470	1550	0.45	
48.5	480	1590	0.45	
49.0	480	1620	0.45	
49.5	470	1620	0.45	
50.0	440	1570	0.46	
50.5	420	1550	0.46	
51.0	410	1590	0.46	
51.5	410	1550	0.46	
52.0	420	1590	0.46	
52.5	450	1620	0.46	
53.0	420	1670	0.47	
53.5	500	1700	0.45	
54.0	460	1670	0.46	
54.5	420	1620	0.46	
55.0	410	1650	0.47	
55.5	410	1570	0.46	
56.0	420	1570	0.46	
56.5	410	1590	0.46	
57.0	420	1590	0.46	
57.5	410	1590	0.46	
58.0	430	1620	0.46	
58.5	470	1650	0.46	
59.0	530	1700	0.45	
59.5	570	1820	0.45	
60.0	630	1890	0.44	
60.5	630	1890	0.44	

American Units					
Depth at	\/ - I -	• 4			
Midpoint Between Source	Velocity		velocity		
and Near			Poisson's		
Receiver	V_s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
200.3	1980	6370	0.45		
201.9	1770	5970	0.45		
203.5	1610	5630	0.46		
205.2	1600	5530	0.45		
206.8	1550	5530	0.46		
208.5	1530	5440	0.46		
210.1	1630	5490	0.45		
211.7	1600	5530	0.45		
213.1	1610	5530	0.45		
215.0	1660	5580	0.45		
216.7	1780	5870	0.45		
218.3	1880	6030	0.45		
219.9	2300	6820	0.44		
221.6	2410	6820	0.43		
223.2	2260	6550	0.43		
224.9	2390	6550	0.42		
226.5	2130	6190	0.43		
228.1	2000	5970	0.44		
229.8	1690	6110	0.46		
231.4	1890	5770	0.44		
233.1	1960	6190	0.44		
234.7	2130	6620	0.44		
236.3	2290	6890	0.44		
238.0	2210	7180	0.45		
239.6	2220	6720	0.44		
241.3	2160	6490	0.44		
242.9	2030	6340	0.44		
244.5	2010	6370	0.44		
246.2	2040	6460	0.44		
247.8	2160	6650	0.44		
249.5	2120	6550	0.44		
251.1	2120	6720	0.44		
252.7	2060	6550	0.45		
254.4	2040	6460	0.44		
256.0	1850	6280	0.45		
257.7	2050	6430	0.44		
259.3	1800	6520	0.46		
261.0	1700	6220	0.46		
262.6	1750	6370	0.46		
264.2	1650	6110	0.46		
265.9	1510	6160	0.47		
267.5	1750	6140	0.46		

Metric Units					
Depth at Midpoint	Velo				
Between Source and Near Receiver	V_s	V _p	Poisson' s Ratio		
(m)	(m/s)	(m/s)			
61.0	600	1940	0.45		
61.5	540	1820	0.45		
62.0	490	1710	0.46		
62.5	490	1690	0.45		
63.0	470	1690	0.46		
63.5	470	1660	0.46		
64.0	500	1670	0.45		
64.5	490	1690	0.45		
64.9	490	1690	0.45		
65.5	510	1700	0.45		
66.0	540	1790	0.45		
66.5	570	1840	0.45		
67.0	700	2080	0.44		
67.5	730	2080	0.43		
68.0	690	2000	0.43		
68.5	730	2000	0.42		
69.0	650	1890	0.43		
69.5	610	1820	0.44		
70.0	510	1860	0.46		
70.5	570	1760	0.44		
71.0	600	1890	0.44		
71.5	650	2020	0.44		
72.0	700	2100	0.44		
72.5	670	2190	0.45		
73.0	680	2050	0.44		
73.5	660	1980	0.44		
74.0	620	1930	0.44		
74.5	610	1940	0.44		
75.0	620	1970	0.44		
75.5	660	2030	0.44		
76.0	640	2000	0.44		
76.5	650	2050	0.44		
77.0	630	2000	0.45		
77.5	620	1970	0.44		
78.0	570	1910	0.45		
78.5	630	1960	0.44		
79.0	550	1990	0.46		
79.5	520	1900	0.46		
80.0	530	1940	0.46		
80.5	500	1860	0.46		
81.0	460	1880	0.47		
81.5	530	1870	0.46		

Metric Units

American Units					
Depth at					
Midpoint Between Source	Velocity				
and Near			Poisson's		
Receiver	V_s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
269.2	1740	6220	0.46		
270.8	1670	6160	0.46		
272.4	1760	6280	0.46		
274.1	1760	6340	0.46		
275.7	1620	6190	0.46		
277.4	1800	6110	0.45		
279.0	1850	6280	0.45		
280.6	1870	6370	0.45		
282.3	1950	6490	0.45		
283.9	2130	6590	0.44		
285.6	2420	6990	0.43		
287.2	2350	7380	0.44		
288.8	2460	7260	0.43		
290.5	2400	7140	0.44		
292.1	2250	6780	0.44		
293.8	2270	6960	0.44		
295.4	2140	6960	0.45		
297.0	2160	6820	0.44		
298.7	2150	6750	0.44		
300.3	2180	6680	0.44		
302.0	2260	5970	0.42		
303.9	2210	6340	0.43		
305.2	2130	6400	0.44		
306.9	2150	6140	0.43		
308.5	2150	6490	0.44		
310.2	2170	6650	0.44		
311.8	2240	6590	0.43		
313.4	2530	6780	0.42		
315.1	2660	6780	0.41		
316.7	2910	6890	0.39		
318.4	3360	7850	0.39		
320.0	3360	7710	0.38		
321.6	3010	7580	0.41		
323.3	2990	7260	0.40		
324.9	2850	7420	0.41		
326.6	1920	6750	0.46		
328.2	1620	6430	0.47		
329.8	1700	6250	0.46		
331.5	1700	6190	0.46		
333.1	1790	6620	0.46		
334.8	2220	7260	0.45		
336.4	3230	7850	0.40		

Metric Units					
Depth at Midpoint	Velo	city			
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio		
(m)	(m/s)	(m/s)			
82.0	530	1900	0.46		
82.5	510	1880	0.46		
83.0	540	1910	0.46		
83.5	540	1930	0.46		
84.0	490	1890	0.46		
84.5	550	1860	0.45		
85.0	570	1910	0.45		
85.5	570	1940	0.45		
86.0	590	1980	0.45		
86.5	650	2010	0.44		
87.0	740	2130	0.43		
87.5	720	2250	0.44		
88.0	750	2210	0.43		
88.5	730	2180	0.44		
89.0	690	2070	0.44		
89.5	690	2120	0.44		
90.0	650	2120	0.45		
90.5	660	2080	0.44		
91.0	660	2060	0.44		
91.5	670	2040	0.44		
92.0	690	1820	0.42		
92.6	670	1930	0.43		
93.0	650	1950	0.44		
93.5	660	1870	0.43		
94.0	660	1980	0.44		
94.5	660	2030	0.44		
95.0	680	2010	0.43		
95.5	770	2070	0.42		
96.0	810	2070	0.41		
96.5	890	2100	0.39		
97.0	1020	2390	0.39		
97.5	1020	2350	0.38		
98.0	920	2310	0.41		
98.5	910	2210	0.40		
99.0	870	2260	0.41		
99.5	580	2060	0.46		
100.0	490	1960	0.47		
100.5	520	1910	0.46		
101.0	520	1890	0.46		
101.5	540	2020	0.46		
102.0	680	2210	0.45		
			0.40		
102.5	980	2390	0.40		

Metric Units

American Units						
	Depth at					
Midpoint Between Source	Velocity					
and Near			Poisson's			
Receiver	V_s	V _p	Ratio			
(ft)	(ft/s)	(ft/s)				
338.1	3150	7850	0.40			
339.7	2970	7670	0.41			
341.3	2810	7260	0.41			
343.0	2290	6960	0.44			
344.6	1970	6340	0.45			
346.3	1740	5920	0.45			
347.9	1580	5820	0.46			
349.5	1550	6190	0.47			
351.2	1750	6550	0.46			
352.8	1680	6220	0.46			
354.5	1700	6340	0.46			
356.1	1560	5920	0.46			
357.7	1570	5740	0.46			
359.4	1780	6050	0.45			
361.0	1880	6370	0.45			
362.7	2370	7140	0.44			
364.3	3040	7940	0.41			
365.9	2860	7760	0.42			
367.6	2570	7260	0.43			
369.2	2480	6960	0.43			
370.9	2620	7180	0.42			
372.5	2840	7540	0.42			
374.1	3180	7850	0.40			
375.8	3260	8040	0.40			
377.4	3500	8230	0.39			
379.1	2690	6990	0.41			
380.7	2400	7110	0.44			
382.3	2080	6550	0.44			
384.0	1820	6250	0.45			
385.6	1520	5820	0.46			
387.3	1490	5920	0.47			
388.9	1610	6030	0.46			
390.5	1800	6310	0.46			
392.2	2160	6750	0.44			
393.8	2760	7340	0.42			
395.5	2930	7420	0.41			
397.1	2590	7420	0.43			
398.7	2410	7260	0.44			
400.4	1950	6620	0.45			
402.0	1510	6080	0.47			
403.7	1240	5440	0.47			
405.3	1180	5310	0.47			

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
103.0	960	2390	0.40	
103.5	910	2340	0.41	
104.0	860	2210	0.41	
104.5	700	2120	0.44	
105.0	600	1930	0.45	
105.5	530	1800	0.45	
106.0	480	1770	0.46	
106.5	470	1890	0.47	
107.0	530	2000	0.46	
107.5	510	1900	0.46	
108.0	520	1930	0.46	
108.5	480	1800	0.46	
109.0	480	1750	0.46	
109.5	540	1850	0.45	
110.0	570	1940	0.45	
110.5	720	2180	0.44	
111.0	930	2420	0.41	
111.5	870	2360	0.42	
112.0	780	2210	0.43	
112.5	760	2120	0.43	
113.0	800	2190	0.42	
113.5	860	2300	0.42	
114.0	970	2390	0.40	
114.5	990	2450	0.40	
115.0	1070	2510	0.39	
115.5	820	2130	0.41	
116.0	730	2170	0.44	
116.5	630	2000	0.44	
117.0	550	1910	0.45	
117.5	460	1770	0.46	
118.0	450	1800	0.47	
118.5	490	1840	0.46	
119.0	550	1920	0.46	
119.5	660	2060	0.44	
120.0	840	2240	0.42	
120.5	890	2260	0.42	
121.0	790	2260	0.41	
121.5	730		0.43	
		2210		
122.0	590	2020	0.45	
122.5	460	1850	0.47	
123.0	380	1660	0.47	
123.5	360	1620	0.47	

American Units					
Depth at					
Midpoint Between Source	Velocity				
and Near			Poisson's		
Receiver	V_s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
406.9	1160	5270	0.47		
408.6	1210	5360	0.47		
410.2	1240	5310	0.47		
411.9	1340	5360	0.47		
413.5	1380	5580	0.47		
415.1	1370	5560	0.47		
416.8	1460	5600	0.46		
418.4	1390	5510	0.47		
420.1	1390	5310	0.46		
421.7	1340	5110	0.46		
423.4	1250	5090	0.47		
425.0	1250	5000	0.47		
426.6	1200	5040	0.47		
428.3	1180	5000	0.47		
429.9	1240	5060	0.47		
431.6	1260	5090	0.47		
433.2	1250	5090	0.47		
434.8	1240	5110	0.47		
436.5	1220	5090	0.47		
438.1	1230	5090	0.47		
439.8	1330	5420	0.47		
441.4	1460	5650	0.46		
443.0	1610	5720	0.46		
444.7	1750	5270	0.44		
446.3	1810	5900	0.45		
448.0	1850	6160	0.45		
449.6	2000	6110	0.44		
451.2	2170	6400	0.43		
452.9	2120	6550	0.44		
454.5	1960	6490	0.45		
456.2	2200	6030	0.42		
457.8	2360	7220	0.44		
459.4	2420	7300	0.44		
461.1	2560	7460	0.43		
462.7	2300	7220	0.44		
464.4	1660	5670	0.45		
466.0	1530	5670	0.46		
467.6	1390	5560	0.47		
469.3	1330	5560	0.47		
470.9	1340	5490	0.47		
472.6	1400	5340	0.46		
474.2	1400	5530	0.47		

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
124.0	350	1610	0.47	
124.5	370	1630	0.47	
125.0	380	1620	0.47	
125.5	410	1630	0.47	
126.0	420	1700	0.47	
126.5	420	1690	0.47	
127.0	450	1710	0.46	
127.5	430	1680	0.47	
128.0	430	1620	0.46	
128.5	410	1560	0.46	
129.0	380	1550	0.47	
129.5	380	1520	0.47	
130.0	370	1540	0.47	
130.5	360	1520	0.47	
131.0	380	1540	0.47	
131.5	380	1550	0.47	
132.0	380	1550	0.47	
132.5	380	1560	0.47	
133.0	370	1550	0.47	
133.5	380	1550	0.47	
134.0	400	1650	0.47	
134.5	450	1720	0.46	
135.0	490	1740	0.46	
135.5	530	1610	0.44	
136.0	550	1800	0.45	
136.5	570	1880	0.45	
137.0	610	1860	0.44	
137.5	660	1950	0.43	
138.0	640	2000	0.44	
138.5	600	1980	0.45	
139.0	670	1840	0.42	
139.5	720	2200	0.42	
140.0	740	2220	0.44	
140.5	780	2270	0.43	
140.5	700		0.43	
141.5	510	2200 1730	0.44	
	470	1730	0.45	
142.0 142.5				
	420	1690	0.47	
143.0	410	1690	0.47	
143.5	410	1670	0.47	
144.0	430	1630	0.46	
144.5	430	1690	0.47	

American Units					
Depth at Midpoint	Vala	oitv			
Between Source	Velocity				
and Near			Poisson's		
Receiver	Vs	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
475.8	1440	5630	0.46		
477.5	1450	5770	0.47		
479.1	1490	5770	0.46		
480.8	1480	5770	0.46		
482.4	1490	5720	0.46		
484.0	1470	5770	0.47		
485.7	1490	5870	0.47		
487.3	1550	5770	0.46		
489.0	1570	5820	0.46		
490.6	1600	5870	0.46		
492.2	1610	5820	0.46		
493.9	1640	5820	0.46		
495.5	1680	5870	0.46		
497.2	1750	6080	0.45		
498.8	1960	6250	0.45		
500.5	2000	6250	0.44		
502.1	2000	6220	0.44		
503.7	2050	6110	0.44		
505.4	2050	5950	0.43		
507.0	2000	5700	0.43		
508.7	2010	6220	0.44		
510.3	1960	6280	0.45		
511.9 513.6	1920 1880	6080 6080	0.44		
513.6 515.2	1930	6050	0.45 0.44		
			0.44		
516.9 518.5	1930 2070	6030 5970	0.44		
520.1	2200	6030	0.43		
520.1	2220	5950	0.42		
521.6	2230	6000	0.42		
525.4	2210	5900	0.42		
526.7	2110	5720	0.42		
528.3	2070	5770	0.42		
530.0	2040	5740	0.43		
531.6	1990	5670	0.43		
533.3	1930	5630	0.43		
534.9	1960	5740	0.43		
536.5	2000	5720	0.43		
538.2	2010	5740	0.43		
539.8	2110	5840	0.43		
541.5	2120	5900	0.43		
543.1	2100	5920	0.43		

Metric Units					
Depth at Midpoint	Velo	city			
Between Source and Near Receiver	V_s	V _p	Poisson' s Ratio		
(m)	(m/s)	(m/s)			
145.0	440	1710	0.46		
145.5	440	1760	0.47		
146.0	450	1760	0.46		
146.5	450	1760	0.46		
147.0	450	1740	0.46		
147.5	450	1760	0.47		
148.0	460	1790	0.47		
148.5	470	1760	0.46		
149.0	480	1770	0.46		
149.5	490	1790	0.46		
150.0	490	1770	0.46		
150.5	500	1770	0.46		
151.0	510	1790	0.46		
151.5	530	1850	0.45		
152.0	600	1910	0.45		
152.5	610	1910	0.44		
153.0	610	1900	0.44		
153.5	630	1860	0.44		
154.0	630	1810	0.43		
154.5	610	1740	0.43		
155.0	610	1900	0.44		
155.5	600	1910	0.45		
156.0	590	1850	0.44		
156.5	570	1850	0.45		
157.0	590	1850	0.44		
157.5	590	1840	0.44		
158.0	630	1820	0.43		
158.5	670	1840	0.42		
159.0	680	1810	0.42		
159.5	680	1830	0.42		
160.0	670	1800	0.42		
160.5	640	1740	0.42		
161.0	630	1760	0.43		
161.5	620	1750	0.43		
162.0	610	1730	0.43		
162.5	590	1710	0.43		
163.0	600	1750	0.43		
163.5	610	1740	0.43		
164.0	610	1750	0.43		
164.5	640	1780	0.43		
165.0	640	1800	0.43		
165.5	640	1800	0.43		

American Units					
Depth at					
Midpoint Between Source	Velocity				
and Near			Poisson's		
Receiver	V_s	V _p	Ratio		
(ft)	(ft/s)	(ft/s)			
544.7	2110	5920	0.43		
546.4	2120	6110	0.43		
548.0	2130	6030	0.43		
549.7	2210	5870	0.42		
551.3	2220	5820	0.41		
552.9	2200	6000	0.42		
554.6	2190	6030	0.42		
556.2	2120	6030	0.43		
557.9	2070	6050	0.43		
559.5	2120	6160	0.43		
561.1	2120	6190	0.43		
562.8	2230	6370	0.43		
564.4	2220	6340	0.43		
566.1	2180	6190	0.43		
567.7	2130	5970	0.43		
569.3	2110	5920	0.43		
571.0	2070	5900	0.43		
572.6	2120	5900	0.43		
574.3	2240	6370	0.43		
575.9	2330	6400	0.42		
577.6	2410	6340	0.42		
579.2	2460	6370	0.41		
580.8	2230	5970	0.42		
582.5	2140	6050	0.43		
584.1	2050	5700	0.43		
585.8	1990	5740	0.43		
587.4	1960	5840	0.44		
589.0	1960	5740	0.43		
590.7	1990	5820	0.43		
592.3	1970	5740	0.43		
594.0	2000	5700	0.43		
595.6	2030	5720	0.43		
597.2	2030	5720	0.43		
598.9	2050	5700	0.43		
600.5	2060	5820	0.43		
602.2	2110	5840	0.43		
603.8	2280	6400	0.43		
605.4	2350	6430	0.42		
607.1	2410	6520	0.42		
608.7	2350	6190	0.42		
610.4	2180	6030	0.42		
612.0	2070	5920	0.43		

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
166.0	640	1800	0.43	
166.5	640	1860	0.43	
167.0	650	1840	0.43	
167.5	670	1790	0.42	
168.0	680	1770	0.41	
168.5	670	1830	0.42	
169.0	670	1840	0.42	
169.5	640	1840	0.43	
170.0	630	1850	0.43	
170.5	640	1880	0.43	
171.0	640	1890	0.43	
171.5	680	1940	0.43	
172.0	680	1930	0.43	
172.5	660	1890	0.43	
173.0	650	1820	0.43	
173.5	640	1800	0.43	
174.0	630	1800	0.43	
174.5	640	1800	0.43	
175.0	680	1940	0.43	
175.5	710	1950	0.42	
176.0	730	1930	0.42	
176.5	750	1940	0.41	
177.0	680	1820	0.42	
177.5	650	1850	0.43	
178.0	630	1740	0.43	
178.5	610	1750	0.43	
179.0	600	1780	0.44	
179.5	600	1750	0.43	
180.0	610	1770	0.43	
180.5	600	1750	0.43	
181.0	610	1740	0.43	
181.5	620	1740	0.43	
182.0	620	1740	0.43	
182.5	630	1740	0.43	
183.0	630	1770	0.43	
183.5	640	1780	0.43	
184.0	700	1950	0.43	
184.5	720	1960	0.42	
185.0	730	1990	0.42	
185.5	720	1890	0.42	
186.0	660	1840	0.42	
186.5	630	1800	0.43	

American Units						
	Depth at					
Midpoint Between Source	Velocity		Velocity			
and Near			Poisson's			
Receiver	V_s	V_p	Ratio			
(ft)	(ft/s)	(ft/s)				
613.6	2060	5950	0.43			
615.3	2050	6030	0.43			
616.9	2050	6000	0.43			
618.6	2050	6030	0.43			
620.2	2100	6030	0.43			
621.8	2110	6030	0.43			
623.5	2110	6080	0.43			
625.1	2100	6030	0.43			
626.8	2070	5900	0.43			
628.4	2020	5820	0.43			
630.0	2050	5950	0.43			
632.0	2050	5840	0.43			
633.3	2040	5950	0.43			
635.0	2060	5900	0.43			
636.6	2050	5840	0.43			
638.2	2110	5790	0.42			
639.9	2130	5820	0.42			
641.5	2160	5820	0.42			
643.2	2100	5840	0.43			
644.8	2160	5840	0.42			
646.4	2160	5900	0.42			
648.1	2160	5900	0.42			
649.7	2180	5970	0.42			
651.4	2120	5970	0.43			
653.0	2110	5870	0.43			
654.7	2140	5870	0.42			
656.3	2160	5870	0.42			
657.9	2120	5920	0.43			
659.6	2060	5900	0.43			
661.2	2030	5790	0.43			
662.9	1990	5770	0.43			
664.5	1930	5770	0.44			
666.1	2010	5790	0.43			
667.8	1960	5790	0.44			
669.4	2010	5790	0.43			
671.1	2090	5900	0.43			
672.7	2300	6340	0.42			
674.3	2350	6460	0.42			
676.0	2460	6550	0.42			
677.6	2740	6520	0.39			
679.3	2460	6310	0.41			
680.9	2300	6110	0.42			

Metric Units				
Depth at Midpoint	Velo	city		
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio	
(m)	(m/s)	(m/s)		
187.0	630	1810	0.43	
187.5	630	1840	0.43	
188.0	630	1830	0.43	
188.5	630	1840	0.43	
189.0	640	1840	0.43	
189.5	640	1840	0.43	
190.0	640	1850	0.43	
190.5	640	1840	0.43	
191.0	630	1800	0.43	
191.5	620	1770	0.43	
192.0	630	1810	0.43	
192.6	630	1780	0.43	
193.0	620	1810	0.43	
193.5	630	1800	0.43	
194.0	630	1780	0.43	
194.5	640	1770	0.42	
195.0	650	1770	0.42	
195.5	660	1770	0.42	
196.0	640	1780	0.43	
196.5	660	1780	0.42	
197.0	660	1800	0.42	
197.5	660	1800	0.42	
198.0	660	1820	0.42	
198.5	640	1820	0.43	
199.0	640	1790	0.43	
199.5	650	1790	0.42	
200.0	660	1790	0.42	
200.5	640	1800	0.43	
201.0	630	1800	0.43	
201.5	620	1770	0.43	
202.0	610	1760	0.43	
202.5	590	1760	0.44	
203.0	610	1770	0.43	
203.5	600	1770	0.44	
204.0	610	1770	0.43	
204.5	640	1800	0.43	
205.0	700	1930	0.42	
205.5	720	1970	0.42	
206.0	750	2000	0.42	
206.5	840	1990	0.42	
207.0	750	1920	0.39	
207.5	700	1860	0.41	
201.3	700	1000	0.42	

American Units								
Depth at Midpoint Velocity								
Midpoint Between Source	veic	city						
and Near			Poisson's					
Receiver	V_s	V _p	Ratio					
(ft)	(ft/s)	(ft/s)						
682.5	2030	6050	0.44					
684.2	1920	5840	0.44					
685.8	1830	5840	0.45					
687.5	1750	5630	0.45					
689.1	1880	5650	0.44					
690.7	2070	5900	0.43					
692.4	2240	6140	0.42					
694.0	2410	6160	0.41					
695.7	2580	6220	0.40					
697.3	2270	5950	0.41					
698.9	2220	5820	0.41					
700.6	2230	5820	0.41					
702.2	2480	6000	0.40					
703.9	2640	6430	0.40					
705.5	2710	6430	0.39					
707.5	2910	6430	0.37					
708.8	2820	6590	0.39					
710.4	2480	6400	0.41					
712.1	2280	6250	0.42					
713.7	2130	6080	0.43					
715.3	1960	5840	0.44					
717.0	1860	5720	0.44					
718.6	1890	5790	0.44					
720.3	1830	5770	0.44					
721.9	1850	5720	0.44					
723.5	1860	5720	0.44					
725.2	1910	5820	0.44					
726.8	1950	5700	0.43					
728.5	1960	5600	0.43					
730.1	2040	5560	0.42					
731.8	2000	5600	0.43					
733.4	1960	5440	0.43					
735.0	2030	5790	0.43					
736.7	2110	5650	0.42					
738.3	2160	6140	0.43					
740.0	2160	5920	0.42					
741.6	2160	5870	0.42					
743.2	2130	5820	0.42					
744.9	1960	5530	0.43					
746.5	1910	5380	0.43					
748.2	1900	5580	0.43					
749.8	1890	5510	0.43					

Metric Units								
Depth at Midpoint	Depth at Midpoint Velocity							
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio					
(m)	(m/s)	(m/s)						
208.0	620	1850	0.44					
208.5	590	1780	0.44					
209.0	560	1780	0.45					
209.5	530	1710	0.45					
210.0	570	1720	0.44					
210.5	630	1800	0.43					
211.0	680	1870	0.42					
211.5	730	1880	0.41					
212.0	790	1900	0.40					
212.5	690	1810	0.41					
213.0	680	1770	0.41					
213.5	680	1770	0.41					
214.0	760	1830	0.40					
214.5	800	1960	0.40					
215.0	830	1960	0.39					
215.6	890	1960	0.37					
216.0	860	2010	0.39					
216.5	760	1950	0.41					
217.0	700	1910	0.42					
217.5	650	1850	0.43					
218.0	600	1780	0.44					
218.5	570	1740	0.44					
219.0	570	1770	0.44					
219.5	560	1760	0.44					
220.0	560	1740	0.44					
220.5	570	1740	0.44					
221.0	580	1770	0.44					
221.5	590	1740	0.43					
222.0	600	1710	0.43					
222.5	620	1690	0.42					
223.0	610	1710	0.43					
223.5	600	1660	0.43					
224.0	620	1770	0.43					
224.5	640	1720	0.42					
225.0	660	1870	0.43					
225.5	660	1800	0.42					
226.0	660	1790	0.42					
226.5	650	1770	0.42					
227.0	600	1690	0.43					
227.5	580	1640	0.43					
228.0	580	1700	0.43					
228.5	570	1680	0.43					

American Units								
Depth at		•						
Midpoint	Velo	ocity						
Between Source			Daissaula					
and Near Receiver	V	V	Poisson's Ratio					
	(ft/a)	V _p	Kallo					
(ft)	(ft/s)	(ft/s)	0.40					
751.4	1910	5600	0.43					
753.1	1960	5490	0.43					
754.7	1960	5630	0.43					
756.4	2040	5650	0.43					
758.0	2070	5740	0.43					
759.6	2120	5790	0.42					
761.3	2160	5840	0.42					
762.9	2110	5840	0.43					
764.6	2070	5720	0.42					
766.2	2030	5650	0.43					
767.8	2030	5720	0.43					
769.5	2070	5670	0.42					
771.1	2130	5720	0.42					
772.8	2160	5770	0.42					
774.4	2190	5770	0.42					
776.0	2210	5720	0.41					
777.7	2210	5600	0.41					
779.3	2260	5560	0.40					
781.0	2260	5700	0.41					
782.6	2280	5670	0.40					
784.2	2340	5630	0.39					
785.9	2280	5580	0.40					
787.5	2280	5630	0.40					
789.2	2280	5630	0.40					
790.8	2270	5630	0.40					
792.4	2240	6490	0.43					
794.1	2210	5770	0.41					
796.1	2080	5600	0.42					

Metric Units								
Depth at Midpoint	Velo	city						
Between Source and Near Receiver	V _s	V _p	Poisson' s Ratio					
(m)	(m/s)	(m/s)						
229.0	580	1710	0.43					
229.5	600	1670	0.43					
230.0	600	1710	0.43					
230.5	620	1720	0.43					
231.0	630	1750	0.43					
231.5	640	1770	0.42					
232.0	660	1780	0.42					
232.5	640	1780	0.43					
233.0	630	1740	0.42					
233.5	620	1720	0.43					
234.0	620	1740	0.43					
234.5	630	1730	0.42					
235.0	650	1740	0.42					
235.5	660	1760	0.42					
236.0	670	1760	0.42					
236.5	670	1740	0.41					
237.0	670	1710	0.41					
237.5	690	1690	0.40					
238.0	690	1740	0.41					
238.5	700	1730	0.40					
239.0	710	1710	0.39					
239.5	700	1700	0.40					
240.0	700	1710	0.40					
240.5	700	1710	0.40					
241.0	690	1710	0.40					
241.5	680	1980	0.43					
242.0	670	1760	0.41					
242.6	640	1710	0.42					

Notes: "-" means no data available at that particular interval of depth.

APPENDIX A

PROCEDURE FOR OYO P-S SUSPENSION SEISMIC VELOCITY LOGGING

PROCEDURE FOR

OYO P-S SUSPENSION SEISMIC VELOCITY LOGGING

Background

This procedure describes a method for measuring shear and compressional wave velocities in soil and rock. The OYO P-S Suspension Method is applied by generating shear and compressional waves in a borehole using the OYO P-S Suspension Logger borehole tool and measuring the travel time between two receiver geophones or hydrophones located in the same tool.

Objective

The outcome of this procedure is a plot and table of P and S_H wave velocity versus depth for each borehole. Standard analysis is performed on receiver to receiver data. Data is presented in report format, with digital data files transmitted in Excel, Word or ASCII format.

Instrumentation

- 1. OYO Model 170 Digital Logging Recorder or equivalent
- 2. OYO P-S Suspension Logger probe or equivalent, including two sets horizontal and vertical geophones, seismic source, and power supply for the source and receivers
- 3. Winch and winch controller, with logging cable
- 4. Batteries to operate P-S Logger and winch

The Suspension P-S Logger system, manufactured by OYO Corporation, or the Robertson Digital P-S Suspension Probe with the Robertson Micrologger2 are currently the only commercially available suspension logging systems. As shown in Figure 1, these systems consists of a borehole probe suspended by a cable and a recording/control electronics package on the surface.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave generator (S_H) and compressional-wave generator (P), joined to



two biaxial geophones by a flexible isolation cylinder. The separation of the two geophones is one meter, allowing average wave velocity in the region between the geophones to be determined by inversion of the wave travel time between the two geophones. The total length of the probe is approximately 7 meters; the center point of the geophones is approximately 4 meters above the bottom end of the probe.

The probe receives control signals from, and sends the amplified geophone signals to, the instrumentation package on the surface via an armored 4 or 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured by a rotary encoder to provide probe depth data.

The entire probe is suspended by the cable and may be centered in the borehole by nylon "whiskers." Therefore, source motion is not coupled directly to the borehole walls; rather, the source motion creates a horizontally propagating pressure wave in the fluid filling the borehole and surrounding the source. This pressure wave produces a horizontal displacement of the soil forming the wall of the borehole. This displacement propagates up and down the borehole wall, in turn causing a pressure wave to be generated in the fluid surrounding the geophones as the soil displacement wave passes their location.

Environmental Conditions

The OYO P-S Suspension Logging Method can be used in either cased or uncased boreholes. For best results, the uncased borehole must be between 10 and 20 cm in diameter, or 4 to 8 inches. A cased borehole may be as small as 3 inches, if properly grouted (see below) and the grout annulus does not exceed 1 inch.

Uncased boreholes are preferred because the effects of the casing and grouting are removed. It is recommended that the borehole be drilled using the rotary mud method. This method does little damage to the borehole wall, and the drilling fluid coats and seals the borehole wall reducing fluid loss and wall collapse. The borehole fluid is required for the logging, and must be well circulated prior to logging.

If the borehole must be cased, the casing must be PVC and properly installed and grouted. Any voids in the grout will cause problems with the data. Likewise, large grout bulbs used to fill cavities will also cause problems. The grout must be set before testing. This means the grouting must take place at least 48 hours before testing.

For borehole casing, applicable preparation procedures are presented in ASTM Standard D4428/D4428M-91 Section 4.1 (see ASTM website for copy).

Calibration

Calibration of the digital recorder is required. Calibration is limited to the timing accuracy of the recorder. GEOVision's Seismograph Calibration Procedure or equivalent should be used. Calibration must be performed on an annual basis.



Measurement Procedure

The entire probe is lowered into the borehole to a specific measurement depth by the winch. A measurement sequence is then initiated by the operator from the instrumentation package control panel. No further operator intervention is then needed to complete the measurement sequence described below.

The system electronics activates the SH-wave source in one direction and records the output of the two horizontally oriented geophone axes which are situated parallel to the axis of motion of the source. The source is then activated in the opposite direction, and the horizontal output signals are again recorded, producing a SH-wave record of polarity opposite to the previous record. The source is finally actuated in the first direction again, and the responses of the vertical geophone axes to the resultant P-wave are recorded during this sampling.

The data from each geophone during each source activation is recorded as a different channel on the recording system. The seismograph has at least six channels (two simultaneous recording channels), each with at least a 12 bit 1024 sample record. Newer seismographs may have longer record lengths. The recorded data is displayed on a CRT or LCD display and possibly on paper tape output as six channels with a common time scale. Data is stored on digital media for further processing. Up to 8 sampling sequences can be stacked (averaged) to improve the signal to noise ratio of the signals.

Review of the data on the display or paper tape allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and stacking number in order to optimize the quality of the data before recording. In the case of the Model 170, printed data is verified by the operator prior to moving the probe. In the case of the Robertson Micrologger2, storage on the hard disk should be verified from time-to-time, certainly before exiting the borehole.

Typical depth spacing for measurements is 1.0 meters, or 3.3 feet. Alternative spacing is 0.5 meter, or 1.6 feet.

Required Field Records

- 1) Field log for each borehole showing
 - a) Borehole identification
 - b) Date of test
 - c) Tester or data recorder



- d) Description of measurement
- e) Any deviations from test plan and action taken as a result
- f) QA Review
- 2) Paper output records are no longer required, since the Micrologger2 cannot generate them. However, data must be stored in at least 2 places prior to leaving the site
- 3) List of record ID numbers (for data on digital media) and corresponding depth
- 4) Diskettes, CDRom, or USB flash drives with backup copies of data on hard disk, labeled with borehole designation, record ID numbers, date, and tester name.

An example Field Log is attached to this procedure.

Analysis

Following completion of field work, the recorded digital records are processed by computer using the OYO Corporation software program PSLOG and interactively analyzed by an experienced geophysicist to produce plots and tables of P and S_H wave velocity versus depth.

The digital time series records from each depth are transferred to a personal computer for analysis. Figure 2 shows a sample of the data from a single depth. These digital records are analyzed to locate the first minima on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between these arrivals is used to calculate the P-wave velocity for that 1-meter interval. When observable, P-wave arrivals on the horizontal axis records are used to verify the velocities determined from the vertical axis data. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

The digital records are studied to establish the presence of clear SH-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the SH-wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT – IFFT lowpass filtering are used to remove the higher frequency P-wave signal from the SH-wave signal.

The first maxima are picked for the 'normal' signals and the first minima are picked for the 'reverse' signals. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in actuation time of the solenoid source caused by constant mechanical bias in the source or by borehole inclination. This variation does not affect the velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity



value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

In Figure 2, the time difference over the 1-meter interval of 1.70 millisecond is equivalent to a SH-wave velocity of 588 m/sec. Whenever possible, time differences are determined from several phase points on the S_H -wave pulse trains to verify the data obtained from the first arrival of the S_H -wave pulse. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

Figure 3 is a sample composite plot of the far normal horizontal geophone records for a range of depths. This plot shows the waveforms at each depth, clearly showing the Swave arrivals. This display format is used during analysis to observe trends in velocity with changing depth.

Once the proper picks are entered in PSLOG, the picks are transferred to an Excel spreadsheet where Vs and Vp are calculated. The spreadsheet allows output for presentation in charts and tables.

Standard analysis is performed on receiver 1 to receiver 2 data, with separate analysis performed on source to receiver data as a quality assurance procedure.

Registered Geophysicist <u>Ontry Mert</u> Date <u>9/11/06</u>

QA Review <u>Date 9/11/06</u>

References:

- 1. "In Situ P and S Wave Velocity Measurement", Ohya, S. 1986. Proceedings of In-Situ '86, Use of In-Situ Tests In Geotechnical Engineering. an ASCE Specialty Conference sponsored by the Geotechnical Engineering Division of ASCE and co-sponsored by the Civil Engineering Dept of Virginia Tech.
- Guidelines for Determining Design Basis Ground Motions, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.
- 3. "Standard test Methods for Crosshole Seismic Testing", ASTM Standard D4428/D4428M-91, July 1991, Philadelphia, PA



OYO SUSPENSION P-S VELOCITY LOGGING SETUP

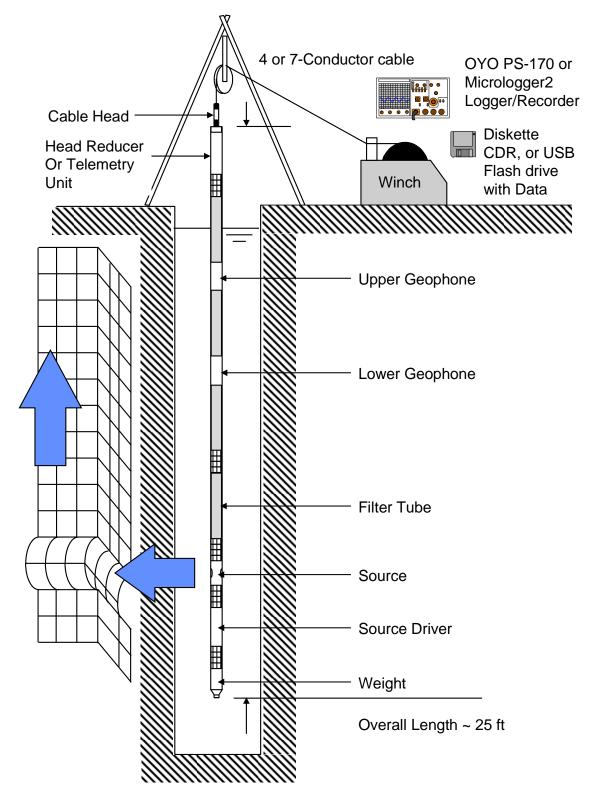


Figure 1. Suspension PS logging method setup



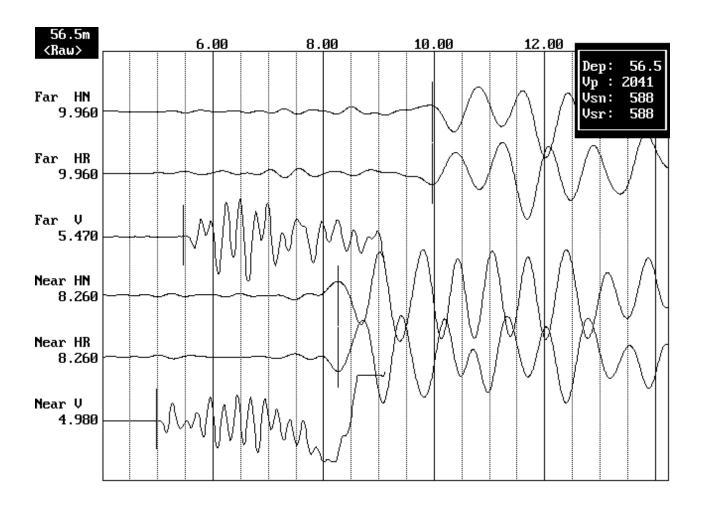


Figure 2. Sample suspension method waveform data showing horizontal normal and reversed (HR and HN), and vertical (V) waveforms received at the near (bottom 3 channels) and far (top 3 channels) geophones. The arrivals in milliseconds for each pick are shown on the left. The box in the upper right corner shows the depth in the borehole and the velocities calculated based on the picks.

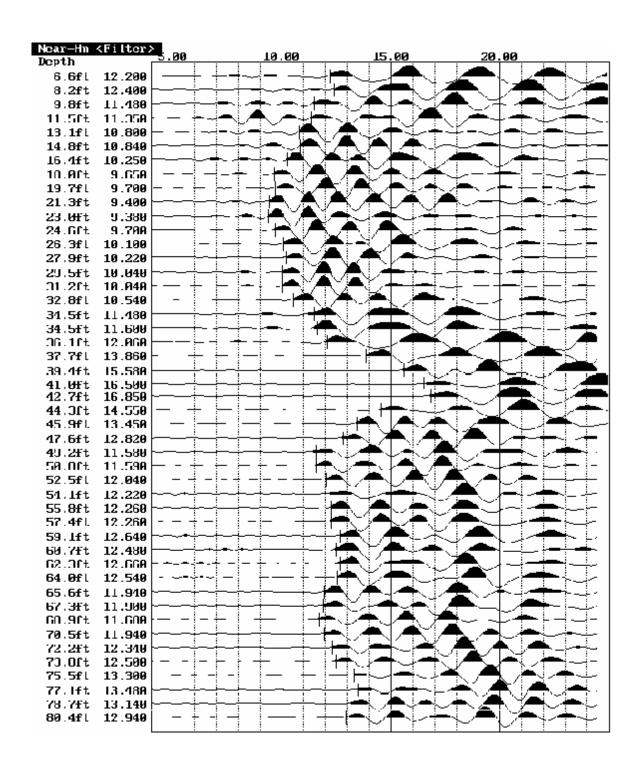


Figure 3. Sample composite waveform plot for normal shear waves received at the near geophone in a single borehole

APPENDIX B

OYO 170 VELOCITY LOGGING SYSTEM

NIST TRACEABLE CALIBRATION PROCEDURE AND CALIBRATION RECORDS



A SO THE N CALIFORNIA EDISON® Company

Metrology

7300 Fenwick Lane Westminster, CA 92683 Phone: 866-723-2257

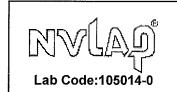
Calibration Report

NVLAP Accredited Calibration

GEOVision Geophysical Services

1124 Olympic Drive Corona, CA 92881-3390





Manufacturer:

Oyo

Model Number: **Description:**

03331-0000 Seismograph,

Asset Number: Serial Number:

15014 15014

PO Number:

8200-080122-01

Condition As Found:

In Tolerance

Condition As Left: Calibration Date:

In Tolerance 07/31/2008

Calibration Due Date: 07/31/2009

Calibration Interval: 12 Months

Remarks:

This unit was calibrated with the customer's old procedure and specifications which have been reviewed by Metrology Engineering and documented in SCE Document M013684. The data can be found on page 2 of this report with the original observation data on pages 3,4,5. The unit was then calibrated with the customer's new procedure and specification's which have been reviewed by Metrology Engineering and documented in SCE Document M013987. The data can be found on pages 6 and 7 of this report with the original observation data on page 8 of this report.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal,	07/17/2008	01/17/2009
S1-01347	Hewlett Packard	3325A	Generator, Function, Synthesizer	04/24/2008	10/24/2008
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/22/2008	01/22/2009

Procedure: Customer Temperature: 23° C **Humidity:** 52% RH

558547

Test No.:

Calibration Performed By: Quality Reviewer: Branson, Craig A W 8-2-08 Metrologist 714-895-0714

This report may not be reproduced, except in full, without written permission of this laboratory. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. The results stated in this report relate only to the items tested or calibrated. Measurements reported herein are traceable to SI units via national standards maintained by NIST. This calibration is in compliance with NVLAP laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0.

Custom Specification Report Oyo 03331-0000 Seismograph

Test No. 558547 Asset No. 15014

Page 2 of 8

STEP	FUNCTION	NOMINAL	10.55	V (v. a. analom	Out	CALIBRATION
NUM	TESTED	VALUE	AS FOUND	AS LEFT	of Tol	TOLERANCE
	CH HN Frequency Square Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	ļ	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	Sine Wave	100.0 Hz	100.1	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	CH HR Frequency Square Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	Sine Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	100.0 Hz	99.8	Same		99.0 to 101.0 Hz [EMU 0.000500]
	CH V Frequency Square Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	I	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	Sine Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
emarks:				,		



SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

SYSTEM MFR: SERIAL NO.: BY: COUNTER MFF SERIAL NO.: BY: FCTN GEN MFF SERIAL NO.:	BY: CRAIG BRACOUNTER MFR: HEWLET SERIAL NO.: 2626A0988 BY: SCE #S1-07 FCTN GEN MFR: HEWLET		MODEL NO CALIBRATIO DUE DATE: MODEL NO CALIBRATIO DUE DATE: MODEL NO CALIBRATIO CALIBRATIO DUE DATE:	ON DATE: .: ON DATE: .: ON DATE:	03331-0000 7/31/2008 7/31/2009 5335A 7/17/2008 1/17/2009 3325A 4/24/2008 10/24/2008	
SYSTEM SETT GAIN: FILTER: RANGE: DELAY: STACK: 1 (STD PULSE: DISPLAY:	INGS:	ECT DATE & TIME	10 20 KHZ 100 MILLISE 0 1 1.6 NA	EC	008	1729
0.25 VOLT PEA AND PRINT WA	.K. RECC AVEFORM APES, IF A		AND PAPER UTILITY. AT FORM. AVE	TAPE, IF A	VAILABLE. ANA ER COPIES OF QUENCY MUST	LLYZE PRINTOUT BE
AS FOUND		99.9 1.	12	AS LEFT	99.9	42
WAVEFORM	FILE NO	FREQUENCY		TIME FOR 9 CYCLES Hr		AVERAGE FREQ.
SQUARE	201	100.0	90.00m3	90.00 ms	90.00 MS	100.01+2
SQUARE	202	100.0	90,00 ms			100.0 112
SINE	203	100.0	89.90 ms	90.00MS	90,00 ms	100.0 112
SINE	204	100.0	90.00MS	90.20ms	90.00 ms	99.9/42
CALIBRATED E		CRAIG BRANSON NAME	7	//3//20 DATE	o8 Ca SIGNATURE	ig 3 ransan
	Seismic	recorder/Logger Cali	bration Data S	sheet Rev	1.30 4-6-06	

Suspension 170 1.42

ID NO. : 201 HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 21/07/09 5

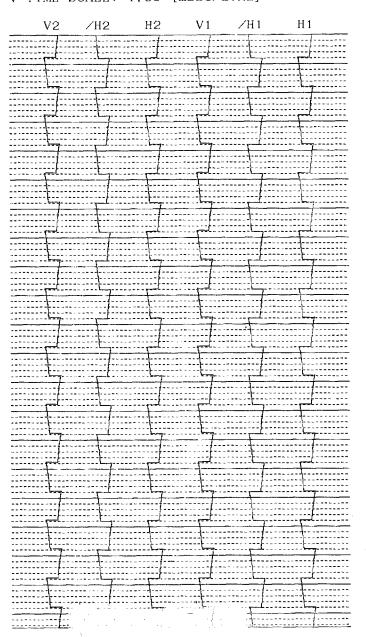
: 31/07/08 05:**28**:48 PM

H-SAMPLE RATE: 100 [#SEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : O [mSEC]

> H1 /H1 V1 H2 /H2 V2

:X 10 X 10 X 10 X 10 X 10 X 10 GAIN LCF[Hz] : 5 5 5 5 5 HCF[Hz] : 20K 20K 20K 20K 20K 20K STACK : 1 1 1 1 1

TRACE SIZE : 1 H-TIME SCALE: 1,00 [mSEC/LINE] V-TIME SCALE: 1,00 [mSEC/LINE]



Suspension 170 1.42

ID_NO. : 202

HOLE NO. : 0
DEPTH : 0.0 [m]
DATE : 31/07/08 05:30:17 PM

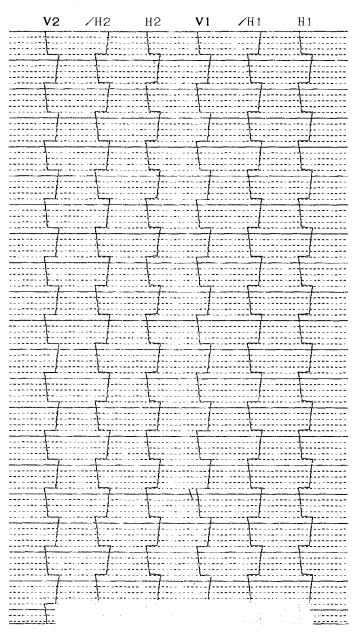
H-SAMPLE RATE: 100 [#SEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : 0 [mSEC]

> H1 /H1 V1 H2 /H2 V2

GAIN :X 10 X 10 X 10 X 10 X 10 X 10 LCF[Hz] : 5 5 5 5 5 5 6 HCF[Hz] : 20K 20K 20K 20K 20K 20K STACK : 1 1 1 1 1 1

TRACE SIZE : 1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



Suspension 170 1,42

ID_NO. : 203 HOLE NO. : 0

DEPTH : '0,0 [m]

DATE : 31/07/08 05:31:28 PM

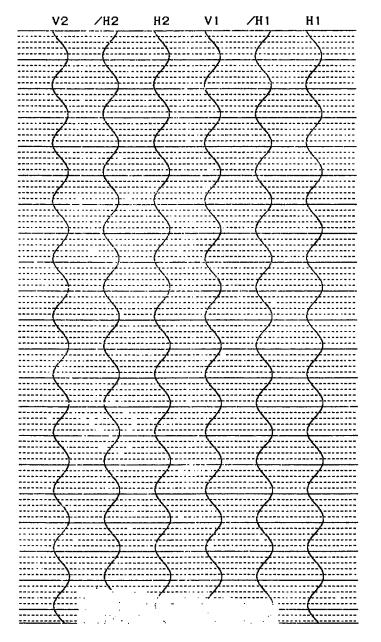
H-SAMPLE RATE: 100 [μ SEC] V-SAMPLE RATE: 100 [μ SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : 0 [mSEC]

H1 /H1 V1 H2 /H2 V2

:X 10 X 10 X 10 X 10 X 10 X 10 GAIN LCF[Hz] : 5 5 5 5 5 5 : 20K 20K 20K 20K 20K HCF [Hz] 20K STACK 1 1 1 1

TRACE SIZE ::____1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



Suspension 170 1.42

ID_NO, : 204 HOLE NO, : 0

DEPTH : 0,0 [m]

DATE : 31/07/08 05:32:32 PM

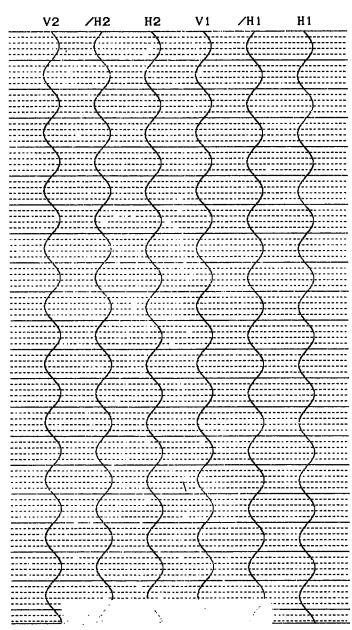
H-SAMPLE RATE: 100 [μ SEC] V-SAMPLE RATE: 100 [μ SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : 0 [mSEC]

H1 /H1 V1 H2 /H2 V2

:X 10 X 10 X 10 X 10 X 10 X 10 GAIN : 5 5 5 5 5 LCF [Hz] 5 20K 20K 20K 20K HCF[Hz] : 20K 20K 1 1 1 STACK 1 1 : 1

TRACE SIZE : 1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



Test No. 558547 Asset No. 15014

Custom Specification Report

Oyo 03331-0000 Logger/Recorder, Seismic, PS Suspension

Page 6 of 8

STEP NUM	FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
	CH HN Frequency Sine Wave	50.00 Hz	50.00	Same		49.50 to 50.50 Hz [EMU 0.000250]
	!	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
		200.0 Hz	199.8	Same		198.0 to 202.0 Hz [EMU 0.001000]
		500.0 Hz	499.4	Same		495.0 to 505.0 Hz [EMU 0.002500]
	1	1000 Hz	1000	Same		990 to 1010 Hz [EMU 0.005000]
	l	2000 Hz	2002	Same		1980 to 2020 Hz [EMU 0.010000]
	CH HR Frequency Sine Wave	50.00 Hz	50.00	Same		49.50 to 50.50 Hz [EMU 0.000250]
	ļ ·	100.0 Hz	100.1	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	200.0 Hz	199.8	Same		198.0 to 202.0 Hz [EMU 0.001000]
	l	500.0 Hz	499.4	Same		495.0 to 505.0 Hz [EMU 0.002500]
		1000 Hz	1001	Same		990 to 1010 Hz [EMU 0.005000]
	l	2000 Hz	2000	Same		1980 to 2020 Hz [EMU 0.010000]
	CH V Frequency Sine Wave	50.00 Hz	50.06	Same		49.50 to 50.50 Hz [EMU 0.000250]
	1	100.0 Hz	99.9	Same		99.0 to 101.0 Hz [EMU 0.000500]
		200.0 Hz	200.0	Same		198.0 to 202.0 Hz [EMU 0.001000]
		500.0 Hz	500.6	Same		495.0 to 505.0 Hz [EMU 0.002500]

Remarks:

Test No. 558547 Asset No. 15014

Custom Specification Report

Oyo 03331-0000 Logger/Recorder, Seismic, PS Suspension

Page 7 of 8

FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
CH V Frequency Sine Wave	1000 Hz	1001	Same		990 to 1010 Hz [EMU 0.005000]
l	2000 Hz	1998	Same		1980 to 2020 Hz [EMU 0.010000]
		, in the second			
	CH V Frequency Sine Wave	TESTED VALUE CH V Frequency Sine Wave 1000 Hz 2000 Hz	TESTED VALUE CH V Frequency Sine Wave 1000 Hz 1998	TESTED VALUE AS FOUND AS LEFT CH V Frequency Sine Wave 1000 Hz 1001 Same 1 2000 Hz 1998 Same	TESTED VALUE AS FOUND AS LEFT of Tol Tested to



SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMEN	T DATA								
System mfg.:		Оуо			Model no.:		03331-0000		
Serial no.:		15014			Calibration	date:	7/3	31/2002	
Ву:		Craig Bra	nson		Due date:		7/3	31/2009	
Counter mfg.:		Hewlett-P	ackard		Model no.:		5335A		
Serial no.:		2626A098	381		Calibration	date:	7/17/2008		
By:		SCE #S1-	-01252		Due date:		1/17/2009		
Signal genera	tor mfg.:	Hewlett-P			Model no.:		3325A		
Serial no.:		2652A256			Calibration	date:	4/24/2008		
Ву:		SCE #S1-	01347		Due date:		10/24/2008		
SYSTEM SET	TINGS:								
Gain:				10					
Filter				20KHz					
Range:	•			See sampl	e period in	table below			
Delay:				0					
Stack (1 std)				1		1 /			
System date =	correct dat	e and time)			7/31/2	008	1734	
PROCEDURE	z.					,			
Set sine wave		a target fr	anopov.	with amplitu	do of appro	vimately 0.3	5 volt neak		
		_		viiii ampiitu	de or appro	Milialely 0.2	.5 voit peak		
Note actual from Set sample pe				Note file n	omo on do	to form			
							m and agua	00	
Pick duration								as	
.sps file. Cald	sulate averaç	ge rrequen	cy for eac	on channei	pair and no	te on data id	orm.		
Average frequ	iency must b	e within +	/- 1% of a	ctual frequ	ency at all c	lata points.			
						/			A 12%
Maximum erro	or ((AVG-AC	T)/ACT*1	00)%	As found		0.121		As left	0.12%
					T" - '.			T	
Target	Actual	Sample	File	Time for	Average	Time for	Average	Time for	Average
Frequency	Frequency		Name	9 cycles	Frequency		Frequency	9 cycles	Frequency
(Hz)	(Hz)	(microS)		Hn (msec)		Hr (msec)	Hr (Hz)	V (msec)	V (Hz)
50.00	50.00	200		190,0	50.00	180.0	50.00	179.8	50.06
100.0	100.0	100	206	_ <u> </u>	100.0	89,90	100.1	90.10	99.9
200.0	200.0	50		45.05	199.8	45.05	199.8	45.00	200.0
500.0	500.0	20	208		499.4	18.02	499,4	17.98	500,6
1000	1000	10	209		1000	8.990	1001	9.990	1001
2000	2000	5	210	4.495	2002	4.900	2000	4.505	1998
					-/2/	1		" . Z	
Calibrated by:		Craig Bra	nson		1/31/	2008		very /	ransen
		Name			' /	Date		Sigbature	
							0		
					_/1	·	// \	12	
Witnessed by	:	Robert St	eller		7/31/2		fel	r VC	
		Name				Date	7	Signature	
S	uspension F	PS Seismic	Recorde	er/Logger C	alibration D	ata Form	Rev 2.0 Ju	ly 21, 2008	



A SOUTE N CALIFORNIA EDISON® Company

Metrology

7300 Fenwick Lane Westminster, CA 92683 Phone: 866-723-2257

Calibration Report

NVLAP Accredited Calibration

GEOVision Geophysical Services

1124 Olympic Drive Corona, CA 92881-3390





Manufacturer:

Oyo Corporation

Model Number:

3331-A

Description:

Logger, Suspension,

Asset Number: Serial Number: 19029 19029

PO Number:

8200-080122-01

Condition As Found:

In Tolerance

Condition As Left:

In Tolerance

Calibration Date:

07/31/2008

Calibration Due Date: 07/31/2009

Calibration Interval: 12 Months

Remarks:

This unit was calibrated with the customer's old procedure and specifications which have been reviewed by Metrology Engineering and documented in SCE Document M013684. The data can be found on page 2 of this report with the original observation data on pages 3,4,5. The unit was then calibrated with the customer's new procedure and specification's which have been reviewed by Metrology Engineering and documented in SCE Document M013987. The data can be found on pages 6 and 7 of this report with the original observation data on page 8 of this report.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal,	07/17/2008	01/17/2009
S1-01347	Hewlett Packard	3325A	Generator, Function, Synthesizer	04/24/2008	10/24/2008
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/22/2008	01/22/2009

Procedure: Customer Temperature: 23° C **Humidity:** 52% RH Test No .: 558548

Calibration Performed By: Quality Reviewer: -2-08 714-895-0714 Branson, Craig A (Metrologist Phone

This report may not be reproduced, except in full, without written permission of this laboratory. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. The results stated in this report relate only to the items tested or calibrated. Measurements reported herein are traceable to SI units via national standards maintained by NIST. This calibration is in compliance with NVLAP laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0.

Custom Specification Report Oyo 3331-A Seismograph

Test No. 558548 Asset No. 19029

Page 2 of 8

		· · · · · · · · · · · · · · · · · · ·				1 agc 2
STEP NUM	FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
	CH HN Frequency Square Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	l	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	Sine Wave	100.0 Hz	99.9	Same		99.0 to 101.0 Hz [EMU 0.000500]
ì		100.0 Hz	99.8	Same		99.0 to 101.0 Hz [EMU 0.000500]
	CH HR Frequency Square Wave	100.0 Hz	100.0	Same	i i	99.0 to 101.0 Hz [EMU 0.000500]
	<u> </u>	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
1	Sine Wave	100.0 Hz	99.9	Same		99.0 to 101.0 Hz [EMU 0.000500]
		100.0 Hz	99.8	Same		99.0 to 101.0 Hz [EMU 0.000500]
	CH V Frequency Square Wave	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	l	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
	Sine Wave	100.0 Hz	99.8	Same		99.0 to 101.0 Hz [EMU 0.000500]
	1	100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
marks:						



SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT I SYSTEM MFR: SERIAL NO.: BY:	OYO 19029	RANSON	MODEL NO CALIBRATION DUE DATE:		3331-A 7/31/2008 7/31/2009			
COUNTER MFF SERIAL NO.: BY:	ETT PACKARD 881 -01252	MODEL NO.: 5335A CALIBRATION DATE: 7/17/2008 DUE DATE: 1/17/2009						
FCTN GEN MFF SERIAL NO.: BY:	R: HEWL 2652A25 SCE #S1	647	MODEL NO.: 3325A CALIBRATION DATE: 4/24/2008 DUE DATE: 10/24/2008					
PROCEDURE: SET FREQUEN 0.25 VOLT PEA AND PRINT WA) E = CORR CY TO 10 K. RECO WEFORM APES, IF #	RD BOTH ON DISK IS FROM ANALYSIS AVAILABLE, TO THIS	10 20 KHZ 100 MILLISEC 0 1 1.6 NA 7/31/2008 (\$10 VE WITH AMPLITUDE APPROXIMATELY AND PAPER TAPE, IF AVAILABLE. ANALYZE BUTILITY. ATTACH PAPER COPIES OF PRINTOUT SFORM. AVERAGE FREQUENCY MUST BE					
AS FOUND 99.8 H 8			<u>2</u>	AS LEFT 99.8 HZ				
WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr		AVERAGE FREQ.		
SQUARE	301	100.0	90.00 ms	90,00 Mg	90,06 mg	100.0 HZ		
SQUARE	302	100.0	90.00 ms	90.00mg	90.00 MS	100.0 HZ		
SINE	303	100.0	90.10 MS	90,10M5	90.20 mg	99.85 42		
SINE	304	100.0	190.20MS	40.20 mg	90.00 MS	99.85 HZ		
CALIBRATED BY:		CRAIG BRANSON NAME		31/2000 DATE	8 Carl SIGNATURE	Branson		
	Seismic	recorder/Logger Cali	bration Data S	Sheet Rev	1.30 4-6-06			

OYO

5/N 19029

Suspension 170 4.25

: 301 ID_NO. HOLE NO. : 2

DEPTH : 0.0 [m] DATE : 31/07/08 06:08:54 PM

H-SAMPLE RATE: 100 [#SEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : O [mSEC]

H1 /H1 V1 H2 /H2 V2 _____ :X 10 X 10 X 10 X 10 X 10 X 10 GAIN : 5 5 5 5 5 LCF [Hz] HCF[Hz] : 20K 20K 20K 20K 20K 20K 1 1 : 1 1 1 STACK

TRACE SIZE : 1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]

∕H1 H 1

5/~ 19029

Suspension 170 4.25

ID_NO. : 302

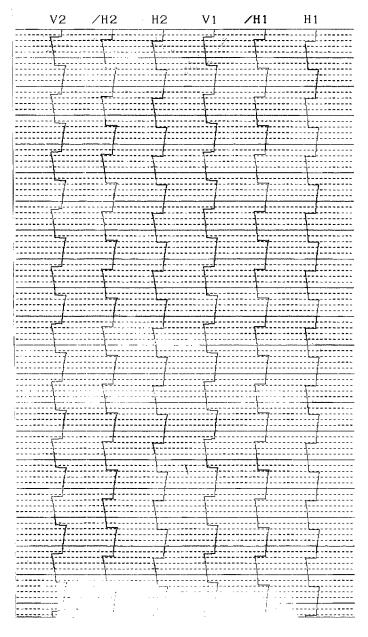
HOLE NO. : 2 DEPTH : 0.0 [m] DATE : 31/07/08 06:11:54 PM

H-SAMPLE RATE: 100 [μ SEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC]
DELAY TIME : 0 [mSEC]

H1 /H1 V1 H2 /H2 V2 GAIN :X 10 X 10 X 10 X 10 X 10 X 10 LCF[Hz]: 5 5 5 5 5 HCF[Hz] : 20K 20K 20K 20K 20K 20K 1 ' 1 ' 1 STACK ¥. 1

TRACE SIZE : 1

H-TIME SCALE: 1,00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



5/N 19029 CYO

5.C8. 5/N 19029

Suspension 170 4.25

: 303 ID_NO. HOLE NO. :

DEPTH 0.0 [m]

DATE

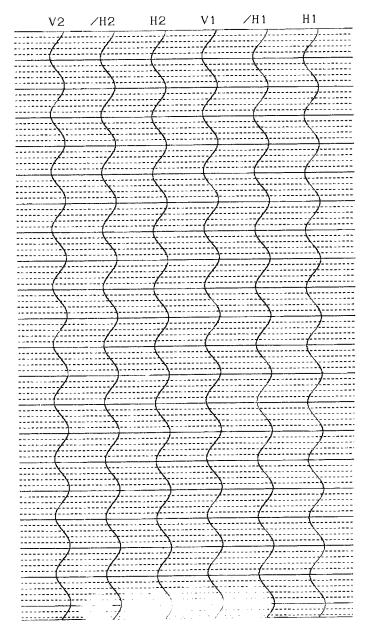
H-SAMPLE RATE: 100 [µSEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : O [mSEC]

H 1	∕H1	V 1	Н2	/H2	V2

:X 10 X 10 X 10 X 10 X 10 X 10 GAIN LCF[Hz] : 5 5 5 5 5 5 HCF[Hz] : 20K 20K 20K 20K 20K 20K : 1 1 1 1 1 1 STACK

TRACE SIZE : 1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



Suspension 170 4.25

ID_NO. : 304 HOLE NO. :

DEPTH 0.0 [m]

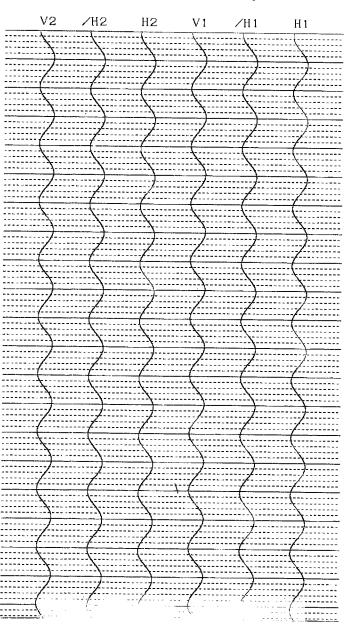
: 31/07/08 06:13:50 PM

H-SAMPLE RATE: 100 [μSEC] V-SAMPLE RATE: 100 [#SEC] PULSE WIDTH : 1.6 [mSEC] DELAY TIME : O [mSEC]

H1 /H1 V1 H2 /H2 V2 ~-~----GAIN :X 10 X 10 X 10 X 10 X 10 X 10 LCF [Hz] : 5 5 5 5 HCF[Hz] : 20K 20K 20K 20K 20K STACK : 1 1 1 1

TRACE SIZE : 1

H-TIME SCALE: 1.00 [mSEC/LINE] V-TIME SCALE: 1.00 [mSEC/LINE]



Test No. 558548 Asset No. 19029

Custom Specification Report Oyo Corporation 3331-A Logger, Suspension,

Page 6 of 8

STEP NUM	FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
	CH HN Frequency Sine Wave	50.00 Hz	49.95	Same	į	49.50 to 50.50 Hz [EMU 0.000250]
	l	100.0 Hz	100.1	Same		99.0 to 101.0 Hz [EMU 0.000500]
	I	200.0 Hz	199.8	Same		198.0 to 202.0 Hz [EMU 0.001000]
	I	500.0 Hz	500.0	Same		495.0 to 505.0 Hz [EMU 0.002500]
	1	1000 Hz	1001	Same		990 to 1010 Hz [EMU 0.005000]
	•	2000 Hz	1998	Same		1980 to 2020 Hz [EMU 0.010000]
	CH HR Frequency Sine Wave	50.00 Hz	49.89	Same		49.50 to 50.50 Hz [EMU 0.000500]
	l	100.0 Hz	99.9	Same	***************************************	99.0 to 101.0 Hz [EMU 0.000500]
	1	200.0 Hz	200.0	Same		198.0 to 202.0 Hz [EMU 0.001000]
	1	500.0 Hz	499.4	Same		495.0 to 505.0 Hz [EMU 0.002500]
		1000 Hz	997.8	Same	, p. op.	990 to 1010 Hz [EMU 0.005000]
	l	2000 Hz	2000	Same		1980 to 2020 Hz [EMU 0.010000]
	CH V Frequency Sine Wave	50.00 Hz	49.95	Same		49.50 to 50.50 Hz [EMU 0.000500]
	1	100.0 Hz	99.78	Same		99.0 to 101.0 Hz [EMU 0.000500]
	I	200.0 Hz	199.8	Same		198.0 to 202.0 Hz [EMU 0.001000]
	l	500.0 Hz	499.4	Same		495.0 to 505.0 Hz [EMU 0.002500]

Remarks:

Test No. 558548 Asset No. 19029

Custom Specification Report

Oyo Corporation 3331-A Logger, Suspension,

Page 7 of 8

STEP NUM	FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
	CH V Frequency Sine Wave	1000 Hz	997.8	Same		990 to 1010 Hz [EMU 0.005000]
	1	2000 Hz	1998	Same		1980 to 2020 Hz [EMU 0.010000]
emarks:						



SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMEN	T DATA								
System mfg.: Oyo				Model no.:		3331-A			
Serial no.: 19029					Calibration date:		7/31/2008		
By:	By: Craig Branson			Due date:		7/31/2009			
Counter mfg.:		Hewlett-F	ackard		Model no.: 5335A				,
Serial no.:		2626A09			_ Calibratior	n date:	7/17/2008		
By:		SCE #S1	-01252		Due date:		1/17/2009		
Signal genera	ntor mfg.:	Hewlett-F	ackard		Model no.:		3325A		
Serial no.:		2652A25	347		_ Calibration	ı date:	4/24/2008		
Ву:		SCE #S1	-01347		Due date:		10/24/2008		
SYSTEM SET	TTINGS:				_				
Gain:				10					
Filter				20KHz					•
Range:				See samp	le period in	table below			
Delay:				0	•				
Stack (1 std)				1					
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						-0.22			-027
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Townst	1 ^ -41	Commis	F :1_	T: f		T: f	A	T	1 4
Target	Actual	Sample	File	Time for	Average	Time for	Average	Time for	Average
Frequency	Frequency		Name	9 cycles	Frequency		Frequency	9 cycles	Frequency
(Hz)	(Hz)	(microS)	205	Hn (msec)		Hr (msec)	Hr (Hz)	V (msec)	V (Hz)
50.00	50.00	200		180.2	49.95		49,89	180.2	49.95
100.0	100.0	100	306		100.1	90.1	99.9	90.2	99.18
200.0	200.0	50	307		199.8	45.00	200.0	45.05	199.8
500.0	500.0	20	308		500.0	18.02	499.4	18.02	499.4
1000	1000	10	309		1001	9.020	997.8	9.020	997.8
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Name						Date		Signature	
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Stratigraphic Interpretation of Geological Formations Observed in Borehole (B-11)

Stratigraphic Interpretation of Geological Formations Observed in SCDOT Borehole (B-11) North Charleston, S.C.

Prepared by: Dr. Michael Katuna

for S&ME Inc.

March, 2009

Introduction

A 500-foot deep borehole was drilled in North Charleston near the intersection of I-26 and the Spruill Avenue eastbound ramp. Sampling was accomplished using split spoon, Shelby tube and continuous coring techniques. Sample splits were collected (where possible) from these cored intervals at observable lithologic discontinuities and near stratal boundaries as determined from geophysical logs. The depth and thickness of formational units recorded from geophysical logs may vary from those obtained by sediment sampling due to errors resulting from unrecovered intervals and sediment compression. In most cases, the log depths for formational contacts were used and appear to be more accurate. Log depths were mainly obtained from gamma ray logs that usually indicate unconformable formational contacts due to the presence and concentration of minerals such as glauconite and phosphate that normally contain some radioactive elements.

This report contains the lithologic and stratigraphic determination of geologic formations that were encountered in the borehole. These determinations were based upon detailed sedimentological laboratory analyses of the sample splits. The analyses included; lithologic descriptions including sediment color, visual estimates of grain size and associated textural characteristics, relative abundances of constituents such as the percentage of sand vs. silt/clay fractions, and other relevant information. The utilization of biostratigraphic analyses (not included in this study) would help to confirm the stratigraphic interpretation. Stratigraphic correlation was also made with the Cannon Park core (CHN 800) that was previously studied by the U.S. Geological Survey (Bybell, L.M. et al., 1998).

Laboratory Procedure and Sample Analyses

A total of twenty sediment samples were collected from the 500-foot deep soil boring located in North Charleston near the intersection of Spruill Avenue and I-26. These samples were collected at specific intervals based upon the preliminary identification of stratigraphic units identified from geophysical logs obtained at the site. Sample splits were acquired from near the upper and lower boundaries of apparent stratigraphic units as identified from the gamma ray log. Samples were also taken in the central section of each representative unit to better define their lithologic character. The samples were then taken to the sedimentology laboratory at the College of Charleston where they were allowed to air dry prior to processing.

Once dry, the samples were disaggregated by hand using a mortar and pestle. The color of the dry sample was determined and recorded using a standard Munsell Soil Color Chart. The entire ground sample was then passed through a sample splitter to provide a working sample of approximately 15 – 30 grams. Each sample split was weighed on a top loading balance and placed into a 400 ml beaker. Since all of the samples contained a significant amount of silt and clay, it was necessary to disaggregate each sample to remove the finer grained fraction. Removal of the silt and clay allowed for visual analysis of the sand fraction that is a better indicator of the lithologic differences between stratigraphic units. In order to accomplish this, a 220 ml solution of 0.5N sodium hexametaphosphate was then added to the sample to initiate flocculation. The samples were then mechanically agitated for approximately 10 to 20 minutes (depending on clay content) using an ultrasonic cell dismembrator. This procedure caused defloculation of the finer grained material creating a suspended sediment slurry. The slurry was then passed through a 270-mesh stainless steel sieve to separate the sand from the silt/clay fraction. The samples were transferred to filter paper and placed into a drying oven.

Once the sand portion had dried sufficiently, it was then weighed on a top loading balance to determine the sand percentage for each of the samples. The sand fraction was then analyzed under a stereozoom binocular microscope to identify the textural and compositional characteristics for each of the samples. The sedimentological characteristics of the sand were used to identify differences in lithology for each of the formational/stratigraphic units encountered in the borehole.

Lithologic Descriptions of Sediment Samples and Stratigraphic Relationships

Wando Formation (Pleistocene)

- Sample 24-26 ft.: CLAY Greenish-gray (10Y6/1) clay containing 3.54% sand: well sorted, very fine sub-angular to sub-rounded quartz sand containing disseminated organic matter and trace amounts of muscovite and other heavy minerals.
- Sample 44-46 ft.: SANDY CLAY Greenish-gray (10Y5/1) containing 17.5% sand; moderately sorted, sub-angular to sub-rounded fine to medium quartz sand with shell fragments; trace amounts of mica, heavy minerals and well rounded phosphate grains, and organic matter.
- Sample 46-48 ft.: SAND (71.6%) with silt and clay, Grayish-brown (10YR5/2). Very fine, well-sorted, sub-rounded quartz sand with disseminated organic matter and minor amounts of heavy minerals.

Ashley Formation (Top of the Tertiary - Cooper Group)

- Sample 48-50 ft.: CLAYEY SAND (45.5%) Light Olive Gray (5Y6/2)
 Fine to medium grained calcareous clayey sand with abundant microfossils (forams) and macrofossil fragments, quartz sand with well rounded phosphate grains and trace amounts of heavy minerals.
- Sample 58-60 ft.: SANDY CLAY (32.7% sand) Light Olive Gray (5Y6/2) Sandy calcareous clay with well-sorted, very fine to fine quartz sand containing abundant whole and fragmented microfossils as well as fragmented macrofossils some replaced by silica, glauconite and phosphate grains common with trace amounts of heavy minerals.
- Sample 78.5-80 ft.: SANDY CLAY (23.9% sand) Olive (5Y5/3)

 Very-fine to fine, well-sorted sandy clay, calcareous sand composed of micro and macro shell fragments, quartz common with trace amounts of phosphate, muscovite and other heavy minerals.

Sample 131.8 ft.: SANDY CLAY (28.2% sand) – Light yellowish-brown (2.5Y 6/3) Very fine to fine clayey calcareous foraminiferal sand with quartz, fossil fragments (spicules, spines, etc.) as well as trace amounts of phosphate and glauconite.

Harleyville Formation - (Cooper Group) - Upper Eocene

- Sample 179.5-181 ft.: CLAY (6.25% sand) (Pale Olive (5Y6/3) Mostly silt and clay with limited amounts of quartz sand, calcareous microfossiliferous shell fragments, and trace amounts of phosphate and glauconite, sand-size fraction is very fine-grained, sub-rounded and well sorted.
- Sample 239.5-241 ft.: SANDY CLAY (20.4% sand) Light Gray (5Y7/2) Very fine to fine, well sorted calcareous sand composed of foraminiferal and macrofossil shell fragments, glauconite common with trace amounts of quartz.
- Sample 250 ft.: SANDY CLAY (27.9% sand) Light Gray (2.5Y7/2) Very fine grained sandy calcareous clay containing abundant whole and fragmented foram shells, spines, etc. with trace amounts of quartz, glauconite and phosphate.
- Sample 270 ft.: CLAY (14.2% sand) Light Gray (5Y7/2) Very fine to fine, well-sorted calcareous sand composed primarily of glauconite and phosphate with trace amounts of quartz, fragmented micro and macrofossil shell fragments.
- Sample 290 ft.: CLAY (19.2% sand) Light Gray (2.5Y7/2) Diastem at the base of the Harleyville Formation, fine to medium grained granular sand, abundant phosphate and glauconite grains, shell fragments common, abundant foraminiferal sand, echinoderm spines and limestone fragments (basal lag) with some pyrite grains as well as coatings on shell fragments.

Cross Member – Santee Limestone

Sample 310 ft.: LIMESTONE (27.6% sand) Pale yellow (2.5Y 7/3) Fine - grained clayey (micritic) limestone containing abundant foraminiferal shells

and siliceous spicules (radiolarian spines) with trace amounts of quartz, glauconite and heavy minerals.

Williamsburg Formation — Black Mingo Group

- Sample 330 ft.: (Chicora Member) LIMESTONE (67.7% sand) Gray (2.5Y6/1) carbonate cemented quartz sand grains, grains are subangular to subrounded with occasional polished black phosphate, shell fragments are common and often have calcite spar coatings on surfaces and exhibits moldic porosity.
- Sample 350 ft.: (Chicora Member) SANDSTONE (58.7% sand) Gray (2.5Y6/1) Calcareous cemented, well-sorted, subangular to subrounded, micaceous quartz sandstone, rare microfossils, shell fragments, with trace amounts of glauconite and phosphate.
- Sample 375.5 ft.: (Chicora Member) SANDSTONE (61.6% sand) Light gray (2.5Y7/1) calcite cemented medium to coarse quartz sandstone, with abundant shell fragments (mainly oysters) and occasional glauconite and phosphate
- Sample 426 ft.: (Lower Bridge Member) MUDSTONE (5.0% sand) Gray (2.5Y6/1) Mostly silt and clay, with some very fine to fine angular to sub-angular quartz sand with trace amounts of fossil material and finely disseminated glauconite and other heavy minerals.
- Sample 439 ft.: (Lower Bridge Member) MUDSTONE (1.1% sand) Gray (2.5Y 5/1) Clay containing minor amounts of very fine grained quartz sand, glauconite, collophane, and heavy minerals.
- Sample 446 ft.: (Lower Bridge Member) MUDSTONE (12.1% sand) Gray (5Y6/1) Mostly silt and clay with very fine to fine sub-angular quartz sand with trace amounts of glauconite, phosphate, pyrite and some silica spicules.

Rhems Formation - Black Mingo Group

Sample 470 ft.: SANDSTONE (69.1% sand) Gray (5Y5/1) Well-sorted, sub-angular to sub-rounded quartz sand with trace amounts of glauconite, mica and phosphate, no apparent microfossils.

Delineation of Stratigraphic/Formational Units

The following is a list of the formational units that have been identified in the borehole based upon lithostratigraphic analysis and geophysical logs:

- 0 48 ft. Wando Formation (Pleistocene)
- 48 170 ft. Ashley Formation Cooper Group (Upper Oligocene)
- 170 290 ft. Harleyville Formation Cooper Group (Upper Eocene)
- 290 330 ft. Cross Member Santee Limestone (Middle Eocene)
- 330 395 ft. Williamsburg Formation Chicora Member Black Mingo Group (Upper Paleocene)
- 395 450 ft. Williamburg Formation Lower Bridge Member Black Mingo Group (Upper Paleocene)
- 450 >500ft. Rhems Formation Black Mingo Group (Upper to Lower Paleocene)

Formational Descriptions

The Wando Formation consists of a series of Pleistocene sediments composed of shelly, quartz sands and silty clay deposits that were formed in barrier/beach and lagoonal environments. The Wando Formation was initially mapped by Weems and Lemon (1993) in the Charleston area and represents a relict Pleistocene barrier island shoreline that parallels the modern coastline.

The Cooper Group consists of a series of formational units composed of fossiliferous, clay-rich impermeable limestones that were originally designated as the Cooper "marl". At this locality, the Ashley and Harleyville Formations represent the Cooper Group. The Ashley Formation is widespread throughout the Charleston area, and consists of an olive green to brown,

phosphatic and quartz-rich clayey limestone containing abundant microfossils (forams). The older Harleyville Formation is a finer-grained, glauconitic, clay-rich limestone also containing an abundance of microfossils.

The Cross Member/Formation of the Santee Limestone is represented by a fairly well consolidated, fossiliferous white to pale yellow limestone, partially silicified, containing abundant radiolarian (silica) spines forming dense "cherty" layers in sections. This unit is approximately forty feet thick in this region.

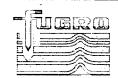
Stratigraphic units within the Black Mingo Group exhibit the greatest lithologic variability and hence are somewhat difficult to differentiate from one another based solely upon composition. The Williamsburg Formation consists of the Chicora Member and the underlying Lower Bridge Member. The Chicora Member is the most heterogeneous unit and consists of quartz sandstones, moldic limestones and mudstones that are fossiliferous and normally highly burrowed. The Lower Bridge Member (distinguished from geophysical logs) is more homogeneous and consists of fossiliferous, interbedded sandy and silty-clay layers. The oldest, and lowermost formation within the Black Mingo Group is the Rhems Formation. It is generally the thickest formational unit and should extend well below the terminus of the borehole. It normally consists of a rather monotonous section of mainly mudstones within some thin sandy layers.

References Cited

Bybell, L.M., Conlon, K.J., Edwards, L.E., Frederiksen, N.O., Gohn, G.S., and Self-Trail, J.M., 1998, Biostratigraphy and Physical Stratigraphy of the U.S.G.S.-Cannon Park Core (CHN 800), Charleston County, South Carolina, U.S. Geological Survey Open File Report 98-246, 65p.

Weems R.E. and Lemon, E.M. Jr., 1993, Geology of the Cainhoy, Charleston, Fort Moultrie, and North Charleston quadrangles, Charleston and Berkeley Countries, South Carolina, U.S. Geological Survey Miscellaneous Investigations Series Map I – 1935, 1:24,000.





SCDOT PORT ACCESS ROAD

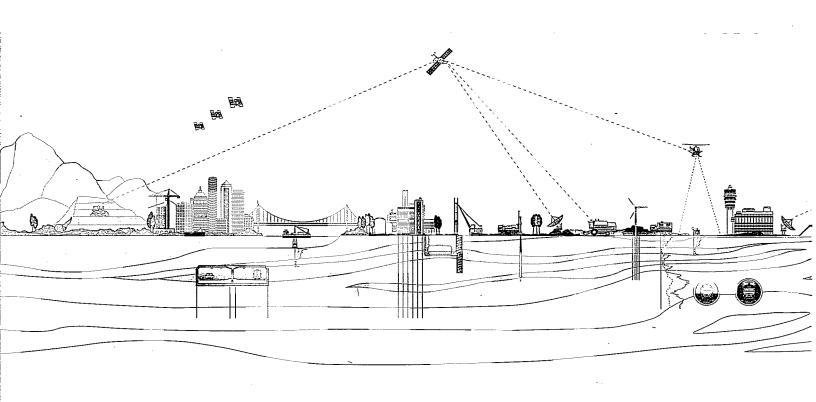
RESONANT COLUMN / TORSIONAL SHEAR (RCTS) TEST RESULTS

PREPARED FOR: S&ME, INC.

PREPARED BY: FUGRO CONSULTANTS INC.

DATE: February 4, 2009

FUGRO#0411-08-1721



FUGRO CONSULTANTS, INC.



6100 Hillcroft (77081) P.O. Box 740010 Houston, Texas 77274 Tel: 713-369-5400 Fax: 713-369-5518

February 4, 2009

William M. Camp, III, P.E. Technical Principal/Vice President S&ME, Inc. 620 Wando Park Boulevard Mt. Pleasant SC 29464

RE: Three (3) Resonant Column and Torsional Shear Test Results for the SCDOT Port Access Road

Dear Mr. Camp:

Per your request, Fugro has completed the above referenced assignment. The reports are attached to this letter. Please let us know if you have questions. Thanks.

Very truly yours,

Fugro Consultants, Inc.

Jiewu Meng, PhD, P.E. Project Engineer

Enclosures

Bill DeGroff, P.E.
Laboratory Department Manager



Applicability of Report

The laboratory testing results, as well as the conclusions and recommendations, if any, contained in this report, were completed based on our scope of services and on our established technical practice. We have prepared this report exclusively for S&ME to assist in their SCDOT Port Access Road project. We conducted our services using the standard level of care and diligence normally practiced by recognized engineering laboratories now performing similar services under similar circumstances. We intend for this report, including all illustrations, to be used in its entirety. Data as presented in this report should be used along with other available information and questions should be asked when inconsistency, if any, is observed.



APPENDIX A

Borehole B11
Depth = 249.65 ft

Total Unit Weight = 115.8 lb/ft³
Water Content = 31.06 %
LL=41, PL=24, PI=17

FUGRO JOB #: 0411-08-1721 Testing Station: RC7



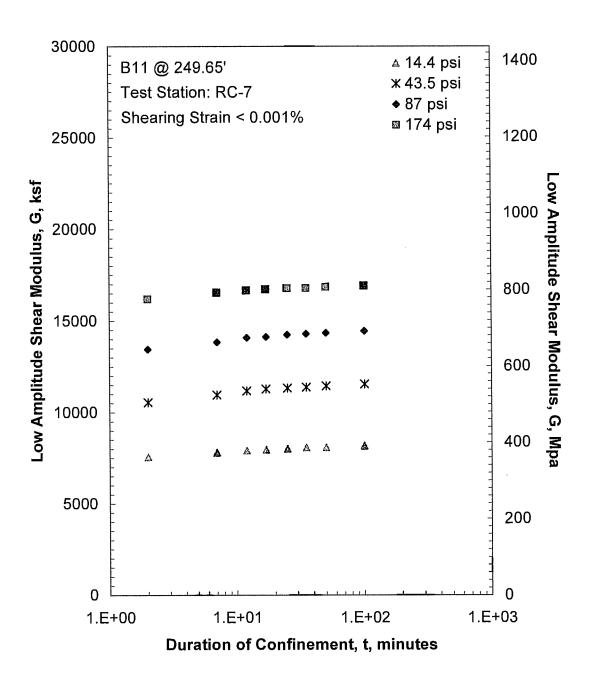


Figure A.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

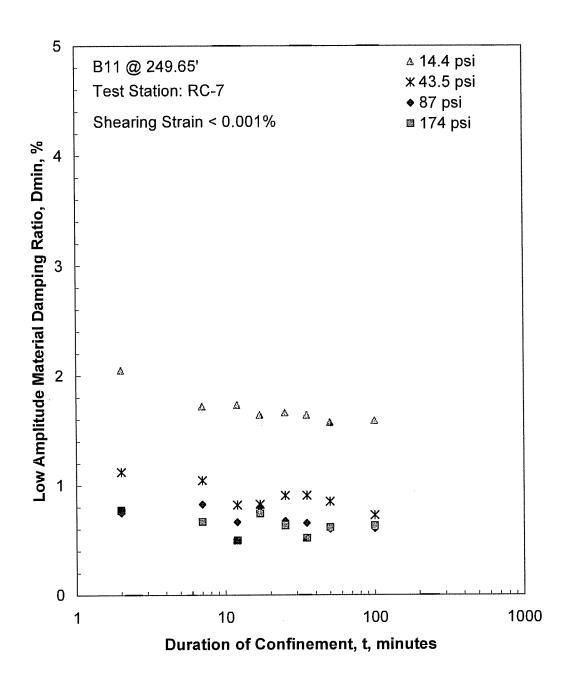


Figure A.2 Variation in Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

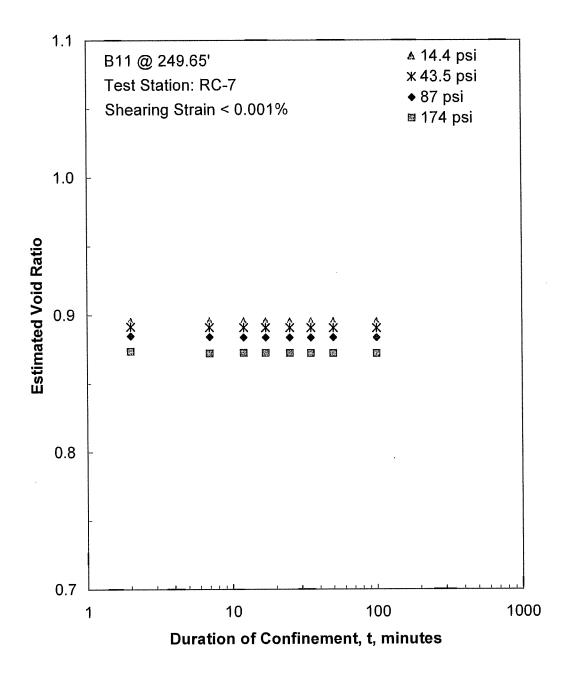


Figure A.3 Variation in Estimated Void Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

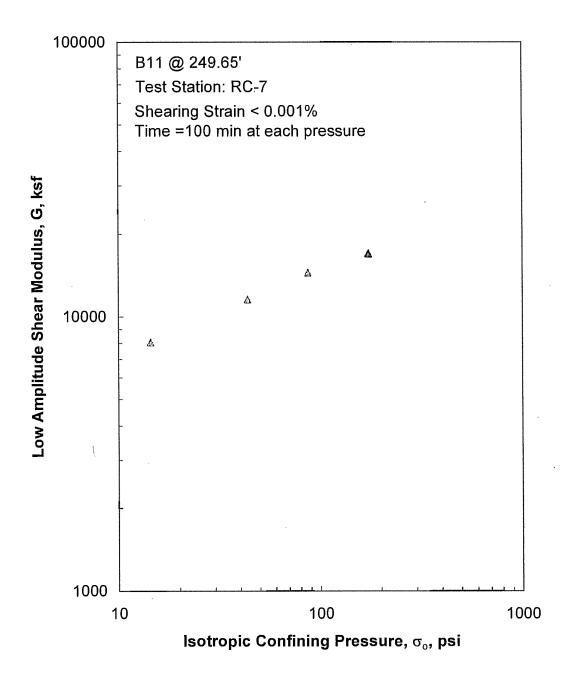


Figure A.4 Variation in Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

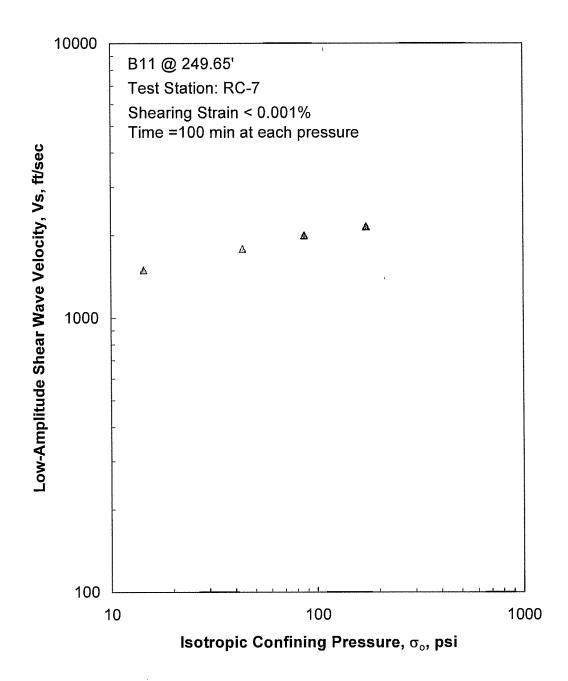


Figure A.5 Variation in Shear Wave Velocity with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

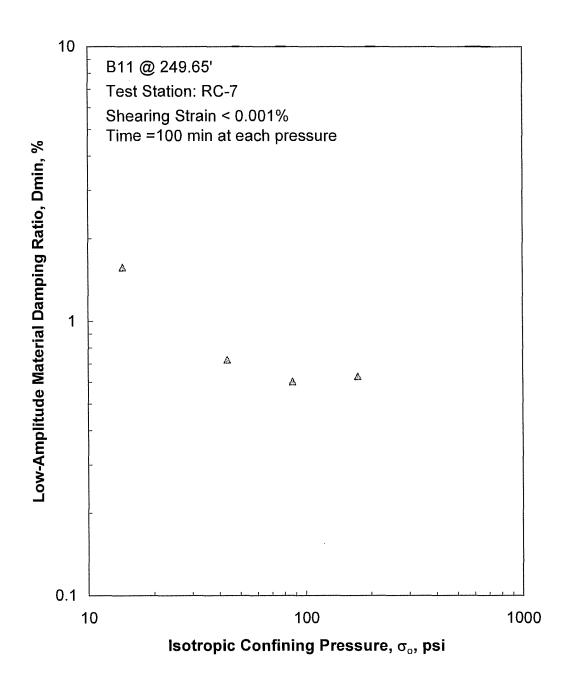


Figure A.6 Variation in Material Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

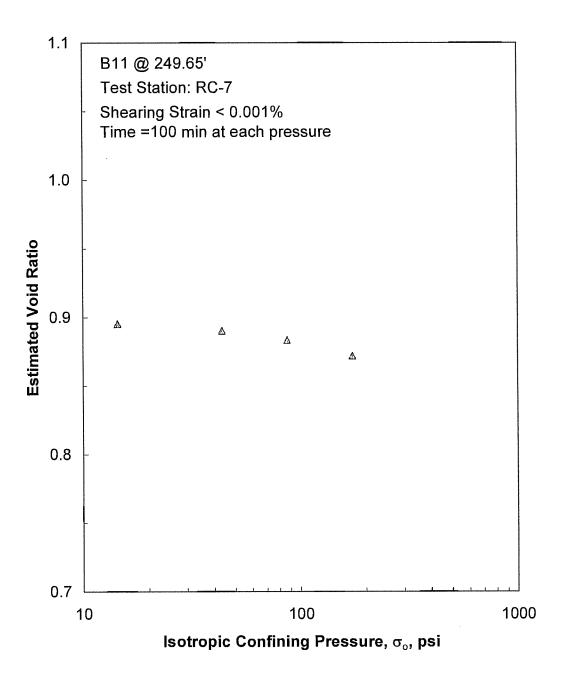


Figure A.7 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

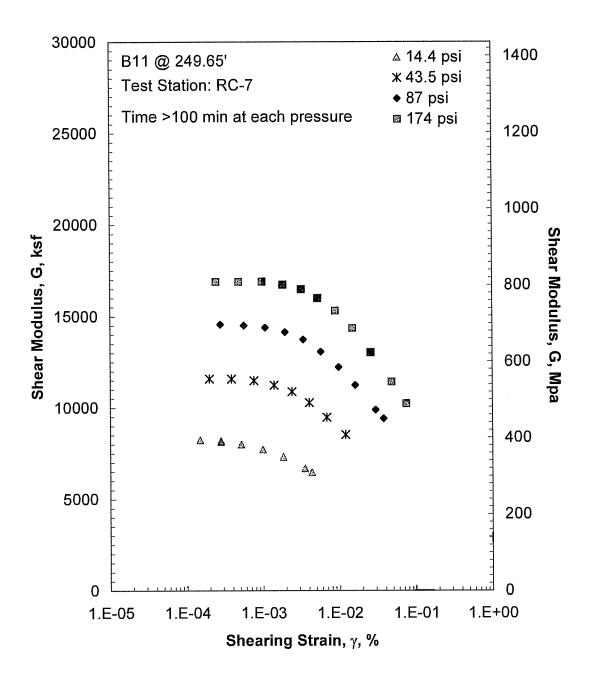


Figure A.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

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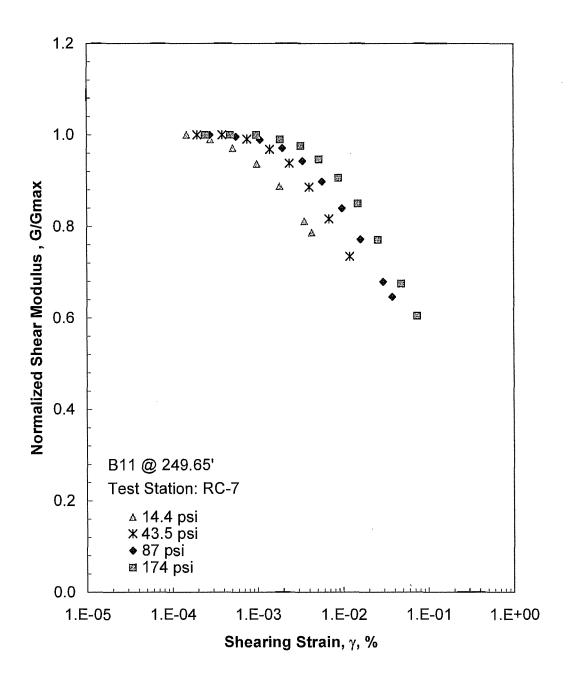


Figure A.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

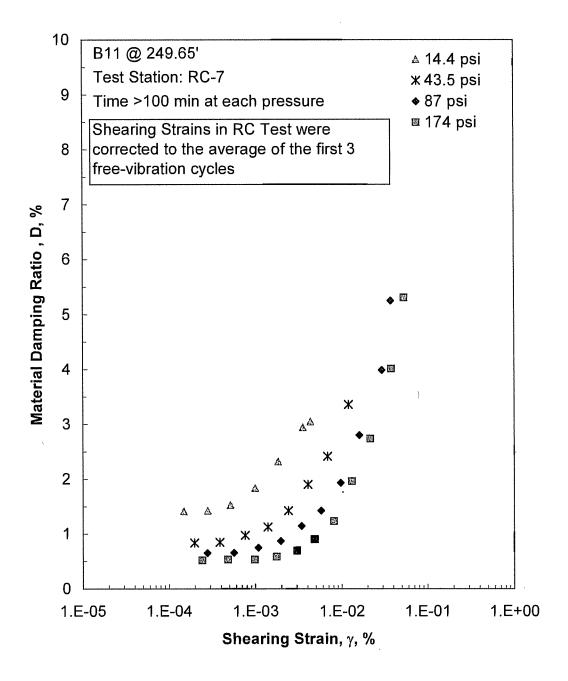


Figure A.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

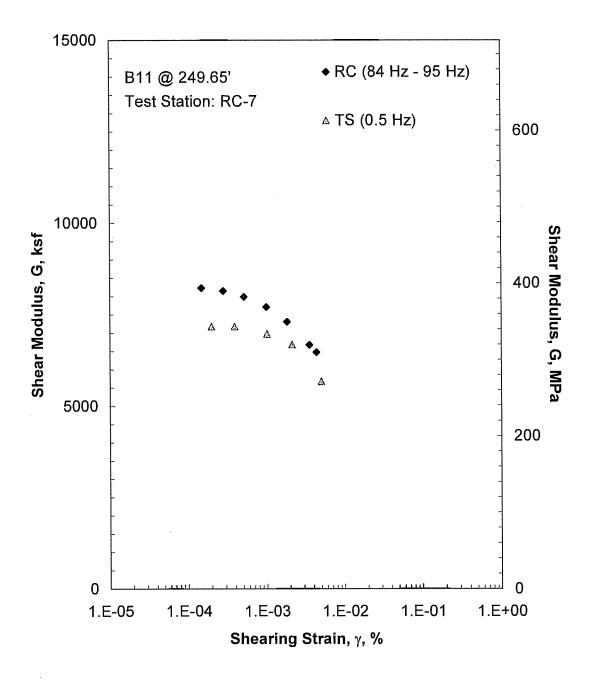


Figure A.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

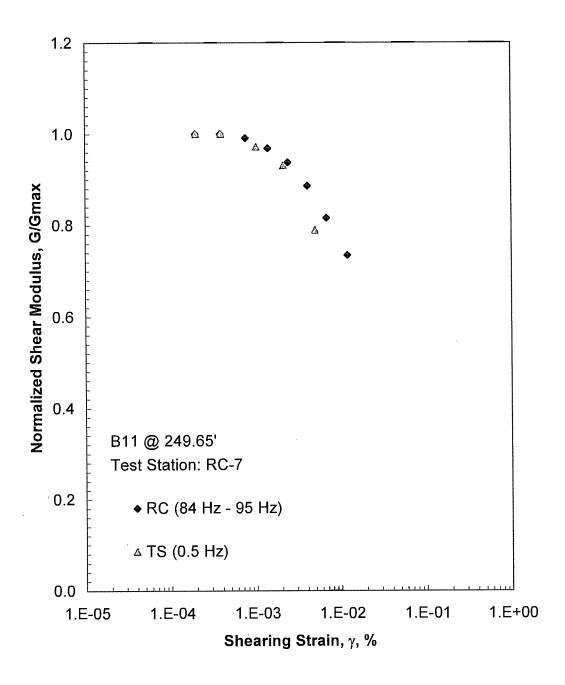


Figure A.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

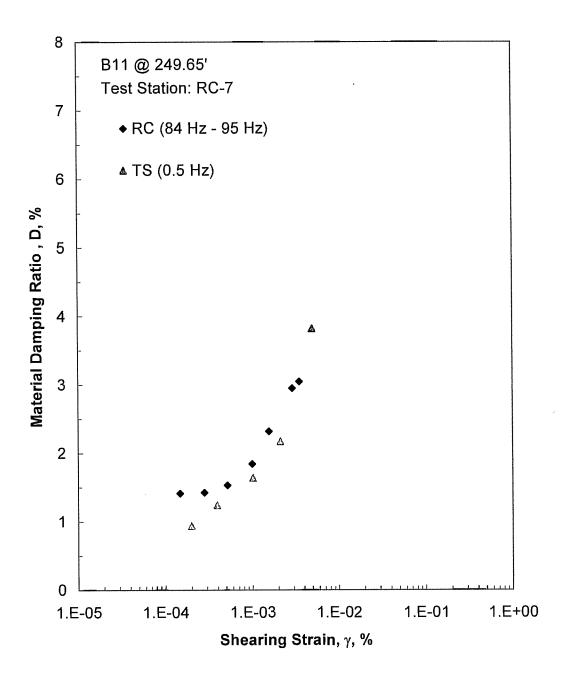


Figure A.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

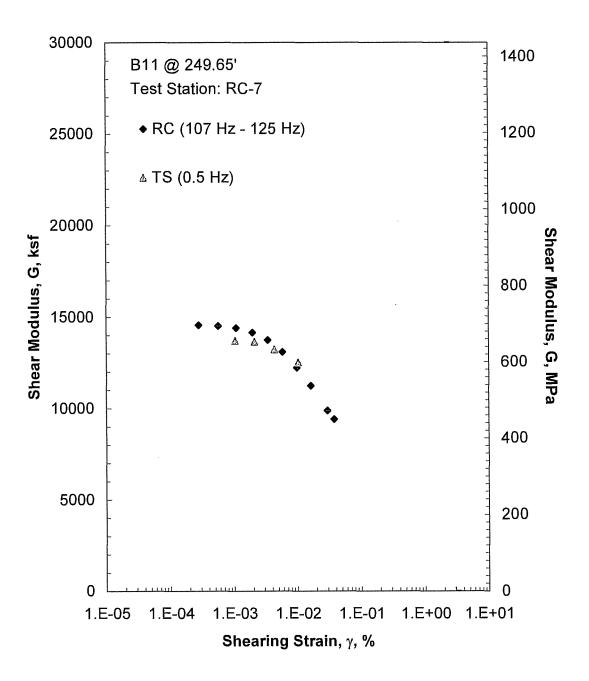


Figure A.14 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 87 psi from the Combined RCTS Tests

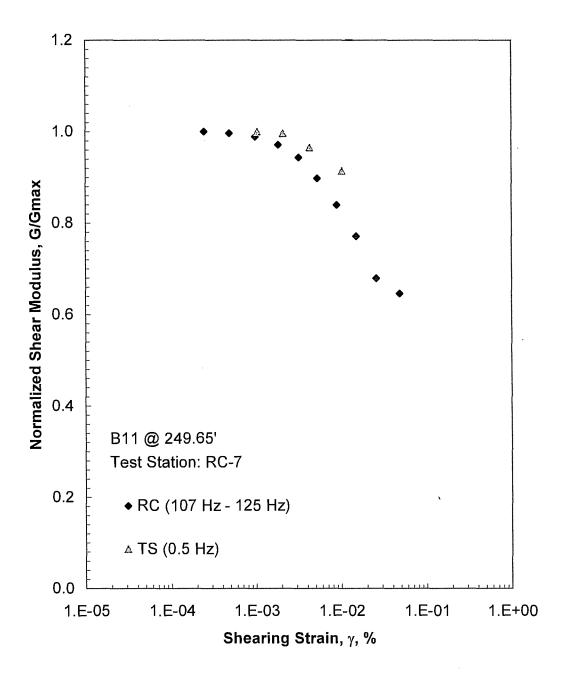


Figure A.15 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 87 psi from the Combined RCTS Tests

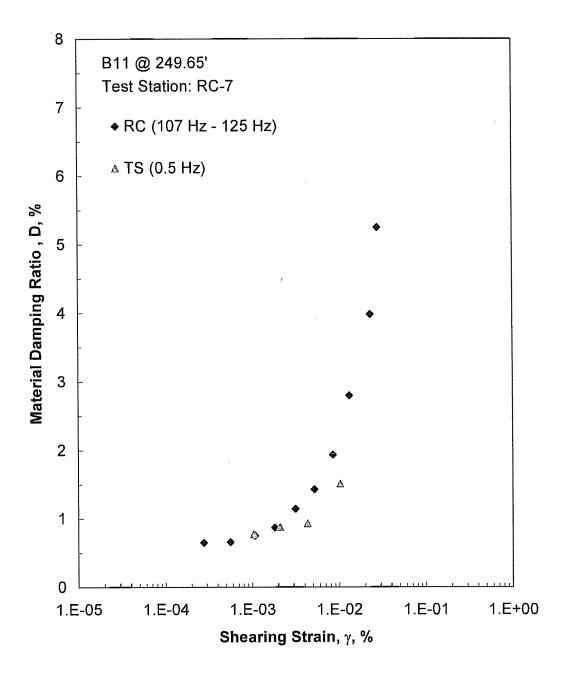


Figure A.16 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 87 psi from the Combined RCTS Tests

Table A.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen B11@249.65'

Isotropic (Low-Amplitude Shear Modulus, G _{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
14.4	2074	99	8066	387	1492	1.57	0.90
43.5	6264	300	11536	554	1782	0.72	0.89
87	12528	599	14444	693	1990	0.60	0.88
174	25056	1199	16912	812	2147	0.63	0.87

Table A.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 249.65'; Isoptropic Confining Pressure, σ_o = 14.4 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
1.48E-04	8229	1.00	1.48E-04	1.41
2.80E-04	8148	0.99	2.80E-04	1.42
5.16E-04	7987	0.97	5.16E-04	1.53
9.90E-04	7708	0.94	9.90E-04	1.84
1.83E-03	7304	0.89	1.56E-03	2.32
3.54E-03	6676	0.81	2.90E-03	2.94
4.34E-03	6469	0.79	3.52E-03	3.05

1

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table A.3 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 249.65'; Isoptropic Confining Pressure, σ_o = 43.5 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [⁺] Shearing Strain, %	Material Damping Ratio ^x , D, %
1.97E-04	11588	1.00	1.97E-04	0.83
3.86E-04	11588	1.00	3.86E-04	0.84
7.62E-04	11484	0.99	7.62E-04	0.97
1.39E-03	11227	0.97	1.25E-03	1.13
2.39E-03	10871	0.94	2.15E-03	1.42
4.04E-03	10265	0.89	3.56E-03	1.90
6.84E-03	9458	0.82	5.75E-03	2.41
1.20E-02	8512	0.73	9.71E-02	3.36

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table A.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 249.65'; Isoptropic Confining Pressure, σ_o = 87 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
2.77E-04	14556	1.00	2.77E-04	0.65
5.63E-04	14504	1.00	5.63E-04	0.65
1.07E-03	14399	0.99	1.07E-03	0.75
1.96E-03	14138	0.97	1.82E-03	0.87
3.40E-03	13726	0.94	3.13E-03	1.14
5.74E-03	13069	0.90	5.16E-03	1.42
9.72E-03	12219	0.84	8.45E-03	1.93
1.61E-02	11226	0.77	1.32E-02	2.80
2.95E-02	9878	0.68	2.30E-02	3.98
3.76E-02	9398	0.65	2.78E-02	5.25

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Table A.5 Specimen B11 @ 249.65'; Isoptropic Confining Pressure, σ_{o} = 174 psi

1	T	N1 1! 1		
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [⁺] Shearing Strain, %	Material Damping Ratio ^x , D, %
2.43E-04	16891	1.00	2.43E-04	0.52
4.82E-04	16891	1.00	4.82E-04	0.53
9.78E-04	16891	1.00	9.78E-04	0.53
1.84E-03	16723	0.99	1.75E-03	0.59
3.21E-03	16473	0.98	3.01E-03	0.69
5.27E-03	15987	0.95	4.85E-03	0.90
8.88E-03	15298	0.91	8.08E-03	1.23
1.50E-02	14348	0.85	1.32E-02	1.96
2.58E-02	13014	0.77	2.16E-02	2.73
4.81E-02	11400	0.67	3.80E-02	4.01
7.44E-02	10208	0.60	5.35E-02	5.31

^{7.44}E-02 10208 0.60 5.35E-02 5.31

* Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

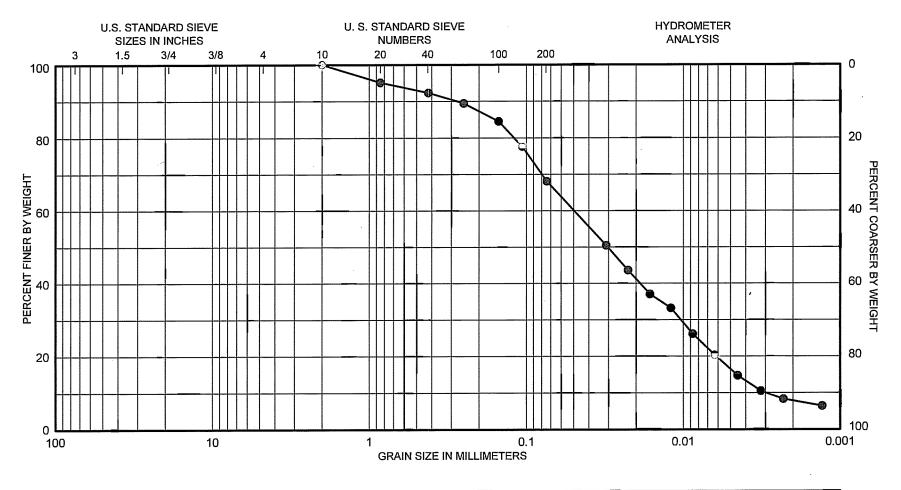
* Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table A.6 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 249.65'; Isotropic Confining Pressure, σ_0 = 14.4 psi

ſ	Peak	Shear	Normalized	Material
	Shearing	Modulus,	Shear Modulus,	Damping
1	Strain, %	G, ksf	G/G _{max}	Ratio, D, %
I	1.99E-04	7174	1.00	0.94
	3.92E-04	7174	1.00	1.24
	1.02E-03	6973	0.97	1.64
١	2.12E-03	6679	0.93	2.17
	5.00E-03	5666	0.79	3.82

Table A.7 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 249.65'; Isotropic Confining Pressure, σ_0 = 87 psi

	Peak	Shear	Normalized	Material
1	Shearing	Modulus,	Shear Modulus,	Damping
	Strain, %	G, ksf	G/G _{max}	Ratio, D, %
١	1.04E-03	13693	1.00	0.77
	2.09E-03	13645	1.00	0.87
	4.32E-03	13216	0.97	0.93
1	1.03E-02	12502	0.91	1.51



	GRAVEL			SAI	ND.		SILT or CLAY	
Coarse	•	Fine Coa		Medium	Medium Fine		SILT OF CLAT	
SYMBOL	BORING	DEPTH, FT	<u>C</u> _c	<u>C</u>	<u>D₅₀</u>	<u>D₉₀</u>	CLASSIFICATION	
•	B-11	249.65	0.73	16.75	0.03	0.28		

GRAIN SIZE CURVE

Table B.6 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 131.8; Isotropic Confining Pressure, σ_0 = 14.4 psi

Peak	Shear	Normalized	Material
Shearing	Modulus,	Shear Modulus,	Damping
Strain, %	G, ksf	G/G _{max}	Ratio, D, %
3.11E-04	1366	1.00	1.58
6.23E-04	1366	1.00	1.50
1.00E-03	1366	1.00 、	1.62
2.02E-03	1350	0.99	1.44
4.17E-03	1312	0.96	1.57
5.03E-03	1269	0.93	1.70



APPENDIX B

Borehole B11
Depth = 131.8 ft

Total Unit Weight = 100.4 lb/ft³
Water Content = 57.76 %
LL=106, PL=33, PI=73

FUGRO JOB #: 0411-08-1721 Testing Station: RC7



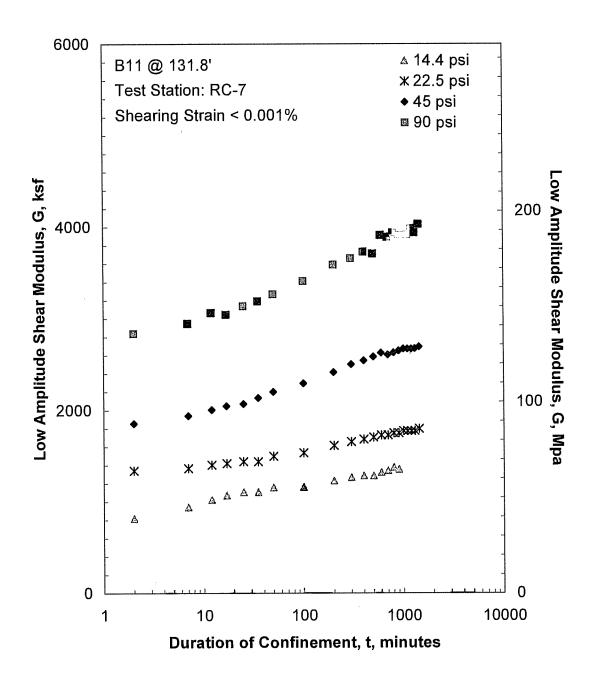


Figure B.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

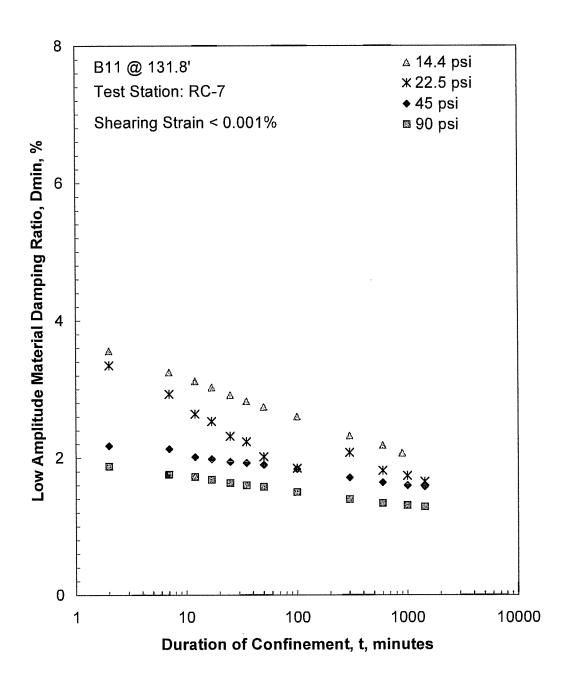


Figure B.2 Variation in Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

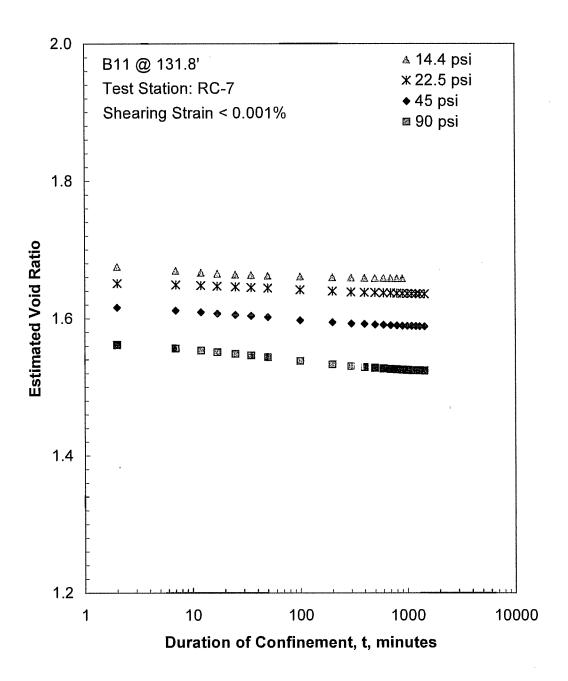


Figure B.3 Variation in Estimated Void Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

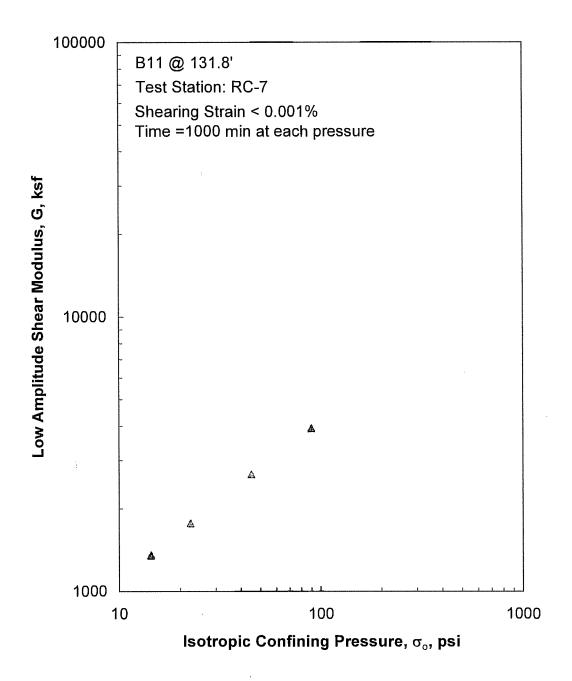


Figure B.4 Variation in Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

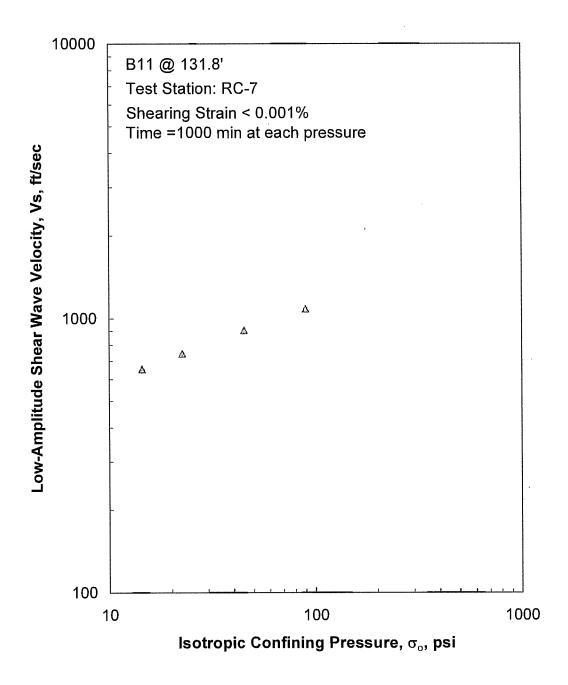


Figure B.5 Variation in Shear Wave Velocity with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

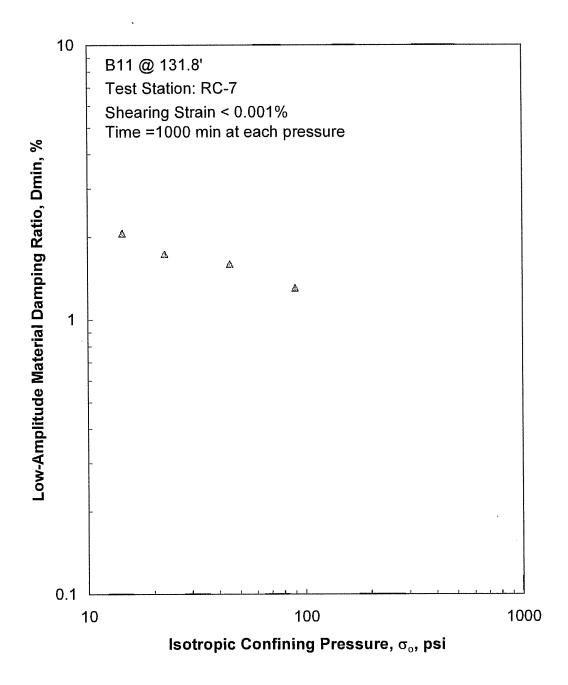


Figure B.6 Variation in Material Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

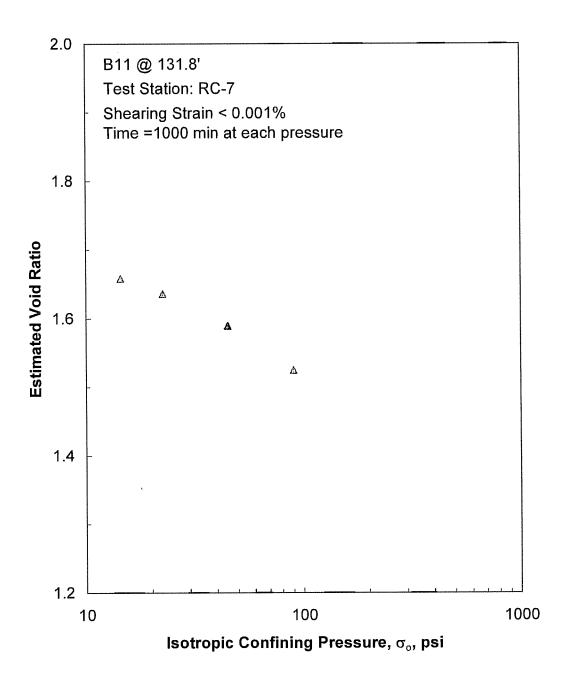


Figure B.7 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

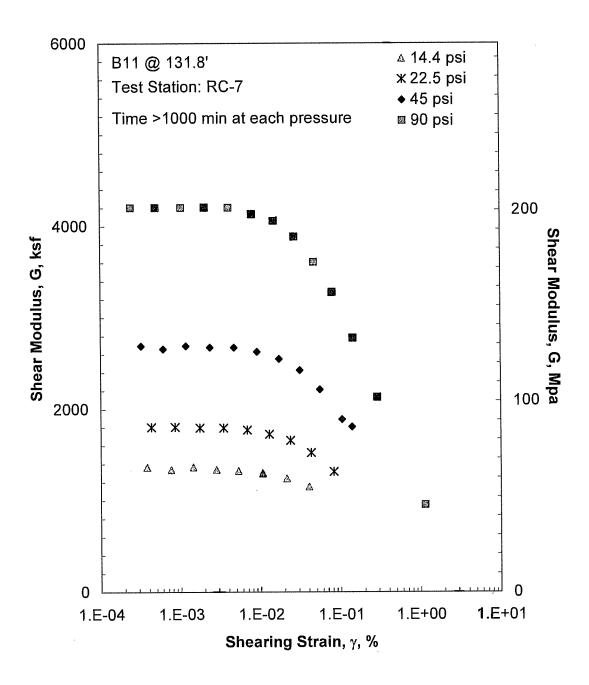


Figure B.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

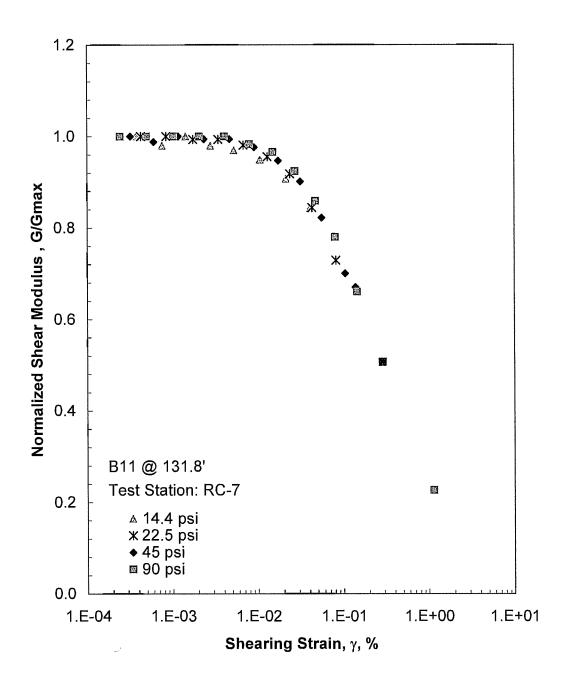


Figure B.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

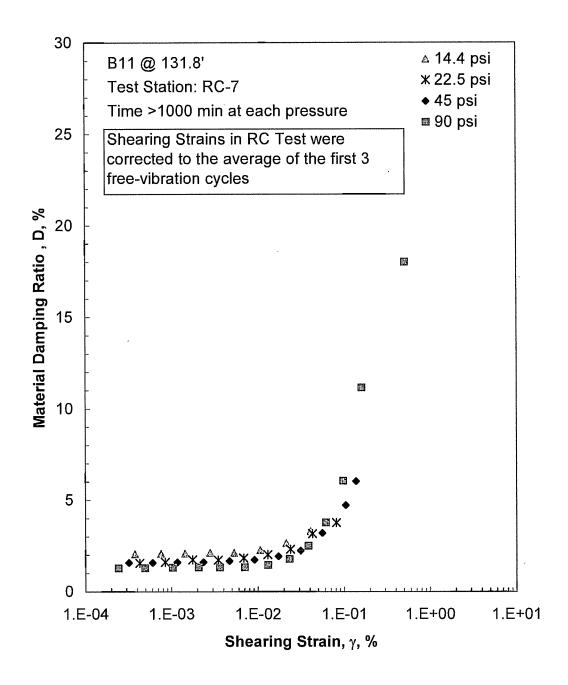


Figure B.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

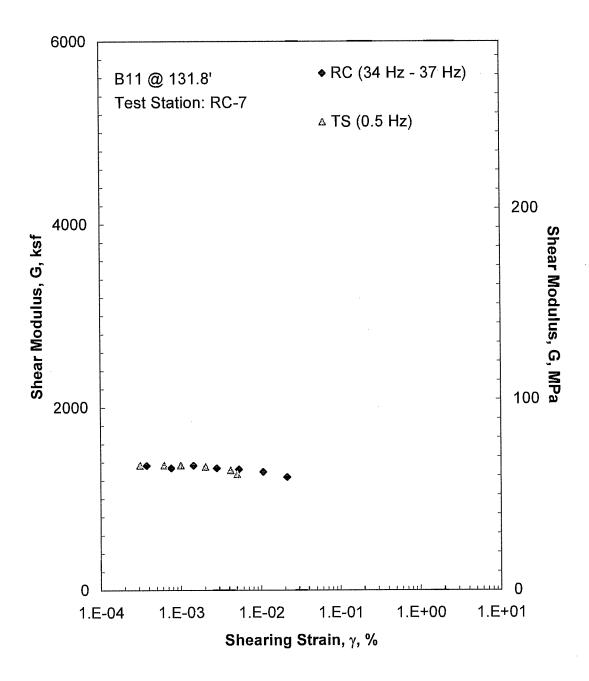


Figure B.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

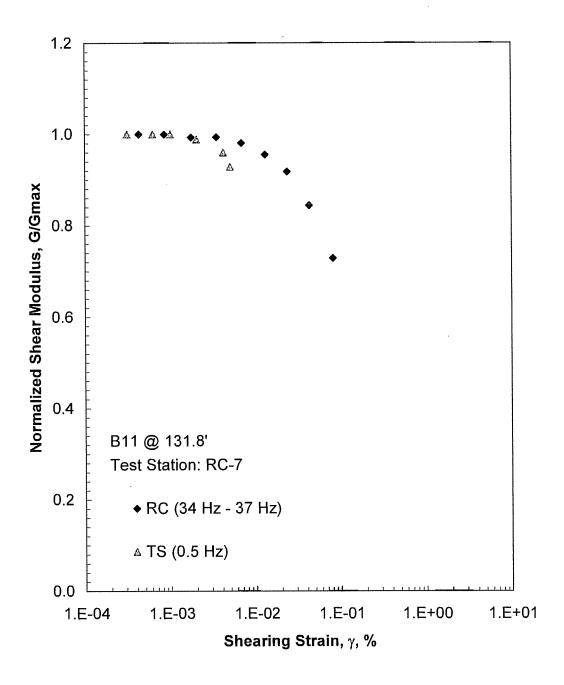


Figure B.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

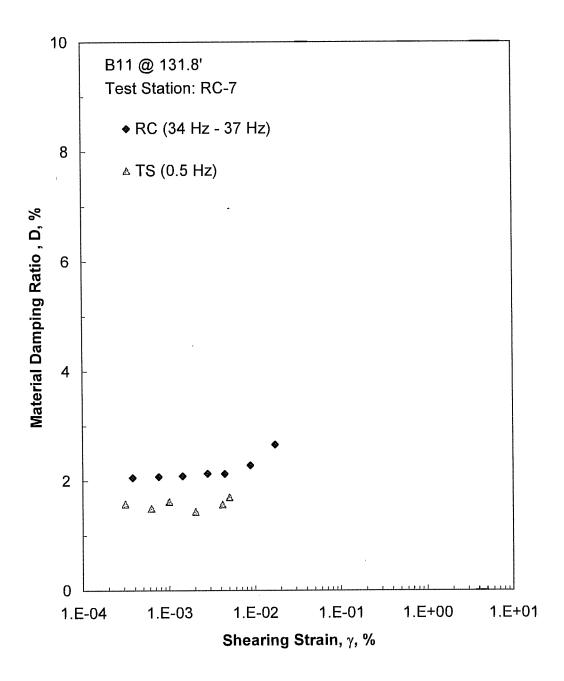


Figure B.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

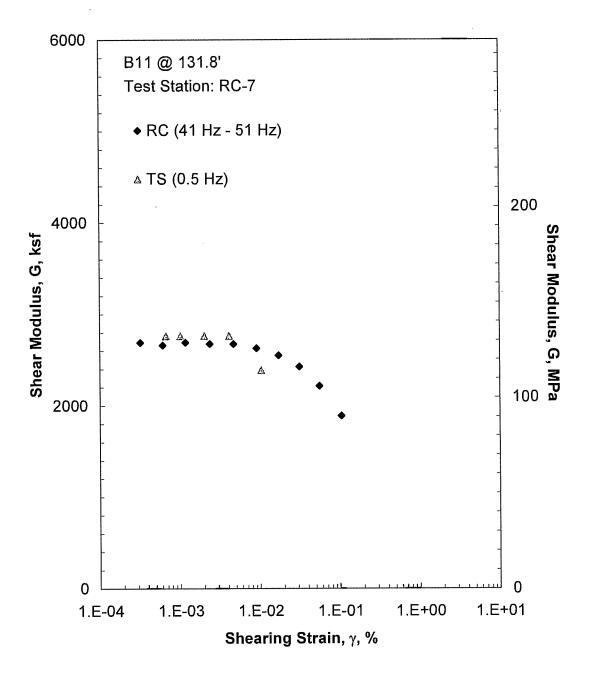


Figure B.14 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 45 psi from the Combined RCTS Tests

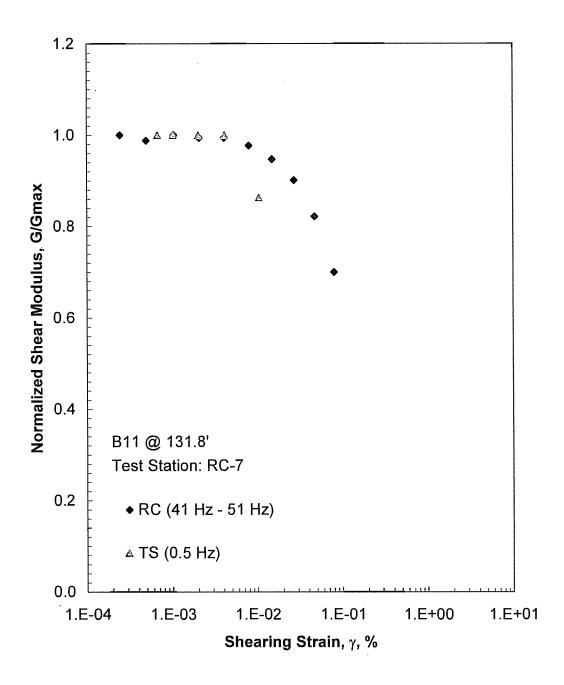


Figure B.15 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 45 psi from the Combined RCTS Tests

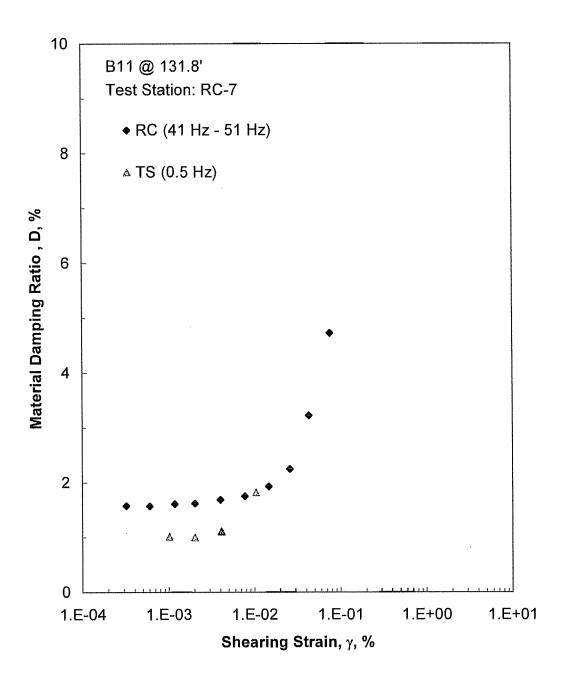


Figure B.16 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 45 psi from the Combined RCTS Tests

Table B.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen B11@131.8'

Isotropic Confining Pressure, σ_o		essure, σ_o	Low-Amplitude Shear Modulus, G _{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf) (MPa)		(fps)	(%)	
14.4	2074	99	1351	65	653	2.06	1.66
22.5	3240	155	1769	85	744	1.73	1.64
45	6480	310	2669	128	906	1.59	1.59
90	12960	620	3914	188	1083	1.30	1.52

Table B.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 131.8'; Isoptropic Confining Pressure, σ_0 = 14.4 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
3.76E-04	1365	1.00	3.76E-04	2.06
7.58E-04	1337	0.98	7.58E-04	2.08
1.43E-03	1365	1.00	1.43E-03	2.09
2.80E-03	1337	0.98	2.80E-03	2.13
5.28E-03	1323	0.97	4.43E-03	2.12
1.06E-02	1296	0.95	8.83E-03	2.28
2.12E-02	1238	0.91	1.72E-02	2.66
4.03E-02	1150	0.84	3.14E-02	3.29

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table B.3 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 131.8'; Isoptropic Confining Pressure, σ_0 = 22.5 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
4.27E-04	1804	1.00	4.27E-04	1.57
8.48E-04	1804	1.00	8.48E-04	1.62
1.75E-03	1793	0.99	1.47E-03	1.75
3.46E-03	1793	0.99	2.90E-03	1.73
6.79E-03	1770	0.98	5.91E-03	1.84
1.29E-02	1724	0.96	1.10E-02	2.02
2.36E-02	1657	0.92	1.92E-02	2.32
4.27E-02	1523	0.84	3.33E-02	3.17
8.13E-02	1315	0.73	5.86E-02	3.78

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table B.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 131.8'; Isoptropic Confining Pressure, σ_o = 45 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
3.21E-04	2691	1.00	3.21E-04	1.58
6.04E-04	2659	0.99	6.04E-04	1.57
1.17E-03	2691	1.00	1.17E-03	1.61
2.35E-03	2675	0.99	2.02E-03	1.62
4.67E-03	2675	0.99	4.01E-03	1.69
9.09E-03	2628	0.98	7.72E-03	1.75
1.72E-02	2549	0.95	1.46E-02	1.93
3.11E-02	2426	0.90	2.58E-02	2.25
5.53E-02	2212	0.82	4.31E-02	3.22
1.04E-01	1885	0.70	7.61E-02	4.73
1.38E-01	1804	0.67	9.37E-02	6.04

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^{1.38}E-01 1804 0.67 9.37E-02 6.04

*Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Table B.5 Specimen B11 @ 131.8'; Isoptropic Confining Pressure, σ_o = 90 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
2.43E-04	4203	1.00	2.43E-04	1.29
4.93E-04	4203	1.00	4.93E-04	1.29
1.04E-03	4203	1.00	1.04E-03	1.32
2.06E-03	4203	1.00	2.06E-03	1.32
4.07E-03	4203	1.00	3.62E-03	1.33
8.00E-03	4130	0.98	7.04E-03	1.33
1.49E-02	4059	0.97	1.31E-02	1.46
2.70E-02	3883	0.92	2.32E-02	1.79
4.68E-02	3609	0.86	3.83E-02	2.51
7.96E-02	3278	0.78	6.13E-02	3.78
1.44E-01	2775	0.66	9.79E-02	6.06
2.89E-01	2128	0.51	1.62E-01	11.15
1.14E+00	952	0.23	5.12E-01	18.01

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

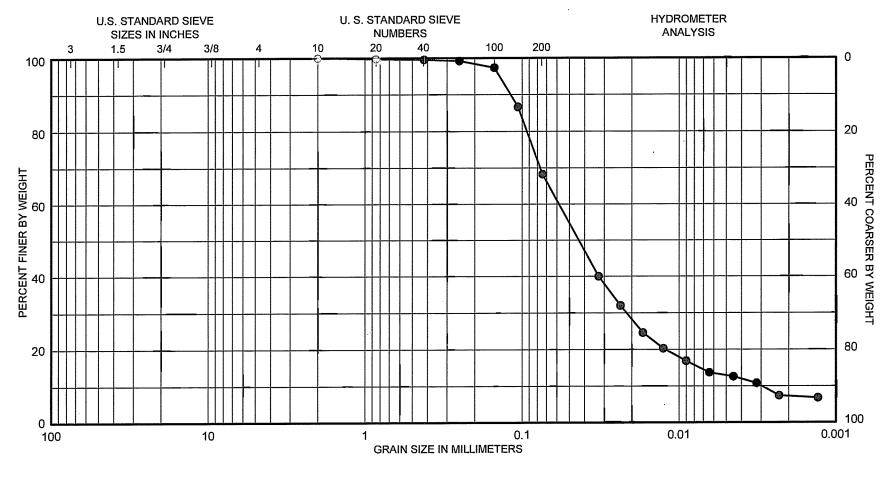
* Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table B.6 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 131.8; Isotropic Confining Pressure, σ_0 = 14.4 psi

-	Peak	Shear	Normalized	Material
	Shearing	Modulus,	Shear Modulus,	Damping
	Strain, %	G, ksf	G/G _{max}	Ratio, D, %
	3.11E-04	1366	1.00	1.58
	6.23E-04	1366	1.00	1.50
	1.00E-03	1366	1.00 、	1.62
	2.02E-03	1350	0.99	1.44
	4.17E-03	1312	0.96	1.57
	5.03E-03	1269	0.93	1.70

Table B.7 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 131.8'; Isotropic Confining Pressure, σ_0 = 45 psi

Peak	Shear	Normalized	Material
Shearing	Modulus,	Shear Modulus,	Damping
Strain, %	G, ksf	G/G _{max}	Ratio, D, %
6.69E-04	2763	1.00	1.07
1.02E-03	2763	1.00	1.02
2.02E-03	2763	1.00	1.00
4.13E-03	2763	1.00	1.11
1.05E-02	2385	0.86	1.82



GRAVEL			SAND			SILT or CLAY		
Coarse	Coarse Fine		Coarse	Medium	Fine		SILT OF CEAT	
SYMBOL	BORING	DEPTH, FT	<u>C</u> <u>e</u>	<u>C</u>	<u>D₅₀</u>	<u>D₉₀</u>	CLASSIFICATION	
®	B-11	131.8	2.71	19.66	0.04	0.12		

GRAIN SIZE CURVE



APPENDIX C

Borehole B11
Depth = 439 ft

Total Unit Weight = 98 lb/ft³
Water Content = 55.2 %
LL=129, PL=49, PI=80

FUGRO JOB #: 0411-08-1721 Testing Station: RC7



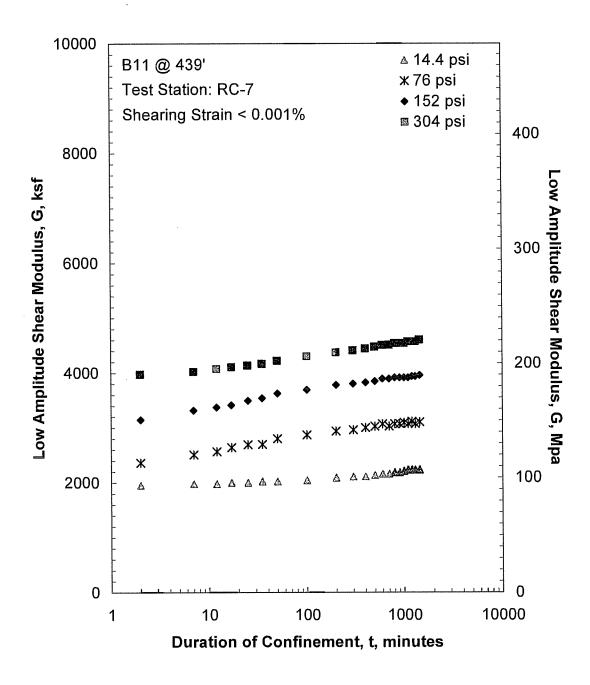


Figure C.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

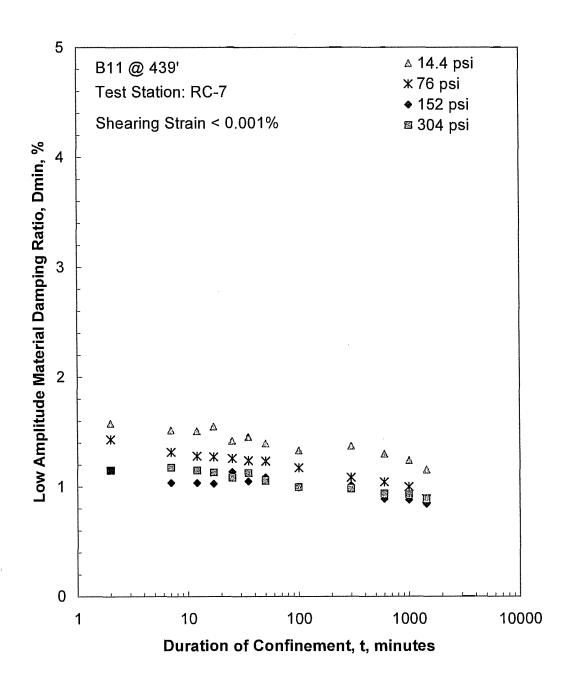


Figure C.2 Variation in Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

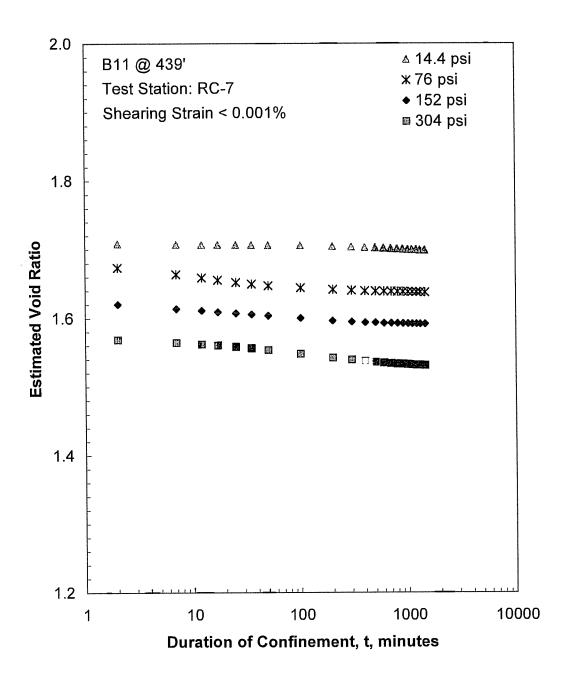


Figure C.3 Variation in Estimated Void Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

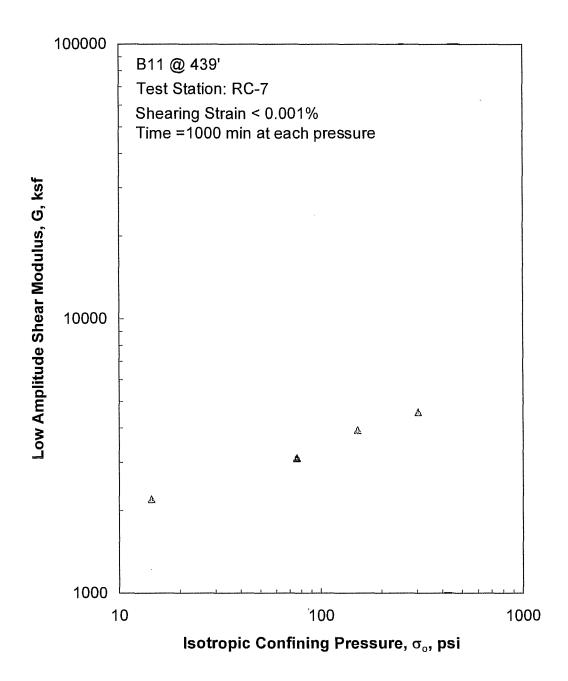


Figure C.4 Variation in Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

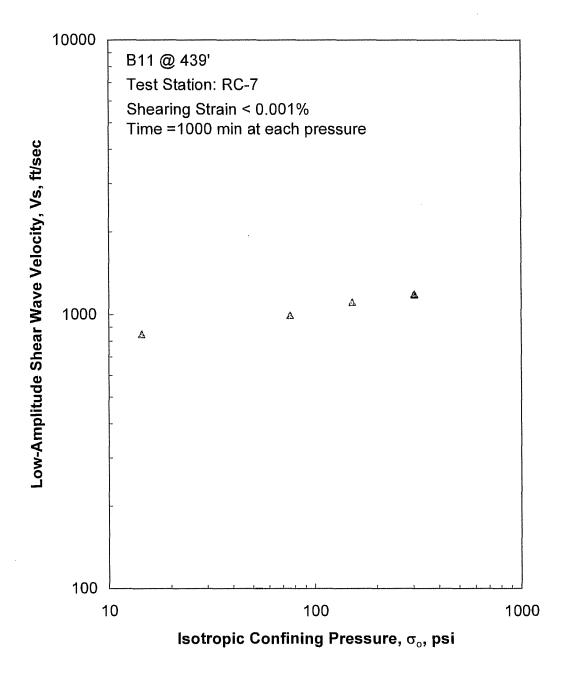


Figure C.5 Variation in Shear Wave Velocity with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

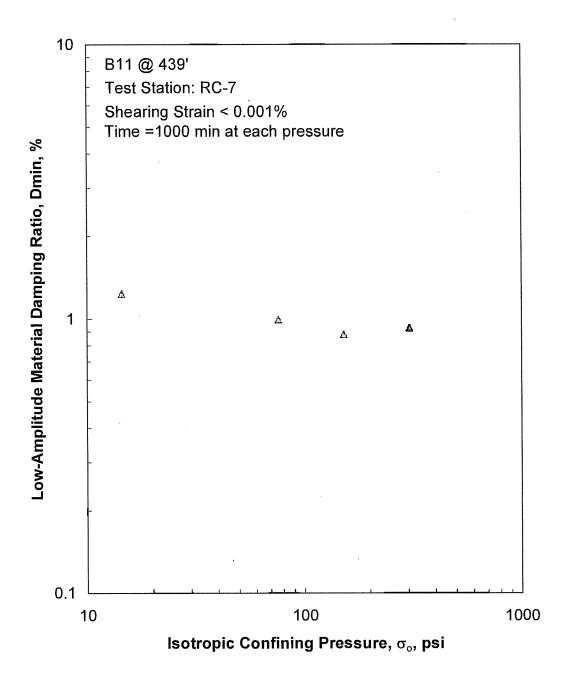


Figure C.6 Variation in Material Damping Ratio and Duration of Isotropic Confining Pressure from Resonant Column Tests

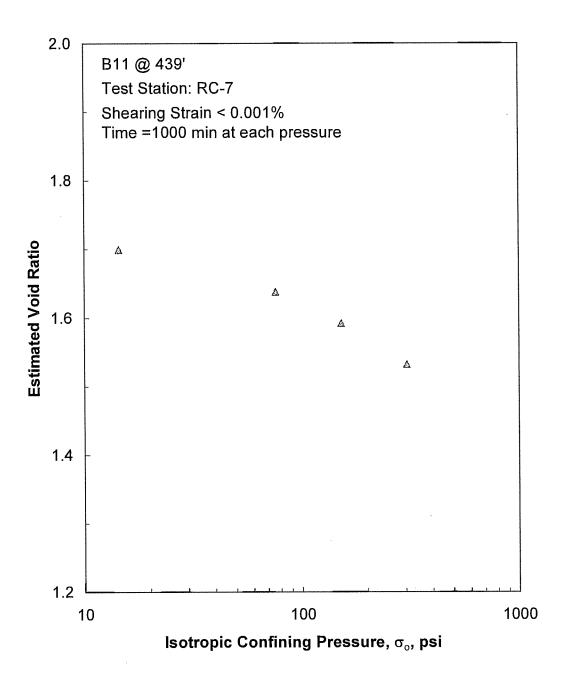


Figure C.7 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

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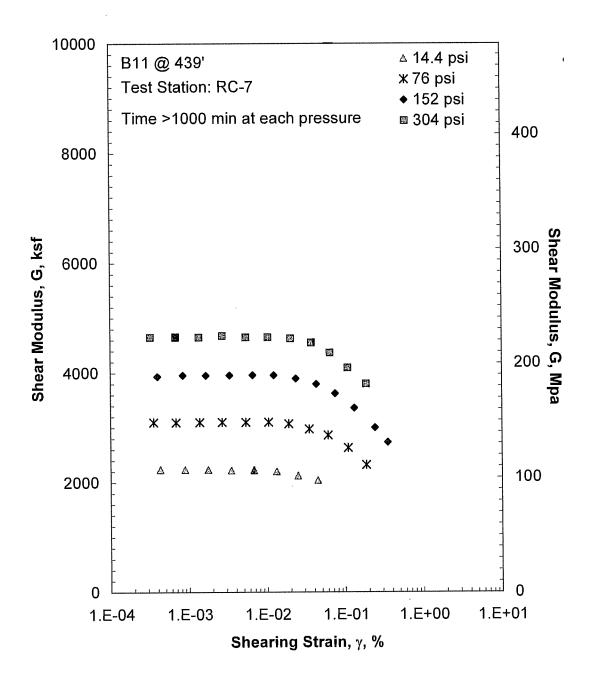


Figure C.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

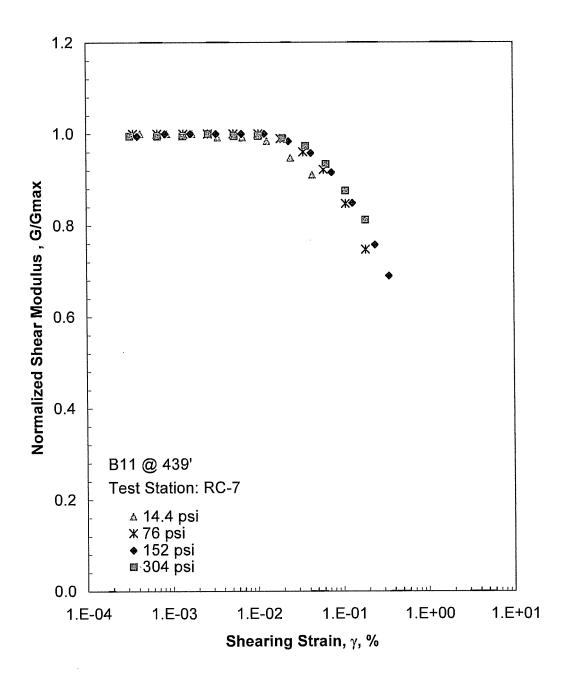


Figure C.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

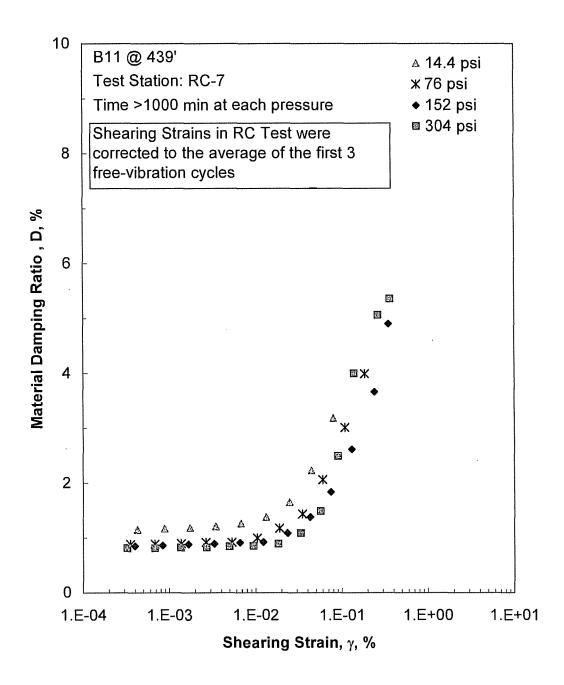


Figure C.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

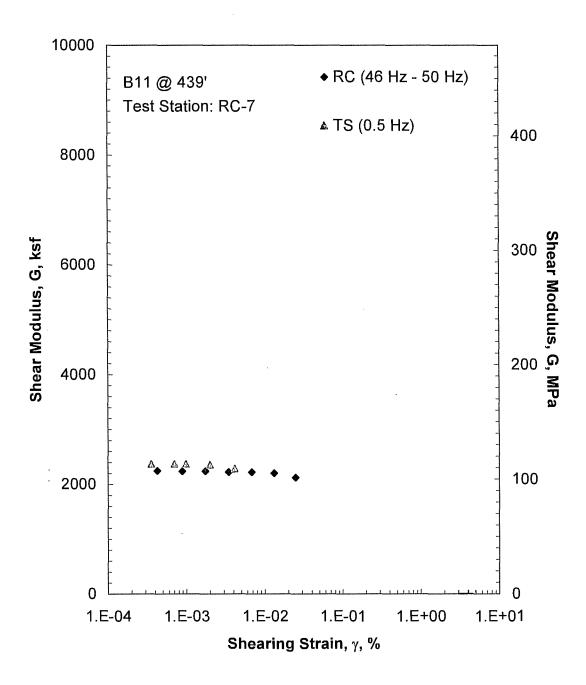


Figure C.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

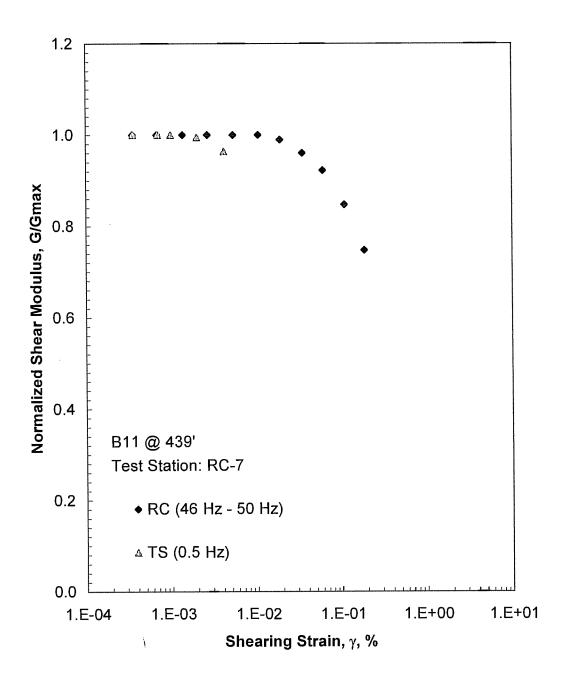


Figure C.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

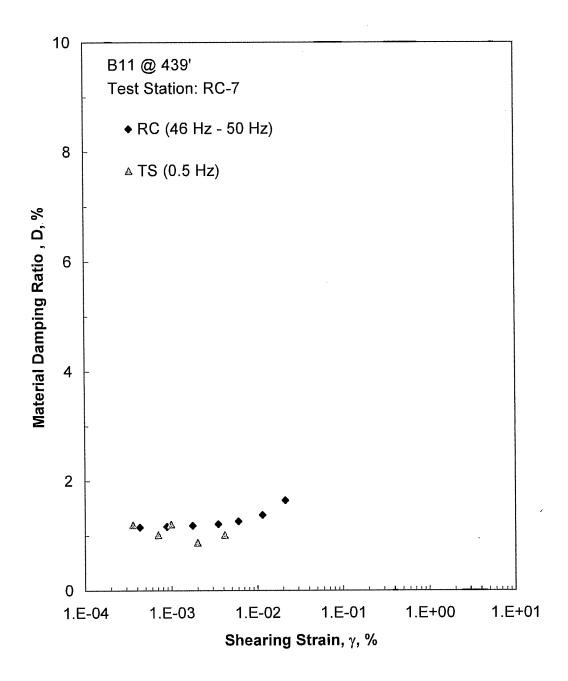


Figure C.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 14.4 psi from the Combined RCTS Tests

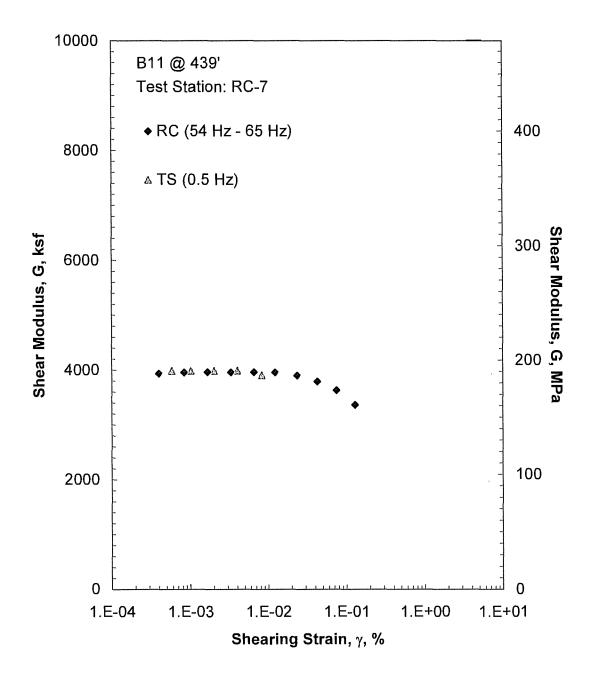


Figure C.14 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 152 psi from the Combined RCTS Tests

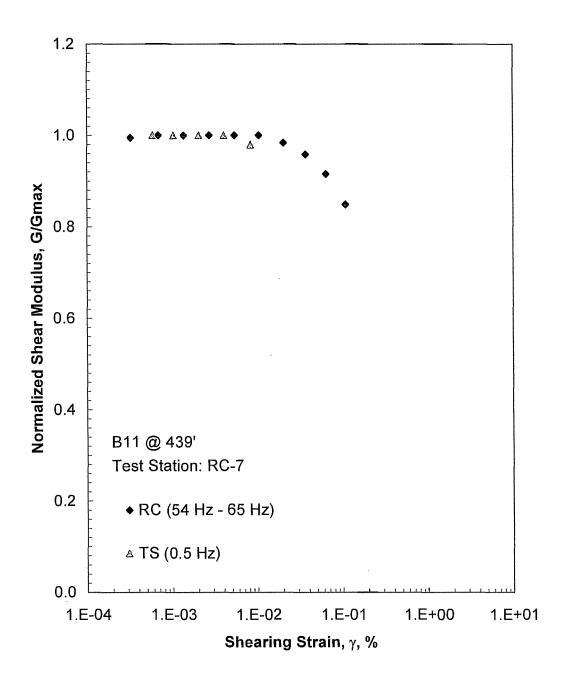


Figure C.15 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 152 psi from the Combined RCTS Tests

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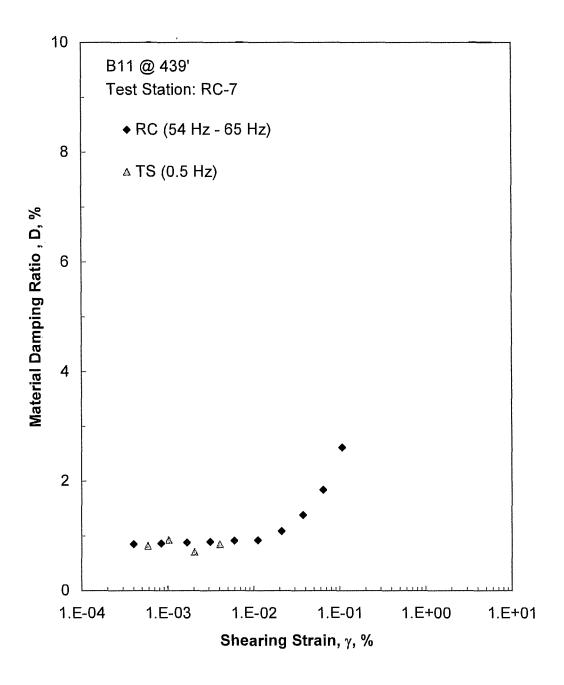


Figure C.16 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 152 psi from the Combined RCTS Tests

Table C.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen B11@439'

Isotropic (sotropic Confining Pressure, σ _ο		Woodius, G _{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
14.4	2074	99	2199	106	847	1.23	1.70
76	10944	524	3088	148	992	0.99	1.64
152	21888	1047	3913	188	1107	0.88	1.59
304	43776	2095	4538	218	1178	0.93	1.53

Table C.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 439'; Isoptropic Confining Pressure, σ_o = 14.4 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
4.27E-04	2236	1.00	4.27E-04	1.15
8.84E-04	2236	1.00	8.84E-04	1.17
1.74E-03	2236	1.00	1.74E-03	1.18
3.47E-03	2218	0.99	3.47E-03	1.21
6.79E-03	2218	0.99	5.98E-03	1.26
1.31E-02	2200	0.98	1.14E-02	1.38
2.47E-02	2119	0.95	2.13E-02	1.64
4.43E-02	2036	0.91	3.68E-02	2.22

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table C.3 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 439'; Isoptropic Confining Pressure, σ_0 = 76 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
3.53E-04	3099	1.00	3.53E-04	0.88
6.80E-04	3099	1.00	6.80E-04	0.89
1.37E-03	3099	1.00	1.22E-03	0.90
2.66E-03	3098	1.00	2.42E-03	0.92
5.31E-03	3098	1.00	5.05E-03	0.92
1.04E-02	3098	1.00	9.60E-03	1.00
1.90E-02	3066	0.99	1.69E-02	1.17
3.47E-02	2975	0.96	3.05E-02	1.43
6.01E-02	2857	0.92	5.11E-02	2.06
1.08E-01	2626	0.85	8.67E-02	3.01
1.85E-01	2316	0.75	1.41E-01	3.99

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table C.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen B11 @ 439'; Isoptropic Confining Pressure, σ_o = 152 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
3.96E-04	3935	0.99	3.96E-04	0.85
8.36E-04	3957	1.00	8.36E-04	0.86
1.66E-03	3957	1.00	1.66E-03	0.88
3.32E-03	3957	1.00	3.12E-03	0.89
6.60E-03	3957	1.00	5.94E-03	0.91
1.22E-02	3957	1.00	1.11E-02	0.92
2.34E-02	3893	0.98	2.11E-02	1.09
4.27E-02	3790	0.96	3.76E-02	1.38
7.44E-02	3623	0.92	6.40E-02	1.83
1.30E-01	3358	0.85	1.07E-01	2.61
2.39E-01	2999	0.76	1.86E-01	3.66
3.49E-01	2730	0.69	2.55E-01	4.89

^{*}Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Table C.5 Specimen B11 @ 439'; Isoptropic Confining Pressure, σ_o = 304 psi

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G _{max}	Average [†] Shearing Strain, %	Material Damping Ratio ^x , D, %
3.24E-04	4650	0.99	3.24E-04	0.81
6.81E-04	4650	0.99	6.81E-04	0.81
1.35E-03	4650	0.99	1.35E-03	0.82
2.70E-03	4674	1.00	2.70E-03	0.82
5.40E-03	4650	0.99	4.97E-03	0.84
1.04E-02	4650	0.99	9.43E-03	0.85
2.01E-02	4627	0.99	1.83E-02	0.89
3.71E-02	4548	0.97	3.33E-02	1.09
6.41E-02	4362	0.93	5.64E-02	1.48
1.08E-01	4091	0.88	8.99E-02	2.48
1.85E-01	3795	0.81	1.39E-01	3.99

^{*} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

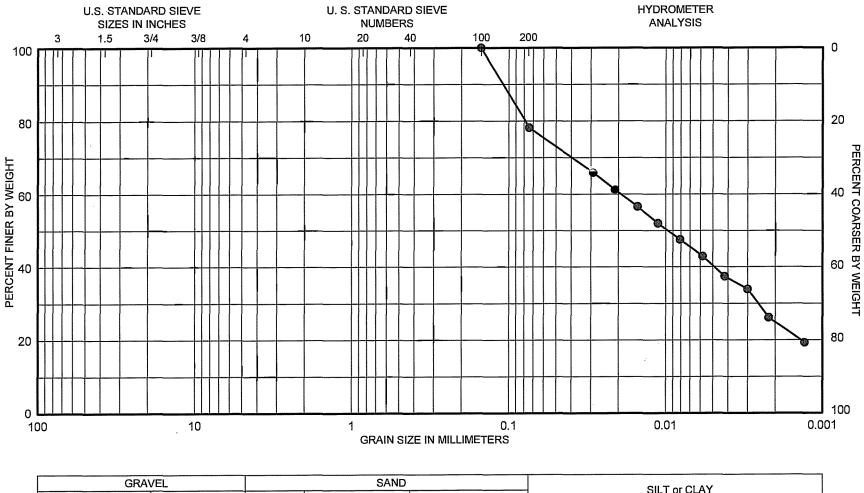
* Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table C.6 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 439; Isotropic Confining Pressure, σ_0 = 14.4 psi

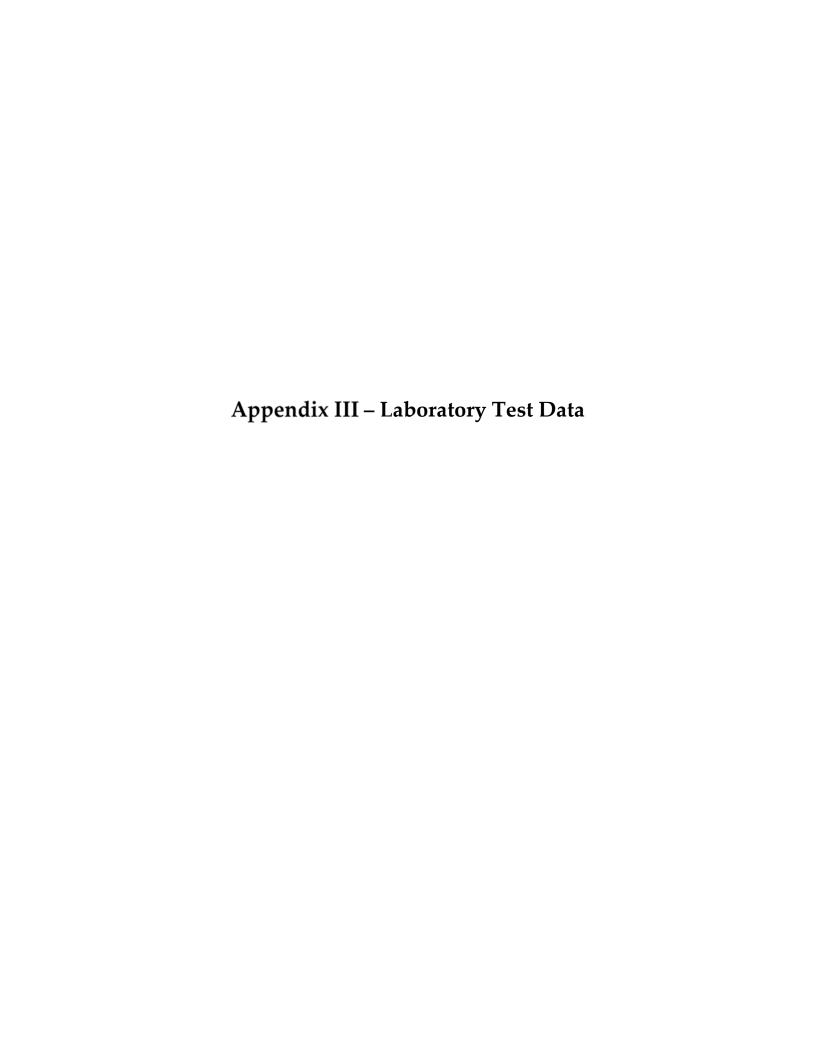
ſ	Peak	Shear	Normalized	Material		
	Shearing	Modulus,	Shear Modulus,	Damping		
	Strain, %	G, ksf	G/G _{max}	Ratio, D, %		
Ī	3.57E-04	2370	1.00	1.20		
ľ	7.01E-04	2370	1.00	1.02		
I	9.88E-04	2370	1.00	1.21		
I	2.01E-03	2357	0.99	0.88		
I	4.14E-03	2284	0.96	1.02		

Table C.7 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen B11 @ 439'; Isotropic Confining Pressure, σ_0 = 152 psi

Peak	Shear	Normalized	Material
Shearing	Modulus,	Shear Modulus,	Damping
Strain, %	G, ksf	G/G _{max}	Ratio, D, %
5.83E-04	3986	1.00	0.82
1.02E-03	3986	1.00	0.92
2.03E-03	3986	1.00	0.71
4.03E-03	3986	1.00	0.85



GRAVEL			EL		1D		SILT or CLAY
Coarse	Coarse Fine		Coarse	Medium	Fine		SIET OF CENT
SYMBOL	BORING	DEPTH, FT	<u>C</u> _e	<u>C</u> <u>u</u>	<u>D₅₀</u>	<u>D₉₀</u>	CLASSIFICATION
®	B-11	439			0.01	0.11	Clay, dark gray



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Sample Location Sample Depth (ft) Sample Type	B-11 8.0 Split Spoon	B-11 10.0 Split Spoon	B-11 20.0 Split Spoon	B-11 22.0 Split Spoon	B-11 30.0 Split Spoon	B-11 103.5 Split Spoon	B-16 10.0 Split Spoon	B-16 30.0 Split Spoon	B-16 40.0 Split Spoon	B-16 50.0 Split Spoon
,										
Natural Moisture Content (%)	26.8		90.9		96.7	59.0	20.7	69.5		66.4
Atterberg Limits										
Liquid Limit	26		56		66	NP		38		38
Plastic Limit	22		36		46	NP		30		29
Plasticity Index	4		20		20	NP		8		9
Gradation Analysis % Finer by Weight Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20	100.0 99.9		100.0 99.6		100.0	100.0	100.0 90.7	100.0 99.8		100.0 99.9 99.0
No. 40	99.6		98.5		98.8	99.9	70.1	99.0		94.8
No. 60	99.2		96.8		96.9	99.6	64.8	97.8		86.6
No. 100	73.7		93.5		94.1	96.7	23.3	95.6		70.0
No. 200	28.6		87.6		89.1	77.4	10.9	80.6		63.1
Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing		7.4		7.7					7.0	
pH Resistivity (ohm-cm)		7.1 1020		7.7 350					7.6 535	
Chloride (mg/L)		1020		330					555	
Sulfate (mg/L)										
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification	SM		МН		МН	ML		ML		ML
AASHTO Soil Classification	A-2-4 (0)		A-7-5 (22)		A-7-5 (25)	A-4 (0)		A-4 (7)		A-4 (5)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-16 90.0 Split Spoon	B-18 13.5 Split Spoon	B-18 23.5 Split Spoon	B-18 33.5 Split Spoon	B-18 43.5 Split Spoon	B-18 48.5 Split Spoon	B-18 78.5 Split Spoon	B-19 10.0 Split Spoon	B-19 15.0 Split Spoon	B-19 35.0 Split Spoon
Natural Moisture Content (%)	51.2	32.7	38.1	79.7	32.7	30.2		34.7	27.8	
Atterberg Limits										
Liquid Limit			NP	66						
Plastic Limit			NP	46						
Plasticity Index			NP	20						
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch										
3/8 inch	400.0	100.0							400.0	
No. 4 No. 10	100.0 99.9	100.0 99.9							100.0 99.6	
No. 10 No. 20	99.8	98.6			100.0	100.0			87.4	
No. 40	99.3	96.1			99.6	97.9			62.8	
No. 60	98.5	93.9			93.9	82.1			52.1	
No. 100	95.1 74.5	20.9			35.0	29.3			18.3	
No. 200	74.5	4.4			11.6	9.6			5.6	
Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing										
pH							7.8			6.4
Resistivity (ohm-cm)							710			430
Chloride (mg/L)										
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification		SP								
AASHTO Soil Classification			0	()						



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location	B-19	B-19	B-19	B-2	B-2	B-2	B-2	B-23 Alt1	B-23 Alt1	B-23 Alt1
Sample Depth (ft) Sample Type	45.0 Split Spoon	55.0 Split Spoon	105.0 Split Spoon	7.5 Split Spoon	15.0 Split Spoon	35.0 Split Spoon	50.0 Split Spoon	4.0 Split Spoon	8.0 Split Spoon	20.0 Split Spoor
Natural Moisture Content (%)	38.2	32.7		21.0	62.1	88.5	47.9		27.2	26.1
Atterberg Limits										
Liquid Limit	NP					72			NP	NP
Plastic Limit	NP					44			NP	NP
Plasticity Index	NP					28			NP	NP
<u>Gradation Analysis</u> % Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4					100.0 99.9		100.0		100.0	100.0
No. 10				100.0	99.2	100.0	99.9		99.8	99.8
No. 20 No. 40		100.0 99.8		99.6 97.3	98.7 98.4	99.8 98.9	99.7 99.2		98.5 95.0	98.9
No. 60		99.6 96.1		97.3 92.7	96.4 97.9	96.9 98.1	99.2 96.8		95.0 92.4	98.4 97.6
No. 100		58.5		58.1	95.7	96.7	84.7		70.4	46.2
No. 200		25.9		19.9	74.7	94.5	57.0		27.5	8.7
Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing										
pH			7.8					5.8		
Resistivity (ohm-cm)			520					3550		
Chloride (mg/L)										
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										

Maximum Dry Density (pct) Optimum Moisture Content (%)

USCS Soil Classification МН SM SP-SM

A-2-4 (0) A-3 (0) **AASHTO Soil Classification**

A-7-5 (35) ()

LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina



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Sample Location Sample Depth (ft) Sample Type	B-23 Alt1 22.0 Split Spoon	B-23 Alt1 34.0 Split Spoon	B-23 Alt1 50.0 3 in. Tube	B-23 Alt1 73.5 Split Spoon	B-29 Alt1 7.5 Split Spoon	B-29 Alt1 15.0 Split Spoon	B-29 Alt1 20.0 Split Spoon	B-29 Alt1 35.0 Split Spoon	B-29 Alt1 40.0 Split Spoon	B-29 Alt1 65.0 Split Spoon
Natural Moisture Content (%)		35.4	34.7	45.8	46.4	135.2		34.3		43.6
Atterberg Limits										
Liquid Limit		NP	40	NP	NP	60		39		41
Plastic Limit		NP	29	NP	NP	42		35		34
Plasticity Index		NP	11	NP	NP	18		4		7
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20 No. 40 No. 60		100.0 99.8 99.7 99.5 98.9 97.6		100.0 99.9 97.9 95.4 92.9 87.6	100.0 99.3 99.2 96.8 89.2 82.5	100.0 99.7 99.3 98.7		100.0 99.9 99.6 98.7		100.0 99.9 98.4 94.5 91.6 88.0
No. 100 No. 200		75.0 26.0	100.0 44.1	75.7 50.2	45.3 23.7	95.9 91.8		93.7 70.0		83.3 68.2
Specific Gravity		_0.0	2.62	55.2		0.1.0		. 0.0		33.2
Organic Content (%)			2.3							
Moist Unit Weight (pcf)			115.0							
Corrosivity Testing										
pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)	8.1 660						8.2 160		7.5 310	
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification		SM	SM	ML	SM	МН		ML		ML
AASHTO Soil Classification		A-2-4 (0)	A-6 (2)	A-4 (0)	A-2-4 (0)	A-7-5 (23)		A-4 (4)		A-5 (5)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

Sample Location Sample Depth (ft) Sample Type	B-2A 23.0 3 in. Tube	B-2A 35.0 3 in. Tube	B-3 7.5 Split Spoon	B-3 15.0 Split Spoon	B-3 30.0 Split Spoon	B-3 45.0 Split Spoon	B-31 5.0 Split Spoon	B-31 10.0 Split Spoon	B-31 20.0 Split Spoon	B-31 35.0 Split Spoon
Natural Moisture Content (%)	94.9	91.9	31.7	47.4	75.1	44.2	178.1	146.9		53.1
Atterberg Limits										
Liquid Limit	63	92		45	70			80		52
Plastic Limit	19	25		36	40			58		35
Plasticity Index	44	67		9	30			22		17
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch 3/8 inch				100.0	100.0					
No. 4				99.6	99.9	100.0	100.0	100.0		
No. 10			100.0	98.5	98.7	99.4	99.7	99.9		100.0
No. 20 No. 40			99.8 99.6	97.2 95.5	95.8 94.3	98.7 97.2	99.2 98.2	99.6 99.2		99.9 99.7
No. 60			99.0	93.3	93.3	94.1	96.2	98.9		99.7
No. 100	100.0	100.0	80.2	87.6	90.9	82.4	94.7	97.9		95.4
No. 200	86.6	94.9	21.4	46.8	85.5	46.5	91.3	94.6		79.7
Specific Gravity	2.64	2.67								
Organic Content (%)	6.2	8.2						13.9		
Moist Unit Weight (pcf)	90.8	92.9								
Corrosivity Testing										
рН									8	
Resistivity (ohm-cm)									50	
Chloride (mg/L)										
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification	СН	СН		SM	МН			МН		МН
AASHTO Soil Classification	A-7-6 (41)	A-7-6 (73)		A-5 (2)	A-7-5 (32)			A-7-5 (34)		A-7-5 (16)



Project: Port Access Road

Location: North Charleston, South Carolina

LABORATORY SUMMARY TABLE

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Sample Location Sample Depth (ft) Sample Type	B-31 100.0 Split Spoon	B-33 6.0 Split Spoon	B-33 23.5 Split Spoon	B-33 48.5 Split Spoon	B-33 63.5 Split Spoon	B-33A 20.0 3 in. Tube	B-33A 30.0 3 in. Tube	B-33A 50.0 3 in. Tube	B-37 2.5 Split Spoon	B-37 5.0 Split Spoon
Natural Moisture Content (%)	49.0	13.4	162.6	55.6	43.3	161.3	149.1	70.7		141.5
Atterberg Limits										
Liquid Limit	50		78			152	141	118		57
Plastic Limit	32		58			66	43	50		38
Plasticity Index	18		20			86	98	68		19
<u>Gradation Analysis</u> % Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20 No. 40 No. 60 No. 100 No. 200	100.0 99.9 99.4 97.9 94.3 81.2	100.0 98.2 98.0 97.1 94.5 90.5 75.3 53.8	100.0 99.9 99.7 99.4	100.0 99.4 98.2 97.2 95.9 91.7 72.3	100.0 99.6 99.2 97.9 93.7 74.2 45.8	100.0 97.9	100.0 98.3	100.0 73.7		100.0 99.3 97.4 94.8 87.9 70.6
Specific Gravity						2.62	2.62	2.65		
Organic Content (%)						12.1	13.8	1.2		
Moist Unit Weight (pcf)						83.1	82.7	96.4		
Corrosivity Testing pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)									7.7 65	
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification	МН		МН			МН	СН	МН		МН
AASHTO Soil Classification	A-7-5 (17)		A-7-5 (33)			A-7-5 (111)	// /->	/>		A-7-5 (15)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-37 10.0 Split Spoon	B-37 12.5 Split Spoon	B-37 17.5 Split Spoon	B-37 97.5 Split Spoon	B-39 8.5 Split Spoon	B-39 23.5 Split Spoon	B-39 43.5 Split Spoon	B-39 63.5 Split Spoon	B-39A 15.0 3 in. Tube	B-39A 28.0 3 in. Tube
Natural Moisture Content (%)		23.3	39.2	43.2	34.6	148.3	44.8	48.0	118.8	148.3
Atterberg Limits										
Liquid Limit		26	NP	NP		70	41		149	149
Plastic Limit		24	NP	NP		47	32		43	64
Plasticity Index		2	NP	NP		23	9		106	85
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch										
3/8 inch		100.0			100.0					
No. 4		99.8	400.0	400.0	67.2	100.0	100.0	100.0		
No. 10		98.6	100.0	100.0	58.2	99.4	99.9	99.9		
No. 20 No. 40		95.6 92.9	99.9 99.4	99.9 99.7	49.3 41.1	98.5 97.4	99.8 99.3	99.5 98.1		
No. 60		92.9 88.9	98.3	99.7 98.5	36.1	96.6	98.0	94.0		
No. 100		59.5	76.3	95.7	28.3	95.3	90.8	78.8	100.0	100.0
No. 200		31.9	16.9	72.9	18.4	92.7	54.8	52.8	99.2	52.4
Specific Gravity									2.63	2.60
Organic Content (%)									10.2	13.4
Moist Unit Weight (pcf)									84.5	83.7
Corrosivity Testing										
—————————————————————————————————————	7.8									
Resistivity (ohm-cm)	70									
Chloride (mg/L)	. •									
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification		SM	SM	ML		МН	ML		СН	МН
AASHTO Soil Classification		A-2-4 (0)	A-2-4 (0)	A-4 (0)		A-7-5 (30)	A-5 (4)		A-7-5 (128)	A-7-5 (40)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

Sample Location Sample Depth (ft) Sample Type	B-3A 26.0 3 in. Tube	B-3A 38.0 3 in. Tube	B-40A 23.0 3 in. Tube	B-40A 38.0 3 in. Tube	B-42 Alt1 2.5 Split Spoon	B-42 Alt1 20.0 Split Spoon	B-42 Alt1 55.0 Split Spoon	B-42 Alt1 80.0 Split Spoon	B-43 Alt1 5.0 Split Spoon	B-43 Alt1 15.0 Split Spoon
Natural Moisture Content (%)	89.9	84.4	87.6	110.5	119.5	37.6	47.4	47.4	34.2	32.8
Atterberg Limits										
Liquid Limit	73	82	98	102						30
Plastic Limit	20	23	35	38						25
Plasticity Index	53	59	63	64						5
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20 No. 40 No. 60 No. 100 No. 200	100.0 61.7	100.0 69.4	100.0 77.2	100.0 95.2	100.0 99.9 99.0 98.0 95.7 84.2	100.0 99.9 99.8 99.2 97.8 81.1 24.0	100.0 99.9 99.5 98.1 93.8 78.4 48.3	100.0 99.8 99.1 96.9 80.2	100.0 99.0 96.6 93.4 88.4 71.4 59.8	100.0 99.8 99.2 97.0 80.1 56.9
Specific Gravity	2.67	2.66	2.55	2.64						
Organic Content (%)	7.5	4.9								
Moist Unit Weight (pcf)	92.7	95.9	92.1	88.4						
Corrosivity Testing pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)										
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification	СН	СН	СН	СН						ML
AASHTO Soil Classification	A-7-6 (30)	A-7-6 (40)	A-7-5 (53)	A-7-5 (74)						A-4 (1)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-43 Alt1 50.0 Split Spoon	B-43 Alt1 100.0 Split Spoon	B-43 Alt2 2.5 Split Spoon	B-43 Alt2 5.0 Split Spoon	B-43 Alt2 15.0 Split Spoon	B-43 Alt2 30.0 Split Spoon	B-43 Alt2 40.0 Split Spoon	B-43 Alt2 65.0 Split Spoon	B-46 10.0 Split Spoon	B-46 20.0 Split Spoon
Natural Moisture Content (%)	27.1	46.9		139.6	32.2		35.6	48.7	30.3	57.3
Atterberg Limits Liquid Limit Plastic Limit Plasticity Index					30 25 5				NP NP NP	34 23 11
<u>Gradation Analysis</u> % Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20 No. 40 No. 60 No. 100 No. 200	100.0 99.7 98.7 97.8 95.8 88.3 55.5	100.0 99.8 99.0 96.9 86.5		100.0 99.9 99.4 98.7 97.6 96.0	100.0 99.3 98.4 96.3 92.7 65.6 41.5		100.0 99.4 99.0 98.4 97.3 94.9 85.7 53.2	100.0 99.7 98.4 96.5 91.7 68.7	100.0 99.5 98.6 97.2 55.6 18.0	100.0 99.7 97.3 94.8 92.6 80.7 63.4
Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)			7 1750			7.4 810				
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification					SM				SM	CL
AASHTO Soil Classification					A-4 (0)				A-2-4 (0)	A-6 (5)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft)	B-46 25.0	B-46 30.0	B-46 40.0	B-46 60.0	B-46 100.0	B-47 8.5	B-47 18.5	B-47 28.5	B-47 33.5	B-47 38.5
Sample Type	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon				
Natural Moisture Content (%)		39.3	47.4			19.5		40.1		36.0
Atterberg Limits										
Liquid Limit		NP	NP			24		NP		NP
Plastic Limit Plasticity Index		NP NP	NP NP			20 4		NP NP		NP NP
Gradation Analysis % Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4			100.0					100.0 99.4		100.0 99.8
No. 10		100.0	99.9			100.0		99.1		99.6
No. 20 No. 40		99.9 99.1	99.7 99.4			99.5 98.4		98.9 98.5		99.4 98.8
No. 60		97.7	98.7			93.5		97.7		96.9
No. 100 No. 200		79.2 24.0	96.8 83.4			62.1 38.1		74.0 26.5		76.7 24.0
Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing										
pH	8.1			7.6	7.7		7.1		7.4	
Resistivity (ohm-cm) Chloride (mg/L)	1340			820	560		1390		450	
Sulfate (mg/L)										
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification		SM	ML			SC-SM		SM		SM
AASHTO Soil Classification		A-2-4 (0)	A-4 (0)			A-4 (0)		A-2-4 (0)		A-2-4 (0)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

Sample Location Sample Depth (ft) Sample Type	B-47 43.5 Split Spoon	B-47A 24.0 3 in. Tube	B-50 6.0 Split Spoon	B-50 13.5 Split Spoon	B-50 33.5 Split Spoon	B-50 43.5 Split Spoon	B-51 Alt1 10.0 Split Spoon	B-51 Alt1 15.0 Split Spoon	B-51 Alt1 25.0 Split Spoon	B-51 Alt1 45.0 Split Spoon
Natural Moisture Content (%)	43.6	55.8	34.0	39.9	38.4	46.4	101.7	100.6	34.2	41.8
Atterberg Limits										
Liquid Limit	43	81	NP	NP	NP	44	NP	54	NP	NP
Plastic Limit	33	19	NP	NP	NP	28	NP	28	NP	NP
Plasticity Index	10	62	NP	NP	NP	16	NP	26	NP	NP
Gradation Analysis % Finer by Weight Sieve: 1/2 inch										
3/8 inch No. 4 No. 10 No. 20 No. 40	100.0 99.9 99.8 99.5		100.0 99.8	100.0 99.8 97.5 95.6 94.5	100.0 99.9 99.8 99.4	100.0 99.9 99.7	100.0 99.9 99.4 98.5	100.0 99.8 99.8 99.4 98.1	100.0 99.9 99.3 98.0	100.0 99.9 99.6 99.1
No. 60	98.5		98.9	93.1	98.4	99.0	97.7	96.5	96.7	97.7
No. 100	93.8	100.0	68.9	73.5	73.3	93.1	94.0	90.8	75.1	89.8
No. 200	69.8	98.5	15.2	41.4	23.6	56.5	82.6	83.2	35.4	48.2
Specific Gravity		2.70								
Organic Content (%)		5.3								
Moist Unit Weight (pcf)		103.9								
Corrosivity Testing pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)										
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification	ML	СН	SM	SM	SM	ML	ML	СН	SM	SM
AASHTO Soil Classification	A-5 (8)	A-7-6 (69)	A-2-4 (0)	A-4 (0)	A-2-4 (0)	A-7-6 (7)	A-4 (0)	A-7-6 (24)	A-2-4 (0)	A-4 (0)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location	B-52	B-52	B-52	B-52	B-53	B-53	B-53	B-53	B-53A	B-55
Sample Depth (ft)	15.0	25.0	35.0	45.0	5.0	25.0	40.0	48.5	32.0	7.5
Sample Type	Split Spoon	Split Spoon 3 in. Tube	Split Spoon							
Natural Moisture Content (%)	32.4	34.6	40.7	33.5	23.9	39.5	71.6	44.2	76.1	27.1
Atterberg Limits										
Liquid Limit	NP	27	NP	NP	27		52		81	
Plastic Limit	NP	16	NP	NP	21		34		31	
Plasticity Index	NP	11	NP	NP	6		18		50	
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch		400.0		400.0		400.0				
3/8 inch No. 4	100.0	100.0 99.9		100.0 97.5	100.0	100.0 93.8				
No. 4 No. 10	99.9	99.7	100.0	97.3 97.2	99.9	93.6 77.0	100.0	100.0		
No. 20	99.3	96.9	99.8	96.8	99.9	61.0	99.8	99.8		100.0
No. 40	98.6	92.7	99.3	95.6	99.5	55.5	99.7	99.4		98.9
No. 60	97.4	90.0	98.1	91.6	98.2	53.2	99.5	98.2	1000	93.0
No. 100	76.6	68.5	80.6	60.5	82.0	29.3	95.4	90.3	100.0	20.4
No. 200	20.1	43.7	46.5	22.2	38.6	15.5	91.8	54.1	82.9	9.6
Specific Gravity									2.69	
Organic Content (%)										
Moist Unit Weight (pcf)									83.3	
Corrosivity Testing										
pH										
Resistivity (ohm-cm)										
Chloride (mg/L)										
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification	SM	sc	SM	SM	SC-SM		МН		СН	
AASHTO Soil Classification	A-2-4 (0)	A-6 (2)	A-4 (0)	A-2-4 (0)	A-4 (0)		A-7-5 (21)		A-7-5 (47)	
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LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-55 15.0 Split Spoon	B-55 35.0 Split Spoon	B-55 48.5 Split Spoon	B-55A 24.0 3 in. Tube	B-55B 35.0 3 in. Tube	B-65 2.5 Split Spoon	B-65 15.0 Split Spoon	B-65 30.0 Split Spoon	B-65 45.0 Split Spoon	B-66 7.5 Split Spoon
Natural Moisture Content (%)	36.9	86.1	34.9	30.0	83.8	24.3	34.2	42.4	47.5	23.4
Atterberg Limits										
Liquid Limit		76		39	104	29	NP	NP	43	
Plastic Limit		37		24	30	20	NP	NP	28	
Plasticity Index		39		15	74	9	NP	NP	15	
Gradation Analysis % Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20	100.0 99.5 98.4 97.7	100.0 99.8 99.1	100.0 99.9 99.7			100.0 99.8	100.0	100.0 99.4	100.0 99.8 99.8 99.6	100.0
No. 40	97.4	98.7	99.1			99.7	99.7	96.8	99.0	99.6
No. 60 No. 100	97.0 52.9	98.3 96.1	97.9 91.7	100.0	100.0	97.0 70.1	97.8 62.9	93.0 35.5	97.7 90.7	97.3 38.0
No. 200	17.2	93.1	60.8	50.9	98.9	45.2	25.4	24.9	63.6	11.6
Specific Gravity				2.66	2.63					
Organic Content (%)				1.7	8.4					
Moist Unit Weight (pcf)				114.0	90.4					
Corrosivity Testing										
pH										
Resistivity (ohm-cm)										
Chloride (mg/L) Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification		МН		CL	СН	sc	SM	SM	ML	
AASHTO Soil Classification		A-7-5 (45)		A-6 (5)	A-7-5 (87)	A-4 (1)	A-2-4 (0)	A-2-4 (0)	A-7-6 (9)	



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-66 20.0 Split Spoon	B-66 45.0 Split Spoon	B-66 75.0 Split Spoon	B-68 Alt1 2.5 Split Spoon	B-68 Alt1 5.0 Split Spoon	B-68 Alt1 10.0 Split Spoon	B-68 Alt1 15.0 Split Spoon	B-68 Alt1 20.0 Split Spoon	B-68 Alt1 25.0 Split Spoon	B-68 Alt1 30.0 Split Spoon
Natural Moisture Content (%)	94.3	34.3	47.5		22.9	25.7	28.7		107.2	64.6
Atterberg Limits										
Liquid Limit	69	NP	43			23			67	29
Plastic Limit	50	NP	34			20			50	24
Plasticity Index	19	NP	9			3			17	5
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch										
3/8 inch						100.0				
No. 4			100.0		100.0	99.7				
No. 10			99.9		99.8	99.2	100.0		100.0	100.0
No. 20	100.0	100.0	99.7		99.1	98.4	99.0		99.9	99.9
No. 40	99.4	99.9	98.8		96.3	95.2	95.6		99.2	99.6
No. 60	99.0	99.6	96.0		92.9	90.7	91.3		98.5	98.7
No. 100 No. 200	98.0 94.7	69.3 30.1	89.8 64.3		59.5 23.4	52.7 22.1	44.9 14.1		96.9 91.8	96.3 67.8
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Specific Gravity										
Organic Content (%)										
Moist Unit Weight (pcf)										
Corrosivity Testing										
pH				7.7				7.7		
Resistivity (ohm-cm)				1880				270		
Chloride (mg/L)				.500				-, 0		
Sulfate (mg/L)										
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)										
Optimum Moisture Content (%)										
USCS Soil Classification	MH	SM	ML			SM			MH	ML
AASHTO Soil Classification	A-7-5 (28)	A-2-4 (0)	A-5 (6)			A-2-4 (0)			A-7-5 (24)	A-4 (2)



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Location Sample Depth (ft) Sample Type	B-68 Alt1 40.0 Split Spoon	B-68 Alt1 45.0 Split Spoon	B-68 Alt1 50.0 Split Spoon	B-68 Alt1 55.0 Split Spoon	B-72 5.0 Split Spoon	B-72 7.5 Split Spoon	B-72 10.0 Split Spoon	B-72 35.0 Split Spoon	B-72 65.0 Split Spoon	B-74 5.0 Split Spoor
Natural Moisture Content (%)	67.7	34.5		35.2	24.3		47.7	28.5	44.6	131.7
Atterberg Limits										
Liquid Limit	44	NP		NP			59		NP	
Plastic Limit	35	NP		NP			33		NP	
Plasticity Index	9	NP		NP			26		NP	
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4 No. 10 No. 20 No. 40 No. 60 No. 100 No. 200		100.0 99.1 99.0 98.5 98.1 96.5 63.5 28.2		100.0 99.9 99.8 99.0 64.5 20.9	100.0 99.8 99.8 99.8 99.6 95.9 32.8 11.2		100.0 99.8 98.8 91.5	100.0 99.6 98.9 95.9 36.9 30.0	100.0 99.9 99.4 98.2 94.0 76.1 53.7	100.0 99.9 99.6 99.0 98.5 95.4 92.3
Specific Gravity										
Organic Content (%)		2.5								
Moist Unit Weight (pcf)										
Corrosivity Testing										
pH Resistivity (ohm-cm) Chloride (mg/L) Sulfate (mg/L)			8 880			4.7 5260				
Compaction Test (ASTM D698) Maximum Dry Density (pcf) Optimum Moisture Content (%)										
USCS Soil Classification		SM		SM			мн		ML	
AASHTO Soil Classification	0	A-2-4 (0)		A-2-4 (0)			A-7-5 (29)		A-4 (0)	



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

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Sample Type	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon	3 in. Tube	3 in. Tube	Bulk	Bulk	Grab
Natural Moisture Content (%)	106.5	22.2		47.5		124.8	45.1	1.3	1.9	
Atterberg Limits										
Liquid Limit	65	NP				86	59	NP	23	
Plastic Limit	45	NP				39	37	NP	20	
Plasticity Index	20	NP				47	22	NP	3	
Gradation Analysis										
% Finer by Weight										
Sieve: 1/2 inch 3/8 inch No. 4		100.0 97.4		100.0						
No. 10 No. 20	100.0	89.9 71.7		99.6 99.1						
No. 40	99.9	32.9		98.5						
No. 60	99.9	14.6		97.8						
No. 100	99.6	3.1		95.0		100.0	100.0	100.0	100.0	
No. 200	98.2	1.1		82.3		88.5	50.5	22.5	33.5	
Specific Gravity						2.48	2.71			
Organic Content (%)										
Moist Unit Weight (pcf)						83.9	109.1			
Corrosivity Testing										
pH			7.6		7.8					7.84
Resistivity (ohm-cm)			190		360					42
Chloride (mg/L)										9260
Sulfate (mg/L)										1190
Compaction Test (ASTM D698)										
Maximum Dry Density (pcf)								108.5	109.0	
Optimum Moisture Content (%)								15.5	16.0	
USCS Soil Classification	МН	SP				МН	МН	SM	SM	
AASHTO Soil Classification	A-7-5 (29)	A-1-b (0)				A-7-5 (51)	A-7-5 (9)	A-2-4 (0)	A-2-4 (0)	



LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina

 Sample Location
 W-2
 W-3
 W-4

 Sample Depth (ft)
 0.0
 0.0
 0.0

 Sample Type
 Grab
 Grab
 Grab

Natural Moisture Content (%)

Atterberg Limits

Liquid Limit Plastic Limit Plasticity Index

Gradation Analysis

% Finer by Weight

Sieve: 1/2 inch

3/8 inch

No. 4 No. 10

No. 20

No. 40

No. 60

No. 100 No. 200

Specific Gravity

Organic Content (%)

Moist Unit Weight (pcf)

Corrosivity Testing

pH	7.80	7.81	7.86
Resistivity (ohm-cm)	42	41.5	41.6
Chloride (mg/L)	8350	10200	8920
Sulfate (mg/L)	1070	1150	1110

Compaction Test (ASTM D698)

Maximum Dry Density (pcf)
Optimum Moisture Content (%)

USCS Soil Classification

AASHTO Soil Classification

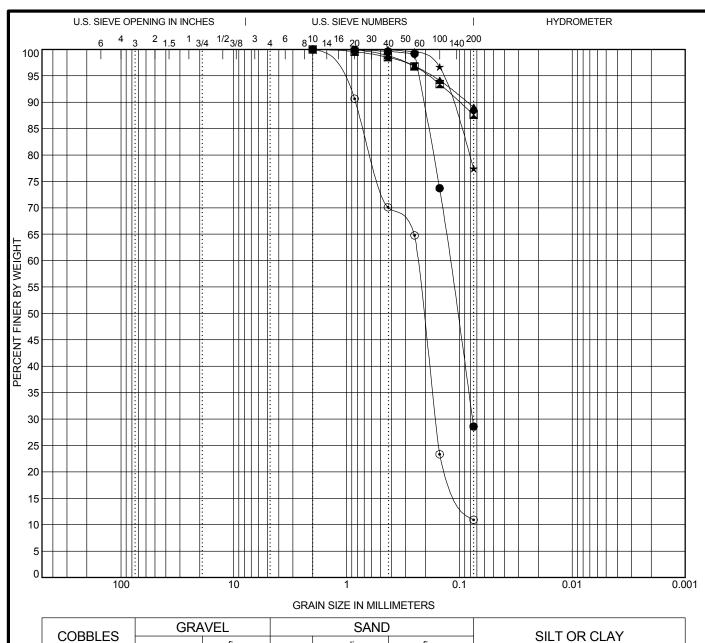


8211 Hermitage Road Richmond, VA 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569

LABORATORY SUMMARY TABLE

Project: Port Access Road

Location: North Charleston, South Carolina



COBBLES	GRA	VEL		SAND)	SILT OR CLAY			
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT			

	Specimen Idea	ntification	Classification						PL	PI	Сс	Cu
•	● B-11	8		SILTY SAND SM						4		
	I B-11	20		ELASTIC SILT MH						20		
<u>.</u>	▲ B-11	30		ELASTIC SILT MH						20		
12/10/08	★ B-11	103.5		SILT with SAND ML					NP NP	NP		
ر 12	B-16	10									1.58	3.31
ROAD.GPJ	Specimen Identification		D100 D60 D30 D10 %Gra			%Grave	! %	Sand	%Si	Silt %Clay		
RO •	B -11	8	2	0.122	0.077		0.0		71.4		28.6	
ACCESS	▼ B-11	20	2				0.0		12.4	87.6		
Ă Ā	▲ B-11	30	0.85	0.85			0.0		10.9		89.1 77.4	
PORT	★ B-11	103.5	0.85				0.0	22.5				
Ž (⊙ B-16	10	2	0.236	0.163		0.0		89.1		10.9	

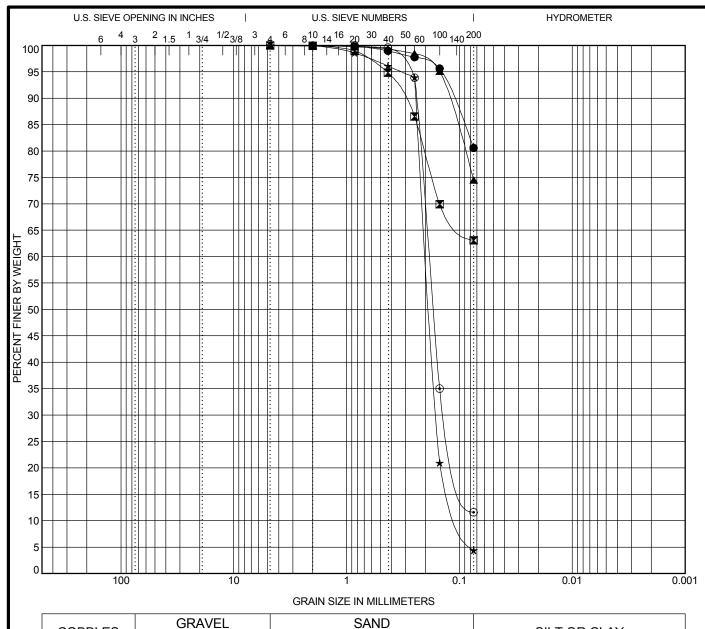


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GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



SAND)	SILT OR CLAY
	c.	SILTURULAT

L														
	Specimen Identification Classification								L PL	PI	Сс	Cu		
ŀ	•	B-16	30		3	8 30	8							
	X	B-16	50		3	8 29	9							
, 4	•	B-16	90											
	*	B-18	13.5		POORLY (1.36	2.08				
5	•	B-18	43.5							1.25	2.60			
5	★ B-18 13.5 ● B-18 43.5 Specimen Identification ● B-16 30 ▼ B-16 50 ▲ B-16 90 ★ B-18 13.5 ● B-18 43.5		tification	D100 D60 D30 D10 %Gra			%Gravel	%Sand	%S	ilt %	6Clay			
2	•	B-16	30	2				0.0	19.4	80.6				
Š	X	B-16	50	4.75				0.0	0.0 36.9			63.1		
2	•	B-16	90	4.75				0.0	25.5	74.5				
É	*	B-18	13.5	4.75	0.197	0.16	0.095	0.0	95.6	4.4				
	•	B-18	43.5	0.85	0.0	88.4		11.6						

medium

coarse



COBBLES

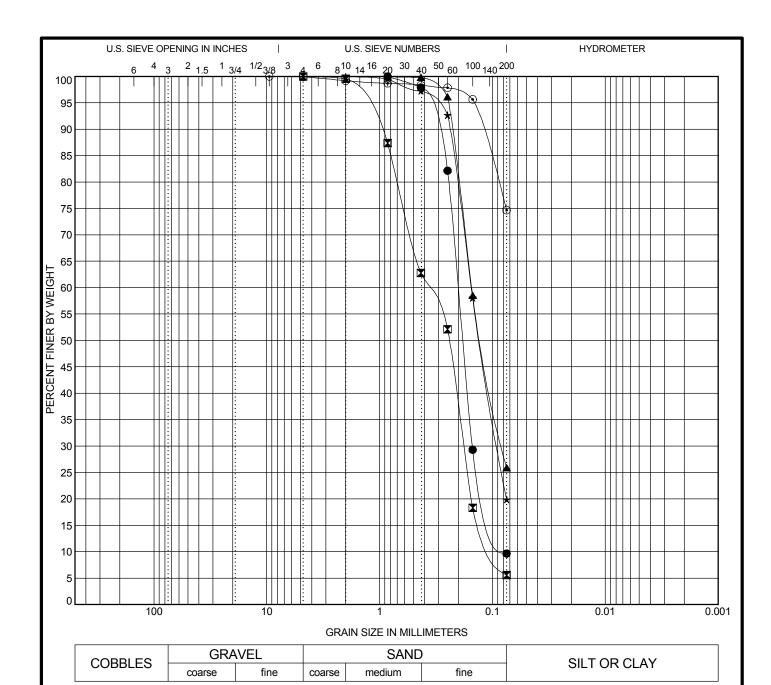
coarse

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GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



	Specimen Identif	ication		Cla	ssification		L	L PL	PI	Сс	Cu
•	B-18	48.5								1.49	2.66
	B-19	15								0.90	3.91
A	B-19	55									
*	B-2	7.5									
•	B-2	15									
	Specimen Identif	ication	D100	D60	D30	D10	%Gravel	%Sand	%Silt	t %	6Clay
•	B-18	48.5	0.85	0.202	0.151	0.076	0.0	90.3		9.6	
X A	B-19	15	4.75	0.373	0.179	0.095	0.0	94.4		5.6	
	B-19	55	0.85	0.153	0.082		0.0	74.1		25.9	
*	1 = =	7.5	2	0.154	0.09		0.0	80.1		19.9	
•	B-2	15	9.5				0.1	25.2		74.7	

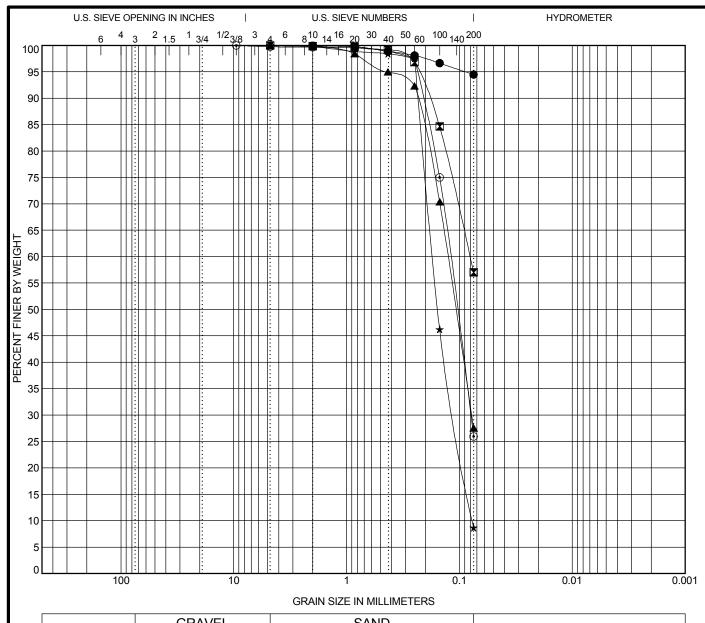


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GRAIN SIZE DISTRIBUTION

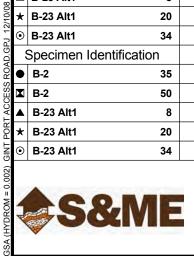
Project: Port Access Road

Location: North Charleston, South Carolina



COPPLES		VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

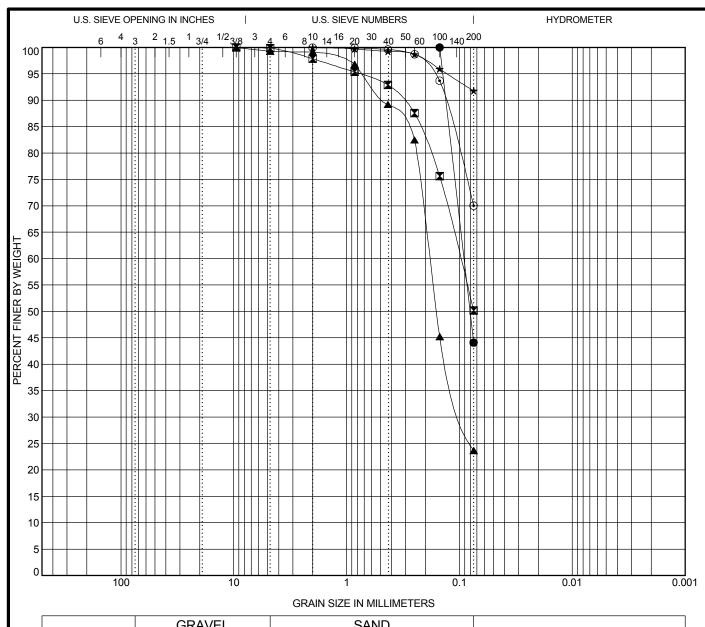
	Specimen Identificat	tion		Cla	ssification		LL	PL	PI	Сс	Cu	
•	B-2	35		ELASTIC SILT MH						28		
	B-2	50										
<u>.</u>	B-23 Alt1	8		SIL	ı	NP	NP	NP				
ACCESS ROAD.GFJ 12/10/08	B-23 Alt1	20	PC	ORLY GRADE	D SAND with S	SILT SP-SM		NP	NP	NP	0.93	2.24
5	B-23 Alt1	34		SIL	TY SAND SM			NP	NP	NP		
D.G	Specimen Identificat	tion	D100	D60	D30	D10	%Gravel	%	Sand	%Si	It %	6Clay
8	B-2	35	2				0.0	5.5		94.5		
	B-2	50	4.75	0.081			0.0	0 43.0		.0 57.0		
	B-23 Alt1	8	4.75	4.75 0.127 0.078 0						5 27.5		
J POK	B-23 Alt1	20	4.75 0.172 0.111 0.077 0					0.0 91.3		8.7		
Z (B-23 Alt1	34	9.5	9.5 0.121 0.079 0					73.8	73.8 26.0		



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

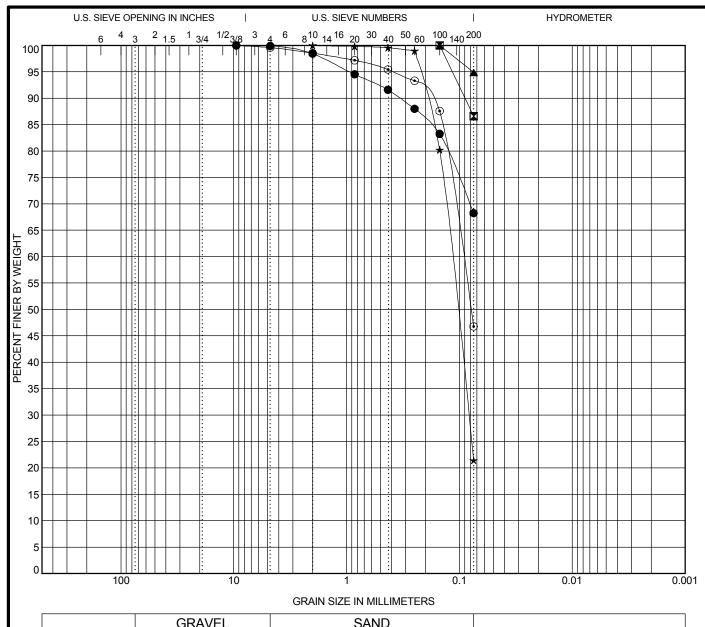


CORPLEC	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

	Specimen Identifica			LL	PL	PI	Сс	Cu					
•	B-23 Alt1	50		SILT	TY SAN	D SM			40	29	11		
	B-23 Alt1	73.5		SAN	NDY SIL	T ML			NP	NP	NP		
_ ⊿	B-29 Alt1	7.5		SILT	TY SAN	D SM			NP	NP	NP		
12/10/08	B-29 Alt1	15		ELASTIC SILT MH						42	18		
(•	B-29 Alt1	35		SILT	with SA	ND ML			39	35	4		
ROAD.GPJ	Specimen Identifica	ition	D100	D60	D	30	D10	%Grave	el 9	6Sand	%Si	lt	%Clay
ROA	B-23 Alt1	50	0.15	0.091				0.0		55.9		44.1	1
ACCESS	B-23 Alt1	73.5	9.5	0.098				0.1		49.7		50.2	2
	B-29 Alt1	7.5	9.5	0.184	0.0	92		0.7		75.6		23.7	7
PORT	B-29 Alt1	15	2					0.0		8.2		91.8	3
GINT	B-29 Alt1	35	2					0.0		29.9		70.0)
0.002)							GRAI	N SIZE	DI	STRII	BUTI	ON	
Project: Port Access Poad													
GSA (HYDROM	\$5& 1		Telephone: Fax: (804) 2	(804) 266-2199		Locat	ion: North (Charlesto	n, Sc	outh Ca	rolina		
3SA (F	•		. un. (00+) 2	-0.000		Numl	per: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION

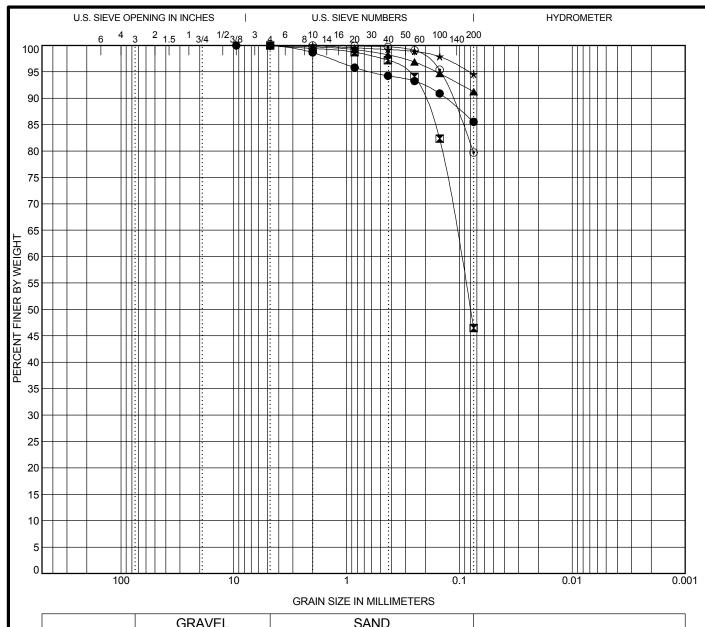


COBBLES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

	Specimen Identi			LL	PL	PI	Сс	Cu					
•	B-29 Alt1	65		SAN	IDY SIL	T ML			41	34	7		
X	B-2A	23		FA	T CLAY	'CH			63	19	44		
_ ▲	B-2A	35		FA	T CLAY	'CH			92	25	67		
12/10/08	B-3	7.5											
(•)	B-3	15		SILT	TY SAN	D SM			45	36	9		
ROAD.GPJ ● (Specimen Identi	fication	D100	D60	D	30	D10	%Grave	1 9	6Sand	%Si	lt	%Clay
₽ RO/	B-29 Alt1	65	9.5					0.1		31.7		68.2	2
ACCESS	B-2A	23	0.15					0.0		13.4		86.	6
▲	B-2A	35	0.15					0.0		5.1		94.9	9
¥ PORT	B-3	7.5	2	0.118	0.0	083		0.0		78.6		21.4	4
© NE O	B-3	15	9.5	0.094				0.4		52.8		46.8	В
0.002)							GRAI	N SIZE	DI	STRIE	BUTI	ON	
II .	400	BAF	8211 Hermit	tage Road Virginia 23228		Proje	ct: Port Acc	ess Road					
GSA (HYDROM	300	ME	Telephone: Fax: (804)	(804) 266-2199		Loca	tion: North	Charlestor	n, So	outh Car	olina		
3SA (I			(001)			Num	ber: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION

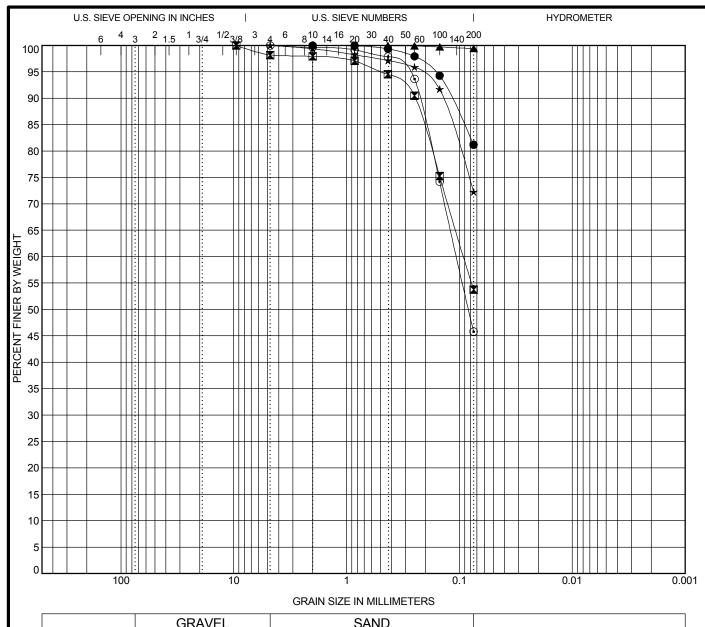


CODDIES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

	Specimen Identification Classification									PL	PI	Сс	Cu
•	B-3	30		ELAS	STIC SIL	_T MH			70	40	30		
×	B-3	45											
_ &	B-31	5											
12/10/08	B-31	10		ELAS	STIC SIL	_T MH			80	58	22		
(•	B-31	35		ELASTIC SILT with SAND MH						35	17		
ROAD.GPJ	Specimen Identification	1	D100	D60	D	30	D10	%Grave	9	%Sand	%Si	lt	%Clay
€ RO/	B-3	30	9.5					0.1		14.4		85.	5
ACCESS	B-3	45	4.75	0.097				0.0		53.5		46.	5
T AC	B-31	5	4.75					0.0		8.7		91.	3
¥ PORT	B-31	10	4.75					0.0		5.4		94.0	6
GINT	B-31	35	2					0.0		20.3		79.	7
0.002)							GRAI	N SIZE	DI	STRIE	BUTI	ON	
II	8211 Hermitage Road Richmond, Virginia 23228 Project: Port Acces								d				
GSA (HYDROM	Richmond, Virginia 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569 Location: North Charles							Charlesto	n, So	outh Car	olina		
GSA (I	Number: 1131-08-554												



GRAIN SIZE DISTRIBUTION



	004	\		CAND		
CODDIES	GRA	VEL		SAND)	SILT OD CLAV
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

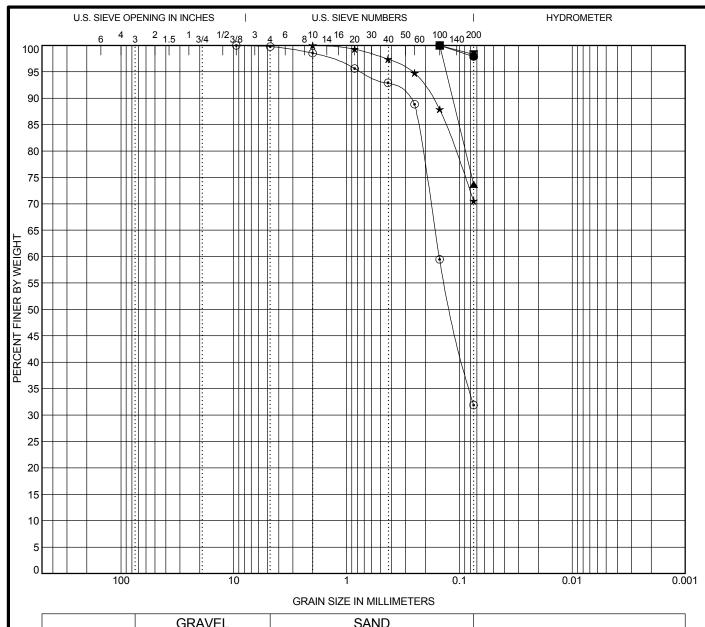
	Specimen Ide	ntification		Classification						PI	Сс	Cu
	B-31	100		ELASTIC S		50	32	18				
	B-33	6										
_∞	B-33	23.5		ELAS	STIC SILT MH			78	58	20		
12/10/08	₽ B-33	48.5										
0 12	B-33	63.5										
ROAD.GPJ	Specimen Ide	ntification	D100	D60	D30	D10	%Grave	1 %	Sand	%Sil	t 9	%Clay
RO4	B-31	100	2				0.0		18.8		81.2	
ACCESS	В-33	6	9.5	0.092			1.8		44.4		53.8	
_A L V	B-33	23.5	0.43				0.0		0.6		99.4	
PORT		48.5	4.75				0.0		27.7		72.3	
TN.	B-33	63.5	4.75	0.106			0.0		54.2		45.8	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



CORRI ES	GRA	VEL		SAND)	SULT OD CLAV
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

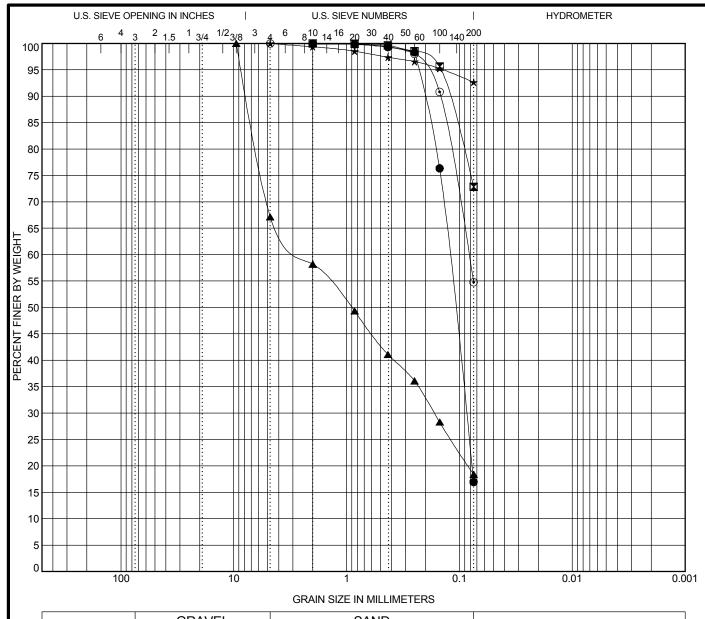
	Specimen Ider	ntification		Cla	ssification			LL	PL	PI	Сс	Cu
•	B-33A	20		ELAS	STIC SILT MH			152	66	86		
×	B-33A	30		FA	T CLAY CH			141	43	98		
∞▲	B-33A	50		ELASTIC S	SILT with SAND	MH		118	50	68		
12/10/08 ★	B-37	5		ELASTIC S	SILT with SAND	MH		57	38	19		
\odot	B-37	12.5		SIL	TY SAND SM			26	24	2		
ROAD.GPJ	Specimen Ider	ntification	D100	D60	D30	D10	%Grav	el 9	6Sand	%Sil	t	%Clay
- RO - RO - RO	B-33A	20	0.15				0.0		2.1		97.9	
ACCESS	B-33A	30	0.15				0.0		1.7		98.3	
	B-33A	50	0.15				0.0		26.3		73.7	
PORT ★	B-37	5	2				0.0		29.4		70.6	
ž O	B-37	12.5	9.5	0.151			0.2		67.9		31.9	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



CORRLES	GRA	VEL		SAND		SILT OD CLAV
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

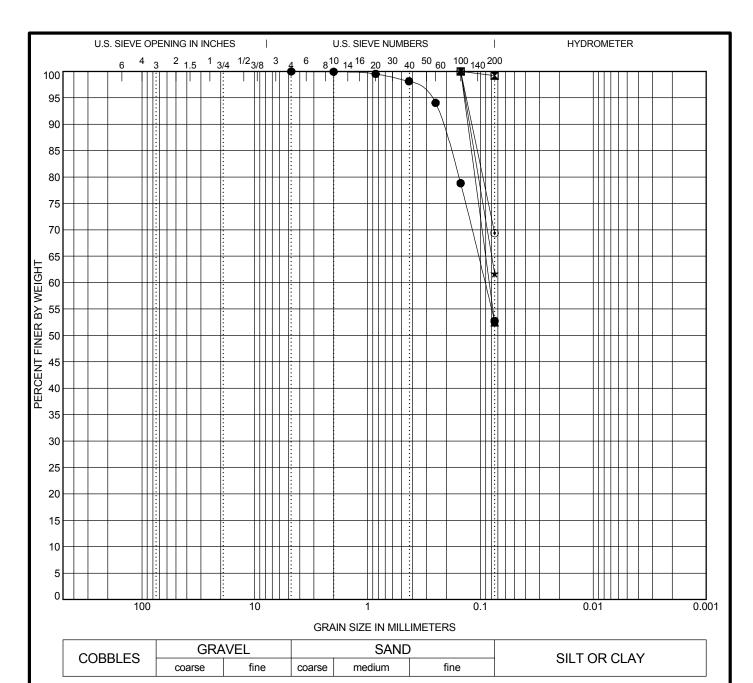
	Specimen Ide	entification		Cla	ssification			LL	PL	PI	Сс	Cu
•	B-37	17.5		SIL	TY SAND SM			NP	NP	NP		
X	B-37	97.5		SILT	with SAND ML			NP	NP	NP		
۸	В-39	8.5										
*	B-39	23.5		ELAS	STIC SILT MH			70	47	23		
	B-39	43.5		SAM	NDY SILT ML			41	32	9		
	Specimen Ide	entification	D100	D60	D30	D10	%Grave	el %	Sand	%Si	lt	%Clay
•	B-37	17.5	2	0.124	0.087		0.0		83.0		16.9	
X X	B-37	97.5	2				0.0		27.1		72.9	
1	B-39	8.5	9.5	2.376	0.168		32.8		48.7		18.4	
★	B-39	23.5	4.75				0.0		7.3		92.7	
0	B-39	43.5	4.75	0.083		_	0.0		45.2		54.8	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

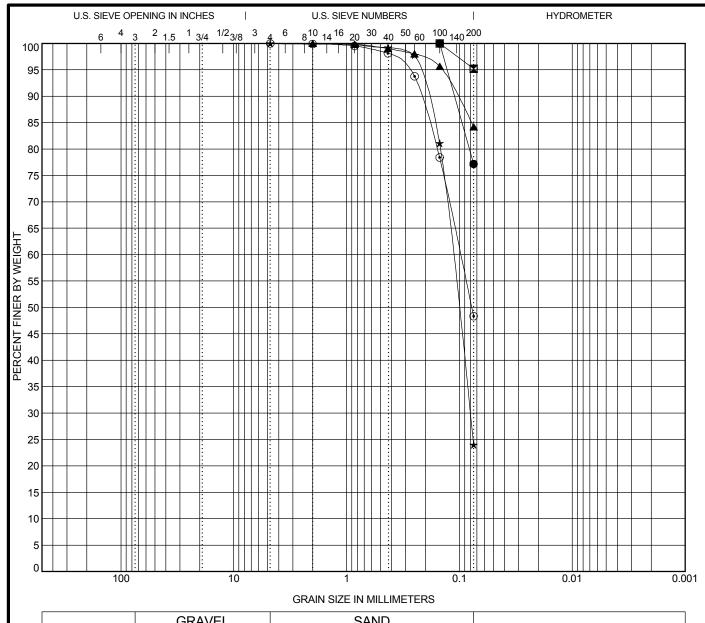
Location: North Charleston, South Carolina



	Specimen Ider	ntification		Cla	ssificat	tion			LL	PL	PI	Сс	Cu	
•	B-39	63.5												
	B-39A	15		FA	T CLAY	'CH			149	43	106			
	B-39A	28		SANDY E	ELASTIC	TIC SILT MH CLAY CH				64	85			
*	В-3А	26		SAND	Y FAT C					20	53			
■ (•)	B-3A	38		SAND	/ FAT C	LAY CH			82	23	59			
	Specimen Ider	ntification	D100	D60	D	30	D10	%Grave	el 9	6Sand	%Si	lt	%Clay	
•	B-39	63.5	4.75	0.091				0.0		47.2		52.8	8	
X	B-39A	15	0.15					0.0		8.0		99.	2	
	B-39A	28	0.15	0.084				0.0		47.6		52.4	4	
*	B-3A	26	0.15					0.0		38.3		61.	7	
0	B-3A	38	0.15					0.0		30.6		69.4	4	
							GRAI	N SIZE	E DI	STRII	BUTI	ON		
	400	MAL	8211 Hermit	age Road Virginia 23228		Projec	t: Port Acc	cess Roa	d					
1	30	ME	Telephone:	(804) 266-2199		Locati	on: North	Charlesto	n, Sc	outh Ca	rolina			
			(551)			Number: 1131-08-554								



GRAIN SIZE DISTRIBUTION



CORRIES	GRA	VEL		SAND		SILT OR CLAY
CODDLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

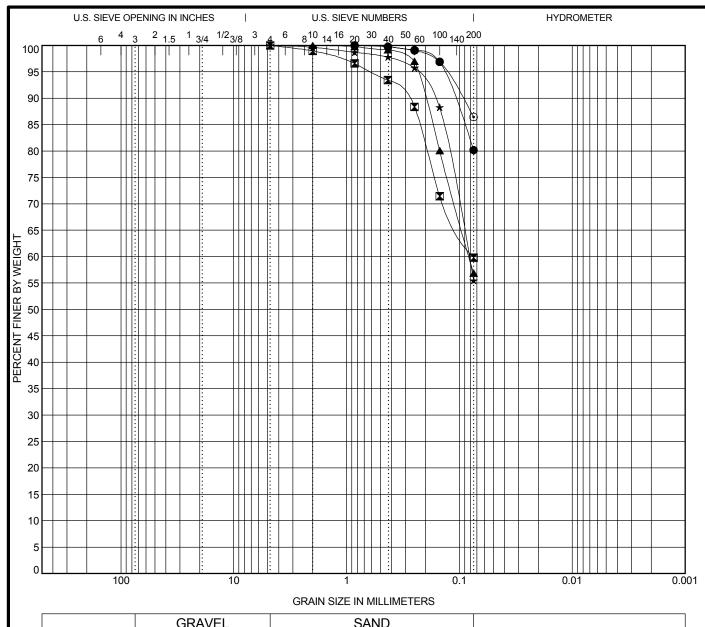
	(Specimen Identification		Cla	ssification			LL	PL	PI	Сс	Cu
- [•	B-40A 23		FAT CLA	AY with SAND (CH	,	98	35	63		
	X	B-40A 38		FA	T CLAY CH		1	02	38	64	1	
_∞ 4	•	B-42 Alt1 2.5										
12/10/08	*	B-42 Alt1 20									1	
ال 12	•	B-42 Alt1 55										
ROAD.GPJ	(Specimen Identification	D100	D60	D30	D10	%Gravel	%	Sand	%Sil	t 9	6Clay
RO/	•	B-40A 23	0.15				0.0	2	22.8		77.2	
ACCESS	X	B-40A 38	0.15				0.0		4.8		95.2	
T AC	•	B-42 Alt1 2.5	2				0.0	•	15.8		84.2	
PORT	*	B-42 Alt1 20	4.75	0.116	0.081		0.0	7	76.0		24.0	
SINT	•	B-42 Alt1 55	4.75	0.098			0.0		51.7		48.3	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



COPPLES	GRA	VEL		SAND)	SULT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

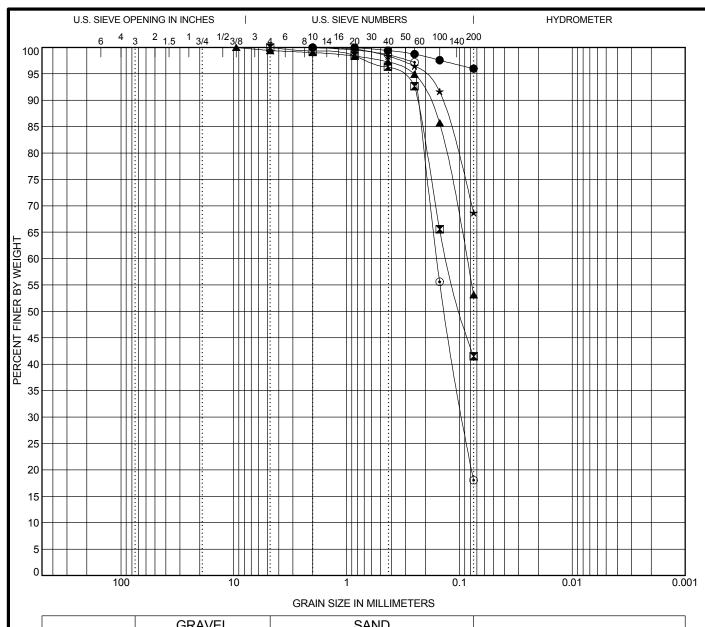
	Specimen Ident	ification		Clas	ssification		L	L	PL	PI	Сс	Cu
ŀ	B-42 Alt1	80										
	B-43 Alt1	5										
_∞ 4	■ B-43 Alt1	15		SAN	NDY SILT ML		3	30	25	5		
700	★ B-43 Alt1	50										
5	9 B-43 Alt1	100										
D.G	Specimen Ident	ification	D100	D60	D30	D10	%Gravel	%S	Sand	%Sil	lt %	6Clay
Š	B-42 Alt1	80	0.85				0.0	19	9.8		80.2	
Ž D	B-43 Alt1	5	4.75	0.076			0.0	40	0.2		59.8	
4	B-43 Alt1	15	2	0.082			0.0	43	3.1		56.9	
GINI PORI ACCESS ROAD. GPJ 1Z/10/08	★ B-43 Alt1	50	4.75	0.083			0.0	44	4.5		55.5	
2	B-43 Alt1	100	0.85				0.0	13	3.5		86.5	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

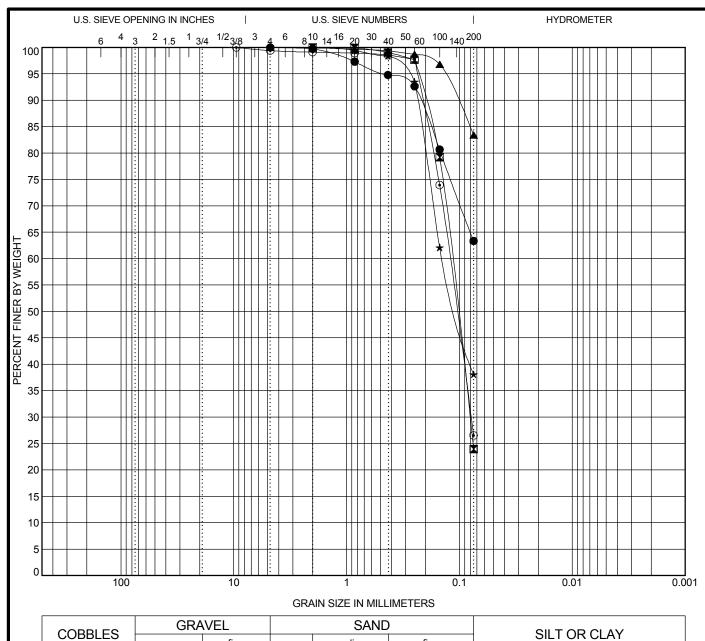


CORRIES	GRA	VEL		SAND)	SULT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

,	Specimen Identi	fication		Clas	ssifica	tion			LL	PL	PI	Сс	Cu
•	B-43 Alt2	5											
	B-43 Alt2	15		SILT	TY SAN	D SM			30	25	5		
•	B-43 Alt2	40											
*	B-43 Alt2	65											
•	B-46	10		SILT	TY SAN	D SM			NP	NP	NP		
) 	Specimen Identi	fication	D100	D60	D	30	D10	%Grave	કો 🦠	6Sand	%Si	lt	%Clay
•	B-43 Alt2	5	2					0.0		4.0		96.0)
X A	B-43 Alt2	15	4.75	0.128				0.0		58.5		41.	5
•	B-43 Alt2	40	9.5	0.087				0.6		46.3		53.2	2
*	B-43 Alt2	65	2					0.0		31.3		68.7	7
•	B-46	10	2	0.158	0.0)94		0.0		82.0		18.0)
							GRAI	N SIZE	: DI	STRII	3UTI	ON	
/	100		8211 Hermit			Proje	ct: Port Ac	cess Road	t				
P	50	ME	Telephone: Fax: (804)	Virginia 23228 (804) 266-2199 261-5569		Locat	ion: North	Charlesto	n, So	outh Ca	rolina		
	•		(001)			Numb	er: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION



SILTOPCIAV)	SAND	VEL	GRA
SILT OR CLAT	-		r.	

fine

	Specimen Identi	ification		Cla	ssification			LL	PL	PI	Сс	Cu
•	B-46	20		SANDY	LEAN CLAY C	_		34	23	11		
	B-46	30		SIL	TY SAND SM			NP	NP	NP		
, 4	■ B-46	40		SILT	with SAND ML			NP	NP	NP		
7	k B-47	8.5		SILTY, CLA	AYEY SAND SC	-SM		24	20	4		
	9 B-47	28.5		SIL	TY SAND SM			NP	NP	NP		
9	Specimen Identi	ification	D100	D60	D30	D10	%Grave	el %	Sand	%Si	It 9	%Clay
2	B-46	20	4.75				0.0		36.6		63.4	
Š	B-46	30	2	0.118	0.081		0.0	0 76.0		0 24		
2	■ B-46	40	4.75		0.0	0 16.6			83.4			
	k B-47	8.5	2	2 0.141 0.0					61.9		38.1	
2	B-47	28.5	9.5	0.122	0.6		72.9		26.5			

medium



coarse

fine

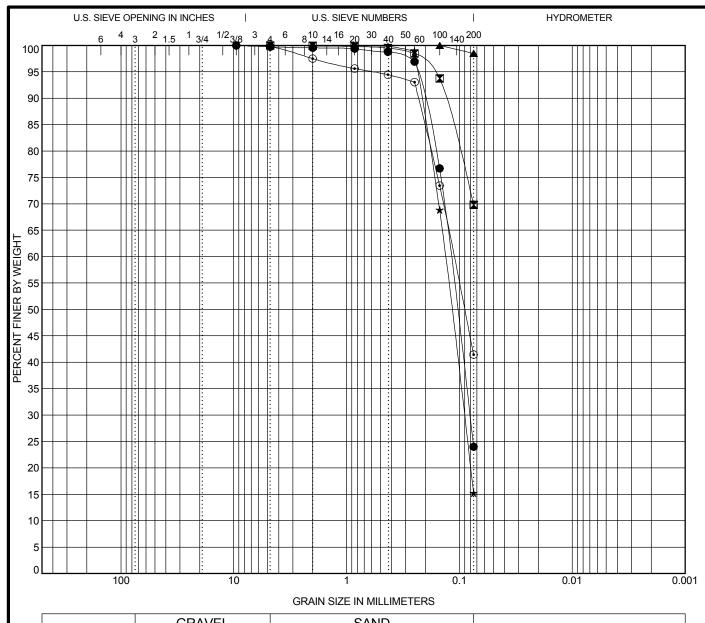
coarse

8211 Hermitage Road Richmond, Virginia 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569

GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

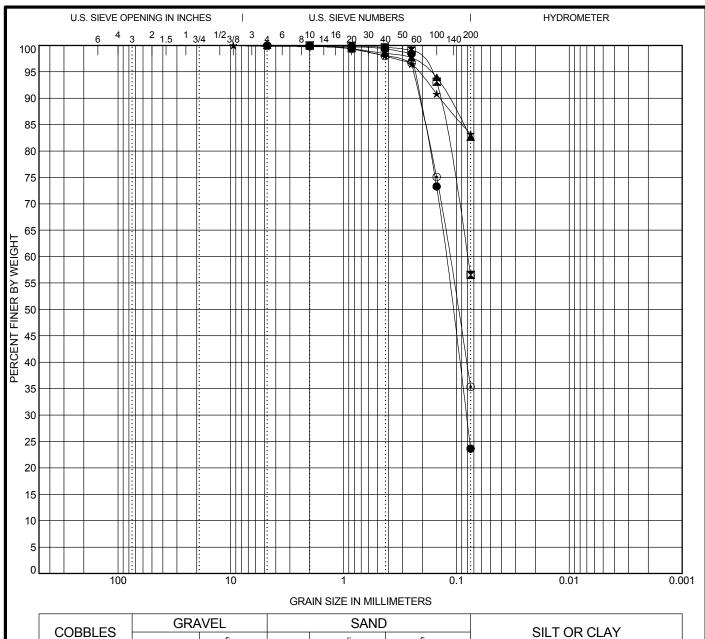


CORDI ES		VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

_											1		
	Specimen Iden	tification		Clas	ssificat	tion			LL	PL	PI	Сс	Cu
•	B-47	38.5		SILT	Y SAN	D SM			NP	NP	NP		
X	B-47	43.5		SAN	IDY SIL	T ML			43	33	10		
_ Δ	B-47A	24		FA	T CLAY	'CH			81	19	62		
12/10/08	B-50	6		SILT	Y SAN	D SM			NP	NP	NP		
(•)	B-50	13.5		SILT	Y SAN	D SM			NP	NP	NP		
ROAD.GPJ	Specimen Iden	tification	D100	D60	D	30	D10	%Grav	rel %	%Sand	%Si	lt	%Clay
§ •	B-47	38.5	9.5	0.12	0.0)81		0.2		75.8		24.0	0
ACCESS	B-47	43.5	4.75					0.0		30.2		69.	В
Ă V	B-47A	24	0.15					0.0		1.5		98.	5
PORT ★	B-50	6	0.85	0.134	0.0	91		0.0		84.8		15.2	2
O L	B-50	13.5	9.5	0.112				0.2		58.3		41.4	4
0.002)		·					GRAI	N SIZI	E DI	STRII	BUTI	ON	
II	400	BAL	8211 Hermit	age Road /irginia 23228		Proje	ct: Port Acc	ess Roa	ıd				
GSA (HYDROM	300	ME	Telephone: Fax: (804)	(804) 266-2199	Location: North Charleston, South Carolina								
SSA (r	•		(001)	-0.000		Num	ber: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION



CORRIES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

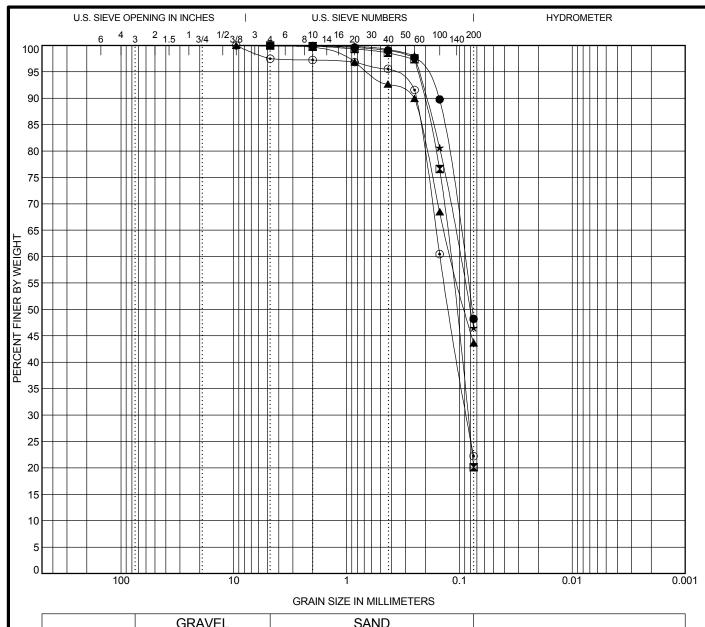
	•	Specimen Identification		Cla	ssification			LL	PL	PI	Сс	Cu
	•	B-50 33.5		SIL	TY SAND SM			NP	NP	NP		
		B-50 43.5		SAI	NDY SILT ML			44	28	16		
80	▲	B-51 Alt1 10		SILT	with SAND ML			NP	NP	NP		
1/10/08	*	B-51 Alt1 15		FAT CL	AY with SAND (CH		54	28	26		
J 12	•	B-51 Alt1 25		SIL	TY SAND SM			NP	NP	NP		
ROAD.GPJ	•	Specimen Identification	D100	D60	D30	D10	%Grave	el %	6Sand	%Si	lt '	%Clay
ROA	•	B-50 33.5	4.75	0.125	0.082		0.0		76.4		23.6	
ACCESS		B-50 43.5	2	0.08			0.0		43.5		56.5	
	A	B-51 Alt1 10	4.75				0.0		17.4		82.6	
PORT	*	B-51 Alt1 15	9.5				0.2		16.6		83.2	
	•	B-51 Alt1 25	4.75	0.115			0.0		64.6		35.4	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

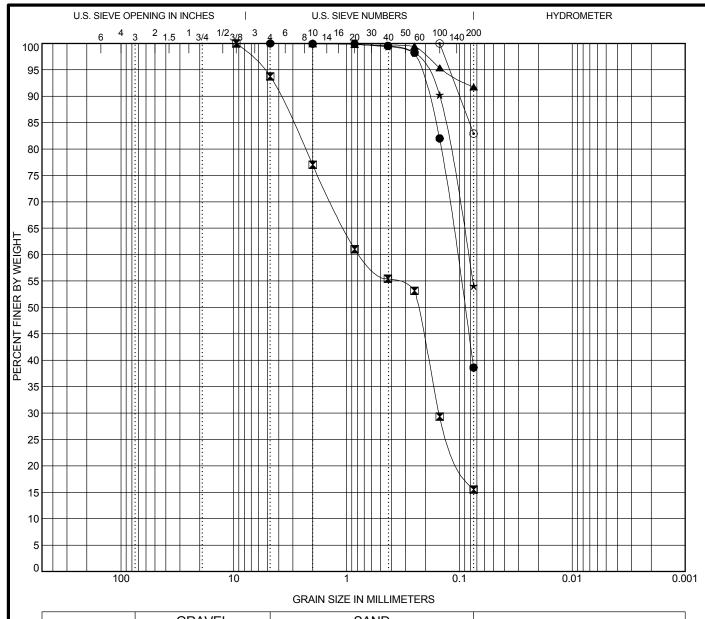


COPPLES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

	Specimen Identifi	cation		Clas	ssificat	tion			LL	PL	PI	Сс	Cu
•	B-51 Alt1	45		SILT	TY SAN	D SM			NP	NP	NP		
×	B-52	15		SILT	TY SAN	D SM			NP	NP	NP		
▲	B-52	25		CLAY	YEY SA	ND SC			27	16	11		
12/10/08 *	B-52	35		SILT	TY SAN	D SM			NP	NP	NP		
(•)	B-52	45		SILT	TY SAN	D SM			NP	NP	NP		
ROAD.GPJ	Specimen Identifi	cation	D100	D60	D	30	D10	%Grav	el %	6Sand	%Si	lt	%Clay
- RO 40 ●	B-51 Alt1	45	4.75	0.091				0.0		51.8		48.2	2
ACCESS	B-52	15	4.75	0.122	0.0)85		0.0		79.9		20.	1
	B-52	25	9.5	0.118				0.1		56.2		43.7	7
PORT ★	B-52	35	2	0.099				0.0		53.4		46.	5
O S	B-52	45	9.5	0.149	0.0)86		2.5		75.3		22.2	2
0.002)							GRAI	N SIZE	E DI	STRII	BUTI	ON	
II	100		8211 Hermit Richmond, \		Proje	ct: Port Acc	ess Roa	d					
GSA (HYDROM	\$5&		Telephone: Fax: (804)	(804) 266-2199		Loca	tion: North (Charlesto	n, Sc	outh Ca	rolina		
SSA (F			(001)	-0.000		Num	ber: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION



COPPLES	GRA	VEL		SAND)	SULT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

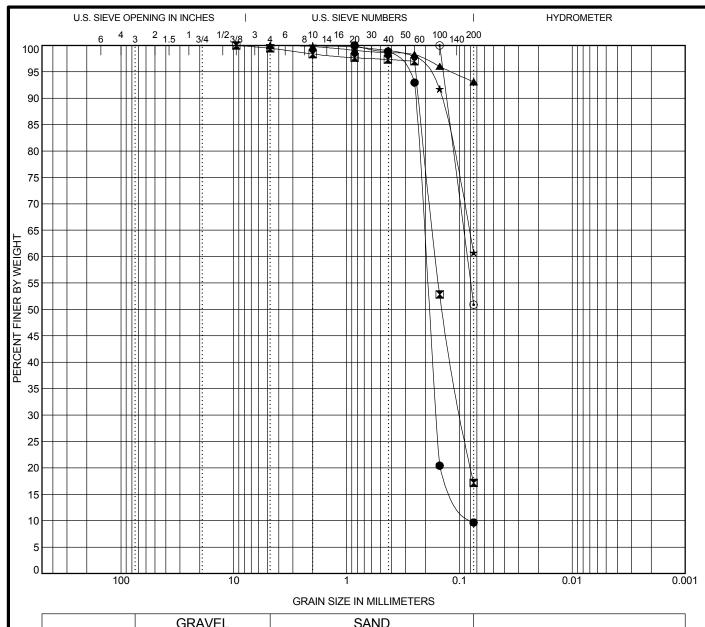
	Specimen Ide	ntification		Cla	ssification			LL	PL	PI	Сс	Cu
•	B-53	5		SILTY, CL	AYEY SAND SO	C-SM		27	21	6		
X	B-53	25										
∞	B-53	40		ELA	STIC SILT MH			52	34	18		
12/10/08	B-53	48.5										
	B-53A	32		FAT CLA	AY with SAND	СН		81	31	50		
ROAD.GPJ	Specimen Ide	ntification	D100	D60	D30	D10	%Grave	1 %	6Sand	%Sil	t ^c	%Clay
80 •	B-53	5	4.75	0.106			0.0		61.4		38.6	
ACCESS	B-53	25	9.5	0.748	0.152		6.2		78.2		15.5	
_ AC	B-53	40	2				0.0		8.2		91.8	
PORT	B-53	48.5	2	0.084			0.0		45.9		54.1	
N N	B-53A	32	0.15				0.0		17.1		82.9	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

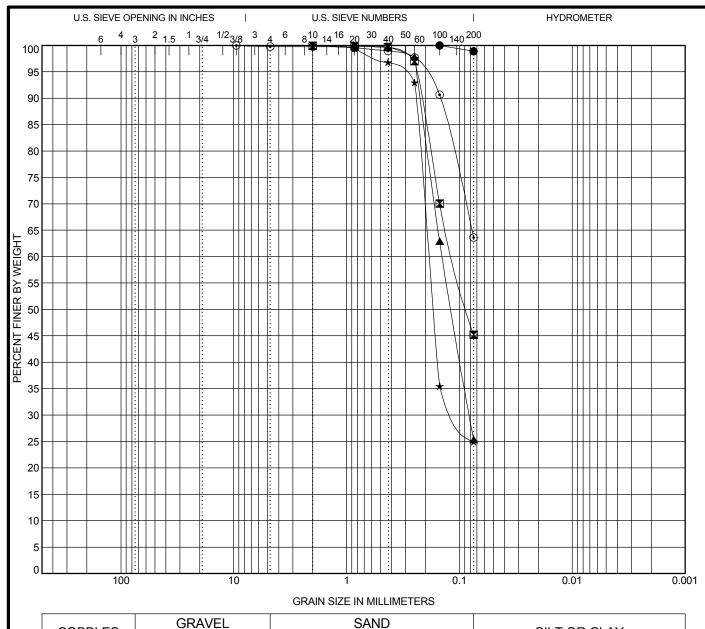


CORRIES	GRA	VEL		SAND)	SULT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

,	Specimen Identific	ation		Clas	sificat	tion			LL	PL	PI	Сс	Cu
•	B-55	7.5										1.69	2.58
X	B-55	15											
▲	B-55	35		ELAS	TIC SII	LT MH			76	37	39		
*	B-55	48.5											
•	B-55A	24		SANDY	LEAN (CLAY C	L		39	24	15		
·,	Specimen Identific	ation	D100	D60	D	30	D10	%Grave	el 9	%Sand	%S	ilt	%Clay
•	B-55	7.5	0.85	0.198	0.	16	0.077	0.0		90.3		9.6	
X	B-55	15	9.5	0.163	0.0)96		0.5		82.3		17.2	
▲	B-55	35	4.75					0.0		6.9		93.1	
*	B-55	48.5	4.75					0.0		39.2		60.8	
•	B-55A	24	0.15	0.085				0.0		49.1		50.9	
							GRAI	N SIZE	DI	STRIE	3UTI	ON	
2	ACOL		8211 Hermit	age Road /irginia 23228		Proje	ct: Port Acc	cess Road	t				
A	FS&	VIE	Telephone:	(804) 266-2199	04) 266-2199 Location: North Charleston, South Carolina					olina			
	•		(551)			Num	ber: 1131-0	8-554					



GRAIN SIZE DISTRIBUTION



	SAND	SILTOPOLAV	
		<i>r</i> .	SILT OR CLAY

fine

	5	Specimen Iden	ntification		LL	PL	PI	Сс	Cu				
Ī	•	B-55B	35		FAT CLAY CH						74		
	X	B-65	2.5		CLA'	YEY SAND SC			29	20	9		
۵	A	B-65	15		SILTY SAND SM						NP		
ACCESS ROAD.GF3 12/10/08	*	B-65	30		SIL	TY SAND SM			NP	NP	NP		
2	•	B-65	45		SAI	NDY SILT ML			43	28	15		
9	(Specimen Iden	ntification	D100	D60	D30	D10	%Grav	el 9	6Sand	%Si	lt ^c	%Clay
è	•	B-55B	35	0.15				0.0		1.1		98.9	
	X	B-65	2.5	2	0.113			0.0		54.8		45.2	
Ź	A	B-65	15	0.85	0.142	0.082		0.0		74.6		25.4	
VIND INIT	*	B-65	30	2	0.186	0.105		0.0		75.1		24.9	
	•	B-65	45	9.5 0.2				0.2		36.2		63.6	

medium

coarse



COBBLES

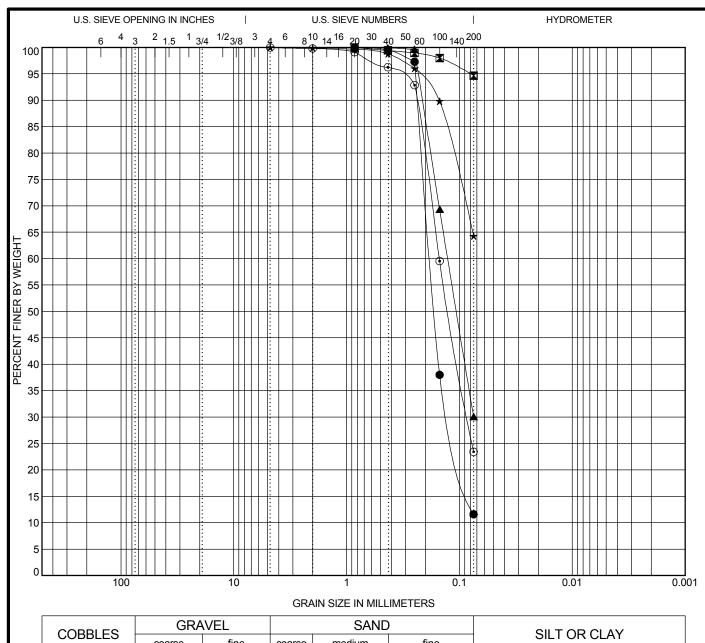
coarse

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GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



CORRLES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

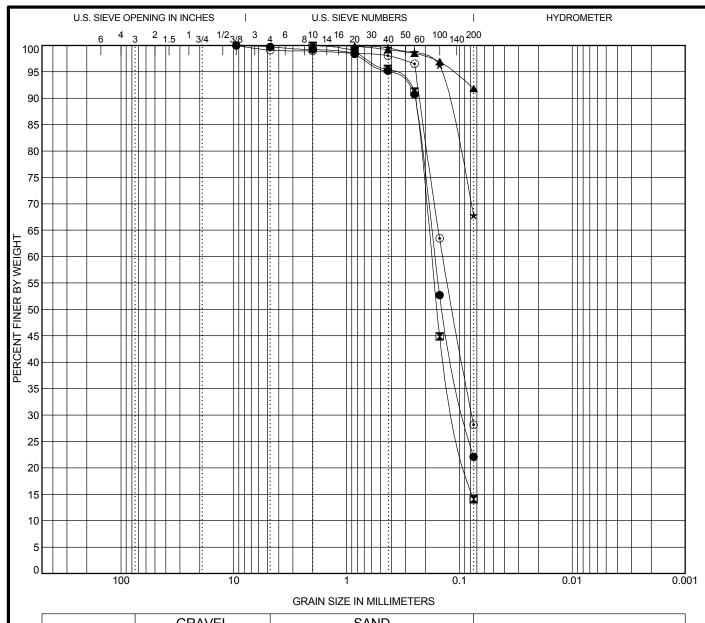
	Specimen Identifica	ition		Cla	ssification			LL	PL	PI	Сс	Cu
•	B-66	7.5									1.13	2.52
×	B-66	20		ELASTIC SILT MH						19		
_ ▲	B-66	45		SIL		NΡ	NP	NP				
12/10/08	B-66	75		SAN	NDY SILT ML			43	34	9		
2	B-68 Alt1	5										
ROAD.GPJ	Specimen Identifica	ition	D100	D60	D30	D10	%Gravel	%	Sand	%Si	lt %	6Clay
₽ RO/	B-66	7.5	0.85	0.181	0.122		0.0		88.4		11.6	
ACCESS	B-66	20	0.85				0.0		5.3		94.7	
A Y	B-66	45	0.85	0.127			0.0		69.9		30.1	
PORT ≠	В-66	75	4.75				0.0		35.7		64.3	
NE O	B-68 Alt1	5	4.75	0.151	0.085		0.0		76.6		23.4	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina

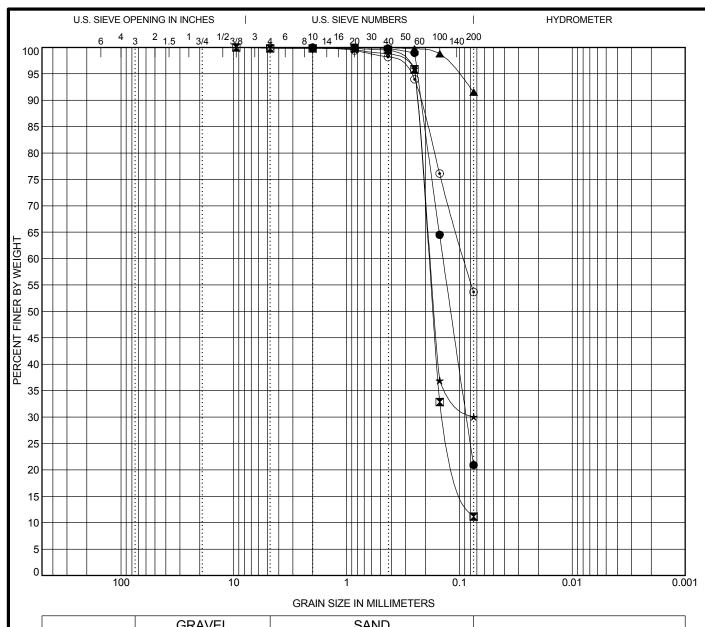


COBBLES	GRA	VEL		SAND)	SILT OR CLAY
	coarse	fine	coarse	medium	fine	SILT OR CLAY

L														
	Specimen Identific	ation		Clas	ssificat	tion		LL F			PI	Сс	Cu	
•	B-68 Alt1	10		SILT	TY SAN	D SM			23	20	3			
X	B-68 Alt1	15												
ـ ▲	B-68 Alt1	25		ELAS	_T MH		67	50	17					
* × ×	B-68 Alt1	30		SAN		29	24	5						
(•)	B-68 Alt1	45		SILT		NP	NP	NP						
ROAD.GPJ	Specimen Identific	ation	D100	D60	D	30	D10	%Grave	9	6Sand	%Si	lt	%Clay	
À	B-68 Alt1	10	9.5 0.165 0.0			09		0.3		77.6	22.1		1	
ACCESS A	B-68 Alt1	15	2	0.177 0.10		107		0.0		85.9	14.1		1	
Ž A	B-68 Alt1	25	2					0.0		8.2		91.8	В	
ਨੂੰ ★	B-68 Alt1	30	2					0.0		32.2		67.8	В	
<u>Z</u> ⊙	B-68 Alt1	45	9.5	0.14	0.0	78		0.9		71.0		28.2	2	
0.002)				GRAIN SIZE DISTRIBUTION										
11	ACOL		Proje	ct: Port Acc	ess Road	t								
GSA (HYDKOM	Richmond, Virginia 23228 Richmond, Virginia 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569						tion: North (Charlesto	n, Sc	outh Ca	rolina			
SSA (F	Nun							Number: 1131-08-554						



GRAIN SIZE DISTRIBUTION

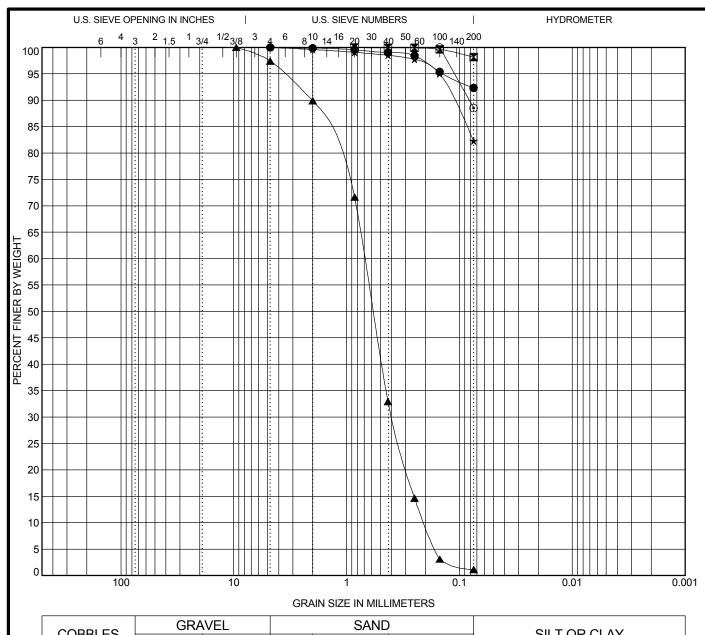


CORRIES	GRA	VEL		SAND		
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAY

	Specimen Identif	ication		ssificat	tion			LL	PL	PI	Сс	Cu		
•	B-68 Alt1	55		SILT	Y SAN	D SM			NP	NP	NP			
×	B-72	5										1.39	2.59	
_ ▲	B-72	10		ELASTIC SILT MH							26			
12/10/08 *	B-72	35												
(•)	1(•) B-72 65 SANDY SILL MI									NP	NP			
ROAD.GPJ	Specimen Identif	ication	D100	D60	D	30	D10	%Grave	9	6Sand	%Si	lt ^c	%Clay	
- RO 40 ●	B-68 Alt1	55	2	0.14	0.0)87		0.0		79.1		20.9		
ACCESS	B-72	5	9.5	0.187	0.1	137		0.2		88.7		11.2		
A A C	B-72	10	0.43					0.0		8.5		91.5		
PORT ★	B-72	35	2	0.183				0.0		70.0		30.0		
O SINT	B-72	65	4.75	0.091				0.0		46.3		53.7		
0.002)		GRAIN SIZE DISTRIBUTION												
II I	100			Proje	ct: Port Acc	ess Road	ı							
GSA (HYDKUM	Same Richmond, Virginia 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569						Location: North Charleston, South Carolina							
SSA (r	Number: 1131-08-554													



GRAIN SIZE DISTRIBUTION



CORRLES	GRA	VEL		SAND)	SILT OR CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OR CLAT

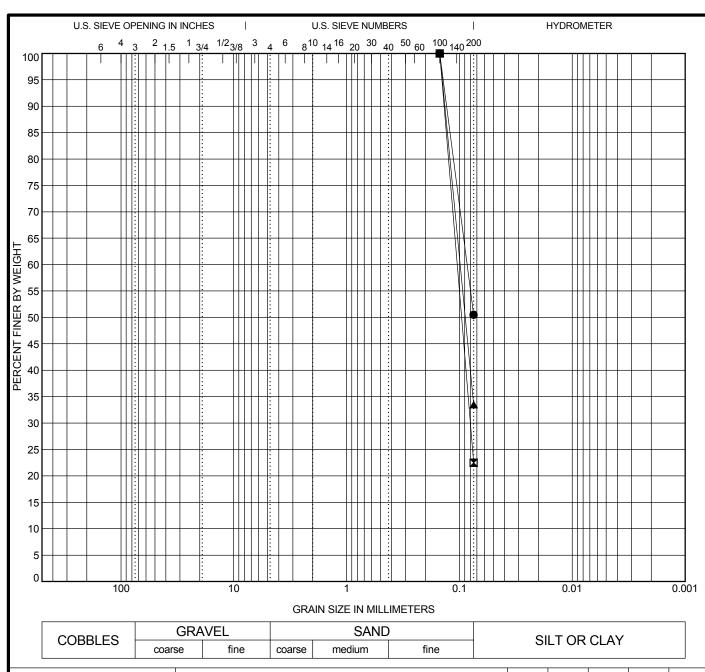
	Specimen Identifica	ation		Clas	ssification		L	L	PL	PI	Сс	Cu
•	B-74	5										
X	B-74	20		ELAS	STIC SILT MH		(3 5	45	20		
•	B-74	40		POORLY GRADED SAND SP						NP	1.10	3.40
<u>+</u>	B-74	85										
•	B-74A	8		ELAS	STIC SILT MH	8	36	39	47			
•	Specimen Identifica	ation	D100	D60	D30	D10	%Gravel	%	Sand	%Si	ilt %	6Clay
•	B-74	5	4.75				0.0		7.7		92.3	
X	B-74	20	0.85				0.0		1.8		98.2	
•	B-74	40	9.5	0.692	0.394	0.204	2.6	-	96.3		1.1	
*	B-74	85	4.75				0.0		17.7		82.3	
•	B-74A	8	0.15				0.0		11.5		88.5	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



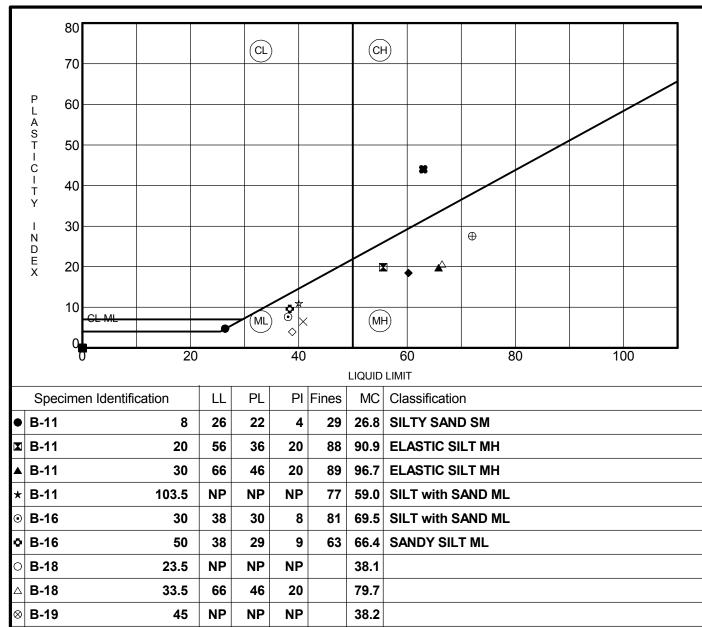
	Specimen Identif	ication		Clas	ssification		l	L	PL	PI	Сс	Cu
•	B-74A	65		SANDY E	LASTIC SILT I	ИΗ		59	37	22		
	Proctor 1	0		SILT	Y SAND SM		N	NP	NP	NP		
	Proctor 2	0		SILT	2	23	20	3				
•	Specimen Identif	ication	D100	D60	D30	D10	%Gravel	%S	Sand	%Sil	it ^c	%Clay
	B-74A	65	0.15	0.086			0.0	49	9.5		50.5	
	Proctor 1	0	0.15	0.105	0.08		0.0	7	7.5		22.5	
	Proctor 2	0	0.15	0.099			0.0	6	6.5		33.5	
											-	



GRAIN SIZE DISTRIBUTION

Project: Port Access Road

Location: North Charleston, South Carolina



Φl B-2 35 72 44 28 94 88.5 **ELASTIC SILT MH** □ B-23 Alt1 NP NP NP 8 28 27.2 SILTY SAND SM B-23 Alt1 20 NP NP NP 9 26.1 POORLY GRADED SAND with SILT SP-SM • B-23 Alt1 NP NP NP 26 35.4 **SILTY SAND SM** 34 B-23 Alt1 50 40 29 11 44 34.7 SILTY SAND SM ස B-23 Alt1 73.5 NP NP NP 50 45.8 SANDY SILT ML NP ■ B-29 Alt1 7.5 NP NP 24 46.4 SILTY SAND SM ◆ B-29 Alt1 15 60 42 18 135.2 **ELASTIC SILT MH** 92 B-29 Alt1 39 35 4 70 34.3 SILT with SAND ML 35 \Diamond B-29 Alt1 65 41 34 7 43.6 SANDY SILT ML 68 **■** B-2A 23 19 44 94.9 FAT CLAY CH 63 87

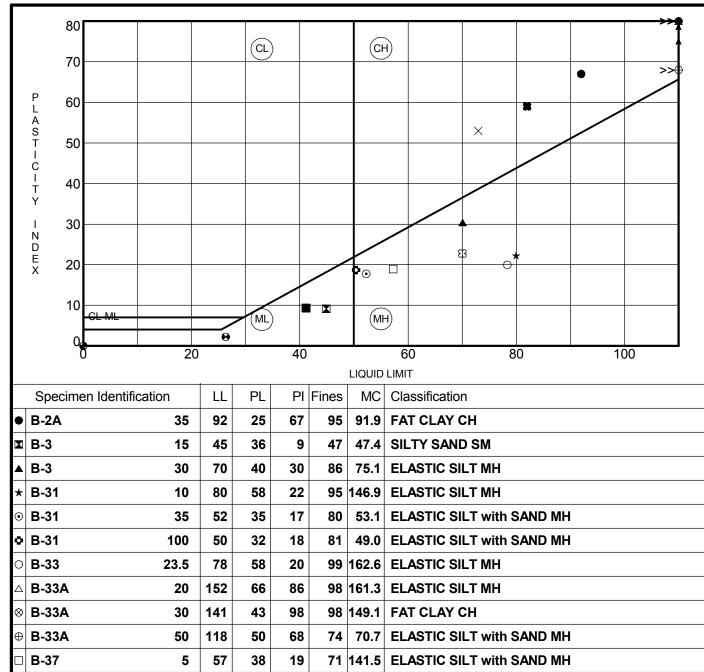


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ATTERBERG LIMITS RESULTS

Project: Port Access Road

Location: North Charleston, South Carolina



2 0 B-37 12.5 26 24 32 23.3 SILTY SAND SM • B-37 17.5 NP NP NP 17 39.2 **SILTY SAND SM** ☆ B-37 97.5 NP NP NP 73 43.2 SILT with SAND ML 8 B-39 23.5 70 47 23 93 148.3 ELASTIC SILT MH ■ B-39 43.5 41 32 9 55 44.8 SANDY SILT ML ◆ B-39A 149 43 106 118.8 **FAT CLAY CH** 15 99 SANDY ELASTIC SILT MH B-39A 149 64 85 148.3 \Diamond 28 52 B-3A 26 73 20 53 89.9 SANDY FAT CLAY CH 62 38 23 **SANDY FAT CLAY CH ■** B-3A 82 59 69 84.4



8211 Hermitage Road Richmond, Virginia 23228 Telephone: (804) 266-2199 Fax: (804) 261-5569

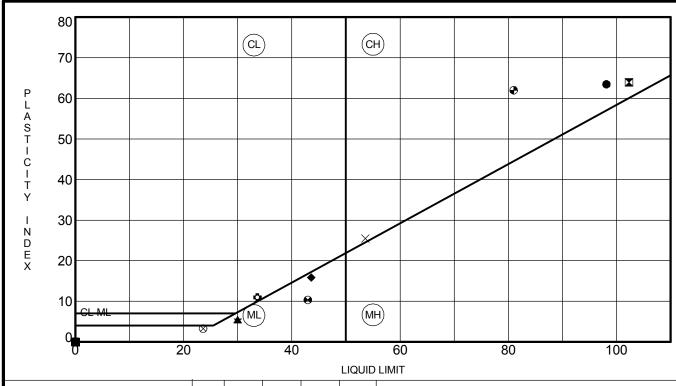
ATTERBERG LIMITS RESULTS

Project: Port Access Road

Location: North Charleston, South Carolina

Number: 1131-08-554

GINT



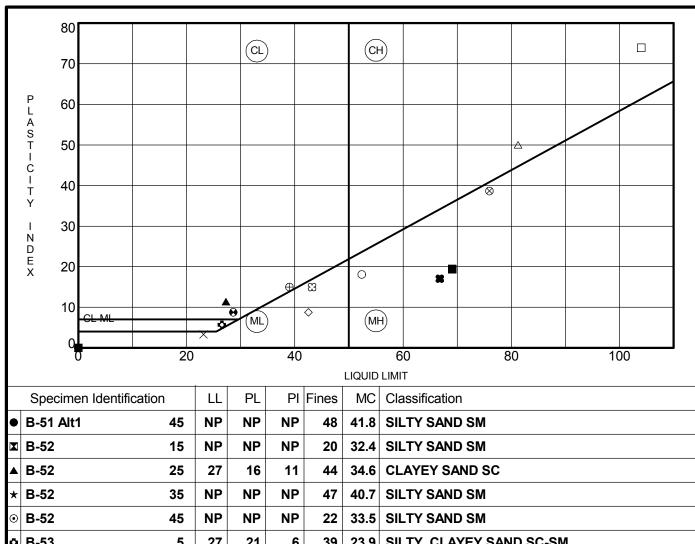
	Specimen Identification	LL	PL	PI	Fines	MC	Classification
•	B-40A 23	98	35	63	77	87.6	FAT CLAY with SAND CH
X	B-40A 38	102	38	64	95	110.5	FAT CLAY CH
A	B-43 Alt1 15	30	25	5	57	32.8	SANDY SILT ML
*	B-43 Alt2 15	30	25	5	42	32.2	SILTY SAND SM
0	B-46 10	NP	NP	NP	18	30.3	SILTY SAND SM
0	B-46 20	34	23	11	63	57.3	SANDY LEAN CLAY CL
С	B-46 30	NP	NP	NP	24	39.3	SILTY SAND SM
Δ	B-46 40	NP	NP	NP	83	47.4	SILT with SAND ML
8	B-47 8.5	24	20	4	38	19.5	SILTY, CLAYEY SAND SC-SM
€	B-47 28.5	NP	NP	NP	27	40.1	SILTY SAND SM
	B-47 38.5	NP	NP	NP	24	36.0	SILTY SAND SM
8	B-47 43.5	43	33	10	70	43.6	SANDY SILT ML
æ	B-47A 24	81	19	62	99	55.8	FAT CLAY CH
*	B-50 6	NP	NP	NP	15	34.0	SILTY SAND SM
\mathbb{S}	B-50 13.5	NP	NP	NP	41	39.9	SILTY SAND SM
	B-50 33.5	NP	NP	NP	24	38.4	SILTY SAND SM
•	B-50 43.5	44	28	16	57	46.4	SANDY SILT ML
3	B-51 Alt1 10	NP	NP	NP	83	101.7	SILT with SAND ML
×	B-51 Alt1 15	54	28	26	83	100.6	FAT CLAY with SAND CH
a	B-51 Alt1 25	NP	NP	NP	35	34.2	SILTY SAND SM



ATTERBERG LIMITS RESULTS

Project: Port Access Road

Location: North Charleston, South Carolina



6 □ B-53 5 27 21 39 23.9 SILTY, CLAYEY SAND SC-SM 0 71.6 ELASTIC SILT MH B-53 40 52 34 18 92 B-53A 32 81 31 50 76.1 FAT CLAY with SAND CH \triangle 83 ⊗ B-55 35 76 37 39 93 86.1 **ELASTIC SILT MH** Φl B-55A 24 39 24 15 51 30.0 SANDY LEAN CLAY CL □ B-55B 104 30 74 83.8 FAT CLAY CH 35 99 B-65 9 **⊕** 2.5 29 20 45 24.3 **CLAYEY SAND SC** • B-65 NP NP NP 34.2 **SILTY SAND SM** 15 25 ☆ B-65 30 NP NP NP 25 42.4 SILTY SAND SM 8 **B-65** 45 43 28 15 64 47.5 SANDY SILT ML ■ B-66 20 69 50 19 95 94.3 ELASTIC SILT MH NP ♦ B-66 NP NP 30 SILTY SAND SM 45 34.3 75 43 34 9 47.5 SANDY SILT ML ♦ B-66 64 B-68 Alt1 10 23 20 3 22 25.7 SILTY SAND SM **■** B-68 Alt1 25 67 17 107.2 ELASTIC SILT MH 50 92

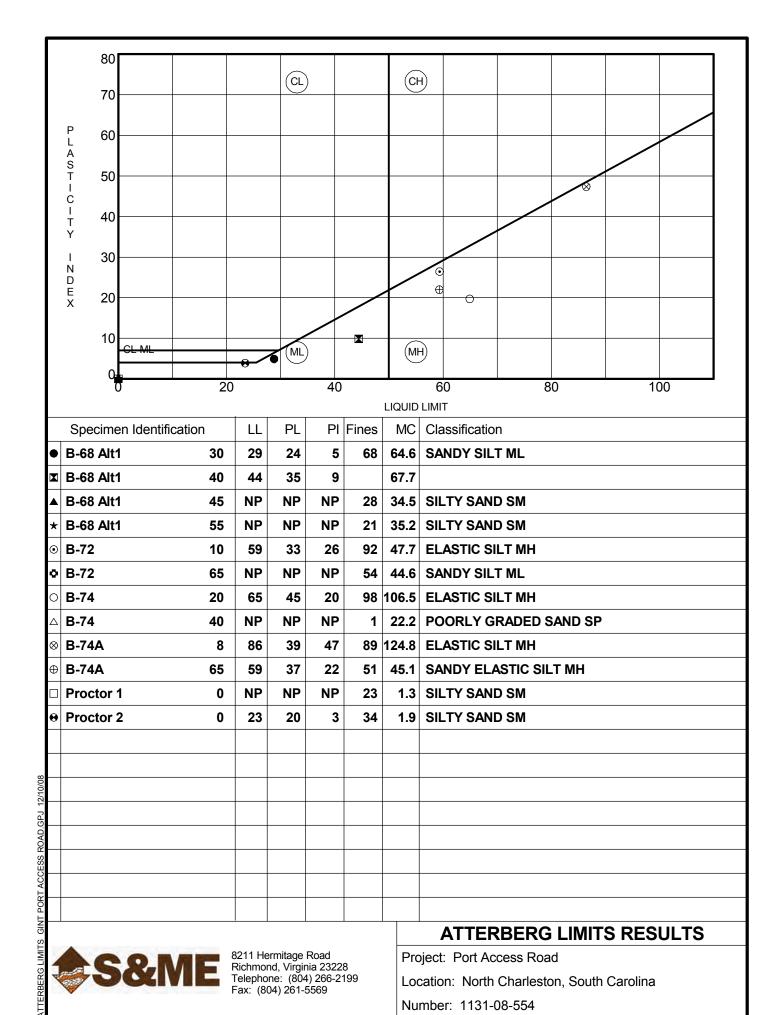


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ATTERBERG LIMITS RESULTS

Project: Port Access Road

Location: North Charleston, South Carolina





ATTERBERG LIMITS RESULTS

Project: Port Access Road

Location: North Charleston, South Carolina

Moisture - Density Report



%

1131-08-554 **S&ME Project #:** Report Date: October 20, 2008 **Project Name: Port Access Road** Test Date(s): October 20, 2008

Client Name: **SCDOT**

Location: North Charleston, South Carolina

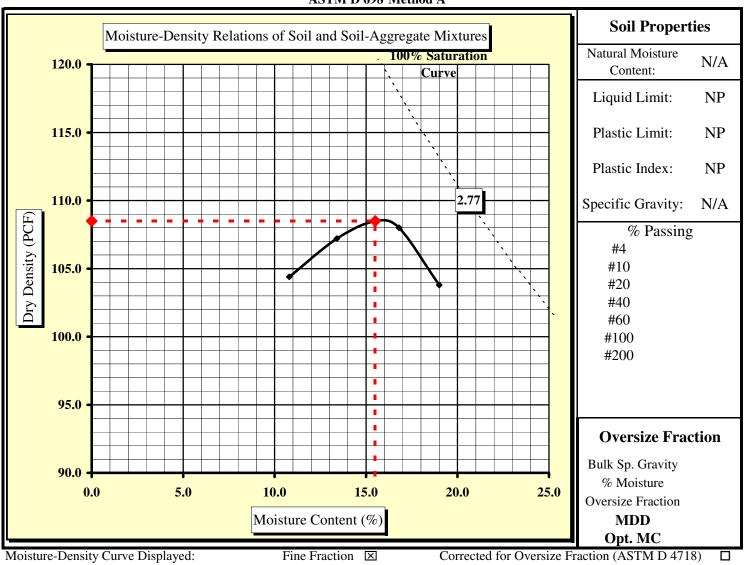
Boring #: Sample #: Sample Date: October 14, 2008 N/A

Location: N/A Offset: N/A Depth: N/A

Sample Description: Brown Silty Sand with Shell

Maximum Dry Density 108.5 PCF. **Optimum Moisture Content** 15.5

ASTM D 698 Method A



Sieve Size used to separate the Oversize Fraction: #4 Sieve ⊠ 3/8 inch Sieve □ 3/4 inch Sieve □

Mechanical Hammer Manual Hammer □ Moist Preparation □ Dry Preparation □

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Soil Discri	ption is	based	on a visual	classification.
Don Discri	puon 13	Duscu	on a visual	Classification.

Technical Responsibility:

Signature

Position

Moisture - Density Report



S&ME Project #: 1131-08-554 Report Date: October 20, 2008
Project Name: Port Access Road Test Date(s): October 20, 2008

Client Name: SCDOT

Location: North Charleston, South Carolina

Boring #: N/A Sample #: 2 Sample Date: October 14, 2008

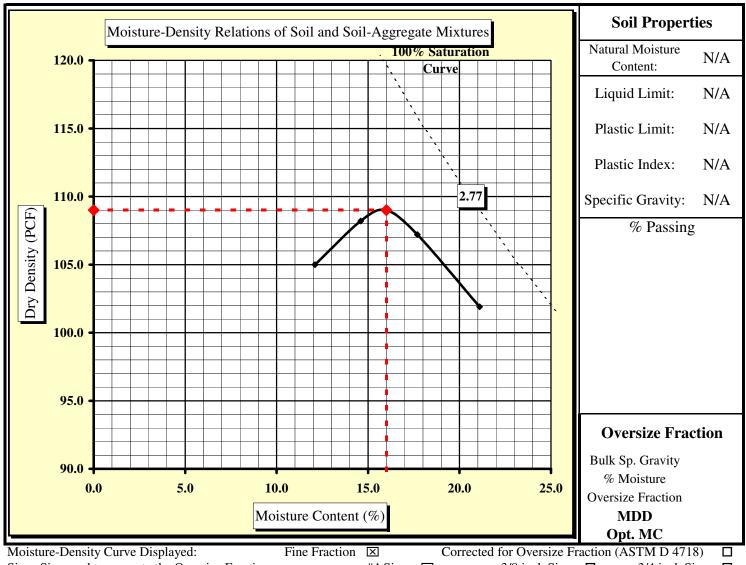
Location: N/A Offset: N/A Depth: N/A

Sample Description: Brown Silty Sand with Shell

Maximum Dry Density 109.0 PCF.

Optimum Moisture Content 16.0 %

ASTM D 698 Method A



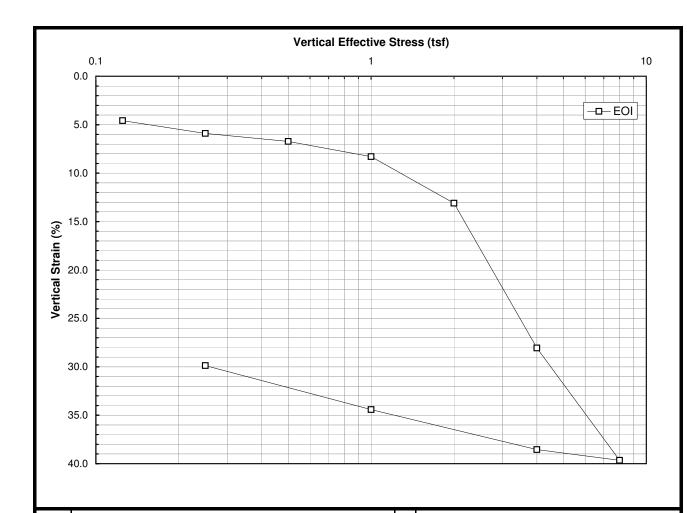
References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Soil Discription is based on a visual classification.

Technical Responsibility:

Signature

Position



NC (S	Probable Preconsolidation Stress, P'c (tsf):	1.8
IDATIO	ETER	Approx. Hydrostatic Effective Stress, P'o (tsf) Vertical Strain at P'o (%):	0.5 6.7
SOL	AM	Compression Ratio (CR):	0.48
NC	A	Recompression Ratio (RR):	0.072
ပြင္တဲ့ '	-	Over Consolidation Ratio (OCR):	3.5

IEST METHOD Test Method: ASTM D-2435 A Trimming Procedure: 2.5-inch Trimming Lathe Pressure at Inundation: 0.125 tsf Method to Compute C_v: ASTM D-2435 12.3.2

Test No.: SCI B-2A, 24' SAMPLE ID Sample No.: UD1 Exploration No.: B-2A Depth: 23 to 25 feet USCS Description: Fat CLAY (CH)

İ	
Sample Diameter (cm):	6.35
Sample Area (cm ²):	31.67
Measured Specific Gravity:	2.64
Trimmings Moisture (%):	85.2
% Passing #200 Sieve:	86.6
1	

Liquid Limit: 63 Plastic Limit: 19 Plasticity Index: 44

_	Liquid Littiit.	00	
Ĭ	Plastic Limit:	19	
2	Plasticity Index:	44	
빌			
SAMPLE DATA		Initial	Final
S	Water Content (%):	94.9	66.5
	Est. % Saturation:	98.9	100.0
	Sample Height (cm):	2.540	1.781
	Wet Sample Weight (g):	117.2	100.1
	Dry Sample Weight (g):	60.1	60.1
	Dry Unit Weight (pcf):	46.6	66.5
	Void Ratio, e:	2.53	1.48
	Solids Height (cm):	0.719	0.719



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: **SCDOT**

Location: North Charleston, South Carolina 1131-08-554 Page 1 of 2 Project No.:

Test No.: SCI B-2A, 24'

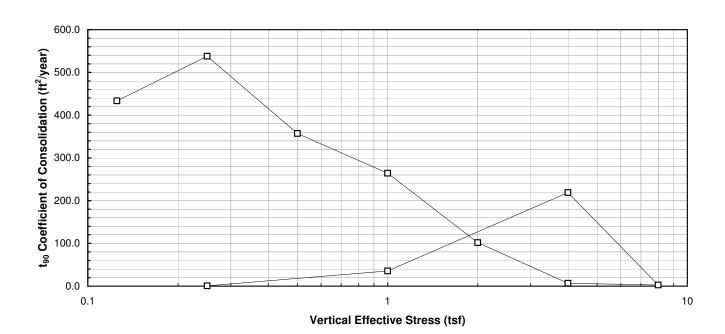
Sample No.: UD1
Exploration No.: B-2A

Depth: 23 to 25 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.125	4.6	4.2	2.37	2.38	0.07	433.5	
2	24-00	0.25	5.9	5.0	2.32	2.36	0.14	537.9	
3	24-00	0.5	6.7	6.4	2.29	2.31	0.28	357.0	
4	24-03	1	8.3	7.7	2.24	2.26	0.56	264.4	
5	24-00	2	13.1	10.6	2.07	2.16	1.11	101.9	
6	24-00	4	28.1	23.2	1.54	1.71	2.22	6.8	
7	24-03	8	39.7	37.9	1.13	1.19	4.44	2.4	
8	24-00	4	38.6	39.3	1.17	1.14	2.22	218.9	
9	24-03	1	34.4	37.4	1.32	1.21	0.56	35.6	
10	24-03	0.25	29.9	30.0	1.48	1.47	0.14	0.6	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

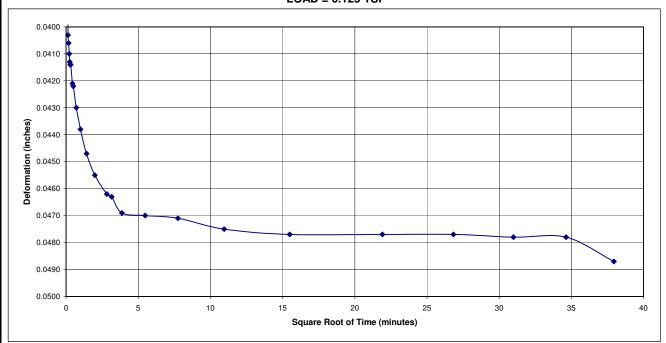
Client: SCDOT

Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 0.125 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

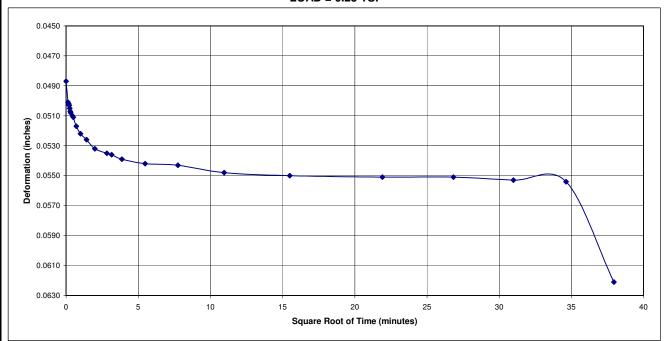
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

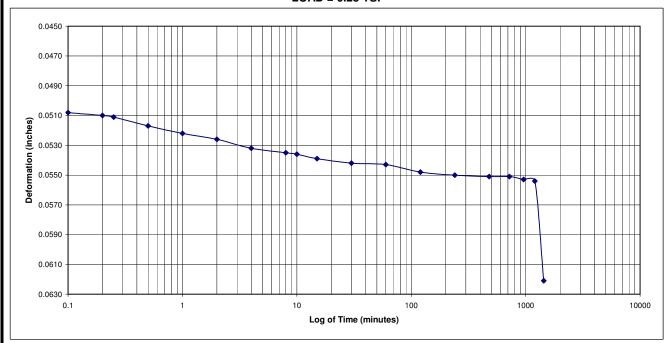
Tel: 804.266.2199 Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 0.25 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

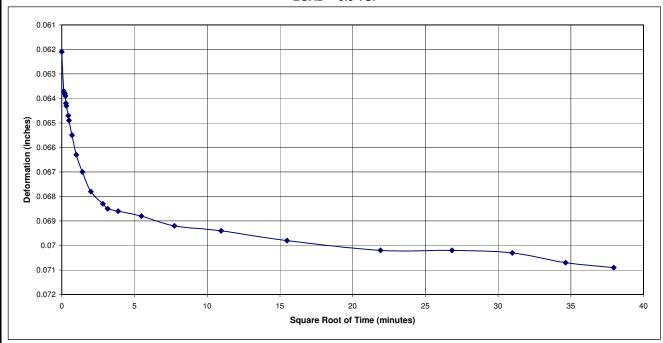
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

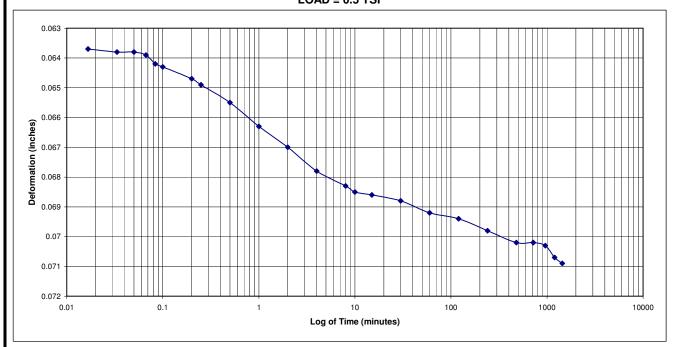
Tel: 804.266.2199 Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 0.5 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

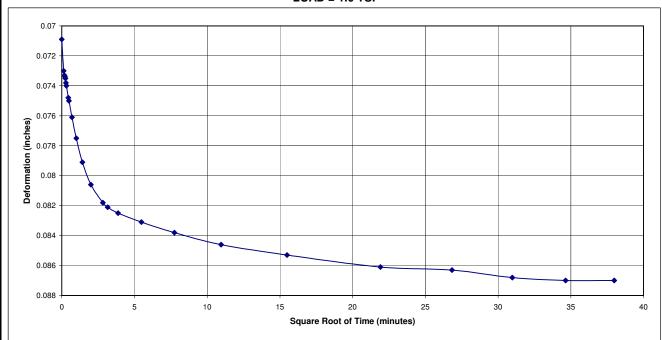
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

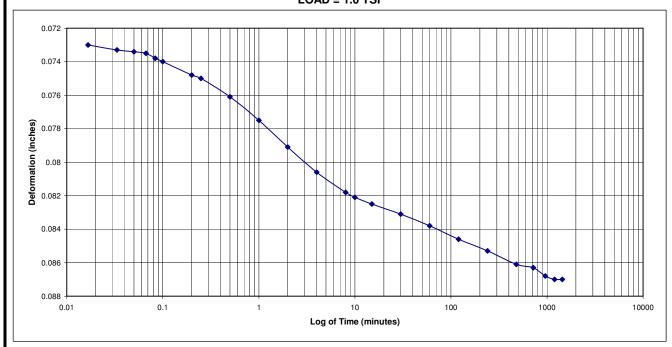
Tel: 804.266.2199 Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 1.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



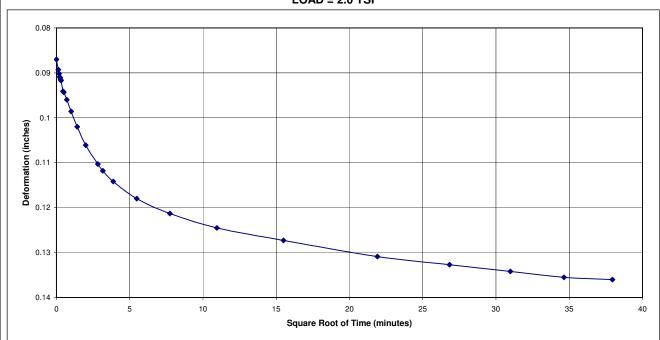
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

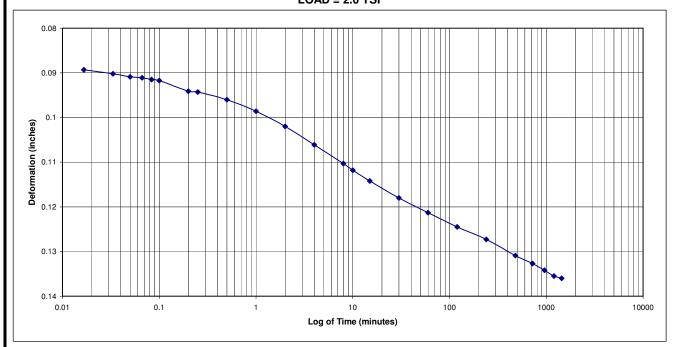
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 2.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



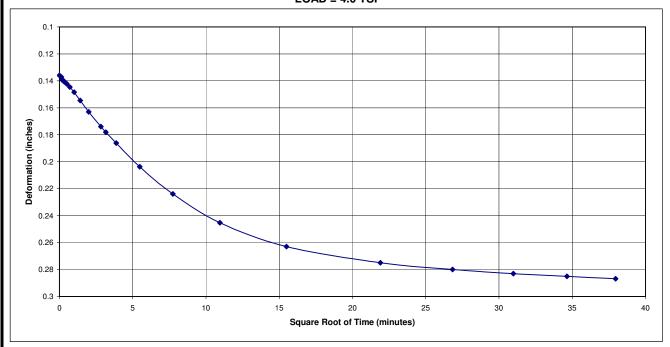
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

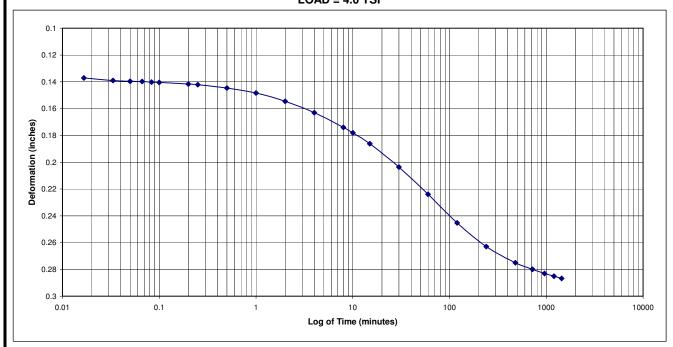
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 4.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



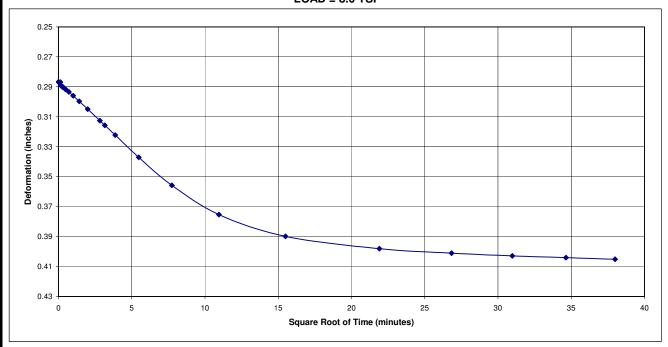
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

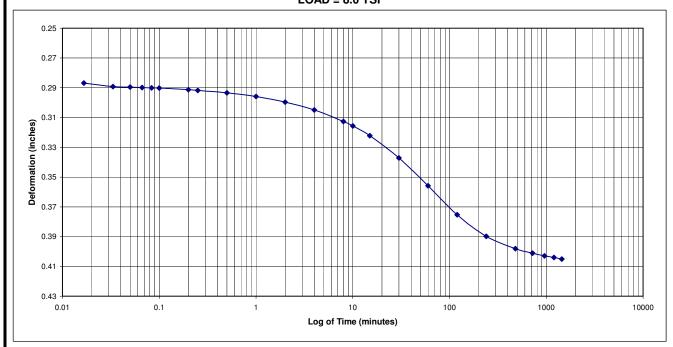
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 8.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



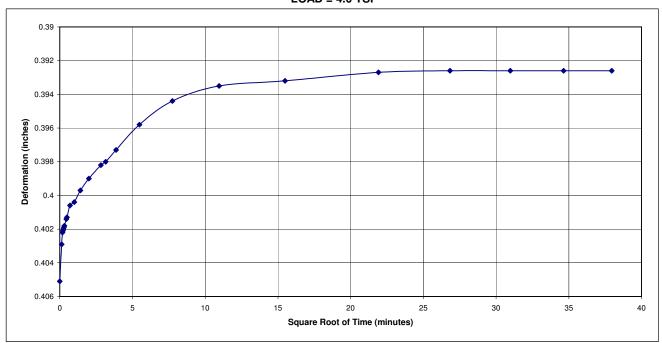
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 4.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



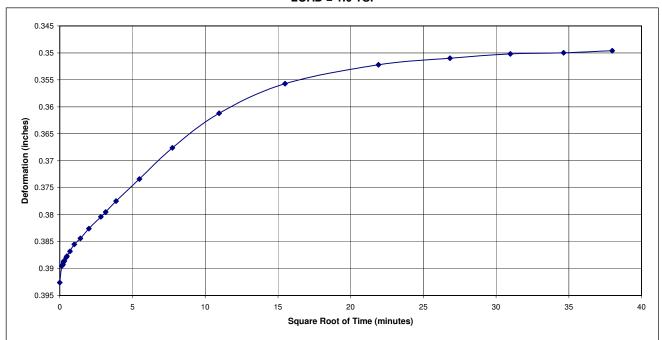
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 1.0 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet



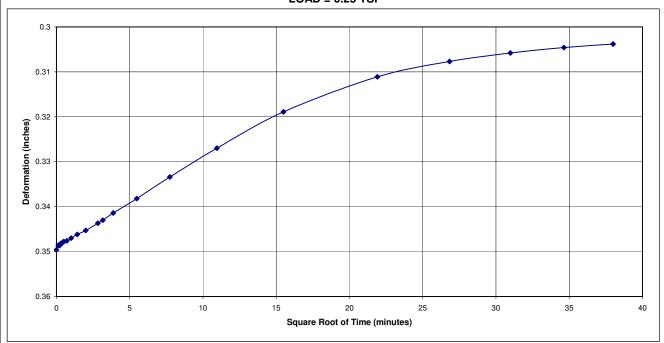
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 23 to 25 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-2A, 23 to 25 feet LOAD = 0.25 TSF



Sample No.: SCI B-2A, 24'
Exploration No.: B-2A
Depth: 23 - 25 feet

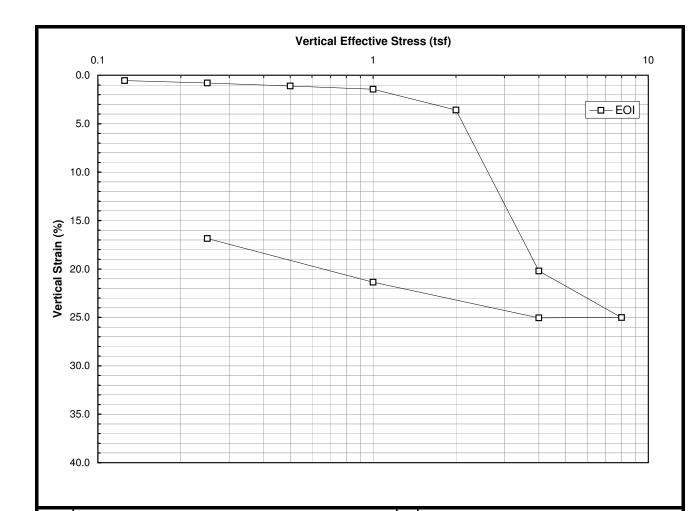


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



S o	Probable Preconsolidation Stress, P'c (tsf):	1.9
DATI(Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.7 1.2
SOL	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.55
ž	Recompression Ratio (RR):	0.067
გ,	Over Consolidation Ratio (OCR):	2.6

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.125 tsf
ASTM D-2435 12.3.2

Test No.: SCI B-2A, 36'
Sample No.: UD2
Exploration No.: B-2A
Depth: 35 to 37 feet
USCS Description: Fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm ²):	31.67
Measured Specific Gravity:	2.67
Trimmings Moisture (%):	83.1
% Passing #200 Sieve:	94.9

Liquid Limit: 92
Plastic Limit: 25
Plasticity Index: 67

	Initial	Final
Water Content (%):	91.9	76.3
Est. % Saturation:	100.0	100.0
Sample Height (cm):	2.540	2.112
Wet Sample Weight (g):	119.9	110.1
Dry Sample Weight (g):	62.5	62.5
Dry Unit Weight (pcf):	48.4	58.2
Void Ratio, e:	2.44	1.86
Solids Height (cm):	0.739	0.739



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569 **ONE-DIMENSIONAL CONSOLIDATION TEST**

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: SCI B-2A, 36'

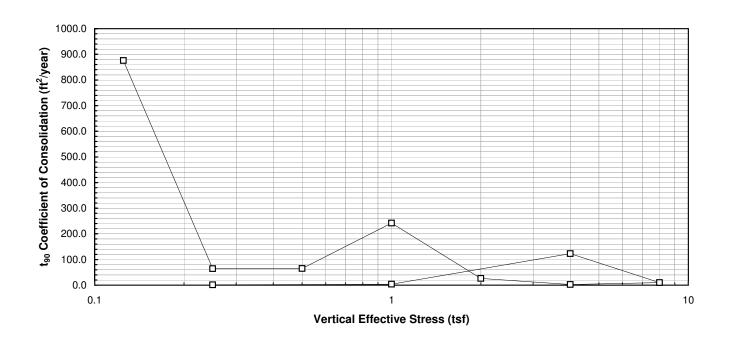
Sample No.: UD2 Exploration No.: B-2A

Depth: 35 to 37 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.125	0.6	0.2	2.42	2.43	0.07	875.8	
2	24-00	0.25	0.8	0.7	2.41	2.41	0.13	64.1	
3	24-00	0.5	1.1	1.0	2.40	2.40	0.26	65.2	
4	24-03	1	1.4	1.3	2.39	2.40	0.53	242.1	
5	24-00	2	3.6	2.7	2.32	2.34	1.05	26.3	
6	24-00	4	20.2	17.4	1.74	1.84	2.11	2.7	
7	24-03	8	25.0	25.0	1.58	1.58	4.21	9.9	
8	24-03	4	25.0	25.1	1.58	1.58	2.11	123.1	
9	24-03	1	21.4	21.9	1.70	1.69	0.53	3.7	
10	24-03	0.25	16.9	17.0	1.86	1.86	0.13	1.0	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

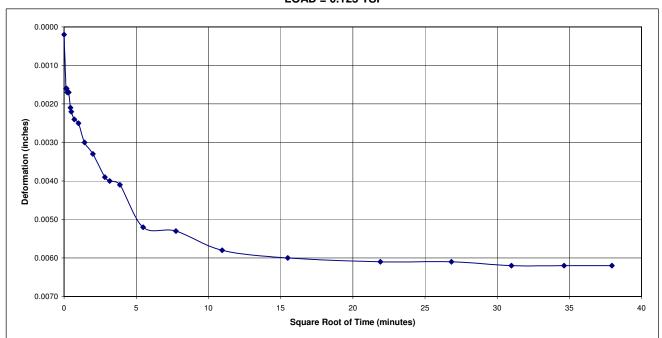
Client: SCDOT

Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 0.125 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



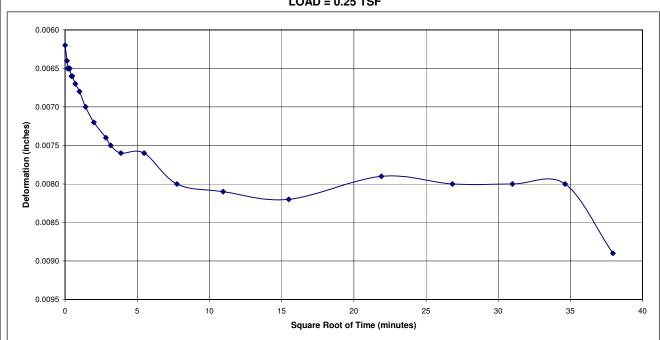
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

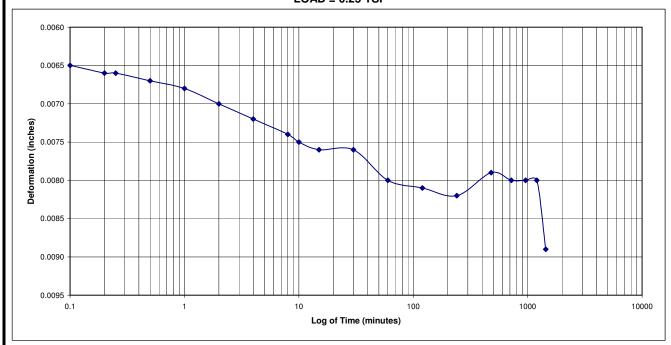
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 0.25 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



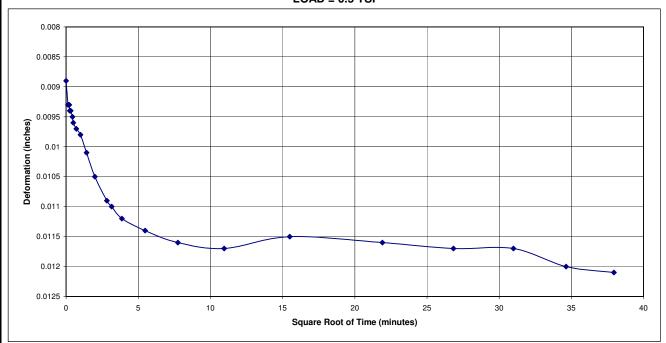
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 0.5 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



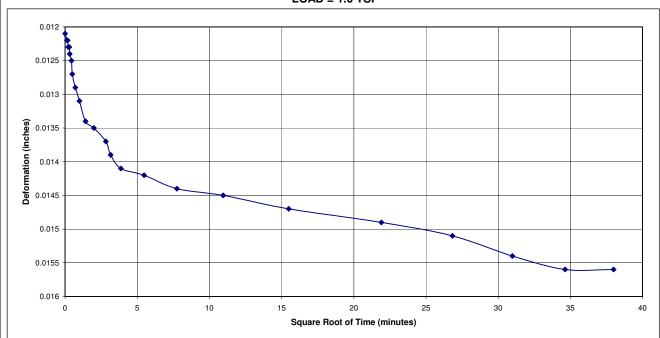
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

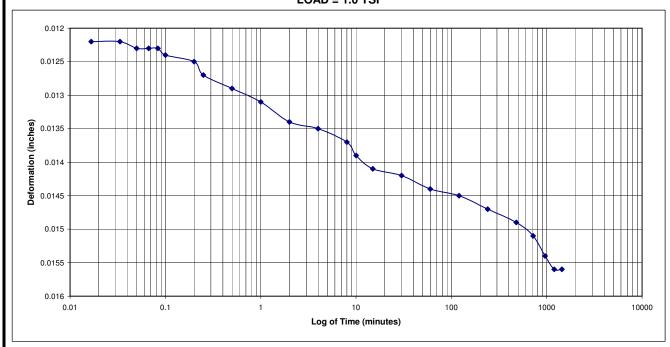
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 1.0 TSF



Sample No.: SCI B-2A, 36'
Exploration No.: B-2A
Depth: 35 - 37 feet



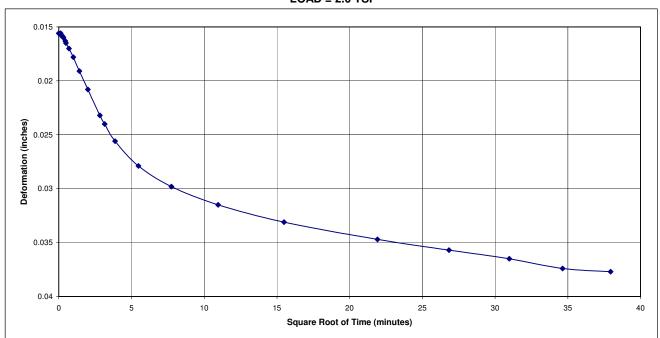
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

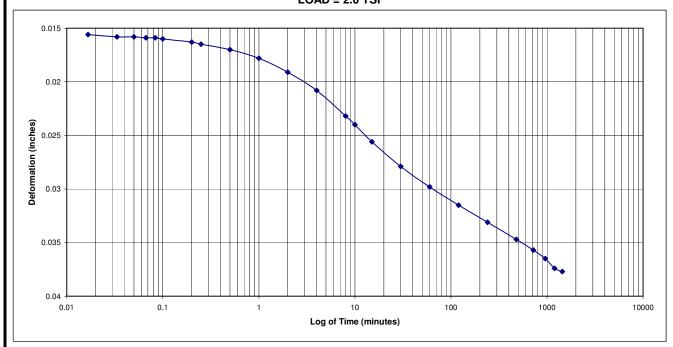
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 2.0 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



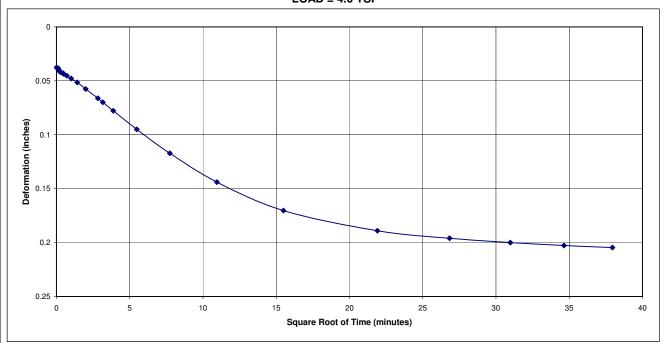
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

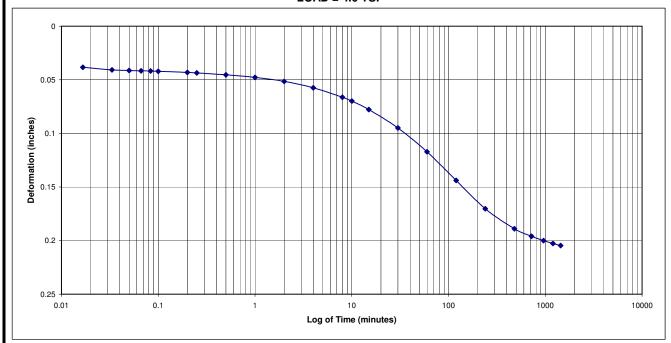
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 4.0 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



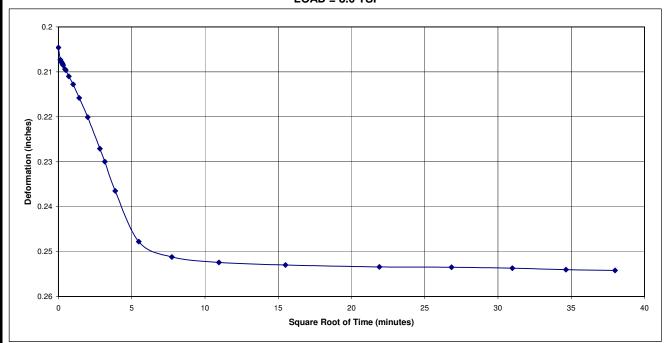
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

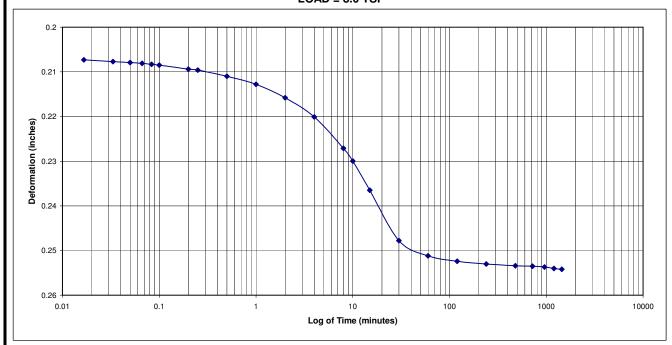
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 8.0 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



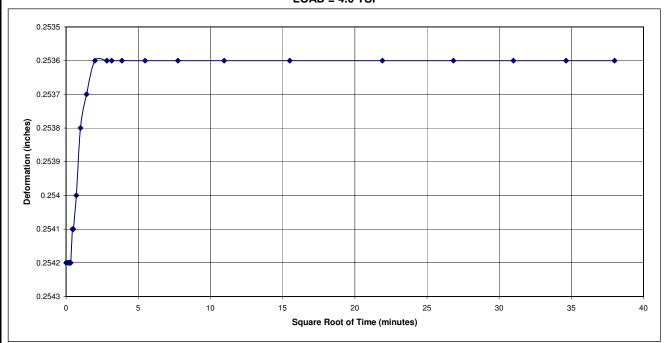
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

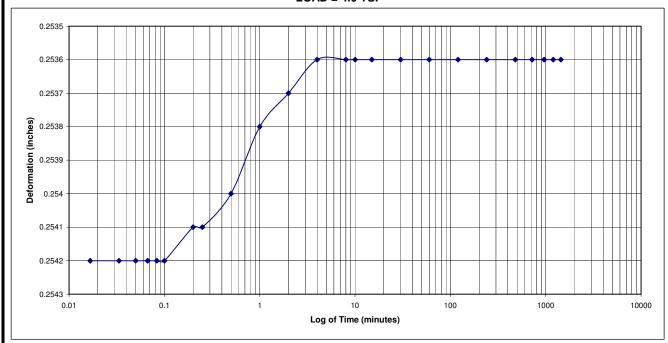
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 4.0 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



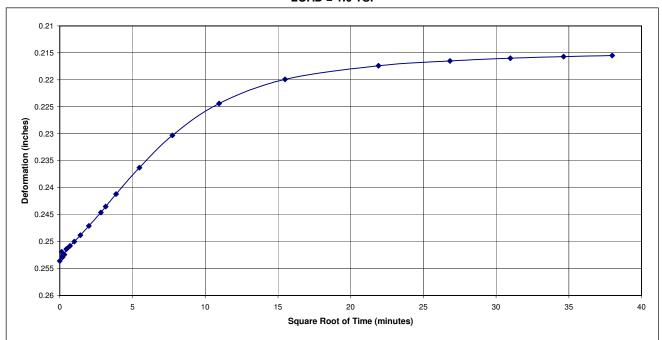
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 1.0 TSF



Sample No.: SCI B-2A, 36' Exploration No.: B-2A Depth: 35 - 37 feet



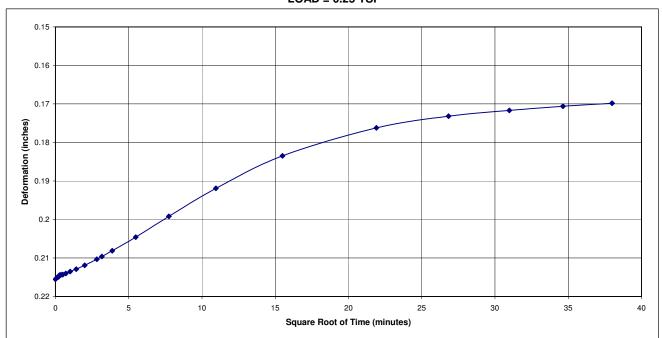
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

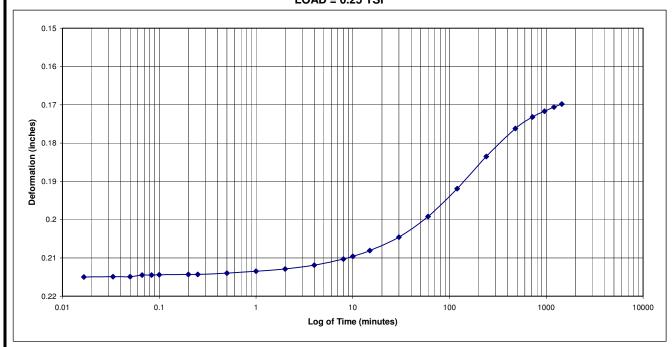
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-2A, 35 to 37 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-2A, 35 to 37 feet LOAD = 0.25 TSF



Sample No.: SCI B-2A, 36'
Exploration No.: B-2A
Depth: 35 - 37 feet

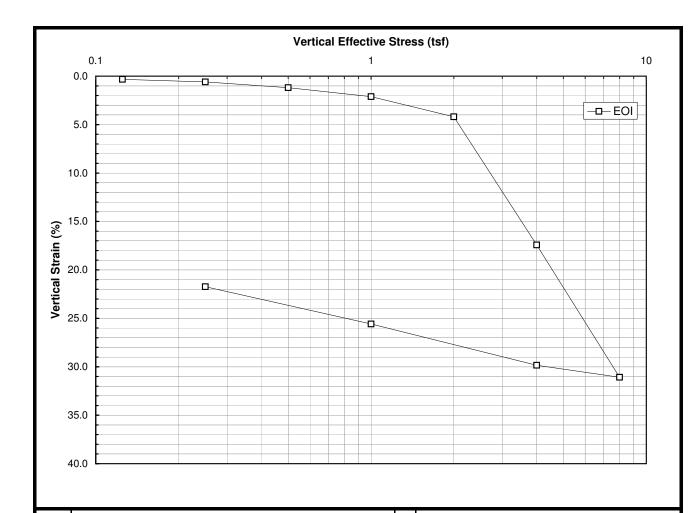


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



Probable Preconsolidation Stress, P'c (tsf):	1.9
Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.6 1.5
Compression Ratio (CR):	0.30
Recompression Ratio (RR):	0.067
Over Consolidation Ratio (OCR):	3.3
	Probable Preconsolidation Stress, P' _c (tsf): Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%): Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.125 tsf
ASTM D-2435 12.3.2

Test No.: SCI B-3A, 27'
Sample No.: UD1
Exploration No.: B-3A
Depth: 26 to 28 feet
USCS Description: Sandy fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm²):	31.67
Measured Specific Gravity:	2.67
Trimmings Moisture (%):	85.7
% Passing #200 Sieve:	61.7

Liquid Limit: 73
Plastic Limit: 20
Plasticity Index: 53

	Initial	Final
Water Content (%):	89.9	63.8
Est. % Saturation:	99.5	100.0
Sample Height (cm):	2.540	1.988
Wet Sample Weight (g):	119.6	103.1
Dry Sample Weight (g):	62.9	62.9
Dry Unit Weight (pcf):	48.8	62.4
Void Ratio, e:	2.41	1.67
Solids Height (cm):	0.744	0.744



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: SCI B-3A, 27'

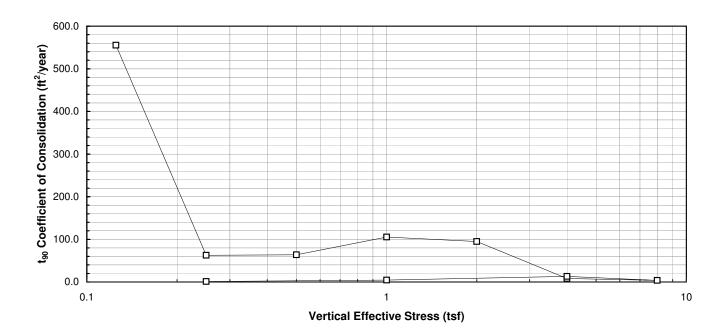
Sample No.: UD1 Exploration No.: B-3A

Depth: 26 to 28 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	23-52	0.125	0.3	0.0	2.40	2.41	0.07	555.5	
2	21-51	0.25	0.6	0.5	2.39	2.39	0.13	62.5	
3	23-25	0.5	1.2	1.0	2.37	2.38	0.26	63.7	
4	24-01	1	2.1	1.9	2.34	2.35	0.53	105.4	
5	21-31	2	4.2	3.4	2.27	2.30	1.05	95.0	
6	20-01	4	17.4	13.3	1.82	1.96	2.11	8.2	
7	24-01	8	31.1	29.2	1.35	1.42	4.21	3.8	
8	24-01	4	29.8	30.1	1.39	1.39	2.11	13.0	
9	24-01	1	25.6	26.5	1.54	1.51	0.53	4.5	
10	24-01	0.25	21.7	21.9	1.67	1.66	0.13	0.9	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

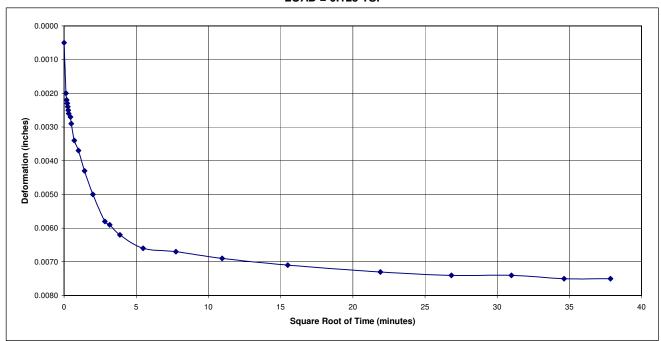
Client: SCDOT

Location: North Charleston, South Carolina

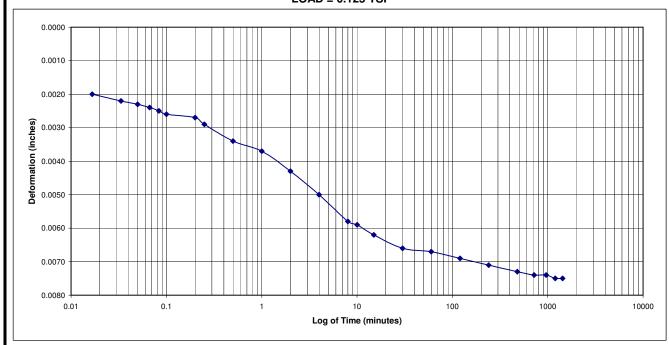
Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 0.125 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



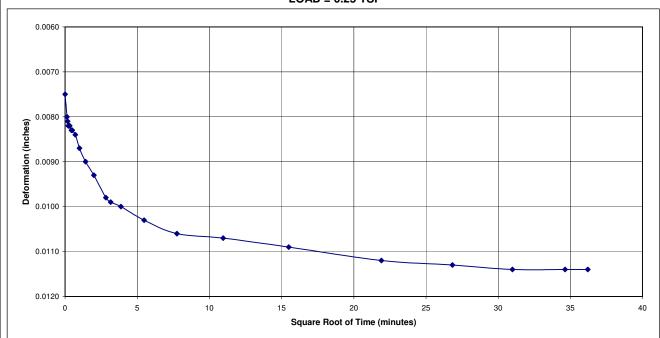
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 0.25 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



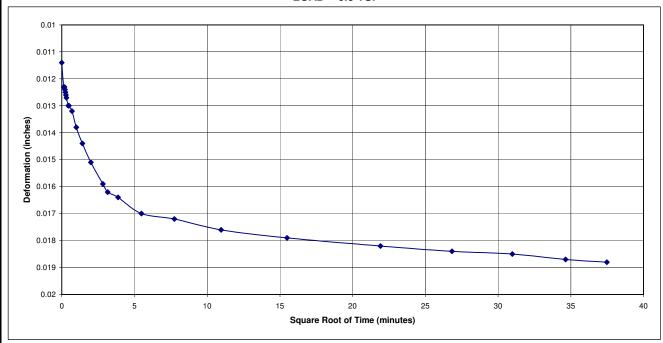
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

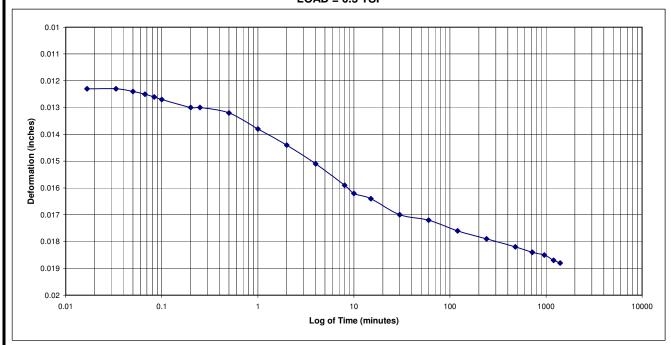
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 0.5 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



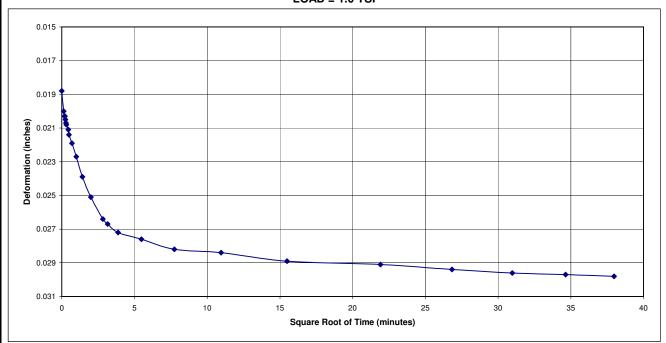
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

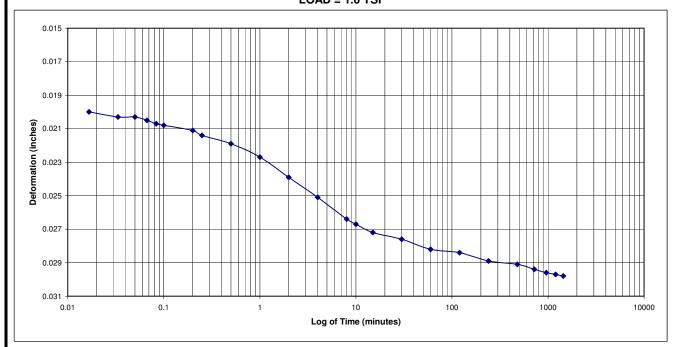
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 1.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



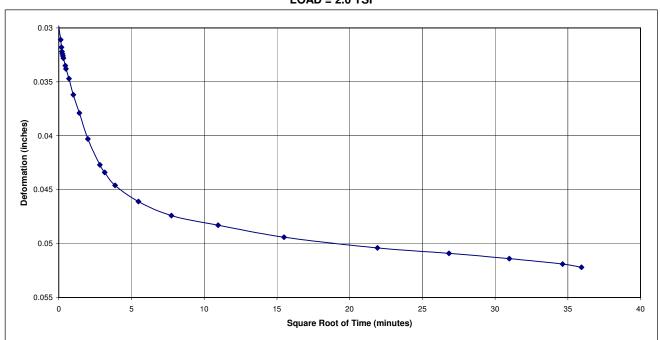
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

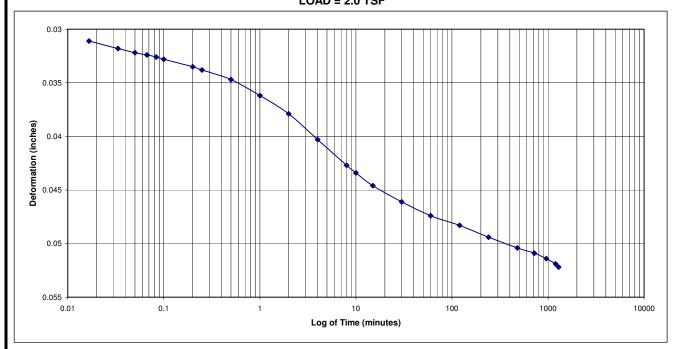
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 2.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



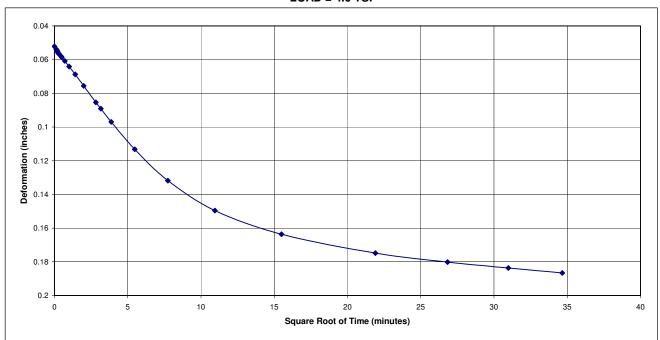
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

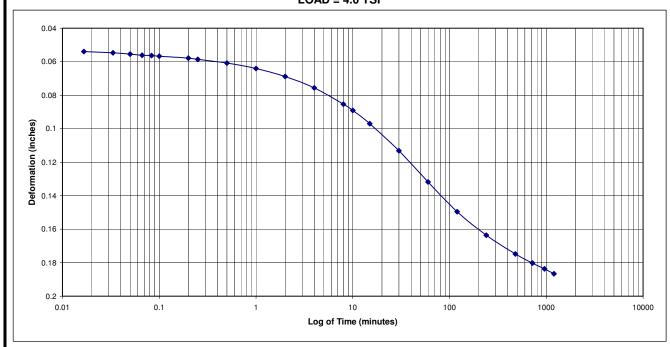
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 4.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



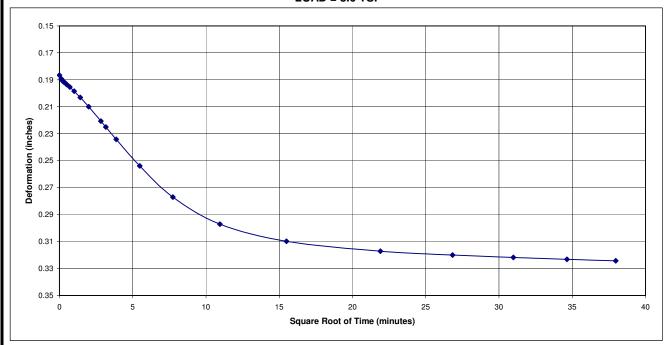
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

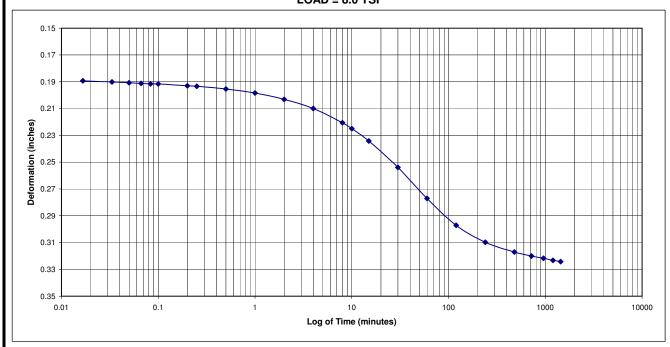
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 8.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



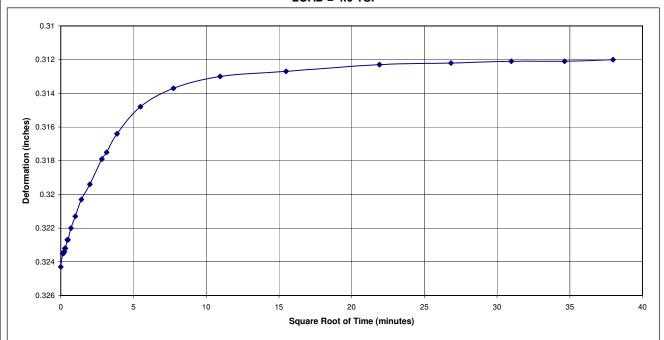
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 4.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



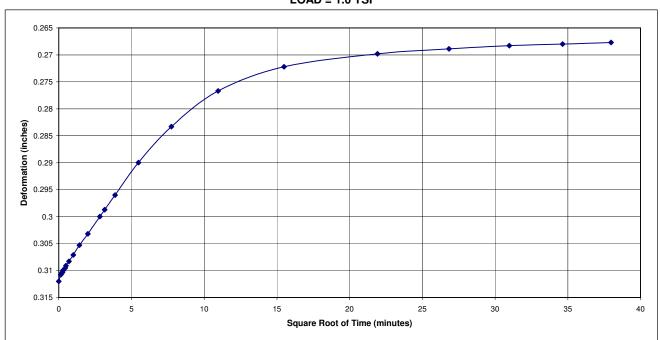
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

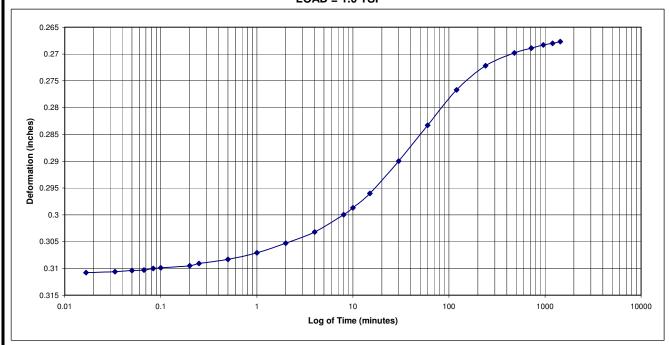
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 1.0 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet



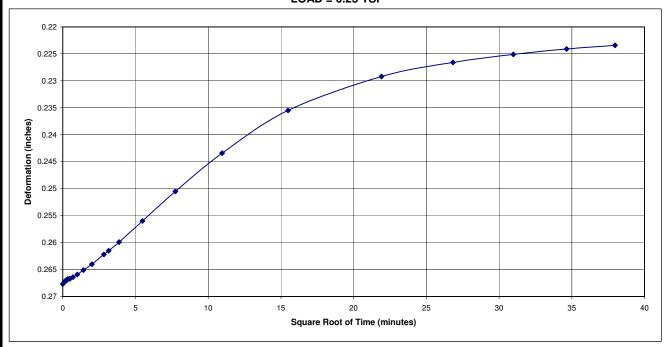
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 26 to 28 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-3A, 26 to 28 feet LOAD = 0.25 TSF



Sample No.: SCI B-3A, 27'
Exploration No.: B-3A
Depth: 26 - 28 feet

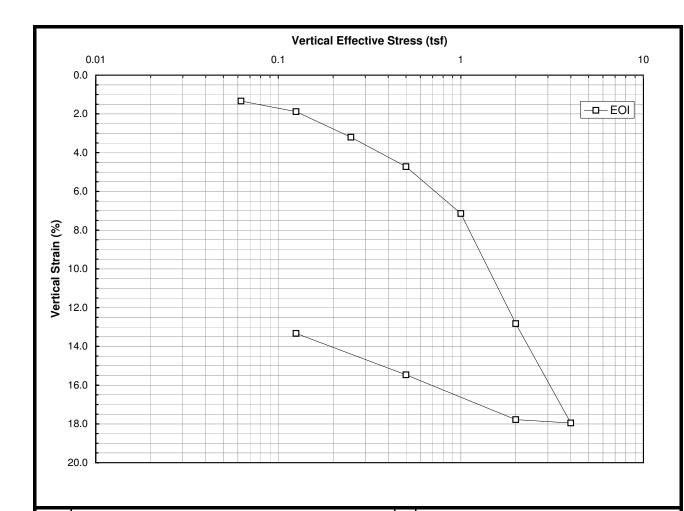


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NO		Probable Preconsolidation Stress, P'c (tsf):	0.9
DATI	ETER	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.8 6.3
SOLI	_	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.17
Ñ.	٦A١	Recompression Ratio (RR):	0.037
ၓ	_	Over Consolidation Ratio (OCR):	1.1

IEST METHOD Test Method: ASTM D-2435 A Trimming Procedure: 2.5-inch Trimming Lathe Pressure at Inundation: 0.0625 tsf Method to Compute C_v: ASTM D-2435 12.3.2

Test No.: SCI B-3A, 39' SAMPLE ID Sample No.: UD2 Exploration No.: B-3A Depth: 38 to 40 feet USCS Description: Sandy fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm ²):	31.67
Measured Specific Gravity:	2.66
Trimmings Moisture (%):	82.4
% Passing #200 Sieve:	69.4

Liquid Limit: 82 Plastic Limit: 23 Plasticity Index: 59

_	Liquid Littiit.	02	
Ĭ	Plastic Limit:	23	
2	Plasticity Index:	59	
빌			
SAMPLE DATA		Initial	Final
S	Water Content (%):	84.4	72.3
	Est. % Saturation:	100.0	100.0
	Sample Height (cm):	2.540	2.201
	Wet Sample Weight (g):	123.7	115.6
	Dry Sample Weight (g):	67.1	67.1
	Dry Unit Weight (pcf):	52.0	60.0
	Void Ratio, e:	2.19	1.76
	Solids Height (cm):	0.796	0.796



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina 1131-08-554 Page 1 of 2 Project No.:

Test No.: SCI B-3A, 39'

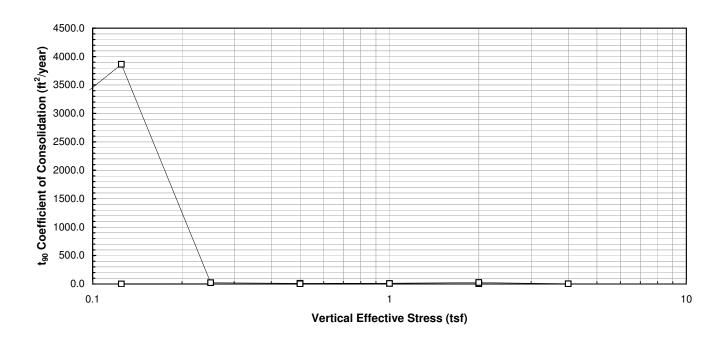
Sample No.: UD2 Exploration No.: B-3A

Depth: 38 to 40 feet

								TAYLOR	·
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	23-48	0.0625	1.3	1.2	2.15	2.15	0.07	2590.9	
2	21-56	0.125	1.9	1.7	2.13	2.14	0.15	3864.5	
3	23-27	0.25	3.2	2.9	2.09	2.10	0.29	23.5	
4	24-01	0.5	4.7	4.5	2.04	2.05	0.59	10.6	
5	21-20	1	7.1	6.8	1.96	1.97	1.18	7.3	
6	20-01	2	12.8	11.9	1.78	1.81	2.35	2.9	
7	24-01	4	18.0	17.3	1.62	1.64	4.71	2.9	
8	24-01	2	17.8	18.0	1.62	1.62	2.35	26.4	
9	24-01	0.5	15.5	15.7	1.70	1.69	0.59	2.4	
10	24-01	0.125	13.3	13.6	1.76	1.75	0.15	0.5	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

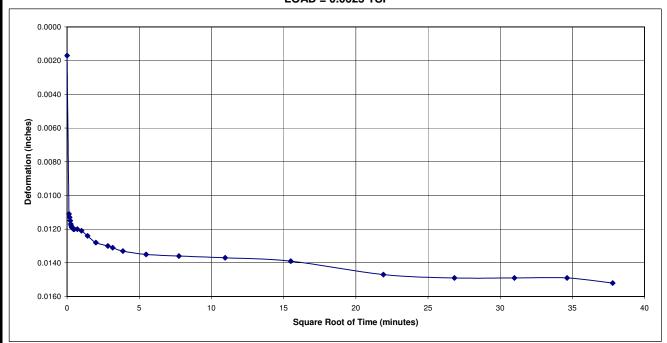
Client: SCDOT

Location: North Charleston, South Carolina

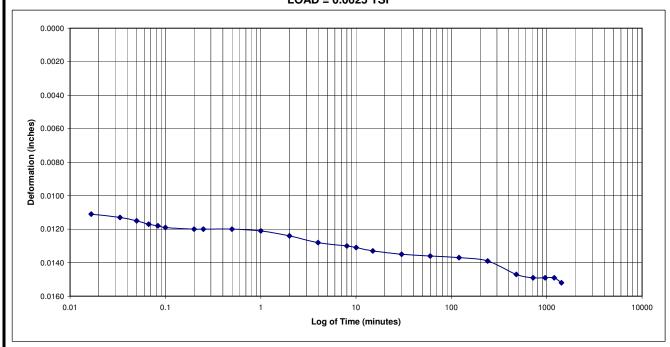
Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.0625 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



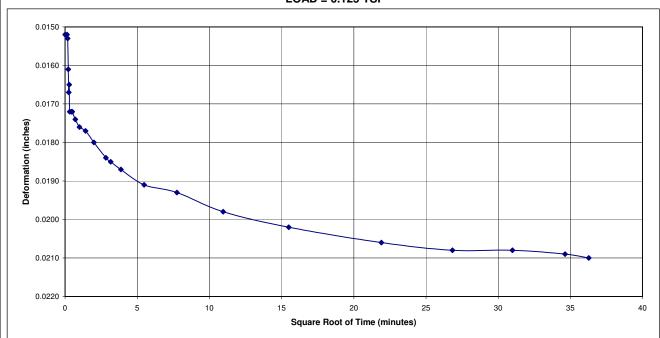
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.125 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



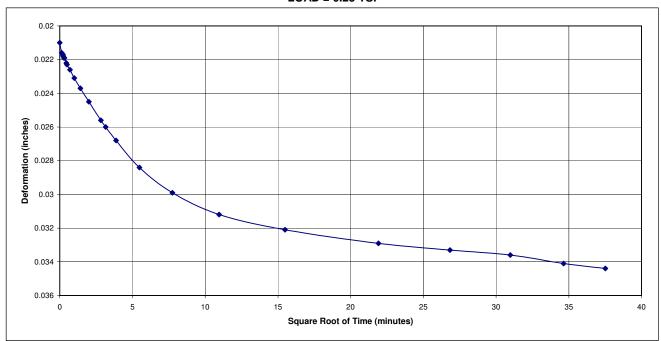
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

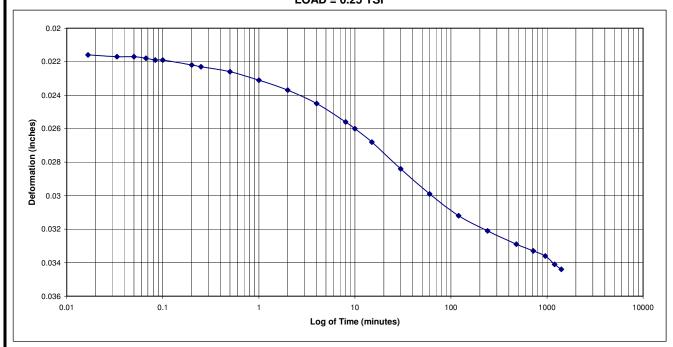
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.25 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



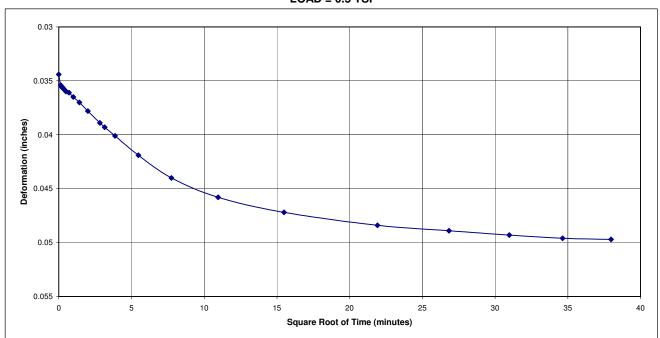
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

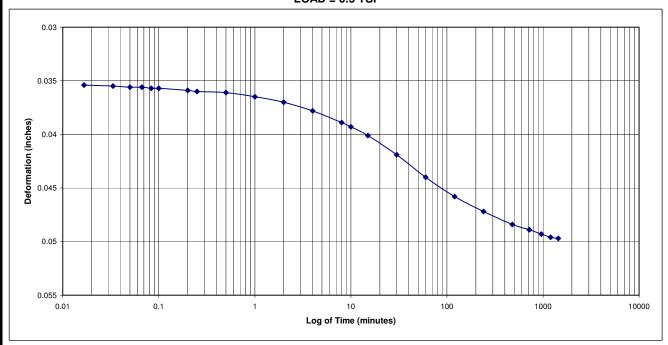
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.5 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



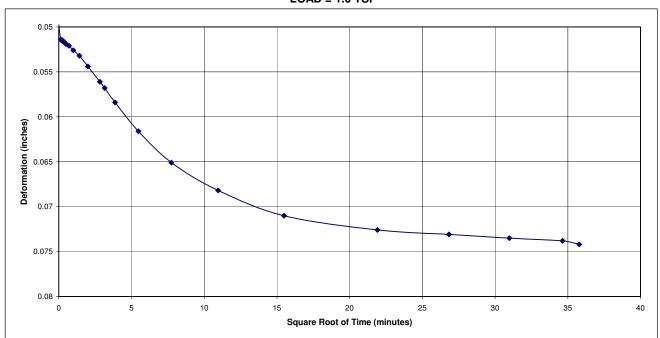
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

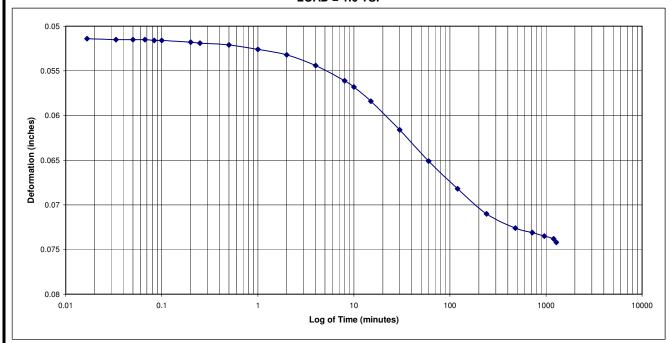
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 1.0 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



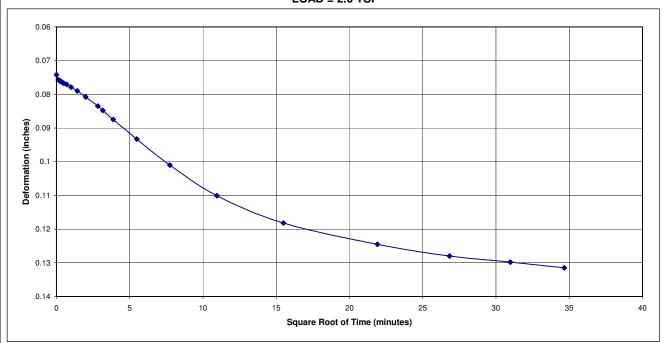
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

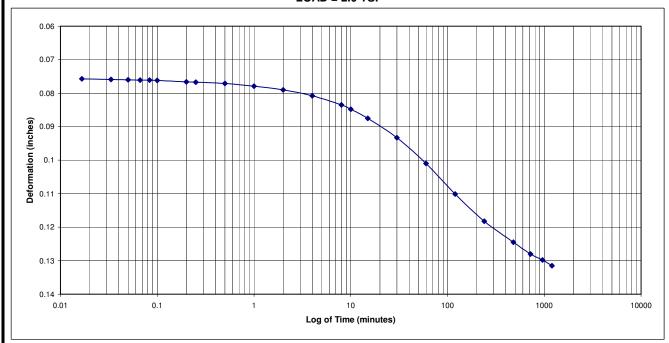
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 2.0 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



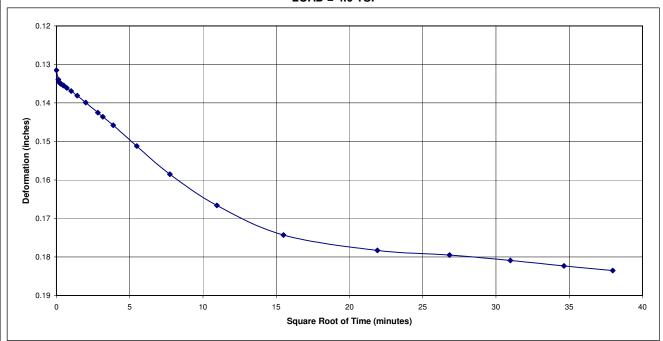
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

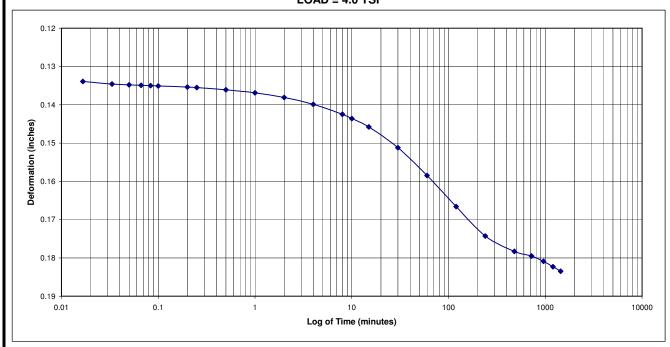
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 4.0 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



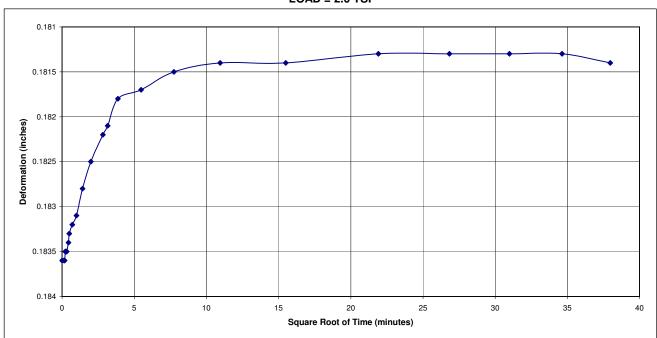
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 2.0 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



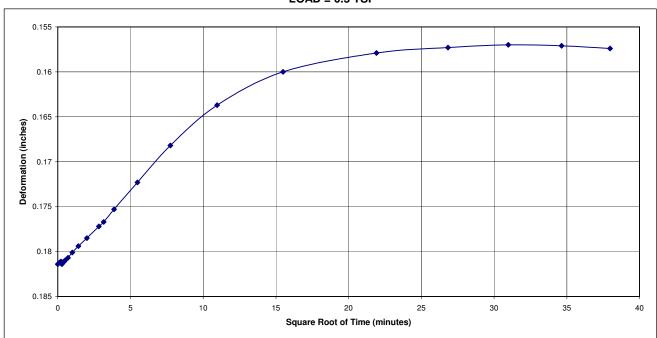
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

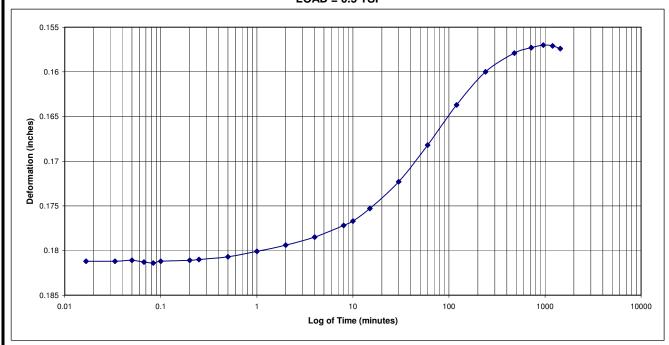
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.5 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet



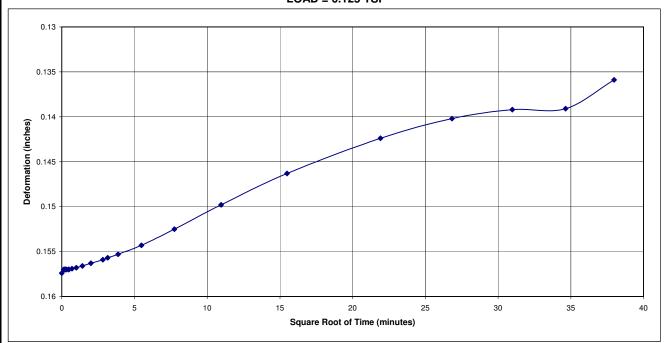
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

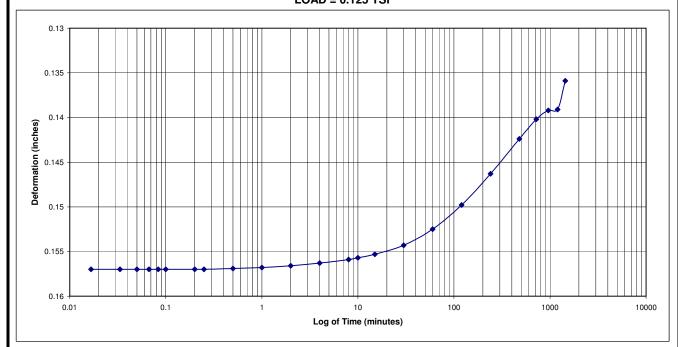
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-3A, 38 to 40 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-3A, 38 to 40 feet LOAD = 0.125 TSF



Sample No.: SCI B-3A, 39'
Exploration No.: B-3A
Depth: 38 - 40 feet

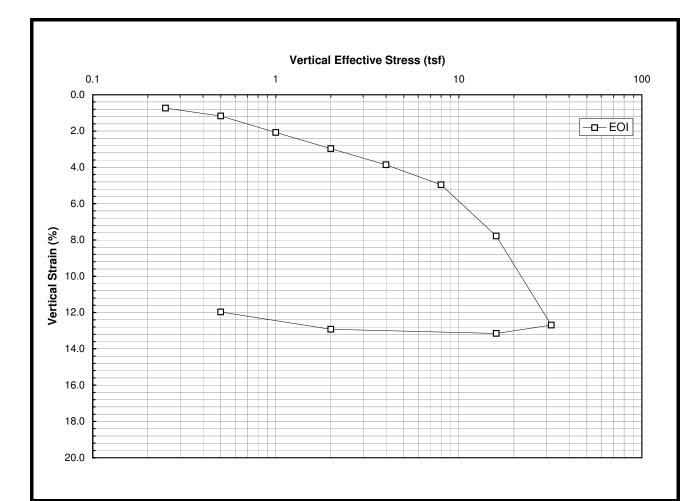


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NC S	Probable Preconsolidation Stress, P'c (tsf):	11.5
IDATION ETERS	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	1.1 2.2
A P	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.16 0.008 10.0

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.25 tsf
ASTM D-2435 12.3.2

Test No.: SCI B-23 Alt1, 51'
Sample No.: UD1
Exploration No.: B-23 Alt1
Depth: 50 to 52 feet

USCS Description: Silty SAND (SM)

Sample Diameter (cm): 6.35
Sample Area (cm²): 31.67
Measured Specific Gravity: 2.62
Trimmings Moisture (%): 35.8
% Passing #200 Sieve: 44.1

Liquid Limit: 40
Plastic Limit: 29
Plasticity Index: 11

	Initial	Final
Water Content (%):	34.7	28.1
Est. % Saturation:	99.3	100.0
Sample Height (cm):	2.540	2.236
Wet Sample Weight (g):	148.3	141.1
Dry Sample Weight (g):	110.1	110.1
Dry Unit Weight (pcf):	85.4	97.0
Void Ratio, e:	0.91	0.69
Solids Height (cm):	1.327	1.327



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: SCI B-23 Alt1, 51'

Sample No.: UD1

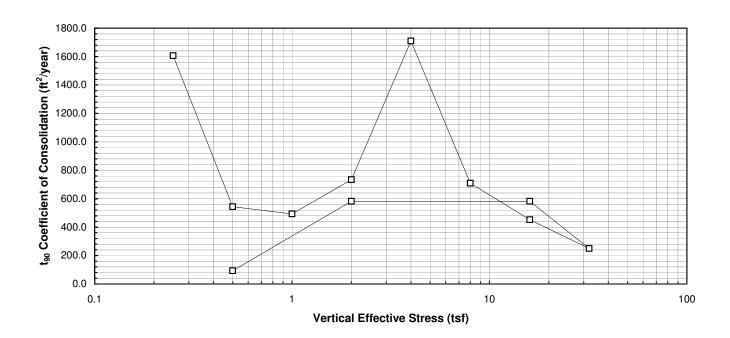
Exploration No.: B-23 Alt1

Depth: 50 to 52 feet

•								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	23-44	0.25	0.7	0.7	0.90	0.90	0.02	1606.5	
2	21-57	0.5	1.2	1.1	0.89	0.89	0.04	544.2	
3	23-27	1	2.1	1.8	0.87	0.88	0.09	493.3	
4	24-01	2	3.0	2.6	0.86	0.86	0.17	734.4	
5	21-07	4	3.9	3.4	0.84	0.85	0.35	1710.5	
6	20-01	8	5.0	4.3	0.82	0.83	0.70	708.8	
7	24-01	16	7.8	6.1	0.77	0.80	1.39	452.0	
8	24-01	32	12.7	10.5	0.67	0.71	2.78	249.9	
9	20-01	16	13.2	13.2	0.66	0.66	1.39	582.2	
10	22-31	2	12.9	13.2	0.67	0.66	0.17	581.8	
11	24-01	0.5	12.0	12.5	0.69	0.67	0.04	93.1	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

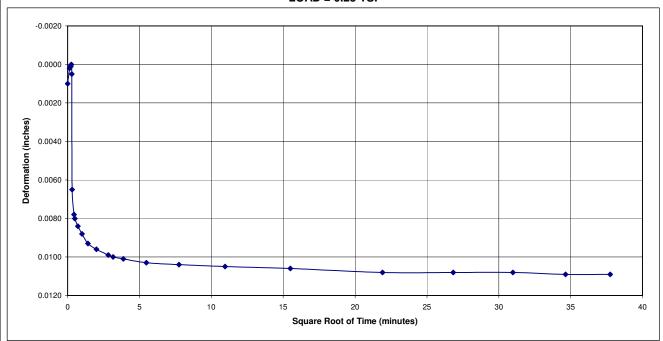
Client: SCDOT

Location: North Charleston, South Carolina

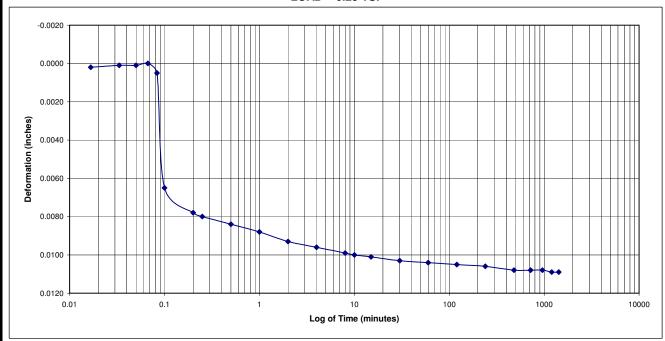
Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.25 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



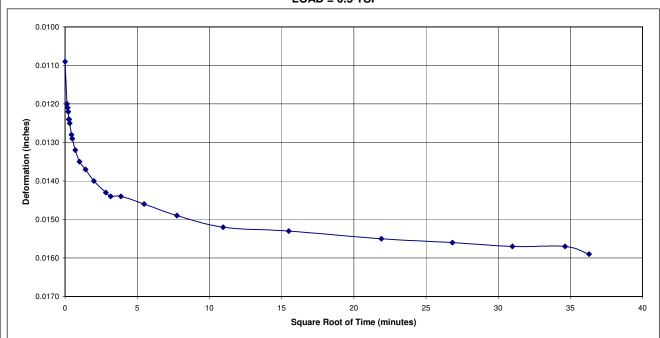
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

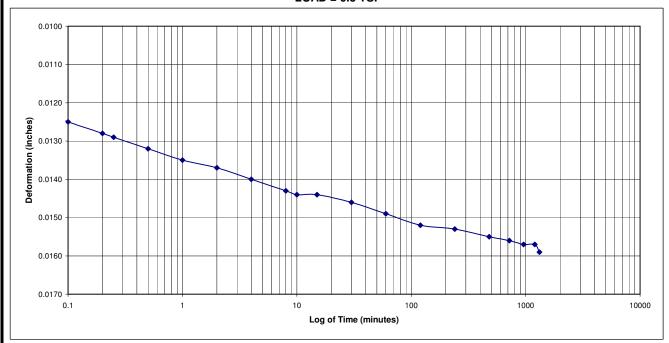
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.5 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



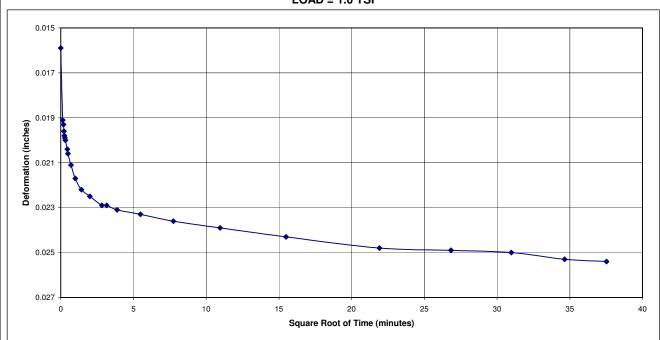
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

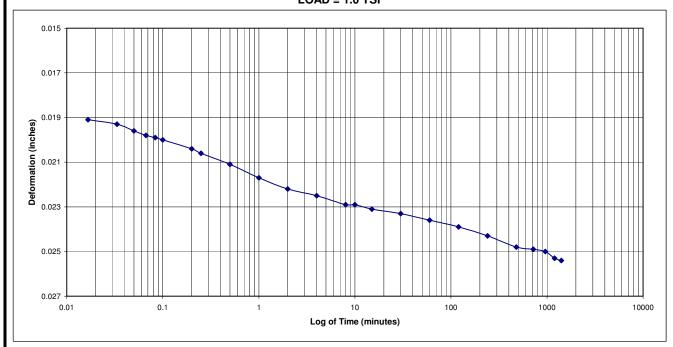
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 1.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



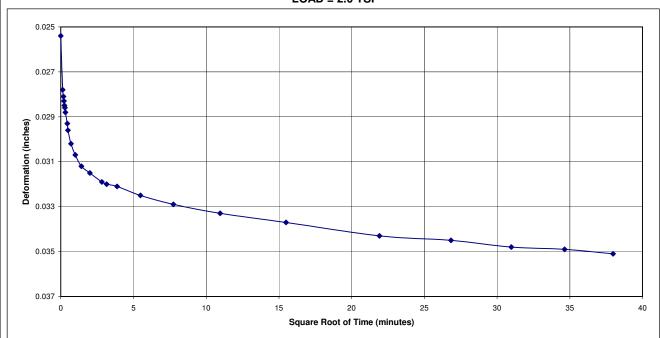
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

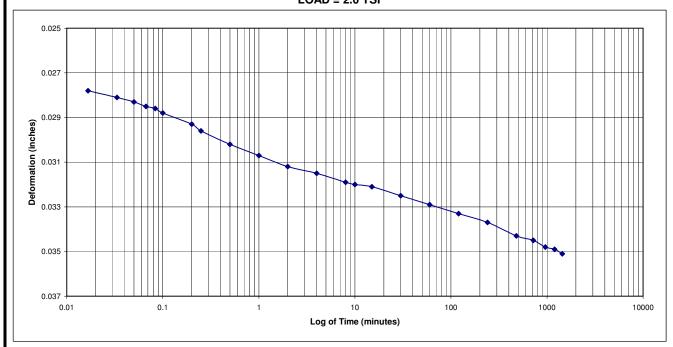
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 2.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



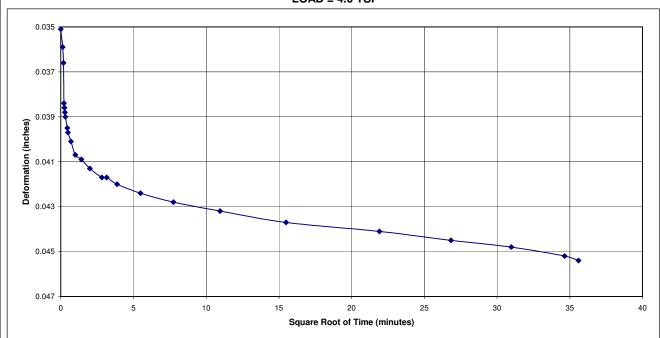
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

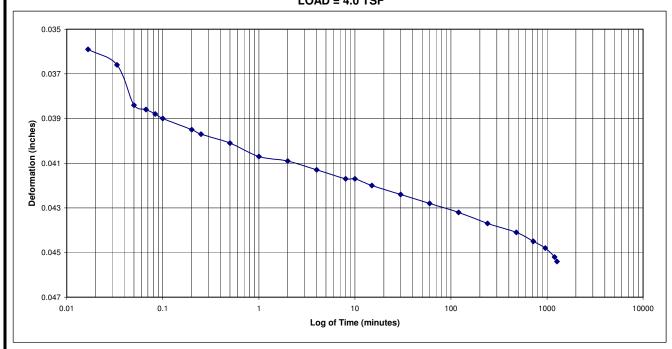
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 4.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



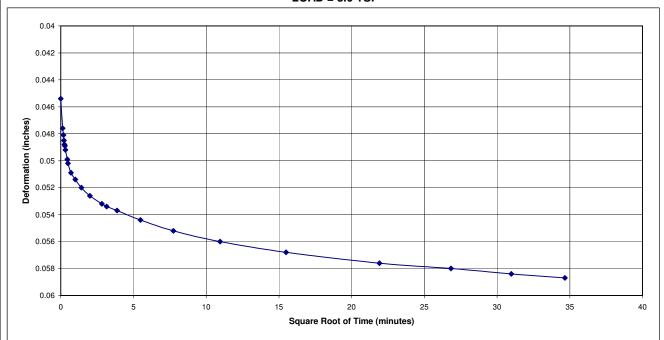
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

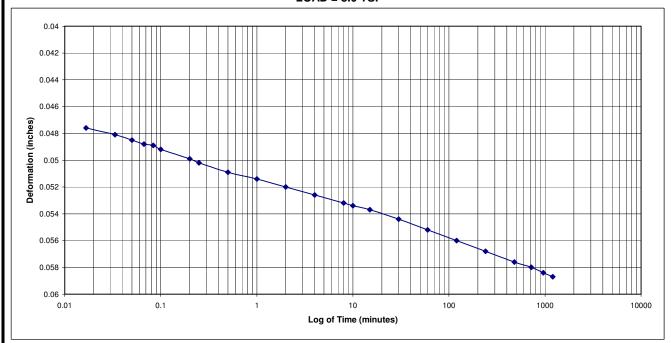
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 8.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



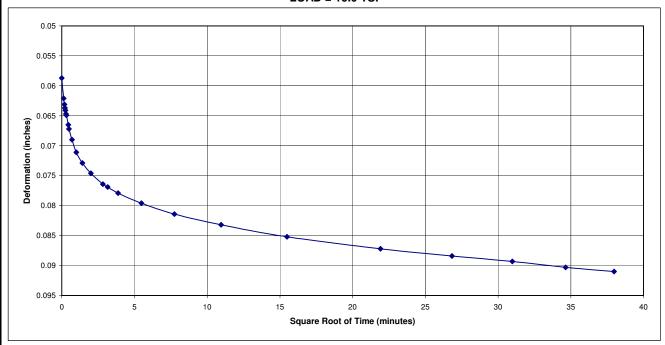
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

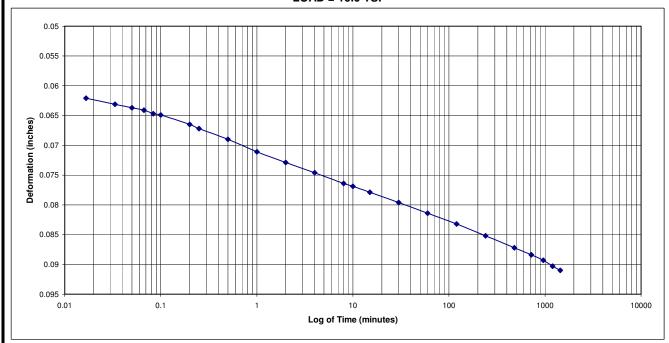
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 16.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 16.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



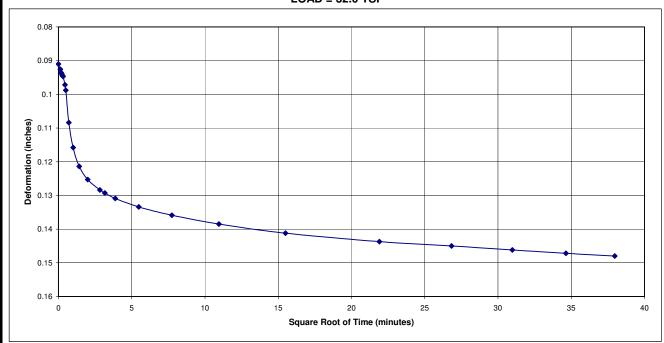
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

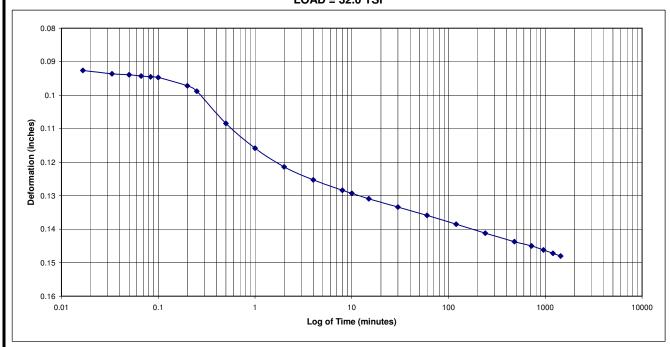
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 32.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 32.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



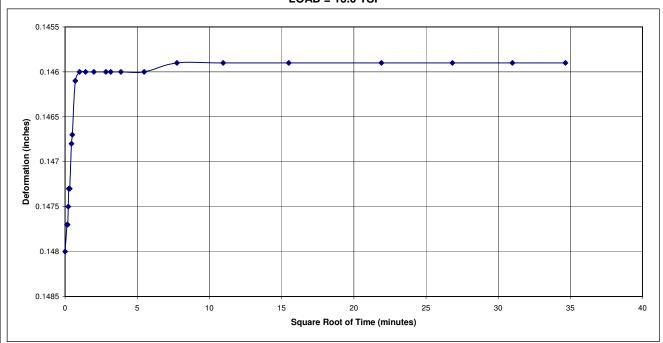
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

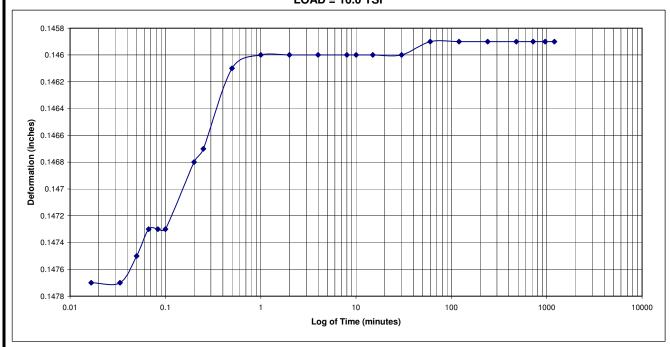
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 16.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 16.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



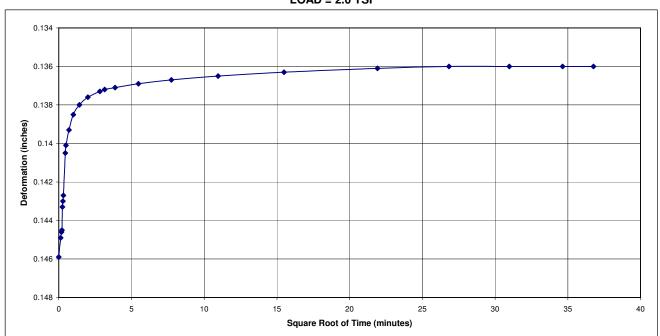
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

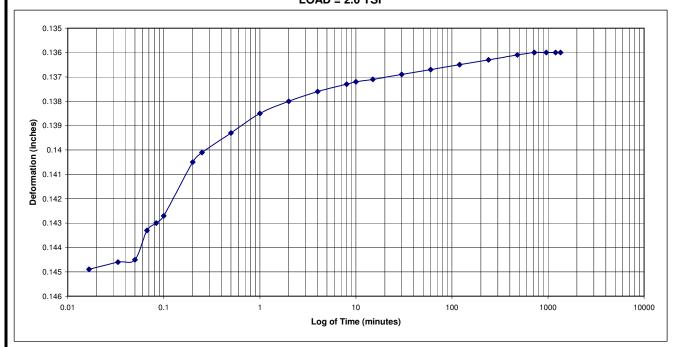
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 2.0 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet



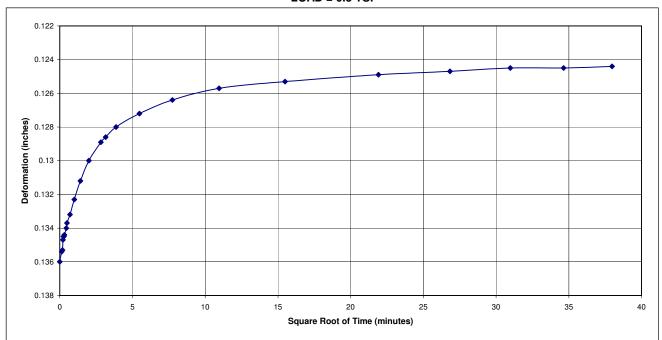
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-23 Alt1, 50 to 52 feet LOAD = 0.5 TSF



Sample No.: SCI B-23 Alt1, 51'
Exploration No.: B-23 Alt1
Depth: 50 - 52 feet

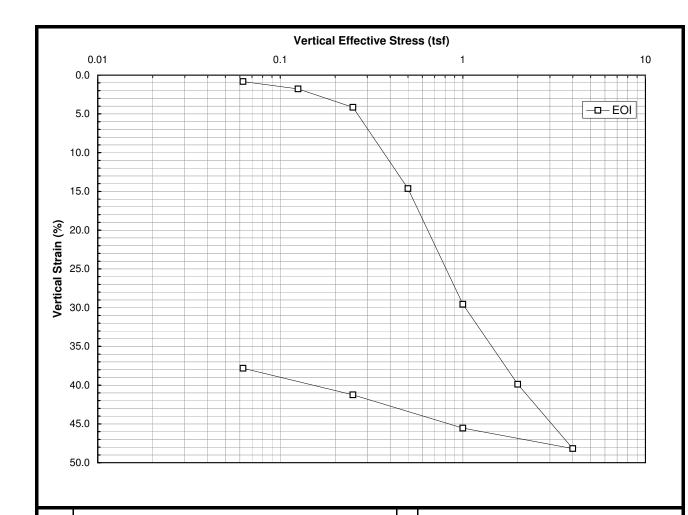


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NC S	Probable Preconsolidation Stress, P'c (tsf):	0.3
IDATI(ETER	Approx. Hydrostatic Effective Stress, P'o (tsf) Vertical Strain at P'o (%):	0.4 11.5
CONSOLI PARAMI	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.25 0.064 0.6

IEST METHOD Test Method: ASTM D-2435 A Trimming Procedure: 2.5-inch Trimming Lathe Pressure at Inundation: 0.0625 tsf Method to Compute C_v: ASTM D-2435 12.3.2

Test No.: GTX 33A, 21' SAMPLE ID Sample No.: UD1 Exploration No.: B-33A Depth: 20 to 22 feet USCS Description: Elastic SILT (MH)

Sample Diameter (cm):	6.35
Sample Area (cm ²): Measured Specific Gravity:	31.67
Measured Specific Gravity:	2.62
Trimmings Moisture (%):	152.5
% Passing #200 Sieve:	97.9

Liquid Limit: 152 Plastic Limit: 66 Plasticity Index: 86

_	Liquid Littiit.	132	
Ĭ	Plastic Limit:	66	
۵	Plasticity Index:	86	
빌			
SAMPLE DATA		Initial	Final
S	Water Content (%):	161.3	88.0
	Est. % Saturation:	100.0	100.0
	Sample Height (cm):	2.540	1.580
	Wet Sample Weight (g):	107.3	77.2
	Dry Sample Weight (g):	41.1	41.1
	Dry Unit Weight (pcf):	31.8	51.2
	Void Ratio, e:	4.13	2.19
	Solids Height (cm):	0.495	0.495



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

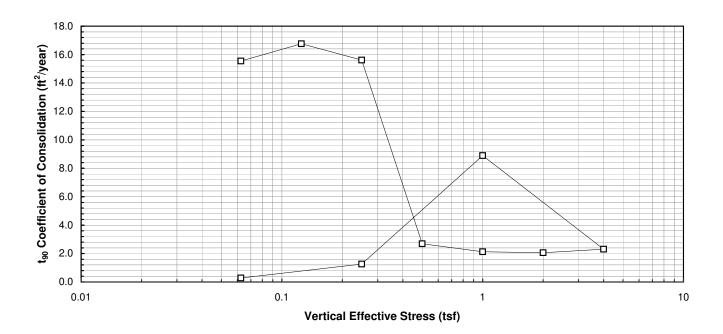
Location: North Charleston, South Carolina 1131-08-554 Page 1 of 2 Project No.:

Test No.: GTX 33A, 21'

Sample No.: UD1
Exploration No.: B-33A
Depth: 20 to 22 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.0625	0.8	0.8	4.09	4.09	0.23	15.5	
2	24-00	0.125	1.8	1.4	4.04	4.06	0.46	16.8	
3	24-00	0.25	4.2	3.6	3.92	3.95	0.93	15.6	
4	24-00	0.5	14.6	11.7	3.38	3.53	1.85	2.7	
5	24-00	1	29.6	27.3	2.62	2.73	3.70	2.1	
6	24-00	2	39.9	38.4	2.09	2.16	7.41	2.1	
7	24-00	4	48.2	46.6	1.66	1.74	14.81	2.3	
8	24-00	1	45.5	46.2	1.80	1.76	3.70	8.9	
9	24-00	0.25	41.2	42.0	2.02	1.98	0.93	1.3	
10	24-00	0.0625	37.8	37.6	2.19	2.20	0.23	0.3	

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

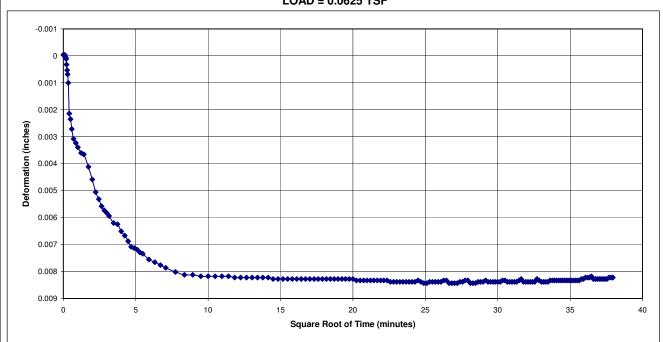
Location: North Charleston, South Carolina

Project No. 1131-08-554

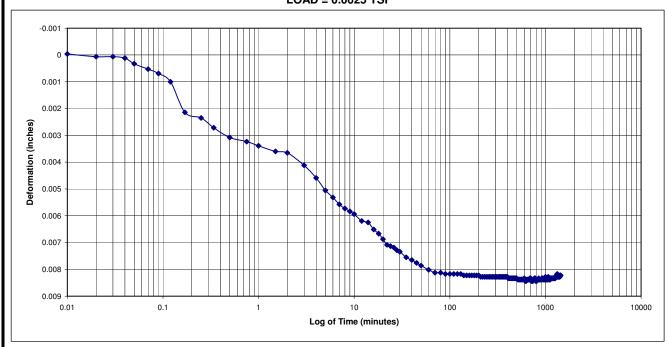
Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.0625 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



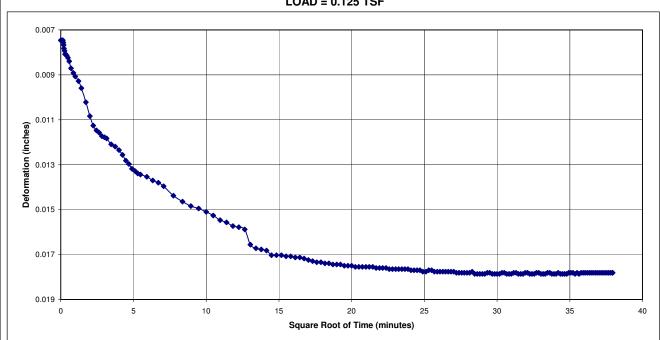
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

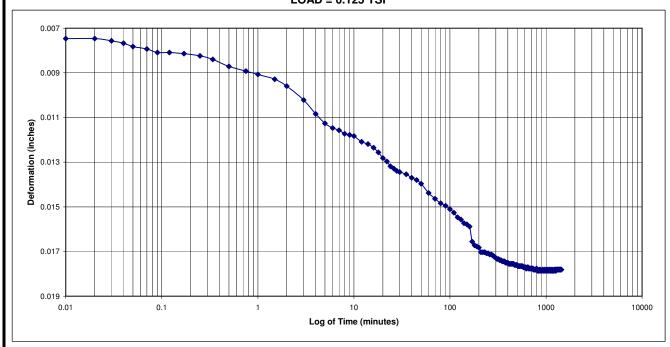
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.125 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



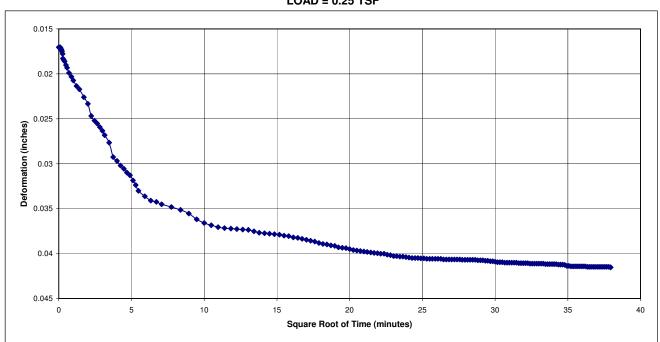
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

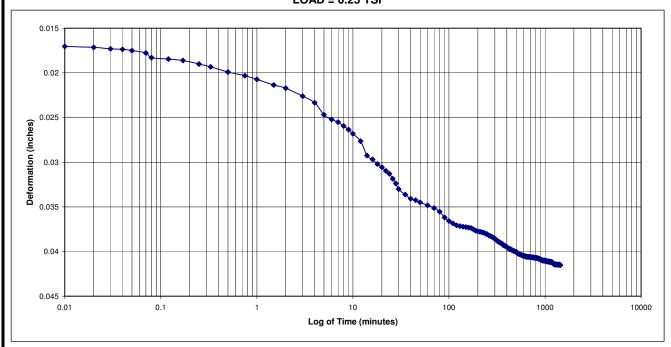
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.25 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



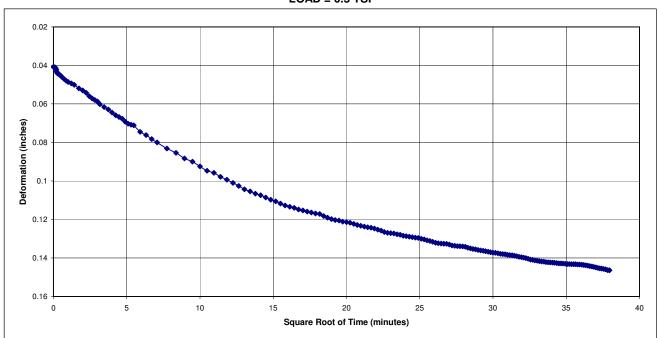
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

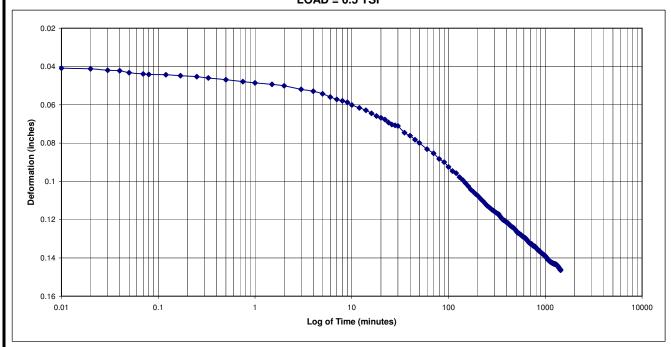
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.5 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



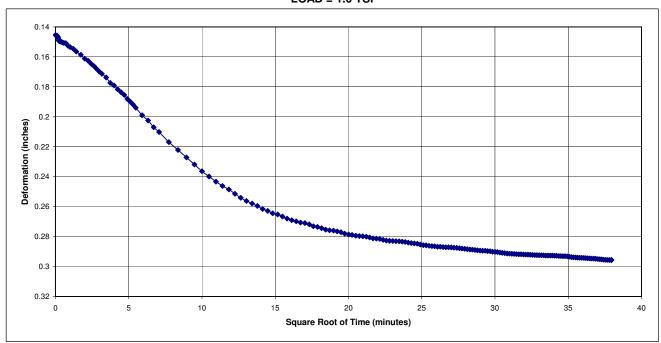
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

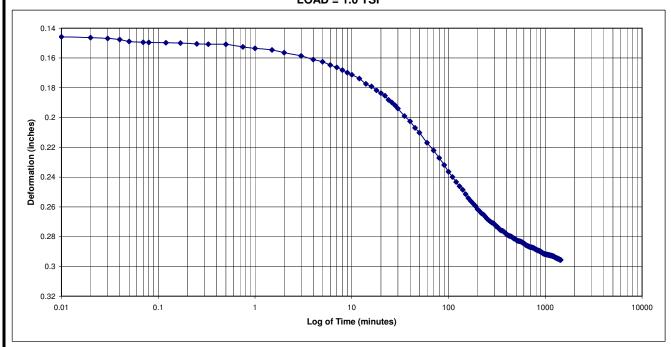
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 1.0 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



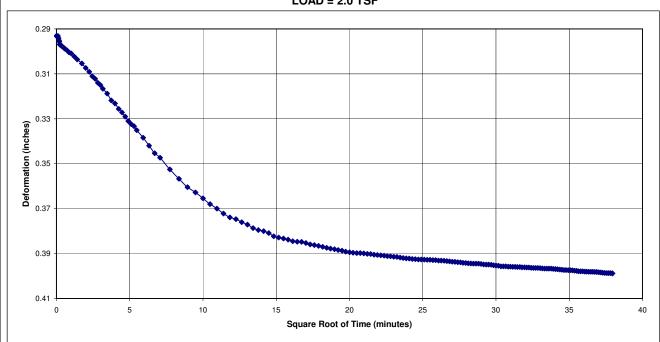
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

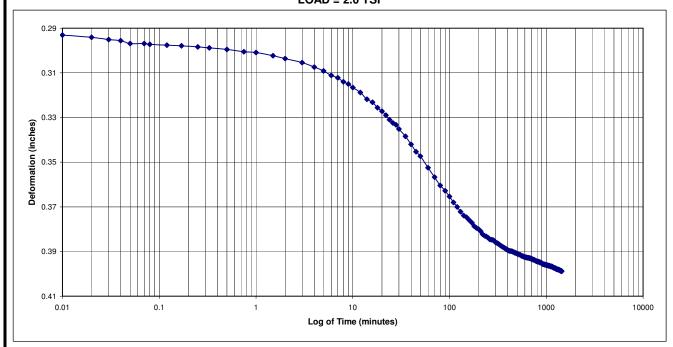
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 2.0 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



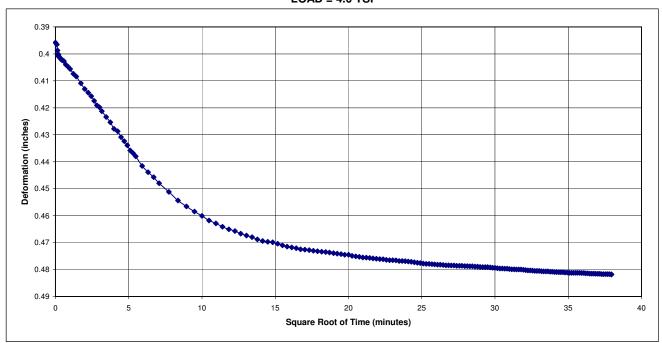
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

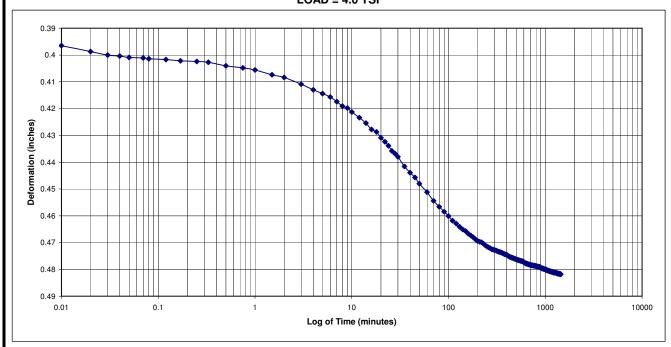
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 4.0 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



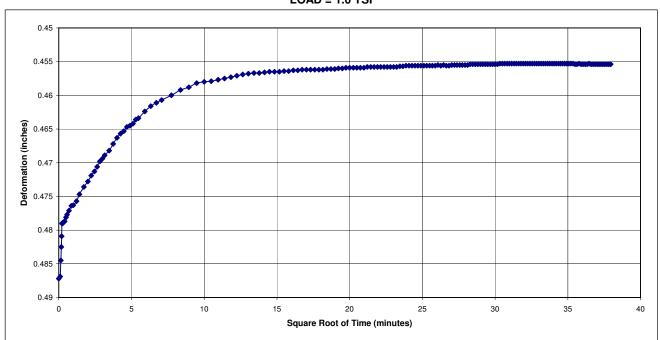
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

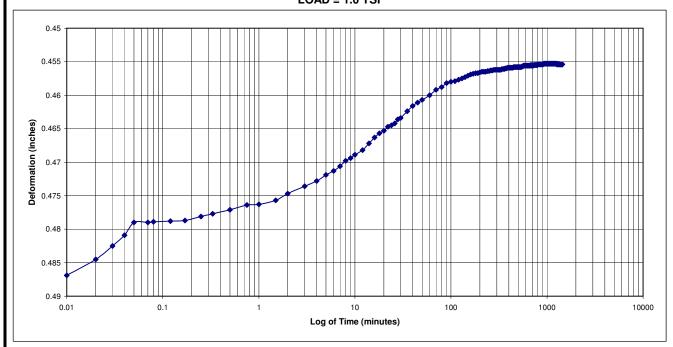
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 1.0 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



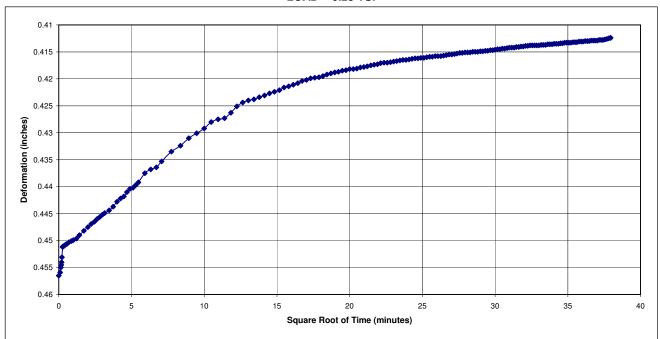
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

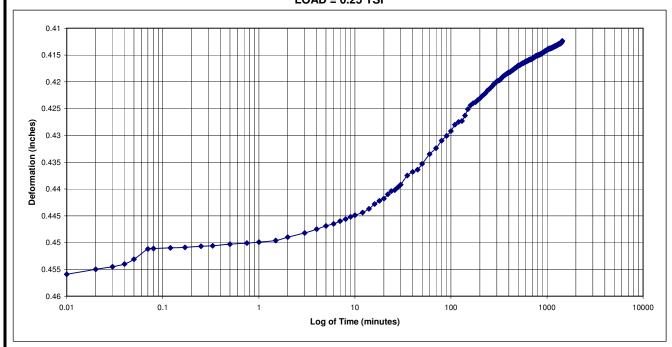
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.25 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



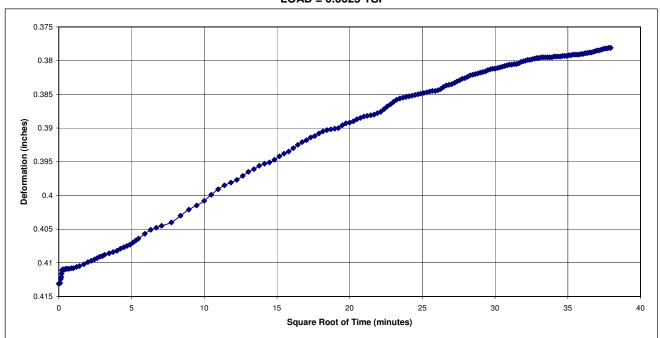
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

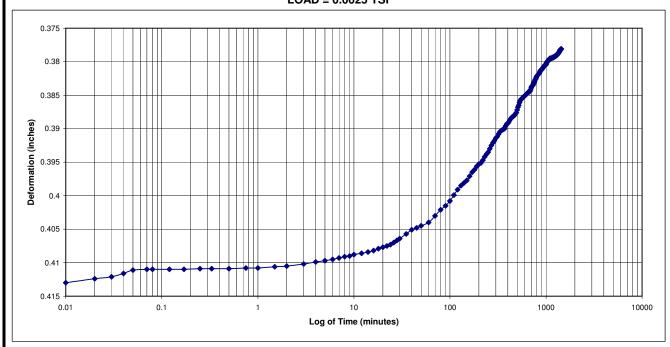
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 20 to 22 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-33A, 20 to 22 feet LOAD = 0.0625 TSF



Sample No.: GTX B-33A, 21'
Exploration No.: B-33A
Depth: 20 - 22 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

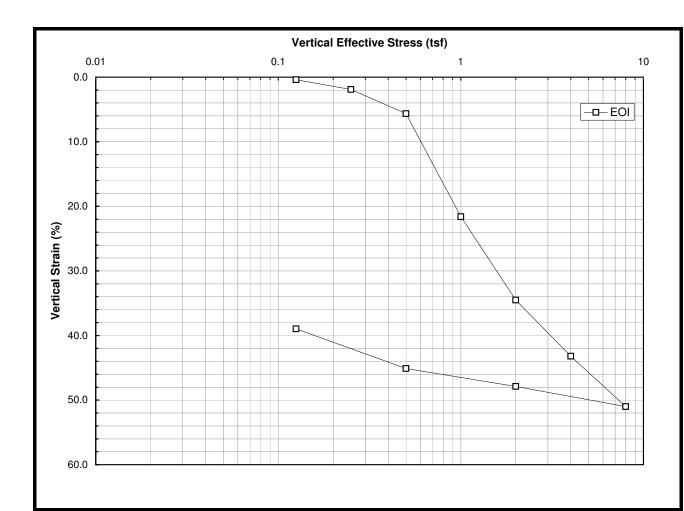
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199



N S	Probable Preconsolidation Stress, P'c (tsf):	0.5
IDATION ETERS	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.6 10.0
NSOL ARAM	Compression Ratio Recompression Ratio	0.48 0.049
2 .	Over Consolidation Ratio (OCR):	8.0

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.125 tsf
ASTM D-2435 12.3.2

Test No.: GTX 33A, 31'
Sample No.: UD2
Exploration No.: B-33A
Depth: 30 to 32 feet

USCS Description: Fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm ²): Measured Specific Gravity:	31.67
Measured Specific Gravity:	2.62
Trimmings Moisture (%):	151.6
% Passing #200 Sieve:	98.3

Liquid Limit: 141
Plastic Limit: 43
Plasticity Index: 98

	Initial	Final
Water Content (%):	149.1	83.4
Est. % Saturation:	99.5	100.0
Sample Height (cm):	2.540	1.550
Wet Sample Weight (g):	106.6	78.5
Dry Sample Weight (g):	42.8	42.8
Dry Unit Weight (pcf):	33.2	54.4
Void Ratio, e:	3.92	2.00
Solids Height (cm):	0.516	0.516



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

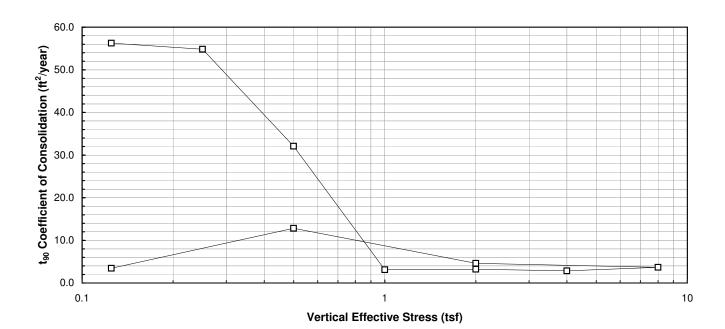
Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: GTX 33A, 31'

Sample No.: UD2
Exploration No.: B-33A
Depth: 30 to 32 feet

	070500	VEDTION	VEDTION	VEDTION	VOID DATIO	VOID DATIO	077700	TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.125	0.4	0.3	3.90	3.91	0.25	56.2	
2	23-50	0.25	1.9	1.6	3.83	3.84	0.50	54.8	
3	24-00	0.5	5.7	4.6	3.64	3.70	1.00	32.1	
4	24-00	1	21.6	19.6	2.86	2.96	2.00	3.1	
5	24-00	2	34.5	32.3	2.22	2.33	4.00	3.2	
6	24-00	4	43.2	41.6	1.80	1.88	8.00	2.8	
7	24-00	8	51.0	48.9	1.41	1.52	16.00	3.7	
8	24-00	2	47.9	48.3	1.57	1.55	4.00	4.6	
9	24-00	0.5	45.1	45.7	1.70	1.67	1.00	12.8	
10	24-00	0.125	39.0	40.3	2.00	1.94	0.25	3.4	

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

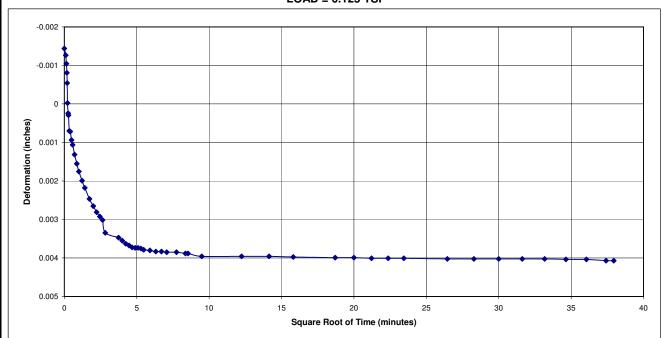
Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 0.125 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



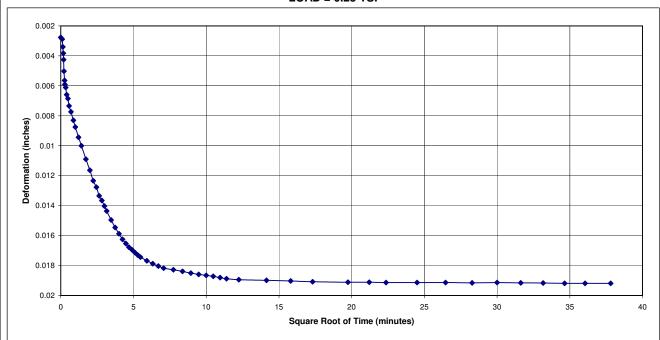
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 0.25 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



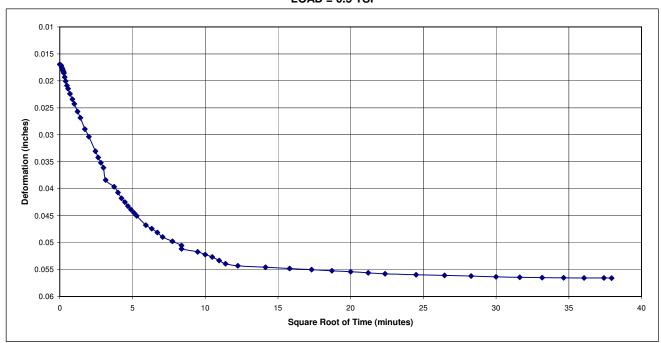
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

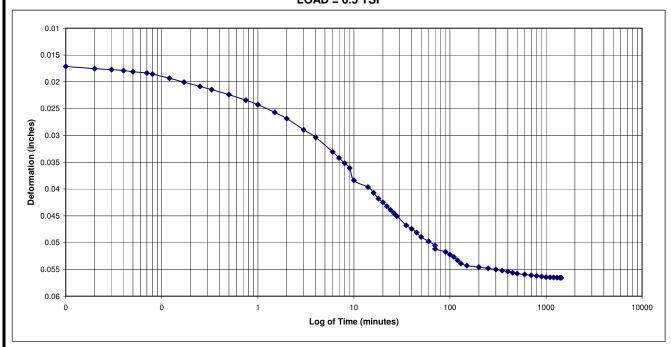
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 0.5 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



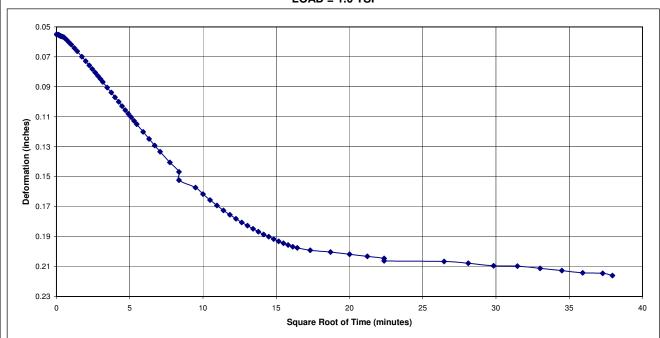
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

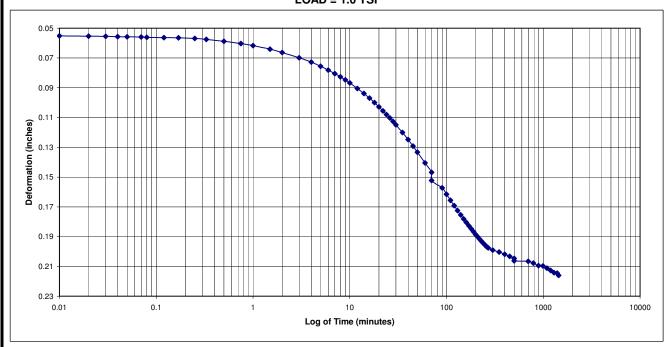
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 1.0 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



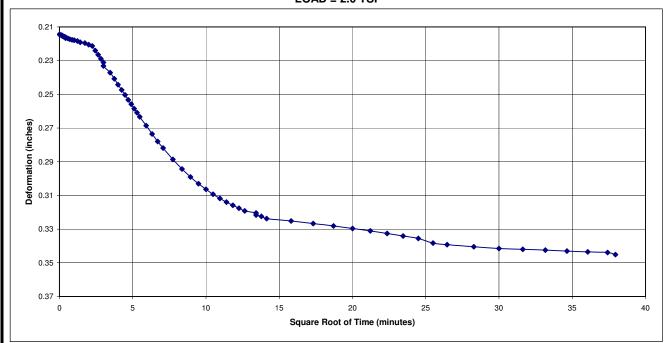
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

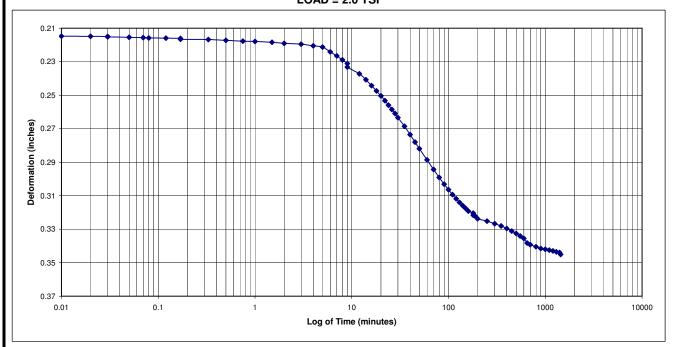
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 2.0 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



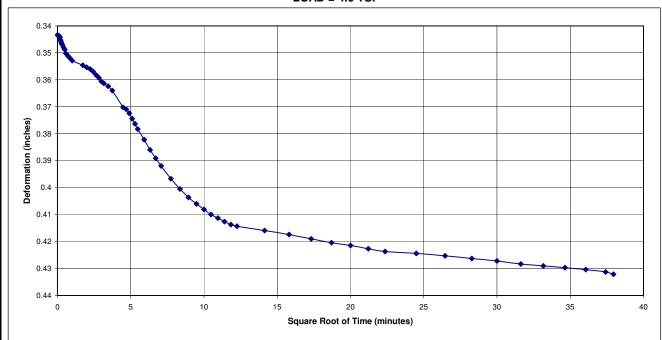
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

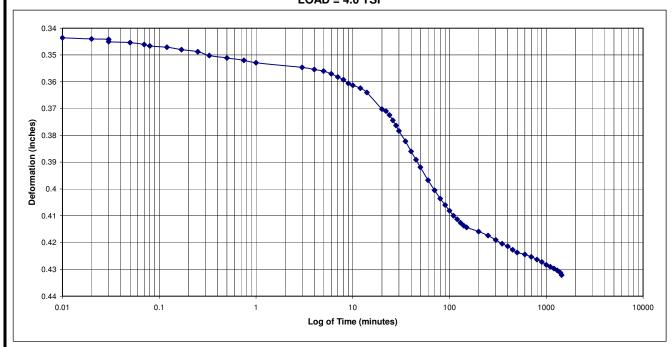
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 4.0 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



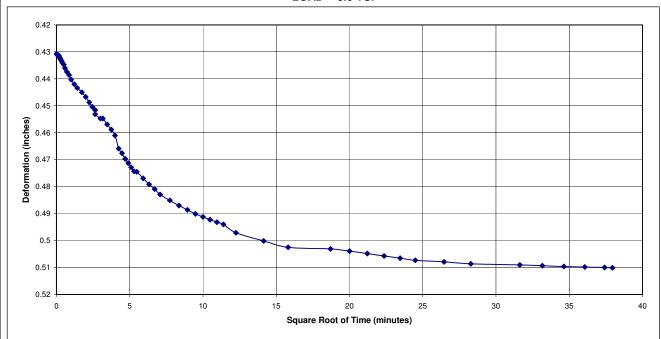
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

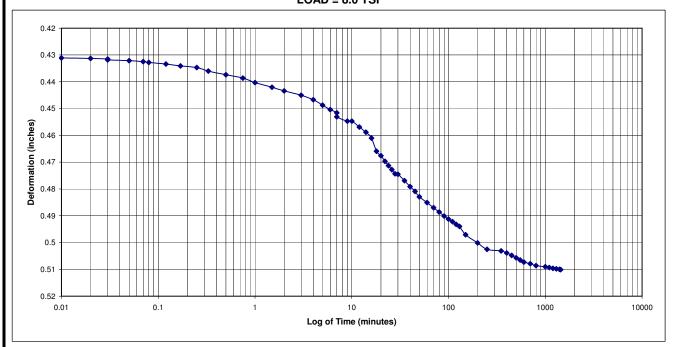
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 8.0 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



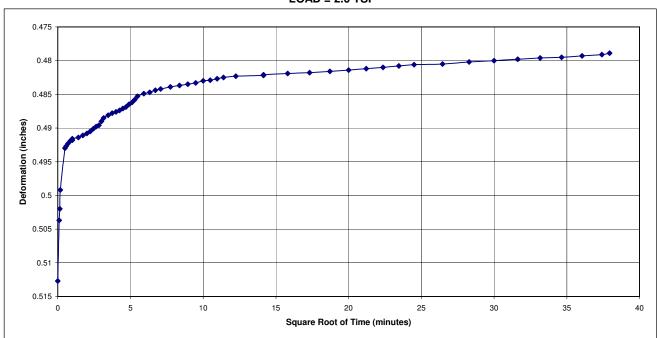
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

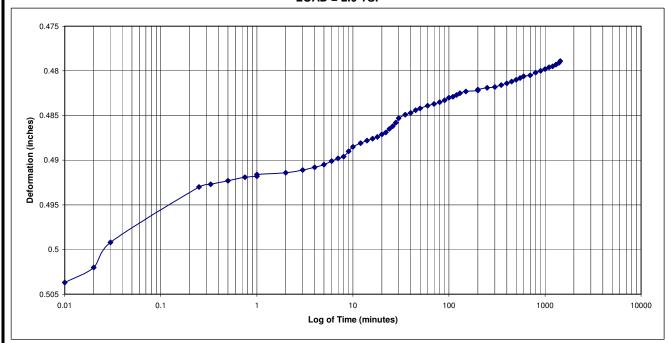
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 2.0 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



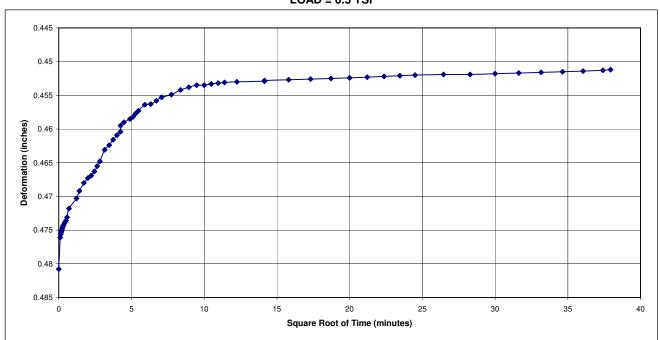
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

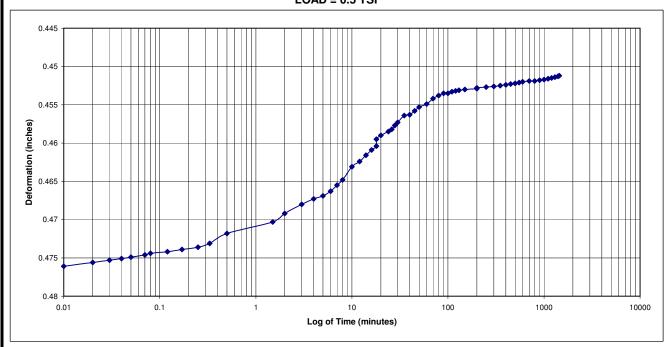
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 0.5 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

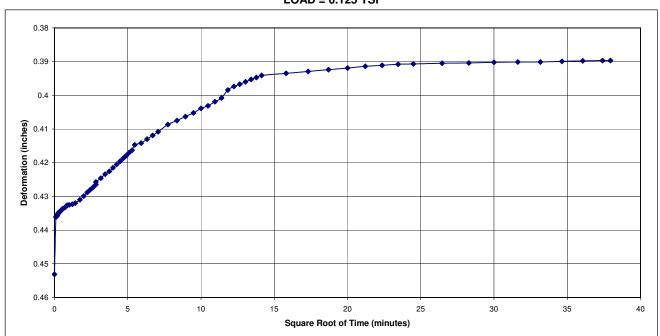
Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

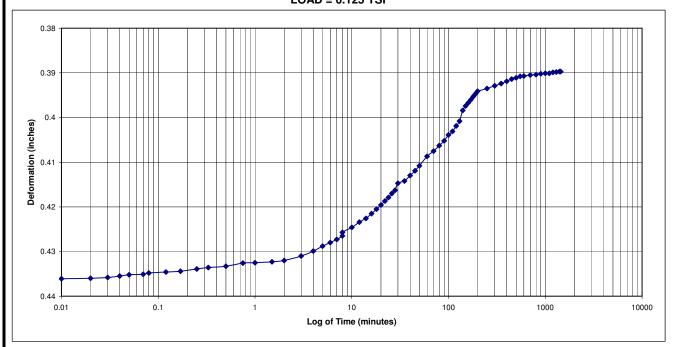
Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 30 to 32 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-33A, 30 to 32 feet LOAD = 0.125 TSF



Sample No.: GTX B-33A, 31'
Exploration No.: B-33A
Depth: 30 - 32 feet

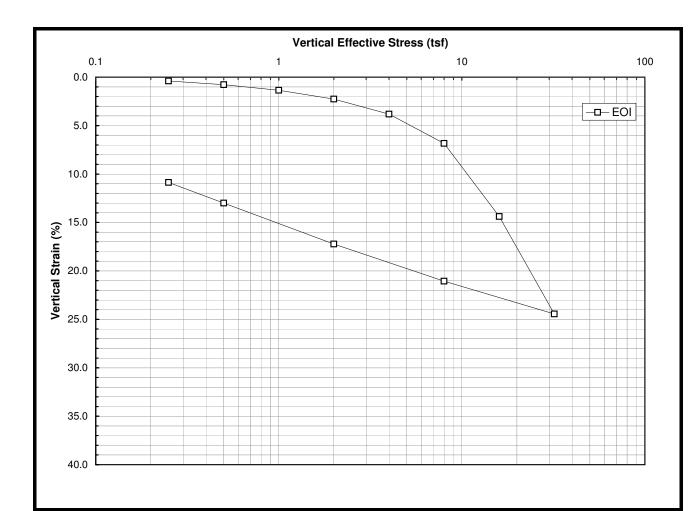


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NC	S	Probable Preconsolidation Stress, P'c (tsf):	7.3
DATI	ETER	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	1.0 1.4
-	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.28	
Š	λF	Recompression Ratio (RR):	0.070
ၓ	-	Over Consolidation Ratio (OCR):	7.4

METHOD Test Method: ASTM D-2435 A Trimming Procedure: 2.5-inch Trimming Lathe Pressure at Inundation: 0.25 tsf Method to Compute C_v: ASTM D-2435 12.3.2

Test No.: GTX B-33A, 51' SAMPLE ID Sample No.: UD3

Exploration No.: Depth: 50 to 51.8 feet

USCS Description: Elastic SILT with sand (MH)

B-33A

Sample Diameter (cm):	6.35
Sample Area (cm ²):	31.67
Sample Area (cm²): Measured Specific Gravity:	2.65
Trimmings Moisture (%):	76.5
% Passing #200 Sieve:	73.7

Liquid Limit: 118 Plastic Limit: 50 Plasticity Index: 68

Initial Final Water Content (%): 70.7 67.8 Est. % Saturation: 97.3 100.0 Sample Height (cm): 2.264 2.540 Wet Sample Weight (g): 122.3 124.4 Dry Sample Weight (g): 72.9 72.9 Dry Unit Weight (pcf): 56.5 63.4 Void Ratio, e: 1.93 1.61 Solids Height (cm): 0.868 0.868



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: **SCDOT**

SAMPLE DATA

Location: North Charleston, South Carolina Project No.: 1131-08-554 Page 1 of 2 Test No.: GTX B-33A, 51'

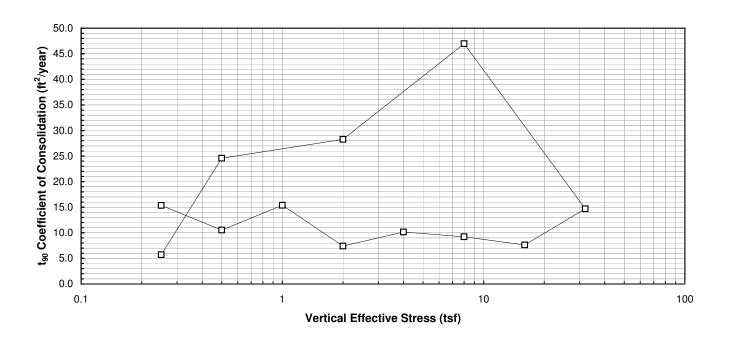
Sample No.: UD3 Exploration No.: B-33A

Depth: 50 to 51.8 feet

LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	TAYLOR COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	e e	e e	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.25	0.4	0.4	1.91	1.91	0.03	15.4	
2	24-00	0.5	8.0	0.8	1.90	1.90	0.07	10.5	
3	24-00	1	1.4	1.3	1.89	1.89	0.14	15.4	
4	24-00	2	2.3	2.2	1.86	1.86	0.27	7.4	
5	24-00	4	3.8	3.8	1.81	1.82	0.55	10.2	
6	24-00	8	6.8	6.7	1.73	1.73	1.10	9.2	
7	24-00	16	14.4	13.8	1.51	1.52	2.19	7.6	
8	24-00	32	24.5	23.1	1.21	1.25	4.38	14.7	
9	24-00	8	21.1	21.1	1.31	1.31	1.10	47.0	
10	24-00	2	17.2	17.6	1.42	1.41	0.27	28.3	
11	24-00	0.5	13.0	14.1	1.55	1.51	0.07	24.6	
12	24-00	0.25	10.9	11.3	1.61	1.60	0.03	5.7	

*EOI = End of Increment

^{*}EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

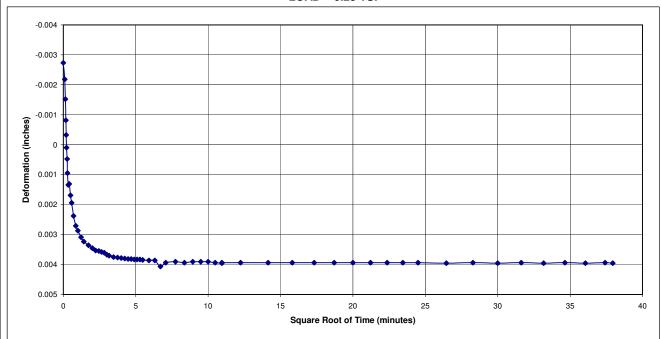
Client: SCDOT

Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 0.25 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



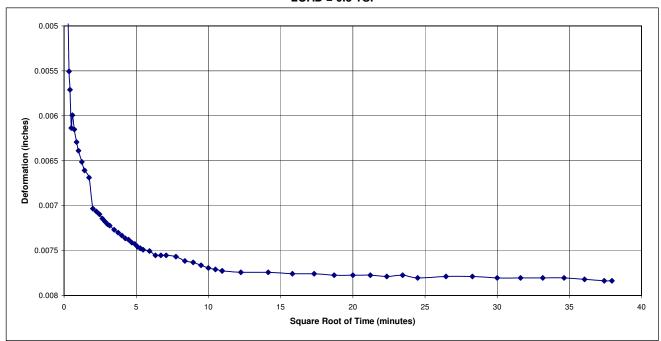
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

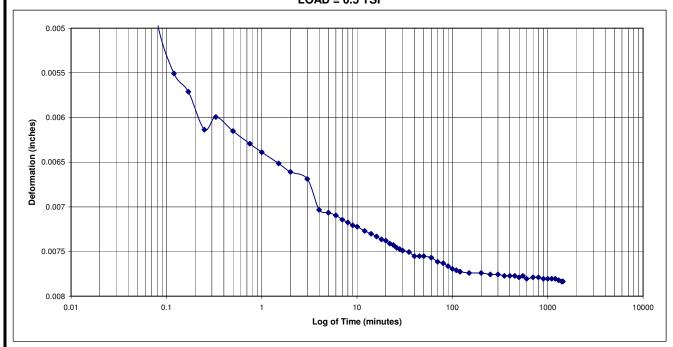
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 0.5 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



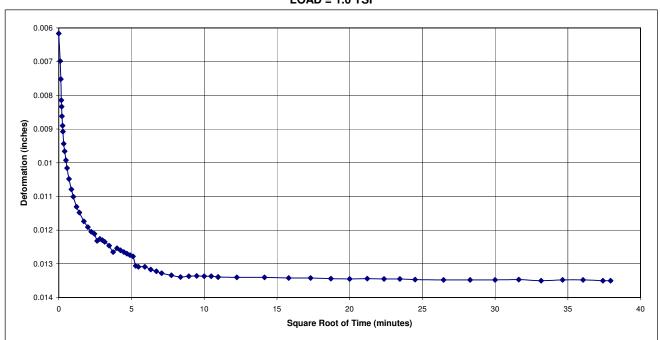
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

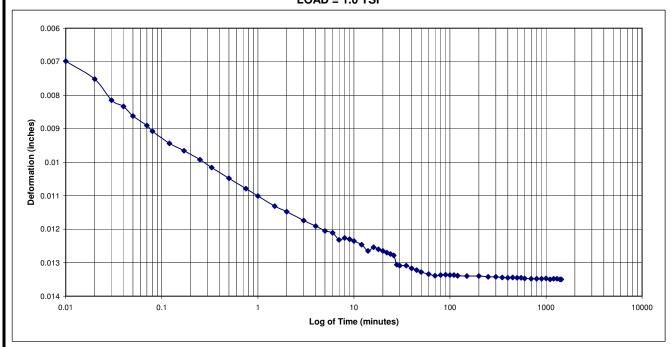
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 1.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



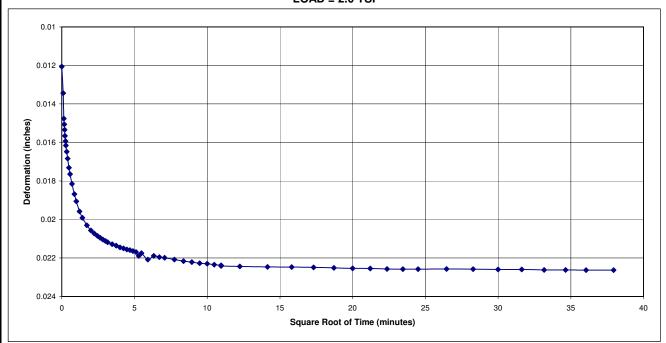
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

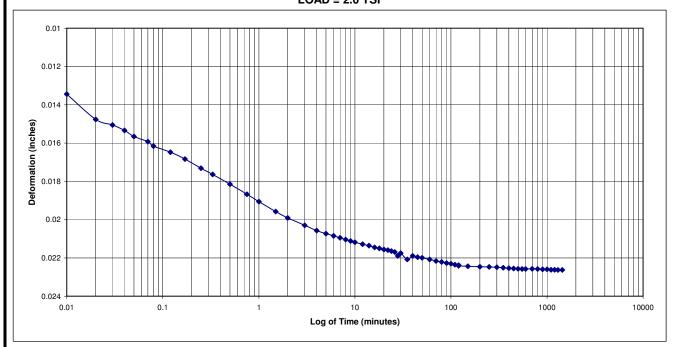
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 2.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



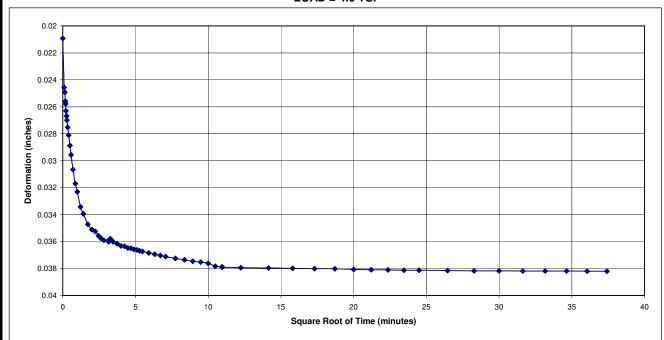
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

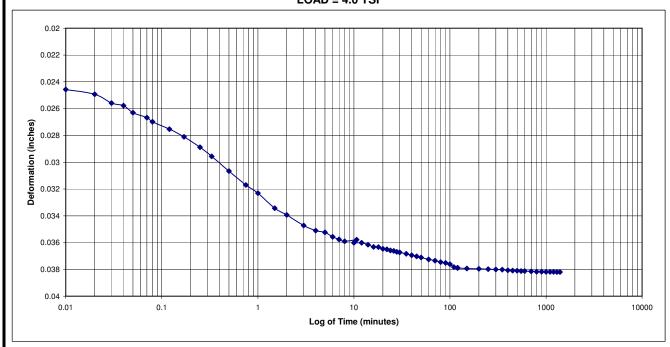
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 4.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



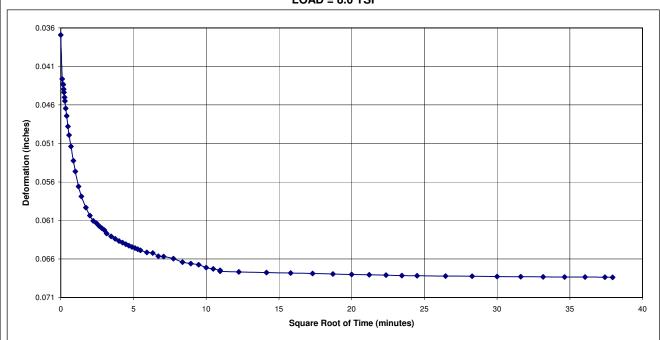
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

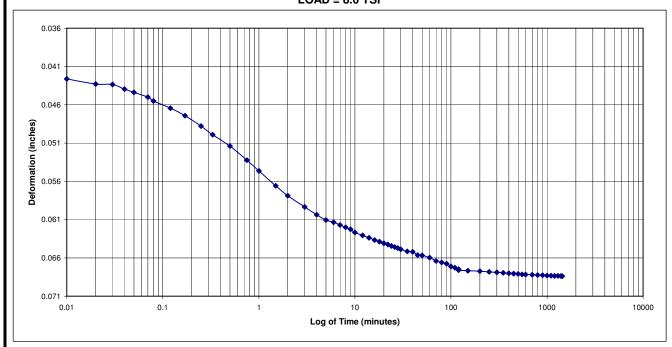
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 8.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



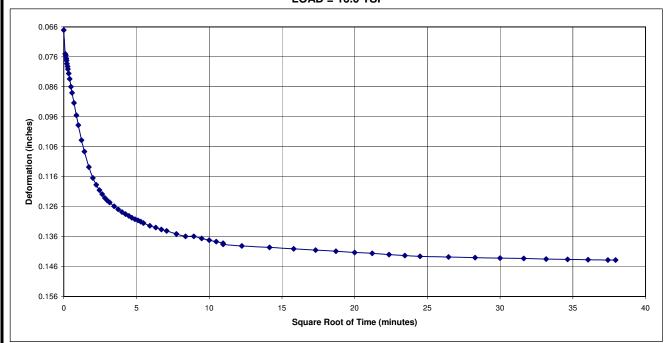
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

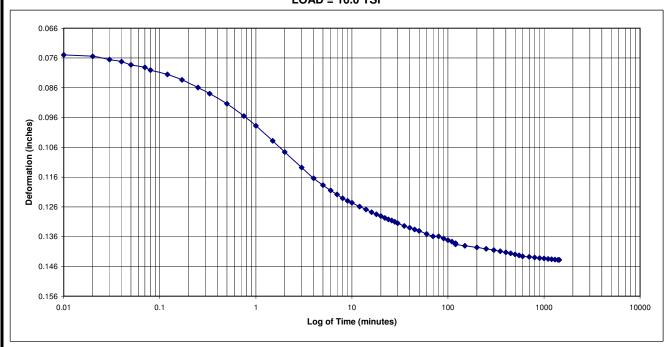
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 16.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 16.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



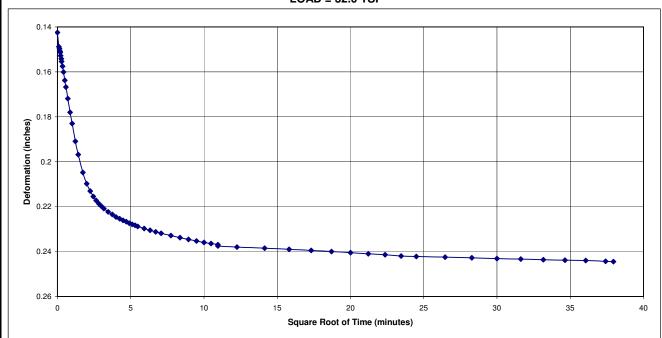
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

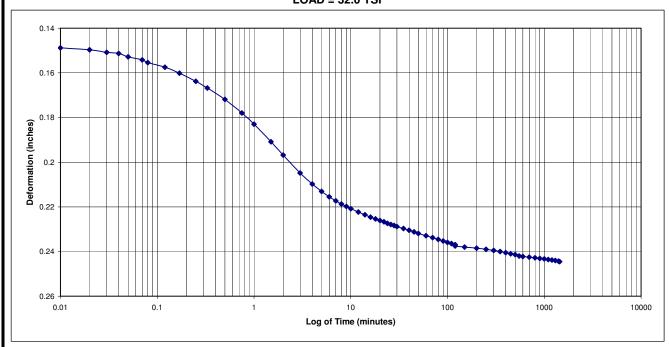
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 32.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 32.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



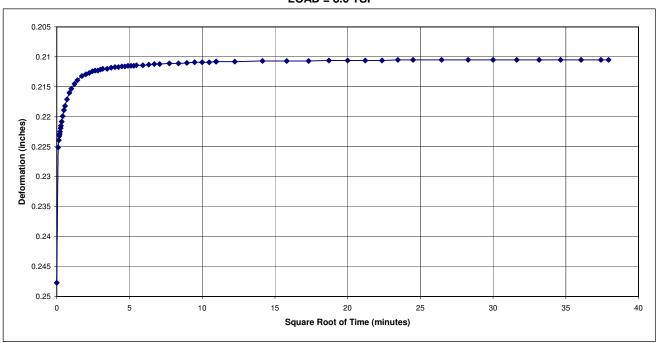
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 8.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



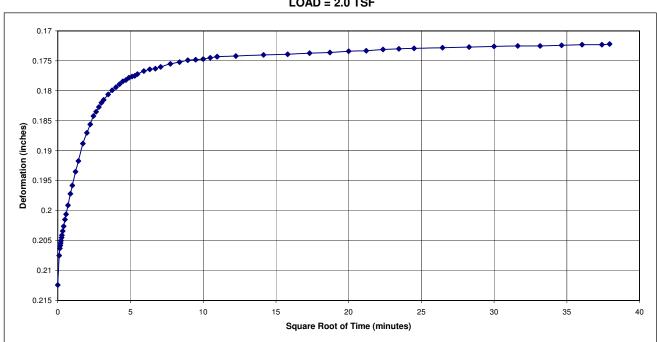
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 2.0 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



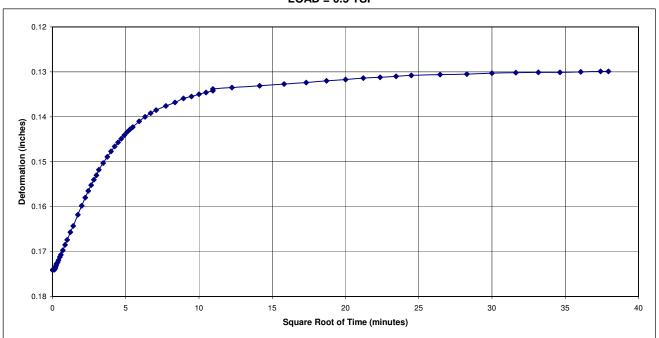
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

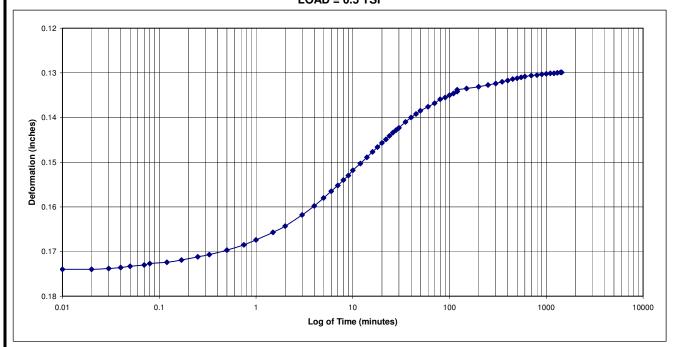
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 0.5 TSF



Sample No.: GTX B-33A, 51'
Exploration No.: B-33A
Depth: 50 - 52 feet



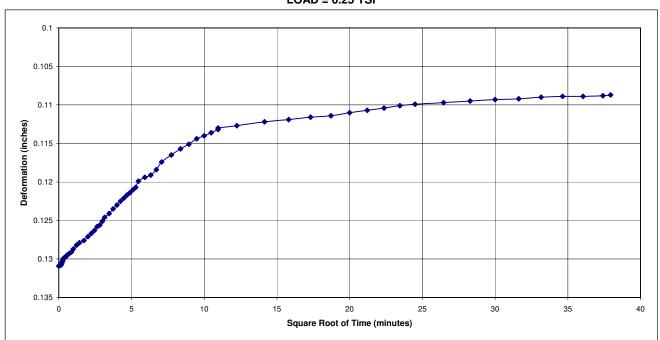
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

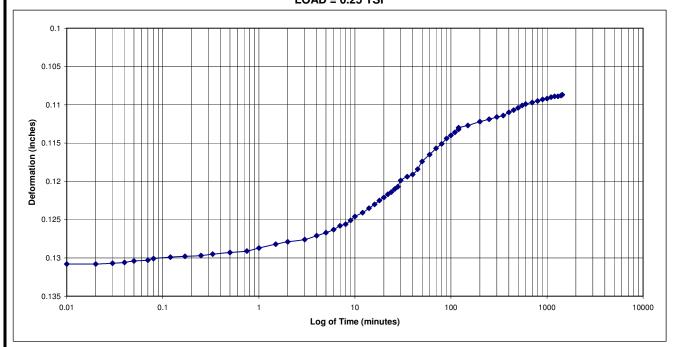
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-33A, 50 to 52 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-33A, 50 to 52 feet LOAD = 0.25 TSF



GTX B-33A, 51' Sample No.: Exploration No.: B-33A Depth: 50 - 52 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

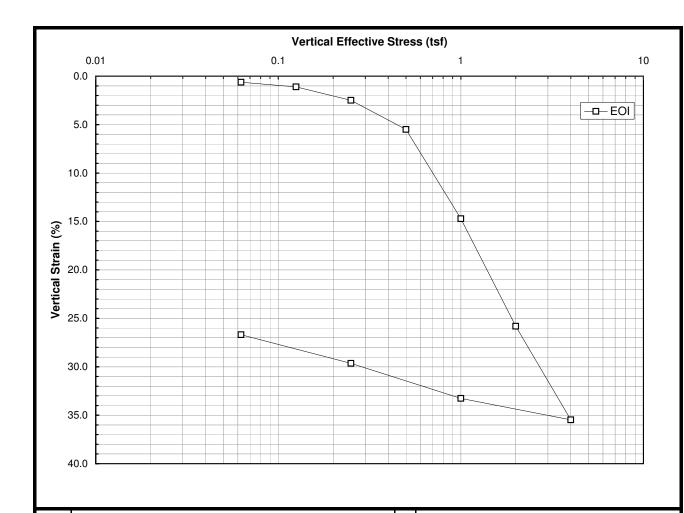
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: **SCDOT**

> Location: North Charleston, South Carolina

1131-08-554 Project No.:

Tel: 804.266.2199



IDATION	Probable Preconsolidation Stress, P' _c (tsf):	0.5 0.3
IDA	Approx. Hydrostatic Effective Stress, P'o (tsf) Vertical Strain at P'o (%):	3.4
CONSOL PARAM	Compression Ratio	0.35
	Recompression Ratio	0.055
	Over Consolidation Ratio (OCR):	1.5
	I and the second second second second second second second second second second second second second second se	

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A

2.5-inch Trimming Lathe
0.0625 tsf
ASTM D-2435 12.3.2

Test No.: GTX B-39A, 16'
Sample No.: UD1
Exploration No.: B-39A
Depth: 15 to 17 feet
USCS Description: Fat CLAY (CH)

6.35
31.67
2.63
117.0
99.2

Liquid Limit: 149
Plastic Limit: 43
Plasticity Index: 106

	Initial	Final
Water Content (%):	118.8	80.7
Est. % Saturation:	96.3	100.0
Sample Height (cm):	2.540	1.862
Wet Sample Weight (g):	109.1	90.1
Dry Sample Weight (g):	49.8	49.8
Dry Unit Weight (pcf):	38.6	52.7
Void Ratio, e:	3.24	2.11
Solids Height (cm):	0.598	0.598



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569 **ONE-DIMENSIONAL CONSOLIDATION TEST**

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

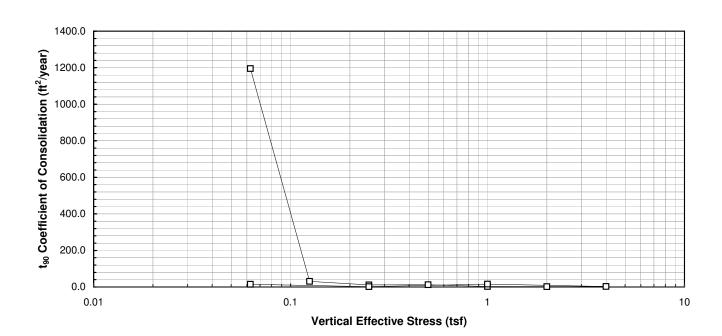
Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: GTX B-39A, 16'

Sample No.: UD1
Exploration No.: B-39A
Depth: 15 to 17 feet

								TAYLOR
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)
1	24-00	0.0625	0.6	0.6	3.22	3.22	0.13	1195.3
2	24-00	0.125	1.1	1.0	3.20	3.20	0.25	30.3
3	24-00	0.25	2.5	2.5	3.14	3.14	0.50	11.8
4	24-00	0.5	5.5	4.3	3.01	3.06	1.00	12.7
5	24-00	1	14.7	13.1	2.62	2.69	2.00	2.3
6	24-00	2	25.8	24.2	2.15	2.22	4.00	2.2
7	24-00	4	35.5	33.8	1.74	1.81	8.00	2.3
8	24-00	1	33.3	34.0	1.83	1.80	2.00	15.7
9	24-00	0.25	29.7	30.3	1.99	1.96	0.50	1.4
10	24-00	0.0625	26.7	26.9	2.11	2.10	0.13	15.2

*EOI = End of Increment *EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

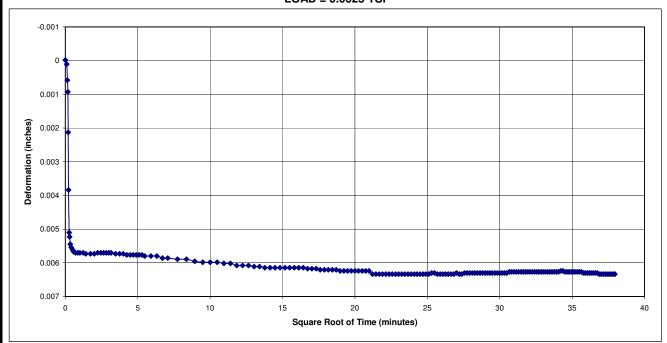
Client: SCDOT

Location: North Charleston, South Carolina

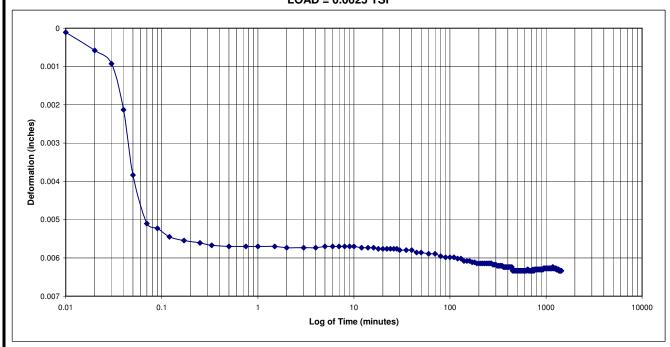
Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.0625 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



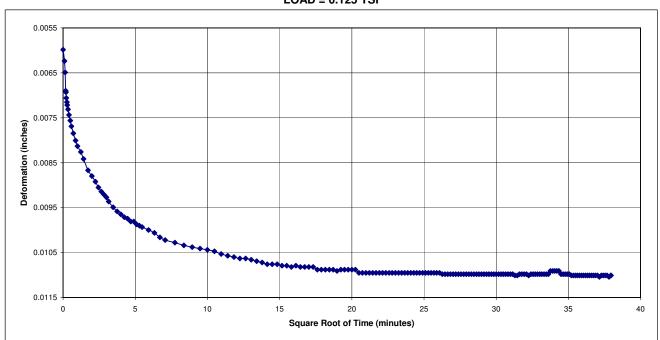
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

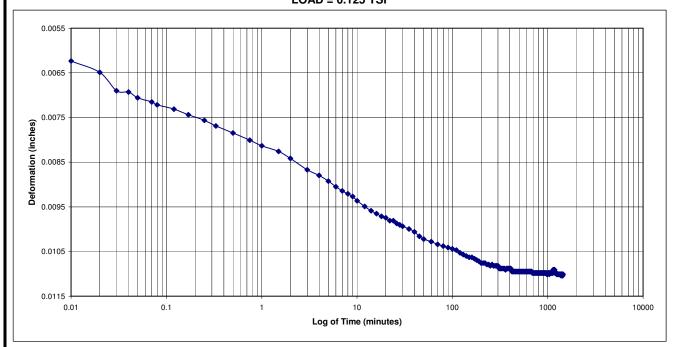
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.125 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



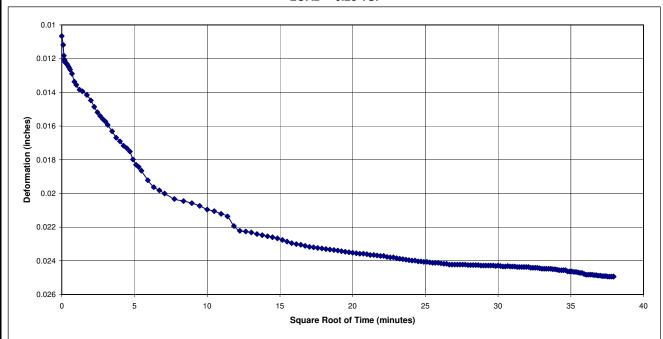
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

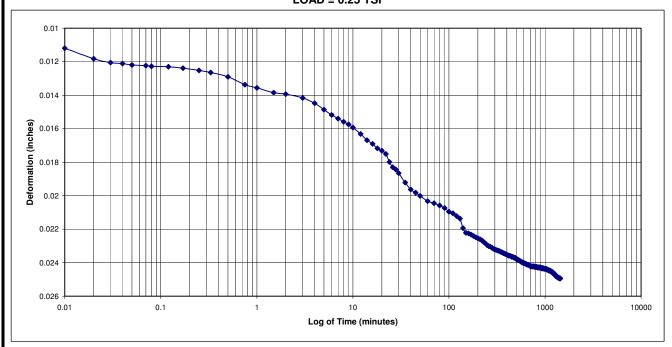
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.25 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



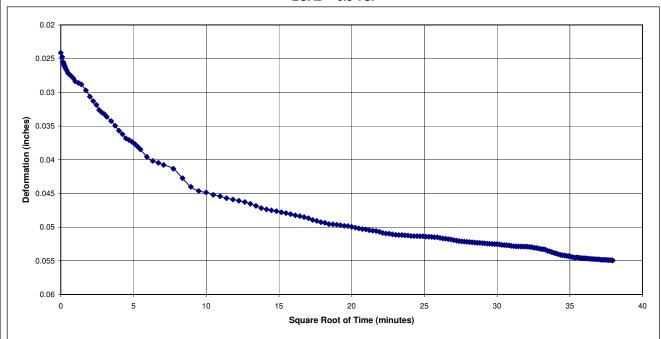
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

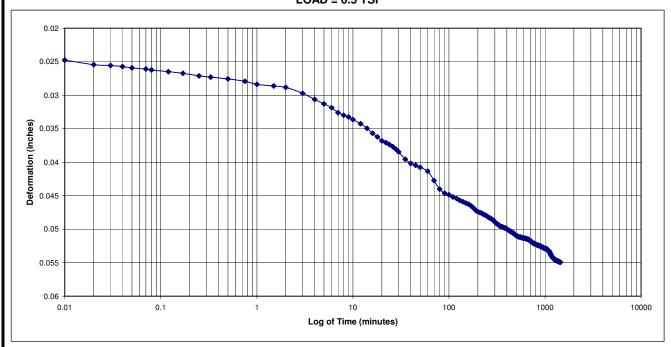
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.5 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



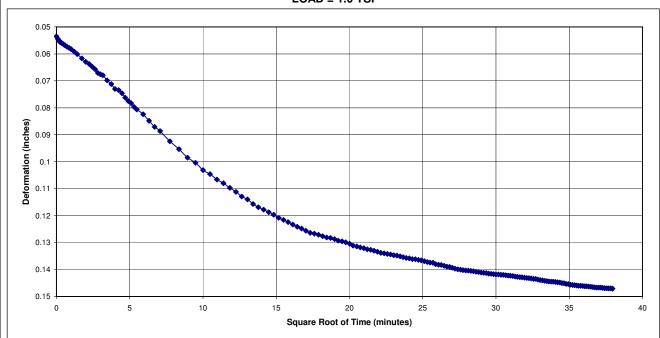
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

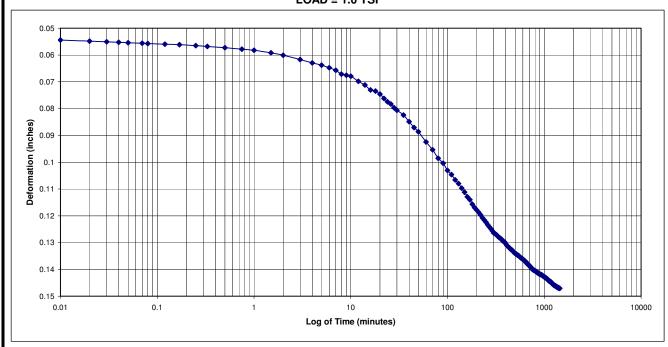
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 1.0 TSF



Sample No.: GTX B-39A, 16' Exploration No.: B-39A Depth: 15 - 17 feet



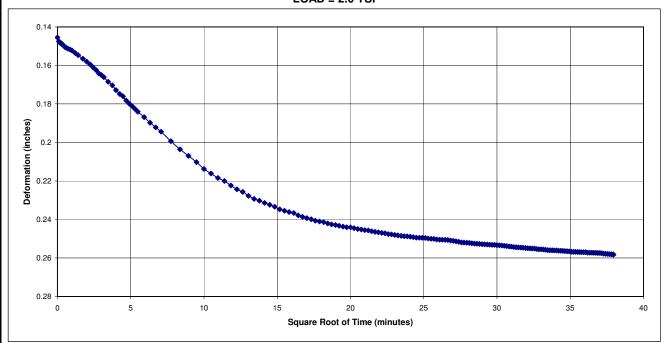
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

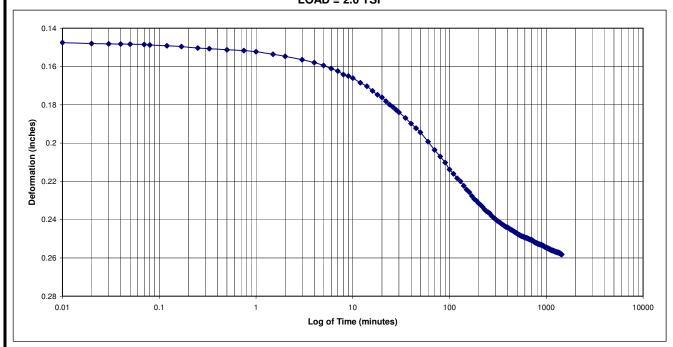
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 2.0 TSF



Sample No.: GTX B-39A, 16' Exploration No.: B-39A Depth: 15 - 17 feet



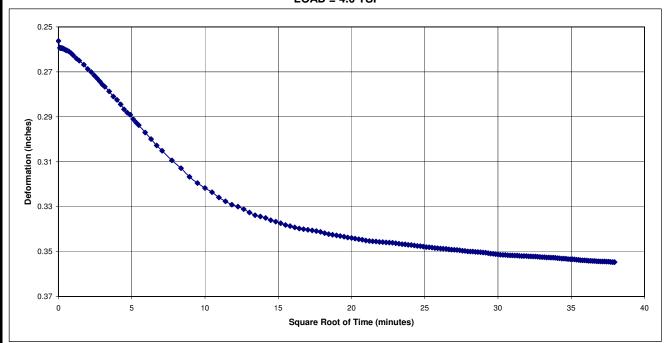
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

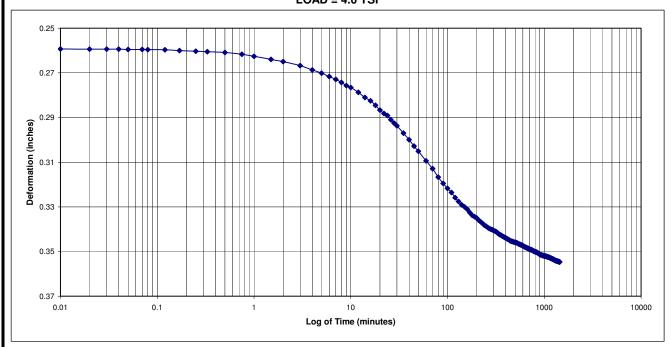
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 4.0 TSF



Sample No.: GTX B-39A, 16' Exploration No.: B-39A Depth: 15 - 17 feet



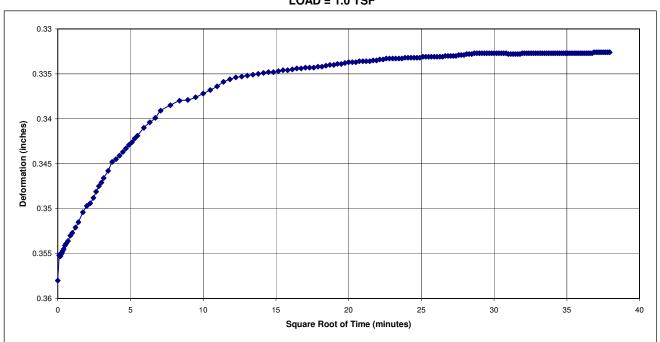
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 1.0 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

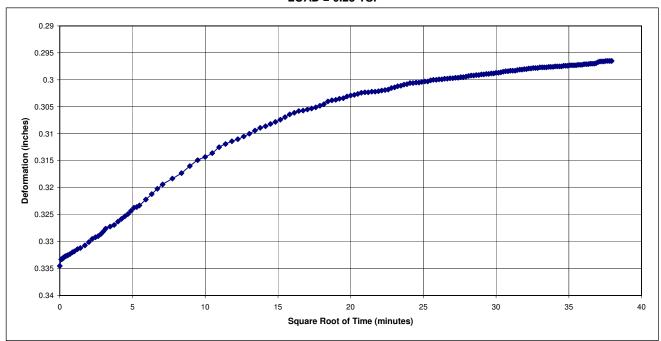
Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

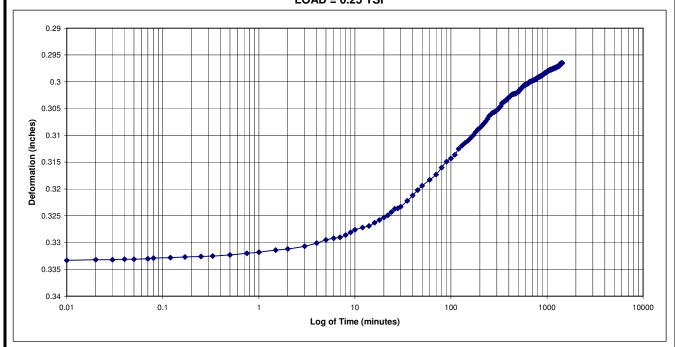
Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.25 TSF



Sample No.: GTX B-39A, 16'
Exploration No.: B-39A
Depth: 15 - 17 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

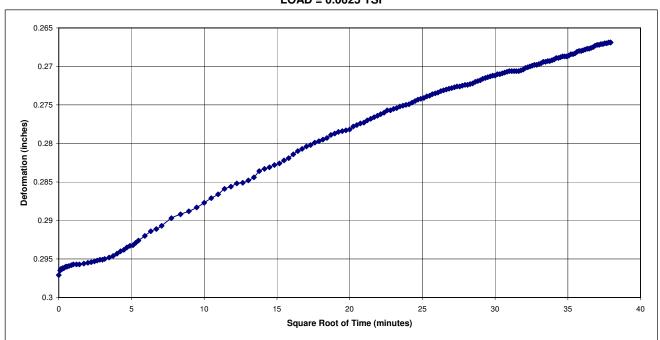
Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

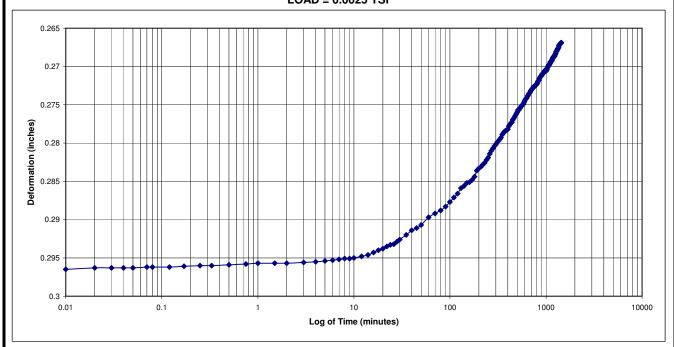
Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 15 to 17 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-39A, 15 to 17 feet LOAD = 0.0625 TSF



Sample No.: GTX B-39A, 16' Exploration No.: B-39A Depth: 15 - 17 feet

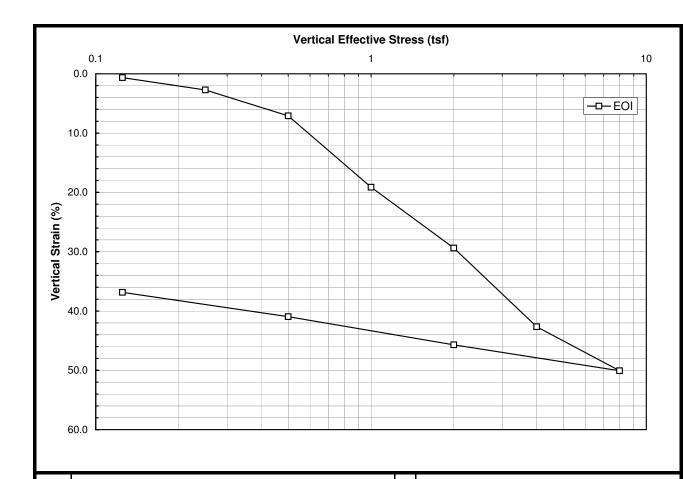


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NC	Probable Preconsolidation Stress, P'c (tsf):	0.5
DATI(ETER	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.6 10.0
ISOLI RAMI	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.39
ON PA	Recompression Ratio (RR):	0.074
0	Over Consolidation Ratio (OCR):	0.9

TEST METHOD Test Method: ASTM D-2435 A Trimming Procedure: 2.5-inch Trimming Lathe Pressure at Inundation: 0.125 tsf Method to Compute C_v: ASTM D-2435 12.3.2

Test No.: GTX B-39A, 29' SAMPLE ID Sample No.: UD2 Exploration No.: B-39A Depth: 28 to 30 feet

USCS Description: Sandy elastic SILT (MH)

Sample Diameter (cm):	6.35
Sample Area (cm²): Measured Specific Gravity: Trimmings Moisture (%):	31.67
Measured Specific Gravity:	2.60
Trimmings Moisture (%):	148.3
% Passing #200 Sieve:	52.4

Liquid Limit: 149 Plastic Limit: 64 Plasticity Index:

_	Liquid Littiit.	173	
Τ	Plastic Limit:	64	
7	Plasticity Index:	85	
LE			
SAMPLE DATA		Initial	Final
S	Water Content (%):	148.3	81.9
	Est. % Saturation:	100.0	100.0
	Sample Height (cm):	2.540	1.604
	Wet Sample Weight (g):	107.9	79.1
	Dry Sample Weight (g):	43.5	43.5
	Dry Unit Weight (pcf):	33.7	53.4
	Void Ratio, e:	3.82	2.04
	Solids Height (cm):	0.527	0.527
l			



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: **SCDOT**

North Charleston, South Carolina Location: 1131-08-554 Page 1 of 2 Project No.:

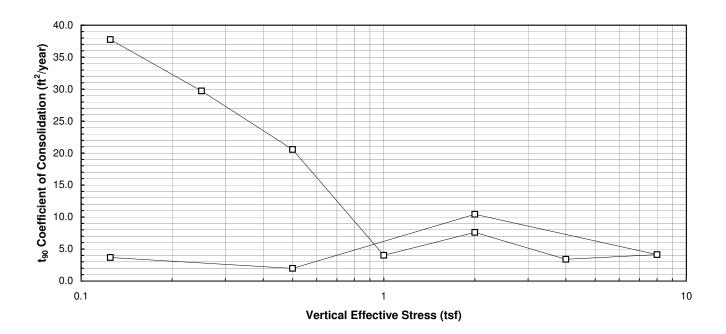
Test No.: GTX B-39A, 29'

Sample No.: UD2
Exploration No.: B-39A
Depth: 28 to 30 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.125	0.7	0.6	3.79	3.79	0.25	37.8	
2	24-00	0.25	2.7	2.1	3.69	3.72	0.50	29.7	
3	24-00	0.5	7.1	5.8	3.48	3.54	1.00	20.6	
4	24-00	1	19.1	18.1	2.90	2.95	2.00	4.0	
5	24-00	2	29.4	26.4	2.40	2.55	4.00	7.6	
6	24-00	4	42.7	39.9	1.76	1.90	8.00	3.4	
7	24-00	8	50.1	47.1	1.41	1.55	16.00	4.1	
8	24-00	2	45.7	46.4	1.62	1.58	4.00	10.4	
9	24-00	0.5	41.0	41.6	1.85	1.82	1.00	2.0	
10	24-00	0.125	36.9	38.3	2.04	1.97	0.25	3.7	

*EOI = End of Increment

*EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

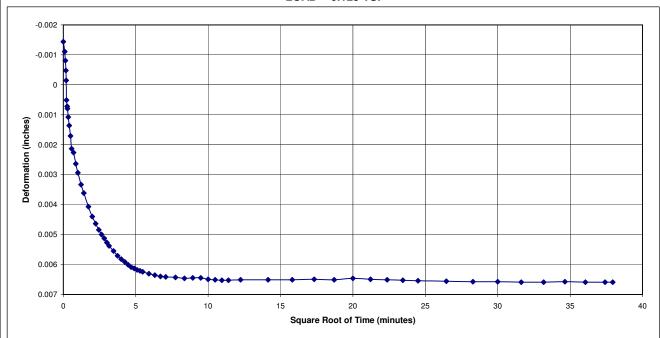
Client: SCDOT

Location: North Charleston, South Carolina

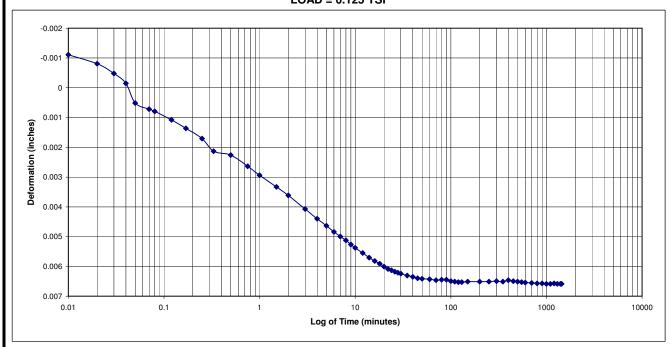
Project No. 1131-08-554

Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 0.125 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



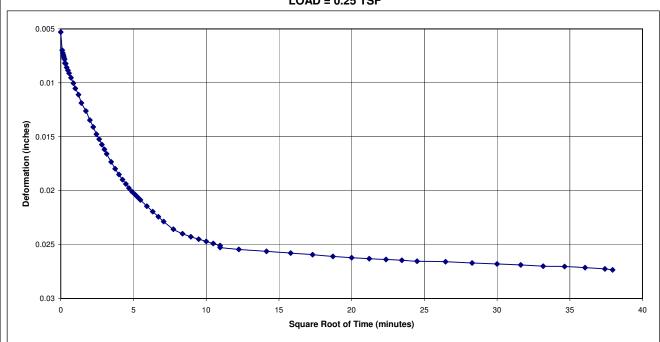
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

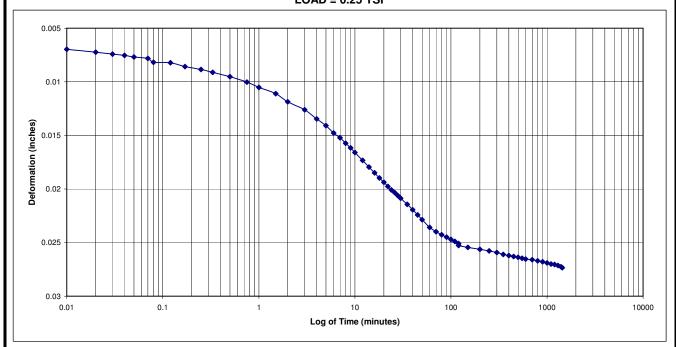
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 0.25 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



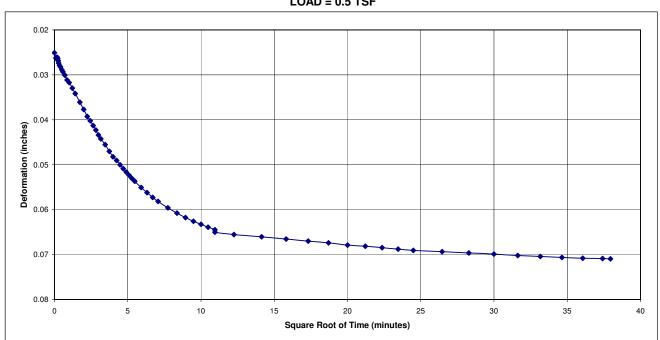
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

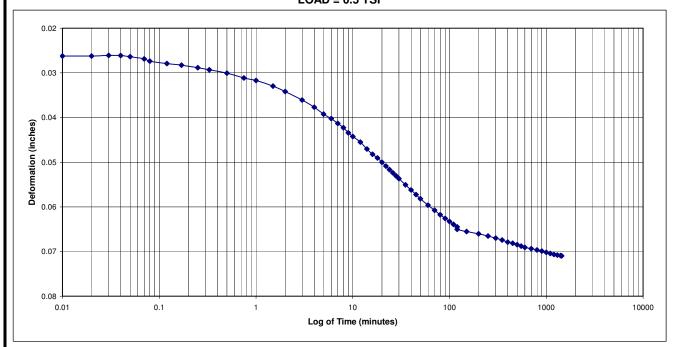
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 0.5 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



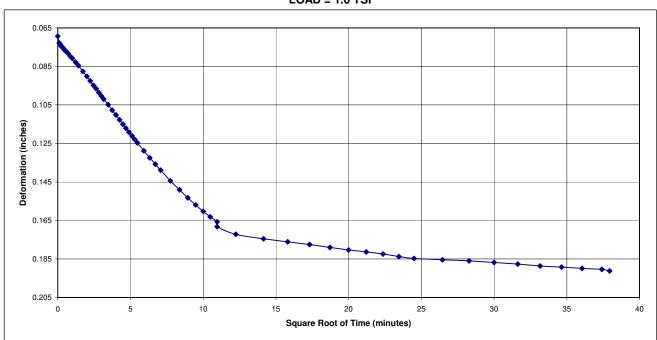
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

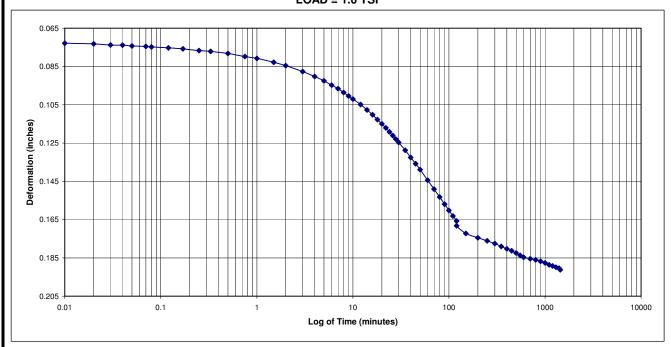
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 1.0 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



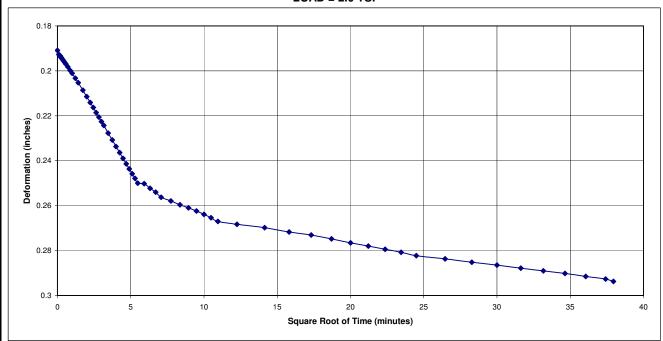
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

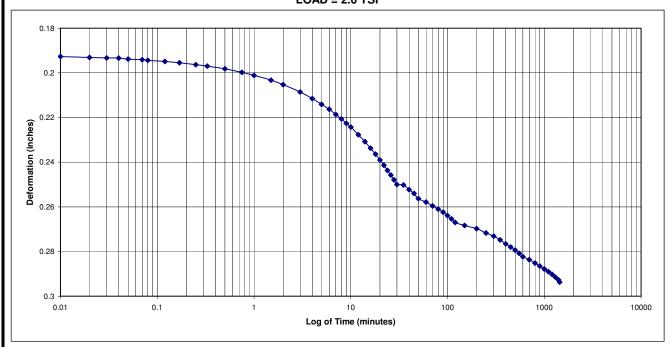
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 2.0 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



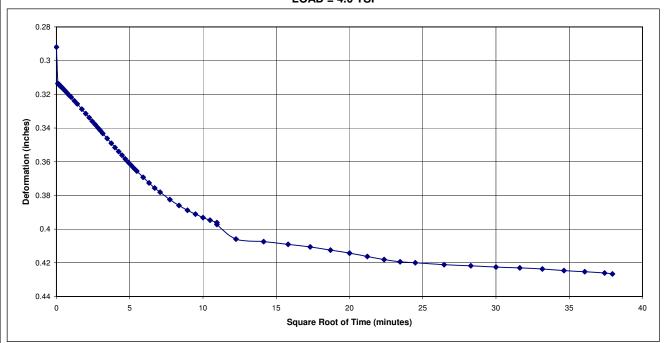
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

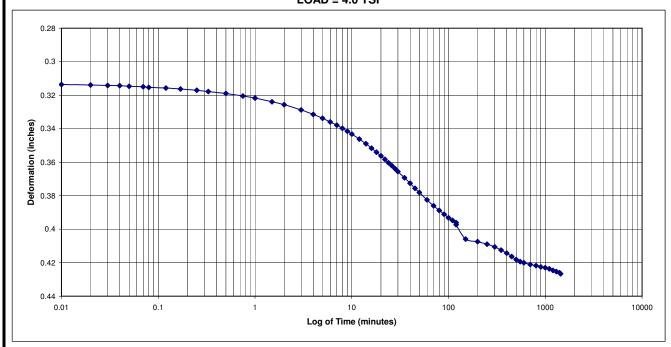
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 4.0 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



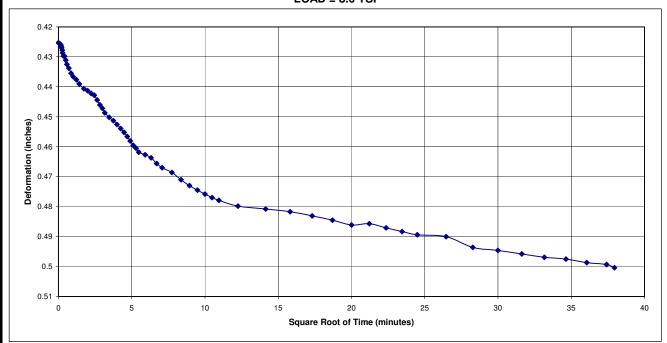
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

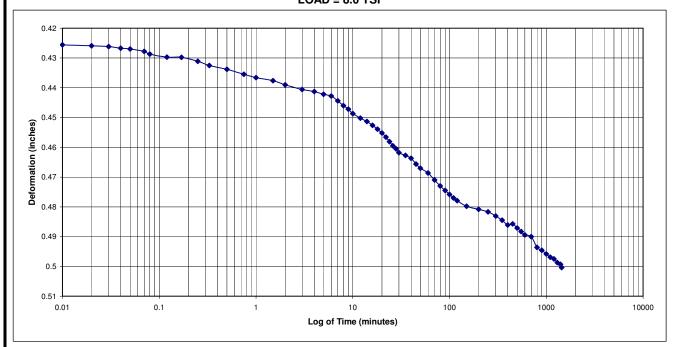
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 8.0 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



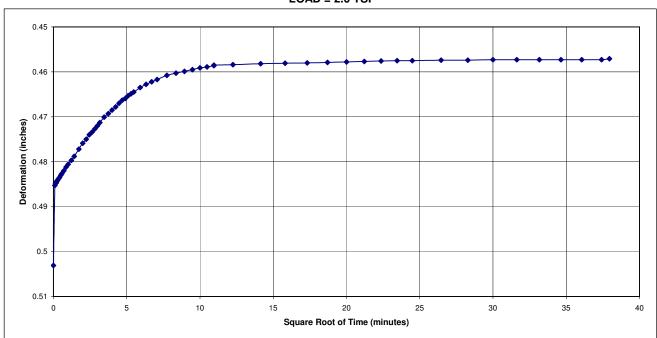
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

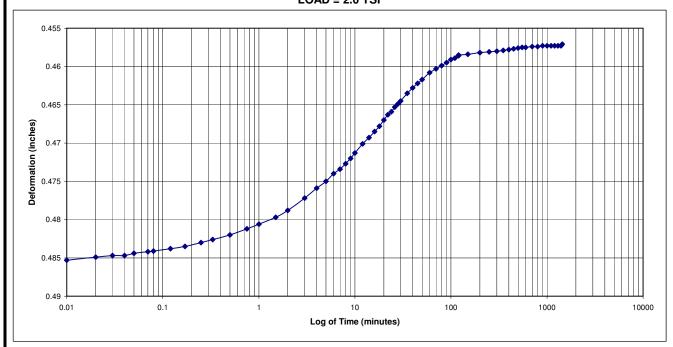
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 2.0 TSF



Sample No.: GTX B-39A, 29' Exploration No.: B-39A Depth: 28 - 30 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

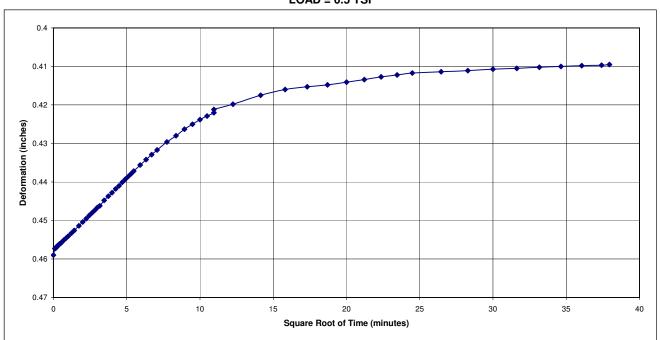
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: **SCDOT**

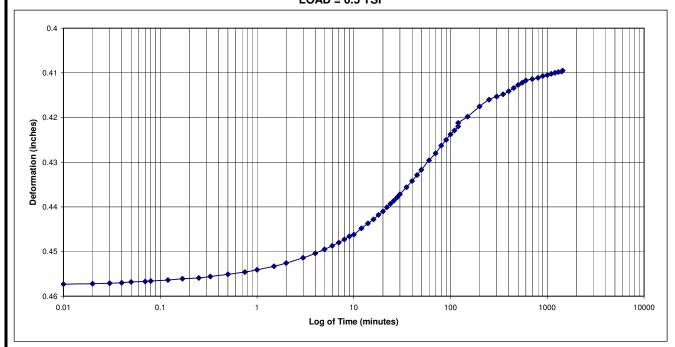
> Location: North Charleston, South Carolina

Tel: 804.266.2199 1131-08-554 Fax: 804.261.5569 Project No.:

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 0.5 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



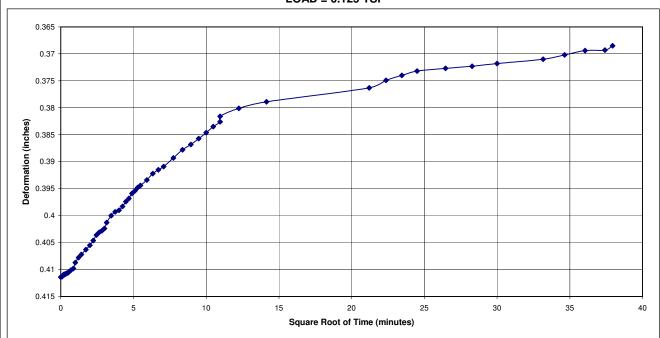
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

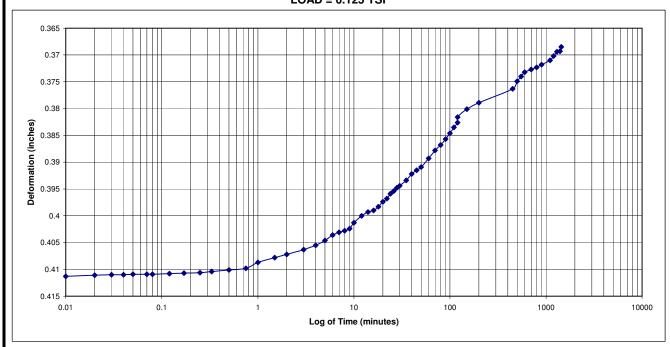
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-39A, 28 to 30 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-39A, 28 to 30 feet LOAD = 0.125 TSF



Sample No.: GTX B-39A, 29'
Exploration No.: B-39A
Depth: 28 - 30 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

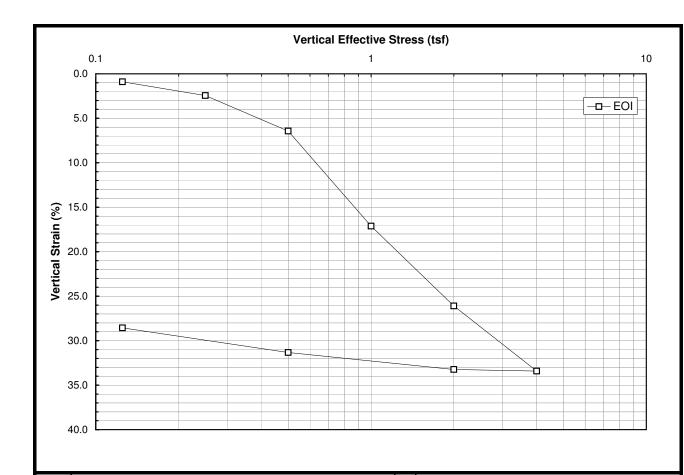
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199



CONSOLIDATION PARAMETERS	Probable Preconsol Approx. Hydrostatic Vertical Strain at P' _c Compression Ratio Recompression Rat Over Consolidation	ess, P' _o (tsf)	0.5 0.5 6.4 0.33 0.038		
TEST METHOD	Test Method: Trimming Procedure Pressure at Inundat Method to Compute	Procedure: 2.5-inch Trim at Inundation: 0.014 tsf			
SAMPLEID	Test No.: Sample No.: Exploration No.: Depth: USCS Description:	23 to 25 fee	t		

Sample Diameter (cm):	6.35
Sample Area (cm²): Measured Specific Gravity:	31.67 2.55
Trimmings Moisture (%):	87.4
% Passing #200 Sieve:	77.2
Liquid Limit:	98
Plastic Limit:	35

Plasticity Index:

SAMPLE DATA Initial Final Water Content (%): 87.6 54.7 Est. % Saturation: 99.7 100.0 Sample Height (cm): 2.540 1.815 Wet Sample Weight (g): 97.9 118.8 Dry Sample Weight (g): 63.3 63.3 Dry Unit Weight (pcf): 68.7 49.1 Void Ratio, e: 2.24 1.31 Solids Height (cm): 0.784 0.784



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

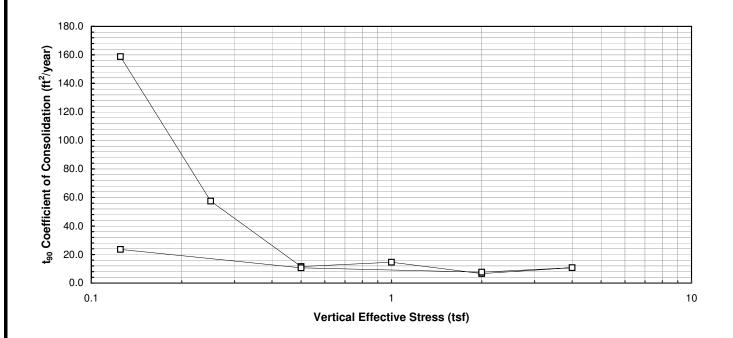
Client: **SCDOT**

North Charleston, South Carolina Location: Project No.: 1131-08-554 Page 1 of 2 Test No.: S&ME B-40A, 24'

Sample No.: UD1
Exploration No.: B-40A
Depth: 23 to 25 feet

								TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	23-58	0.125	0.9	0.4	2.21	2.23	0.27	158.8	
2	24-02	0.25	2.4	1.9	2.16	2.18	0.53	57.5	
3	24-01	0.5	6.4	5.0	2.03	2.08	1.06	11.5	ļ
4	24-00	1	17.1	14.0	1.69	1.79	2.13	14.6	ļ
5	24-00	2	26.1	24.4	1.40	1.45	4.26	6.6	ļ
6	24-00	4	33.4	31.8	1.16	1.21	8.51	10.8	
7	24-05	2	33.2	33.3	1.16	1.16	4.26	7.7	
8	23-59	0.5	31.3	31.8	1.23	1.21	1.06	10.7	ļ
9	24-00	0.125	28.6	30.1	1.31	1.26	0.27	23.5	

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

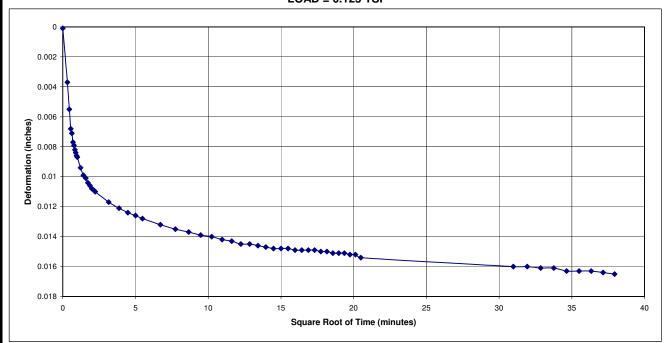
Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 0.125 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



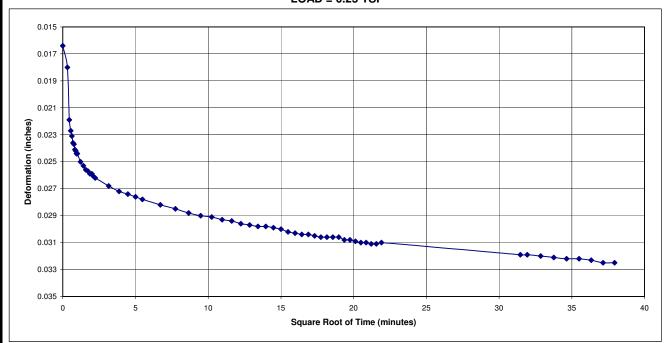
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

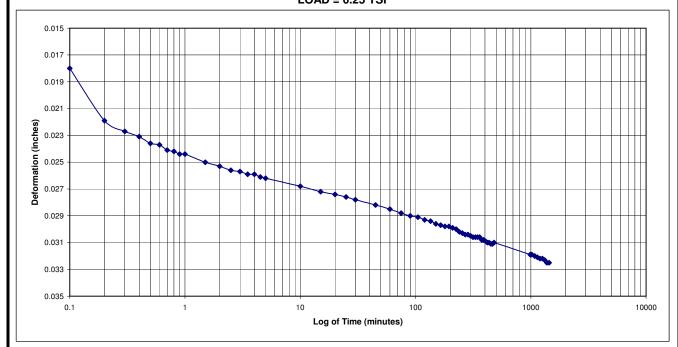
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 0.25 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



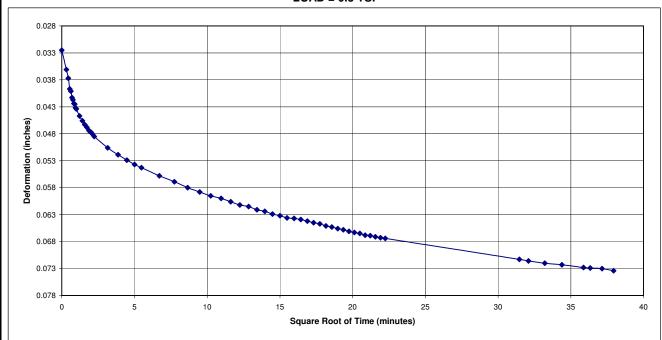
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 0.5 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



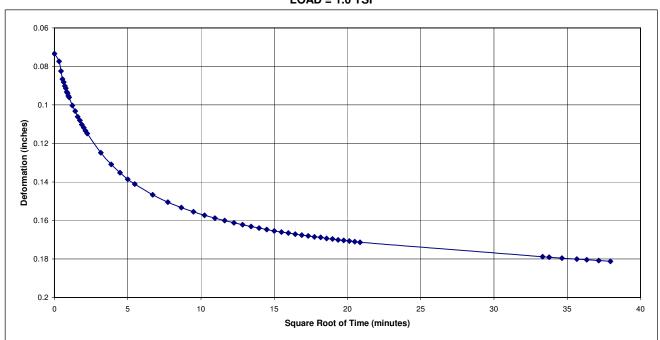
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

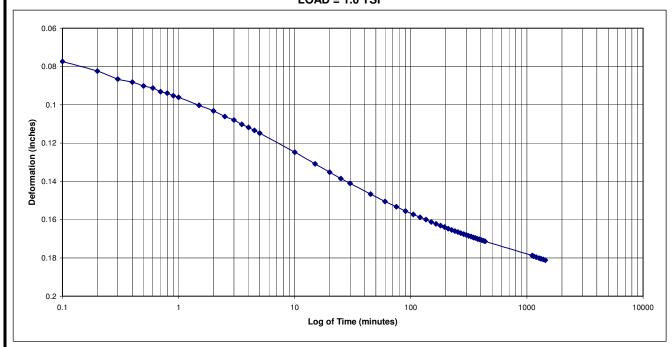
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 1.0 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



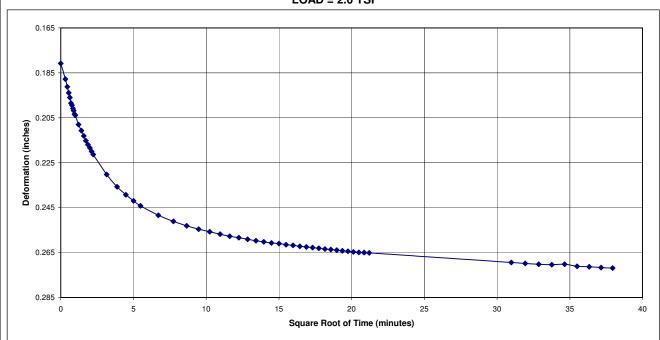
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

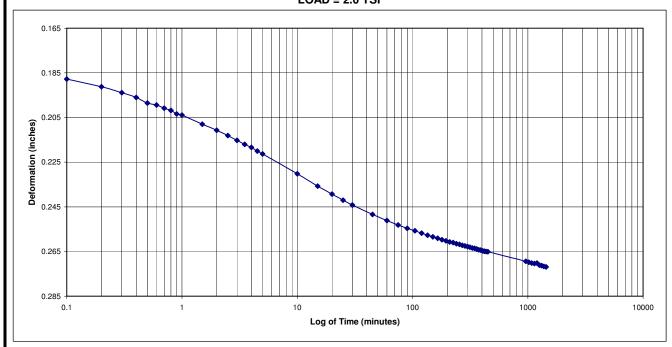
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 2.0 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



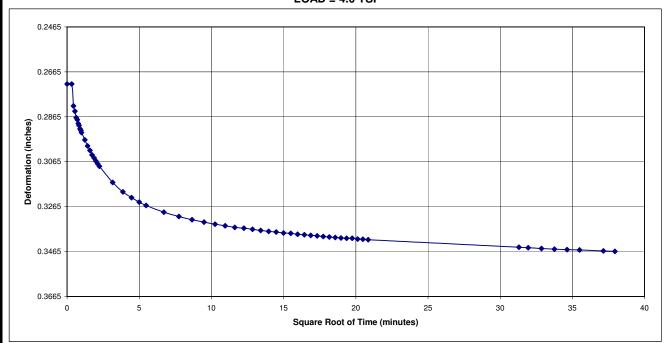
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

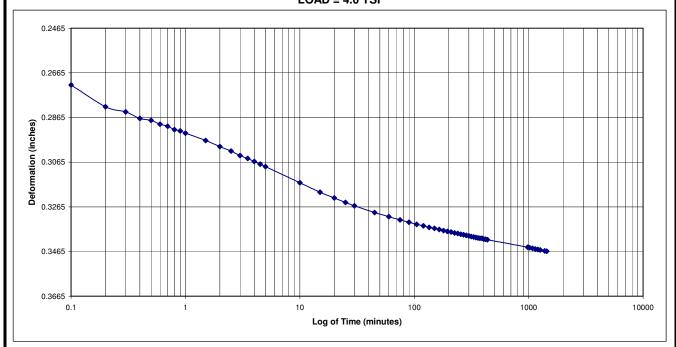
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 4.0 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



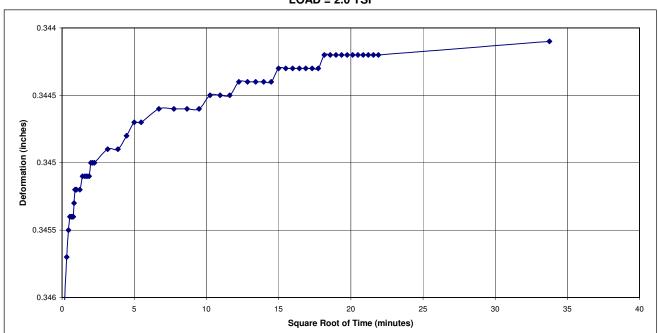
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

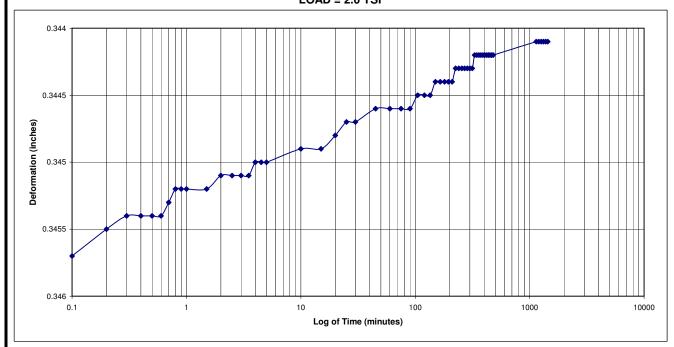
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 2.0 TSF



Sample No.: S&ME B-40A, 24'

B-40A Exploration No.: Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

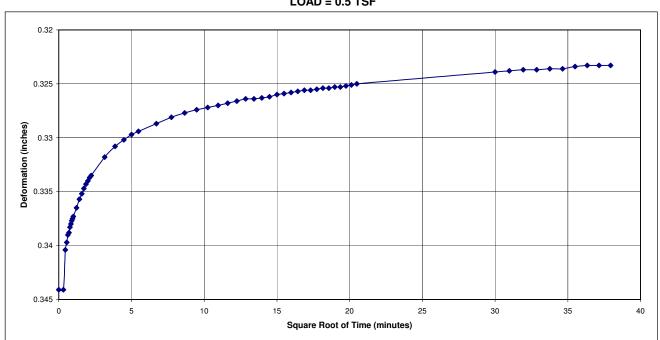
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: **SCDOT**

> Location: North Charleston, South Carolina

Tel: 804.266.2199 Fax: 804.261.5569 Project No.: 1131-08-554

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 0.5 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

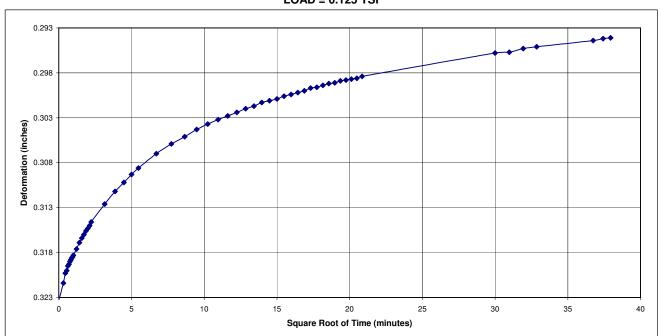
Project No.: 1131-08-554

X:\LB\Job Files\1131-08-554 Port Access Road\Consolidation\Time Plots\[Manual Consolidation Time Plots - B-40A, 23 to 25 feet - 16066.xls]Load Increment 8

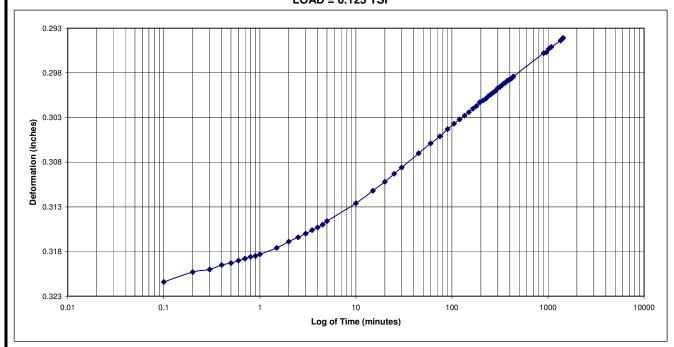
Tel: 804.266.2199

Fax: 804.261.5569

DEFORMATION VS. SQUARE ROOT OF TIME B-40A, 23 to 25 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-40A, 23 to 25 feet LOAD = 0.125 TSF



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A
Depth: 23 - 25 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

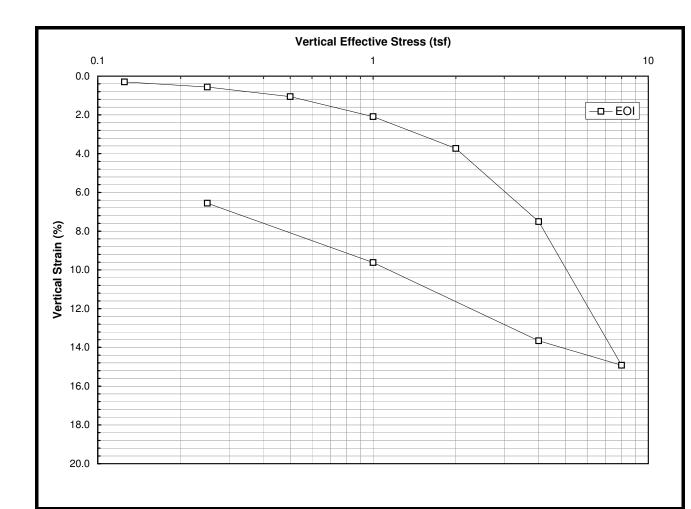
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199



N S	Probable Preconsolidation Stress, P'c (tsf):	3.3
DATIC	Approx. Hydrostatic Effective Stress, P'_{o} (tsf) Vertical Strain at P'_{o} (%):	0.6 1.3
P M	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.24
O	Over Consolidation Ratio (OCR):	5.4

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.125 tsf
ASTM D-2435 12.3.2

Test No.: SCI B-47A, 25'
Sample No.: UD1
Exploration No.: B-47A
Depth: 24 to 26 feet
USCS Description: Fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm ²): Measured Specific Gravity:	31.67
Measured Specific Gravity:	2.70
Trimmings Moisture (%):	54.4
% Passing #200 Sieve:	98.5

Liquid Limit: 81
Plastic Limit: 19
Plasticity Index: 62

	Initial	Final
Water Content (%):	55.8	52.7
Est. % Saturation:	98.8	100.0
Sample Height (cm):	2.540	2.373
Wet Sample Weight (g):	134.0	131.4
Dry Sample Weight (g):	86.0	86.0
Dry Unit Weight (pcf):	66.7	71.4
Void Ratio, e:	1.52	1.36
Solids Height (cm):	1.006	1.006



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

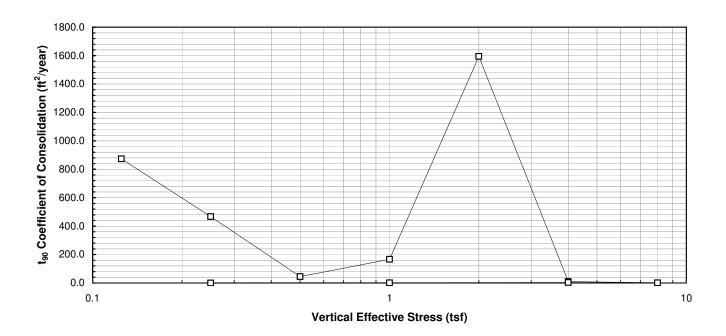
Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: SCI B-47A, 25'

Sample No.: UD1
Exploration No.: B-47A
Depth: 24 to 26 feet

									_
1015	0.7.0.0.0	VEDTION	VEDTICAL	VEDTION	VOID DATIO	VOID DATIO	OTDEOO	TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	23-55	0.125	0.3	0.2	1.52	1.52	0.04	873.3	
2	21-46	0.25	0.6	0.5	1.51	1.51	0.08	467.5	
3	23-23	0.5	1.1	0.9	1.50	1.50	0.15	45.2	
4	24-01	1	2.1	1.6	1.47	1.48	0.30	166.9	
5	20-01	2	3.7	2.4	1.43	1.46	0.61	1594.4	
6	24-01	4	7.5	6.3	1.33	1.37	1.21	10.2	
7	24-01	8	14.9	14.6	1.15	1.16	2.42	1.3	
8	24-01	4	13.7	13.8	1.18	1.18	1.21	3.6	
9	24-01	1	9.6	9.9	1.28	1.27	0.30	1.3	
10	24-01	0.25	6.6	6.2	1.36	1.37	0.08	0.5	

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

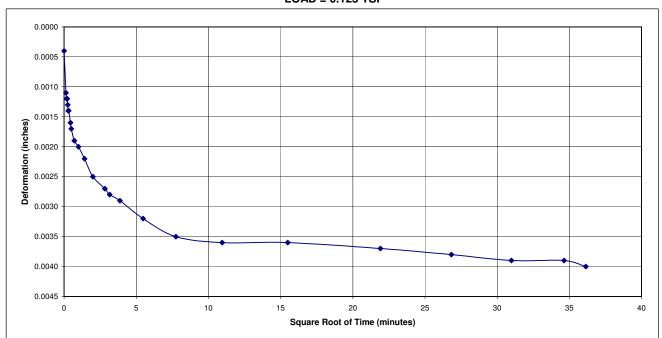
Location: North Charleston, South Carolina

Project No. 1131-08-554

Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 0.125 TSF



Sample No.: SCI B-47A, 25' Exploration No.: B-47A
Depth: 24 - 26 feet



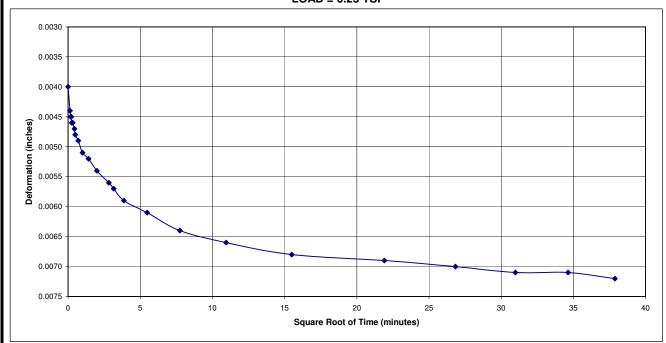
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 0.25 TSF



Sample No.: SCI B-47A, 25' Exploration No.: B-47A Depth: 24 - 26 feet



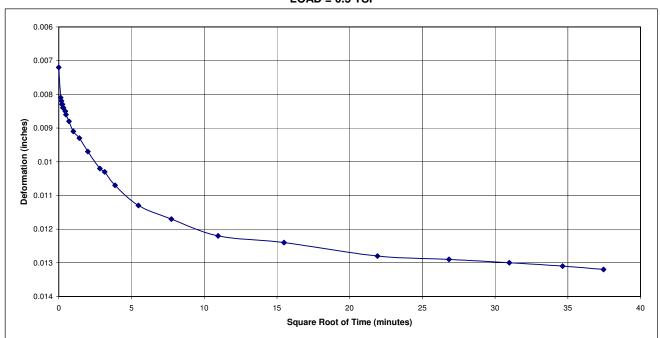
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

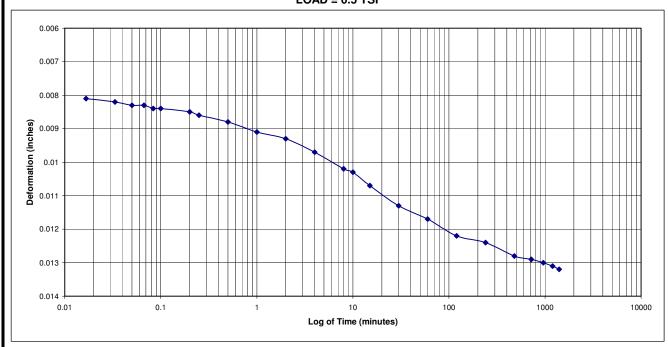
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 0.5 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



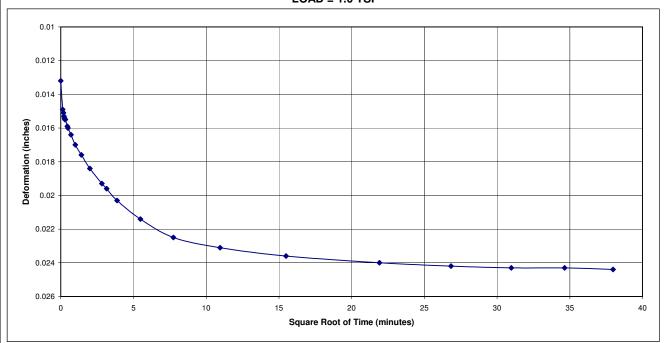
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

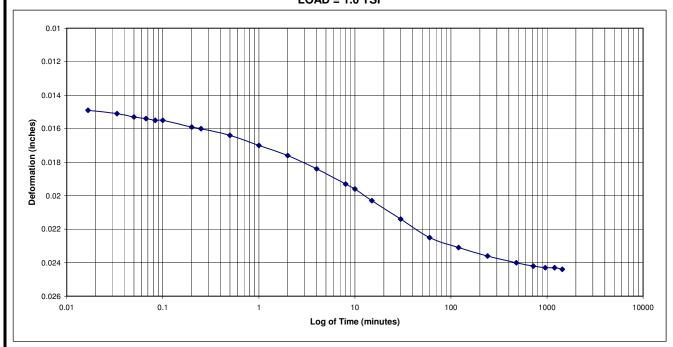
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 1.0 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



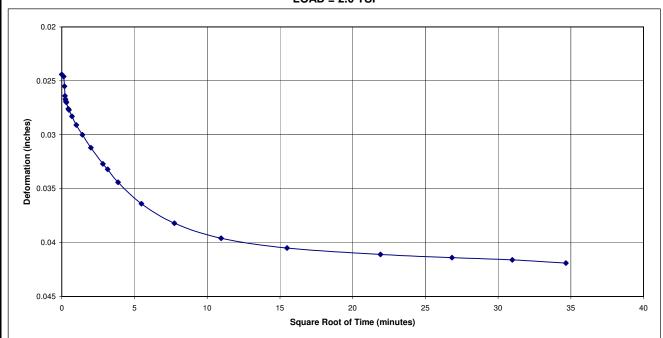
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

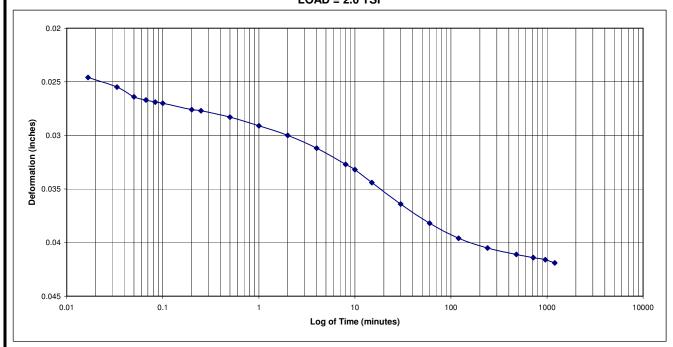
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 2.0 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



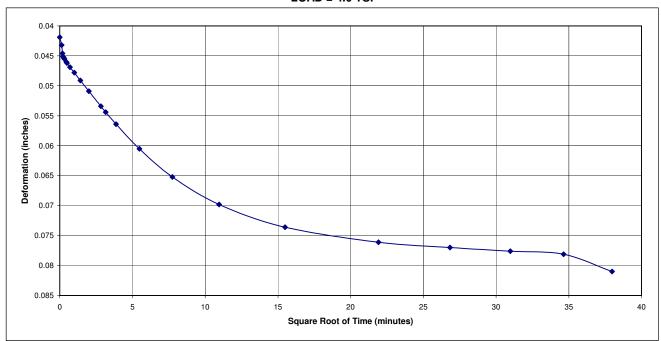
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

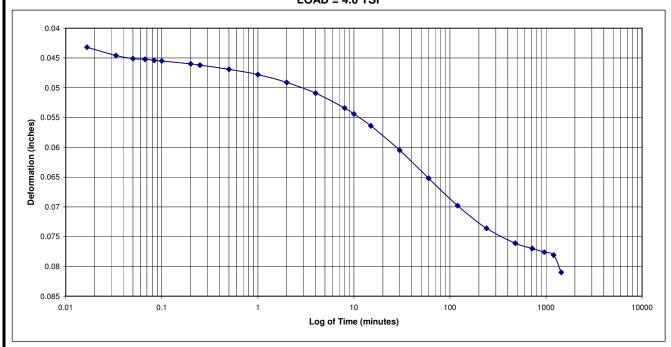
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 4.0 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



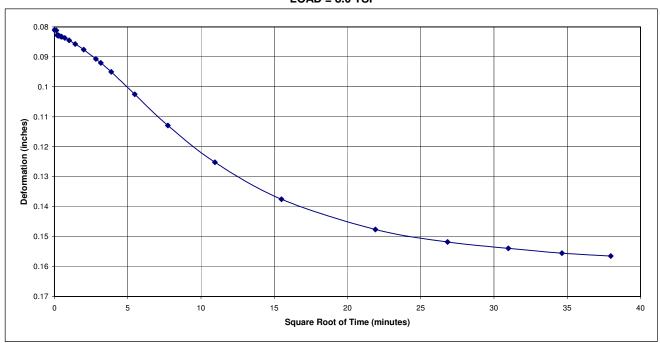
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

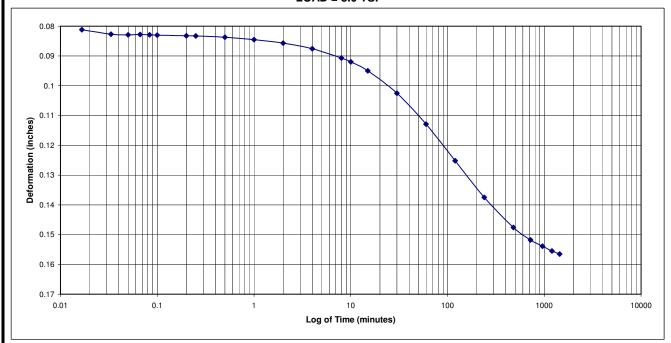
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 8.0 TSF



Sample No.: SCI B-47A, 25' Exploration No.: B-47A
Depth: 24 - 26 feet



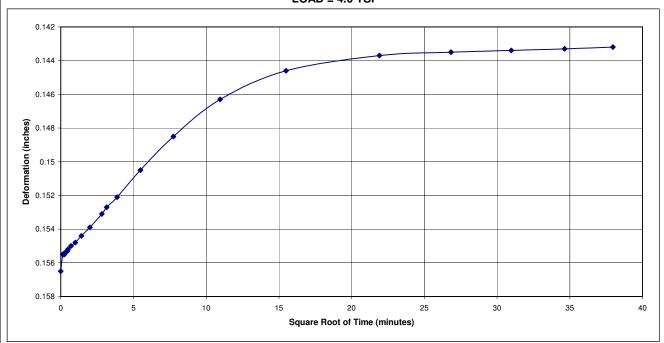
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 4.0 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



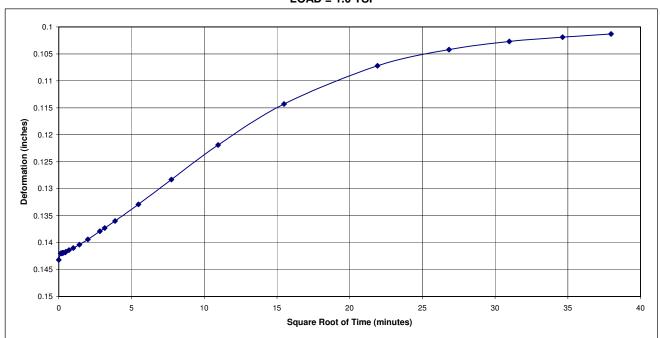
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 1.0 TSF



Sample No.: SCI B-47A, 25'
Exploration No.: B-47A
Depth: 24 - 26 feet



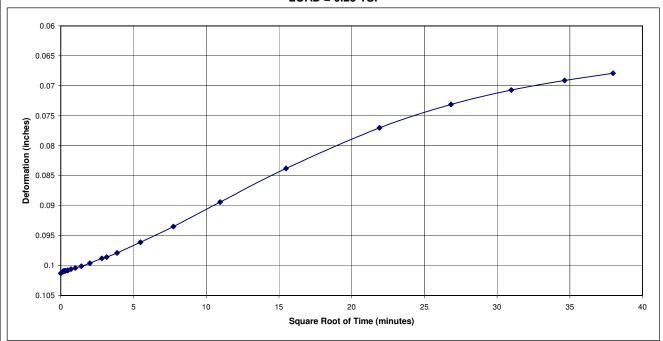
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

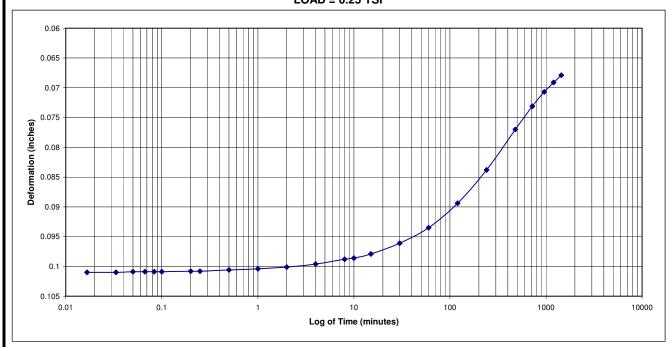
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-47A, 24 to 26 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-47A, 24 to 26 feet LOAD = 0.25 TSF



Sample No.: SCI B-47A, 25' Exploration No.: B-47A Depth: 24 - 26 feet

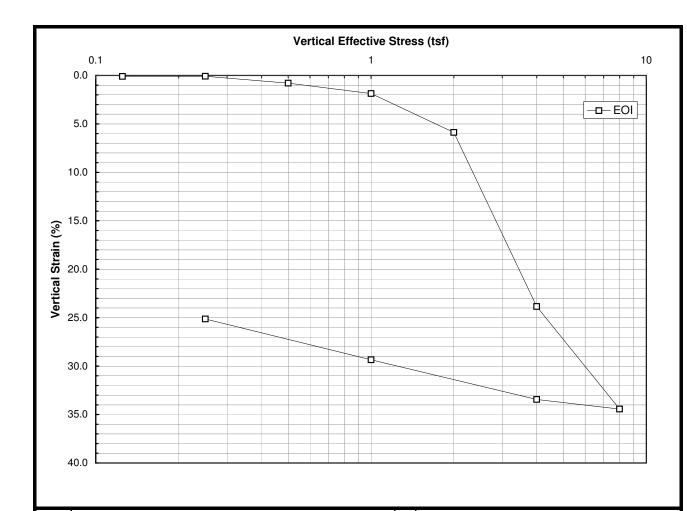


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NC	ഗ	Probable Preconsolidation Stress, P'c (tsf):	1.8
DATIC	ETER	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.7 1.3
SOLI	_	Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):	0.59
Ä	Ă	Recompression Ratio (RR):	0.069
ö	_	Over Consolidation Ratio (OCR):	2.6

Test Method:
Trimming Procedure:
Pressure at Inundation:
Method to Compute C_v:

ASTM D-2435 A
2.5-inch Trimming Lathe
0.015 tsf
ASTM D-2435 12.3.2

Test No.: S&ME B-53A, 33'
Sample No.: UD1

Exploration No.: B-53A
Depth: 32 to 34 feet

USCS Description: Fat CLAY with sand (CH)

Sample Diameter (cm):	6.35
Sample Area (cm²):	31.67
Measured Specific Gravity:	2.69
Sample Area (cm²): Measured Specific Gravity: Trimmings Moisture (%):	76.9
% Passing #200 Sieve:	82.9

Liquid Limit: 81
Plastic Limit: 31
Plasticity Index: 50

	Initial	Final
Water Content (%):	76.1	63.4
Est. % Saturation:	80.4	100.0
Sample Height (cm):	2.540	1.901
Wet Sample Weight (g):	107.5	99.7
Dry Sample Weight (g):	61.0	61.0
Dry Unit Weight (pcf):	47.3	63.2
Void Ratio, e:	2.55	1.66
Solids Height (cm):	0.716	0.716



SAMPLE ID

8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569 **ONE-DIMENSIONAL CONSOLIDATION TEST**

Project: Port Access Road

Client: SCDOT

SAMPLE DATA

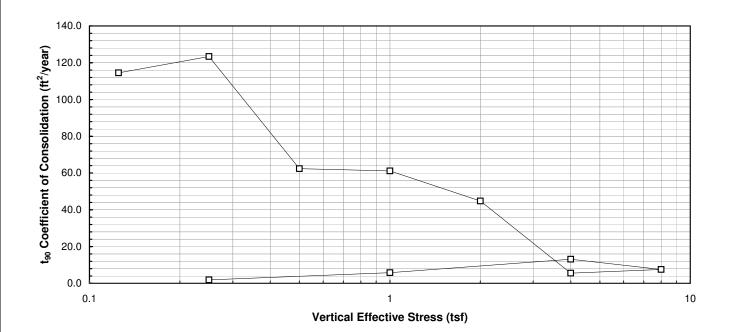
Location: North Charleston, South Carolina
Project No.: 1131-08-554 Page 1 of 2

Test No.: S&ME B-53A, 33'

Sample No.: UD1
Exploration No.: B-53A
Depth: 32 to 34 feet

								TAYLOR
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)
1	24-00	0.125	0.1	0.0	2.54	2.55	0.07	114.5
2	24-00	0.25	0.1	0.2	2.54	2.54	0.14	123.4
3	24-10	0.5	0.8	0.7	2.52	2.52	0.28	62.3
4	24-00	1	1.9	1.7	2.48	2.49	0.56	61.1
5	24-28	2	5.9	3.9	2.34	2.41	1.11	44.8
6	24-22	4	23.8	20.7	1.70	1.81	2.22	5.6
7	24-04	8	34.4	31.6	1.33	1.43	4.44	7.6
8	24-00	4	33.4	33.6	1.36	1.36	2.22	13.1
9	64-15	1	29.4	30.1	1.51	1.48	0.56	5.8
10	24-00	0.25	25.1	25.9	1.66	1.63	0.14	1.9

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

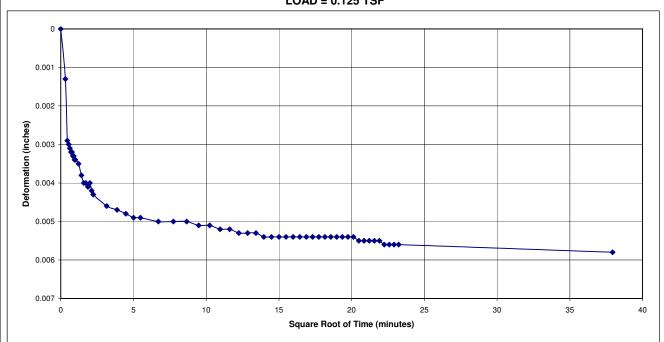
Location: North Charleston, South Carolina

Project No. 1131-08-554

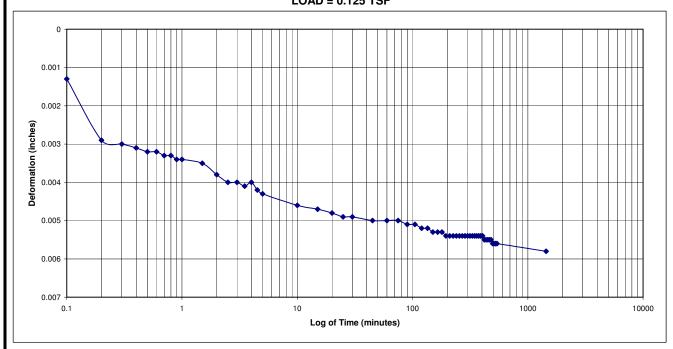
Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 0.125 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



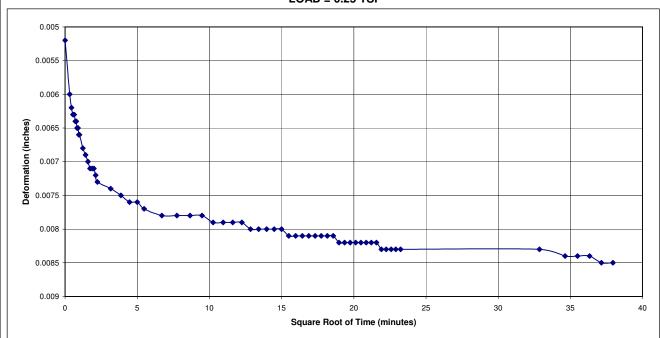
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

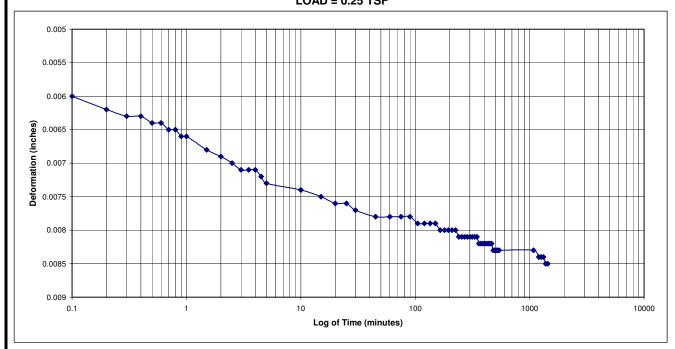
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 0.25 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



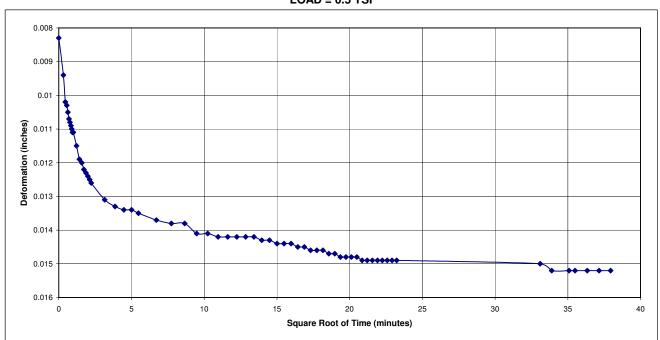
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

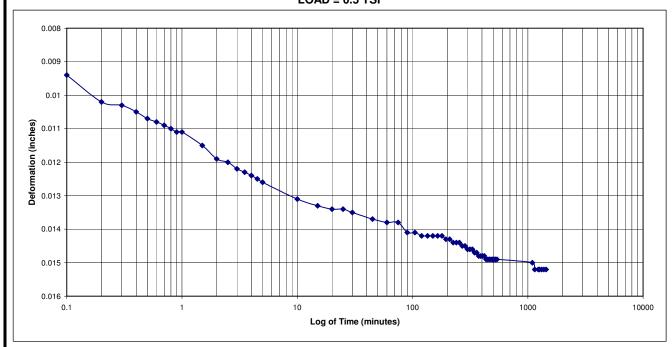
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 0.5 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



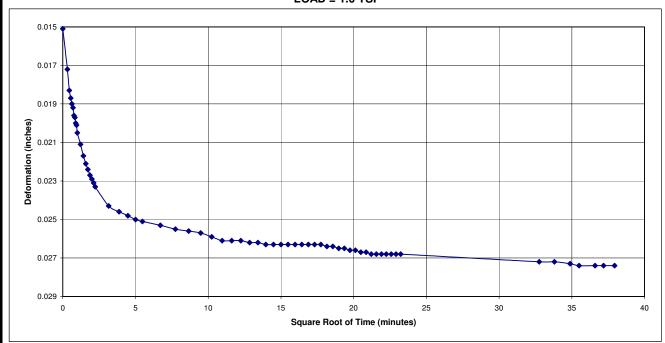
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 1.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



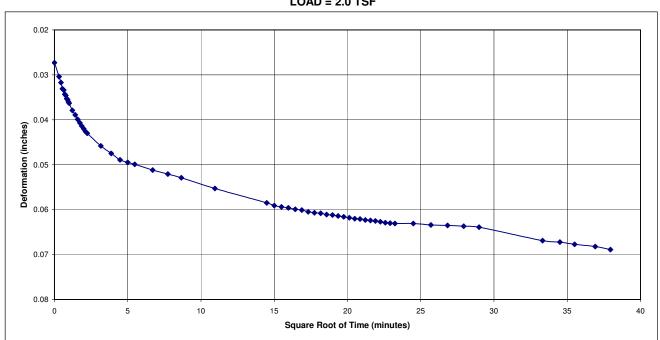
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 2.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



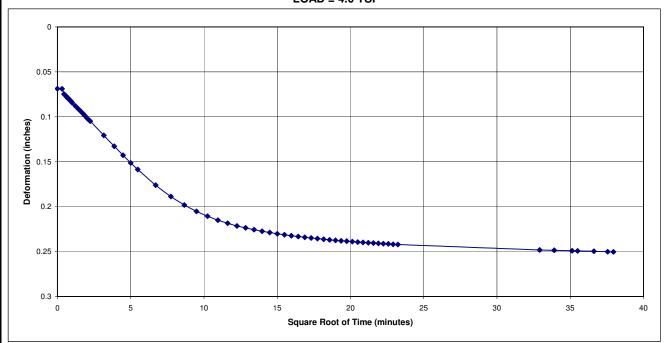
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

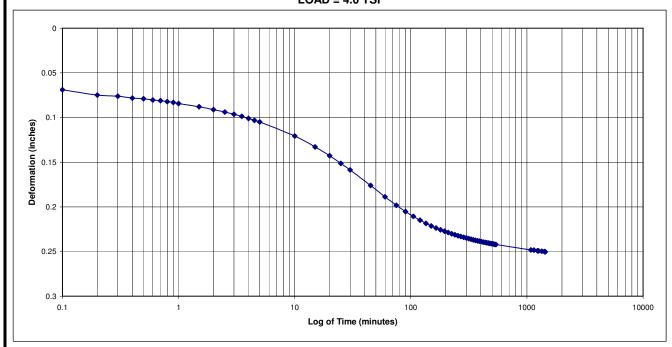
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 4.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



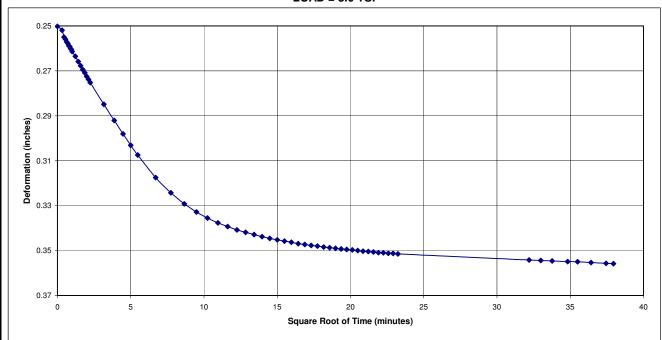
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

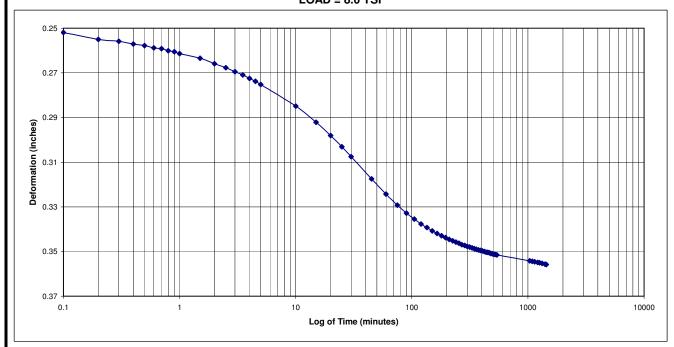
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 8.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



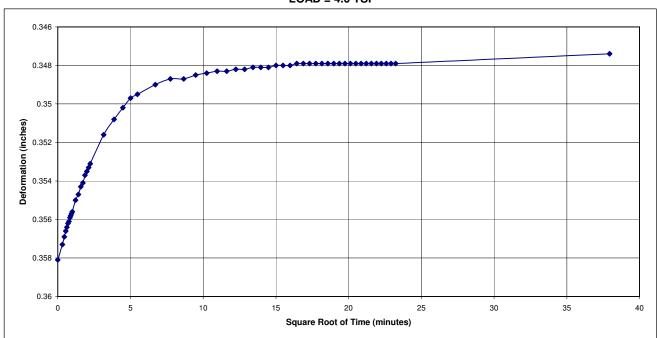
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 4.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



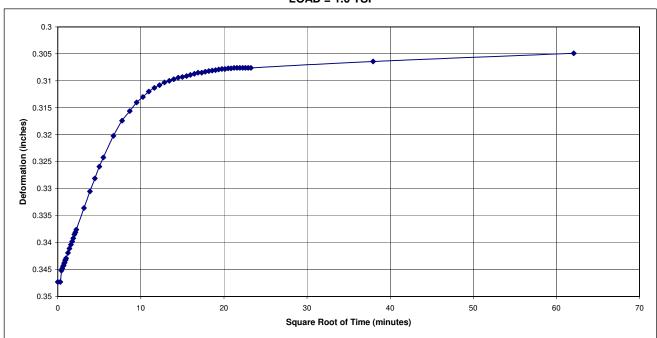
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

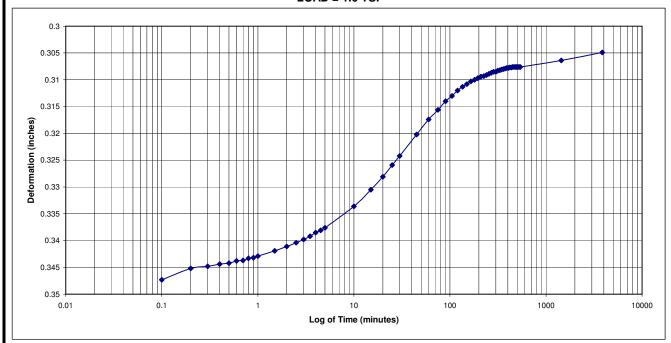
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 1.0 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet



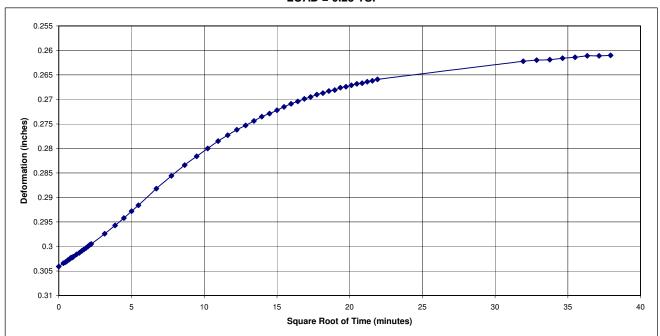
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

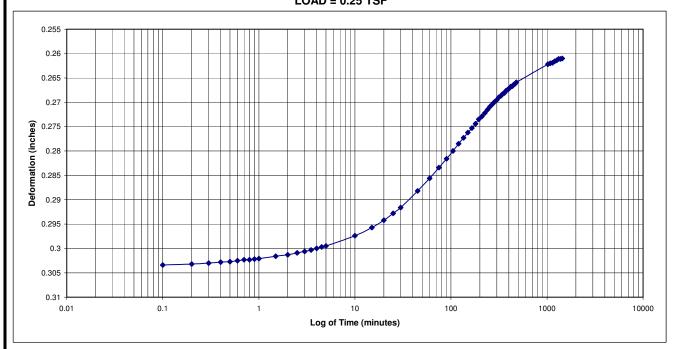
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-53A, 32 to 34 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-53A, 32 to 34 feet LOAD = 0.25 TSF



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A
Depth: 32 - 34 feet

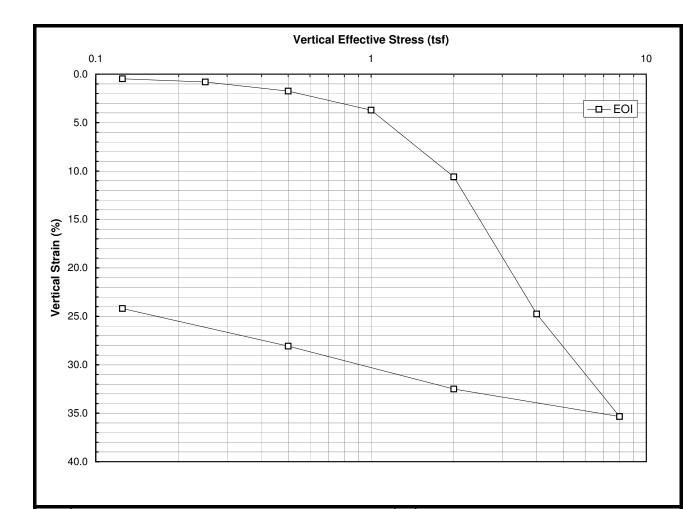


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



NO 6	Probable Preconsolidation Stress, P'c (tsf):	1.4
ONSOLIDATI PARAMETER	Approx. Hydrostatic Effective Stress, P' _o (tsf) Vertical Strain at P' _o (%):	0.7 2.7
	Compression Ratio	0.44
	Recompression Ratio	0.055
S.	Over Consolidation Ratio (OCR):	1.9

Ω		
METHO	Test Method:	ASTM D-2435 A
	Trimming Procedure:	2.5-inch Trimming Lathe
EST M	Pressure at Inundation: Method to Compute C_v :	0.125 tsf ASTM D-2435 12.3.2

Test No.: GTX B-55B, 36' SAMPLE ID Sample No.: UD1 Exploration No.: B-55B

Depth: 35 to 37 feet USCS Description: Fat CLAY (CH)

Sample Diameter (cm):	6.35
Sample Area (cm ²):	31.67
Measured Specific Gravity:	2.63
Trimmings Moisture (%):	77.6
% Passing #200 Sieve:	98.9

Liquid Limit: 104 Plastic Limit: 30 Plasticity Index: 74

_	Liquid Littiit.	104	
ΥT	Plastic Limit:	30	
7	Plasticity Index:	74	
LE			
SAMPLE DATA		Initial	Final
S	Water Content (%):	83.8	61.3
	Est. % Saturation:	94.5	100.0
	Sample Height (cm):	2.540	1.926
	Wet Sample Weight (g):	116.7	102.4
	Dry Sample Weight (g):	63.5	63.5
	Dry Unit Weight (pcf):	49.2	64.9
	Void Ratio, e:	2.33	1.53
	Solids Height (cm):	0.762	0.762



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569 **ONE-DIMENSIONAL CONSOLIDATION TEST**

Project: Port Access Road

Client: SCDOT

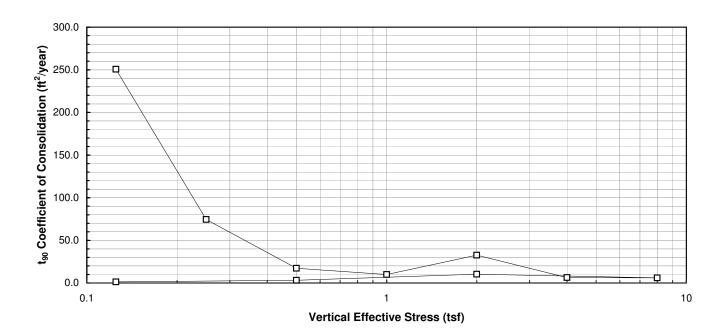
Location: North Charleston, South Carolina 1131-08-554 Page 1 of 2 Project No.:

Test No.: GTX B-55B, 36'

Sample No.: UD1
Exploration No.: B-55B
Depth: 35 to 37 feet

									_
	070500	VEDTION	VEDTION	VEDTION	\(\alpha\) = 1.710	VOID DATIO	077700	TAYLOR	
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF	
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION	
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)	
1	24-00	0.125	0.5	0.5	2.32	2.32	0.09	250.6	
2	24-00	0.25	8.0	0.7	2.31	2.31	0.18	74.5	
3	24-00	0.5	1.8	1.6	2.27	2.28	0.36	17.2	
4	24-00	1	3.7	3.4	2.21	2.22	0.71	10.0	
5	24-00	2	10.6	7.9	1.98	2.07	1.43	32.6	
6	24-00	4	24.8	21.9	1.51	1.60	2.86	6.4	
7	24-00	8	35.3	33.0	1.15	1.23	5.71	5.9	
8	24-00	2	32.5	33.0	1.25	1.23	1.43	10.3	
9	24-00	0.5	28.1	28.9	1.40	1.37	0.36	3.1	
10	24-00	0.125	24.2	24.8	1.53	1.51	0.09	1.3	

*EOI = End of Increment





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: SCDOT

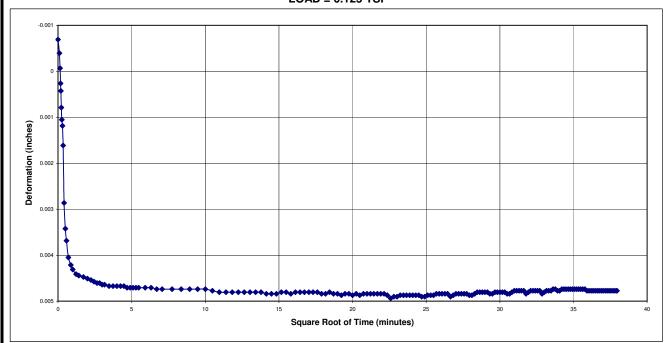
Location: North Charleston, South Carolina

Project No. 1131-08-554

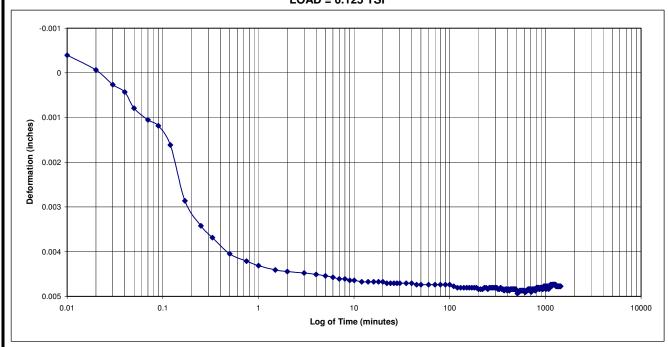
Page 2 of 2

^{*}EOP = End of Primary

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 0.125 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



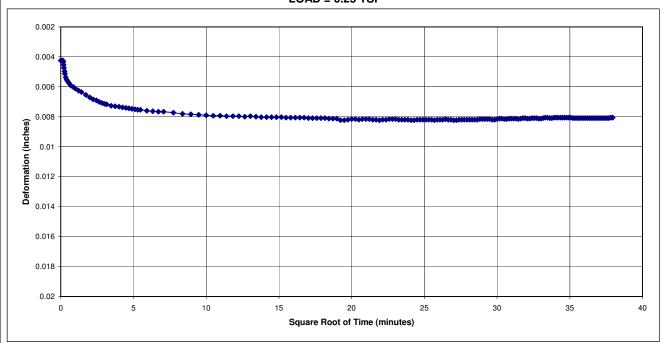
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

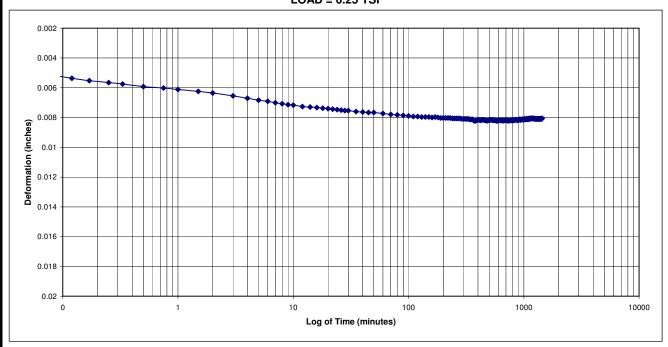
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 0.25 TSF



Sample No.: GTX B-55B, 36' Exploration No.: B-33B Depth: 35 - 37 feet



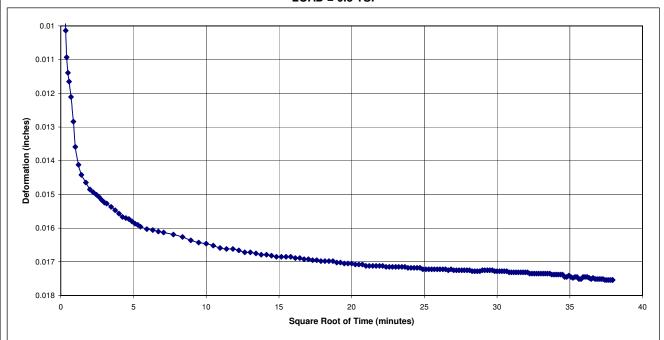
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

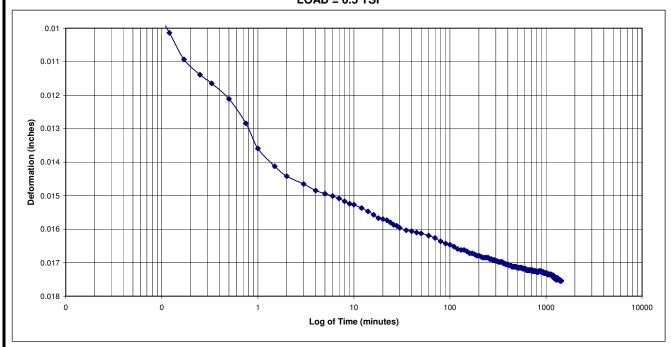
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 0.5 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



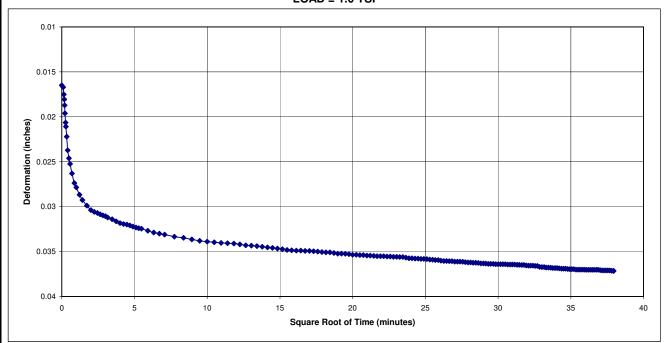
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

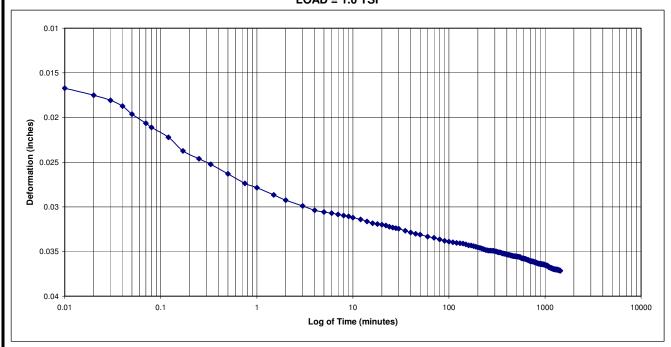
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 1.0 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



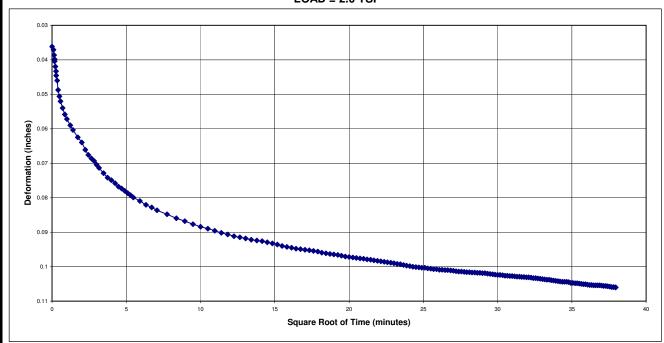
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

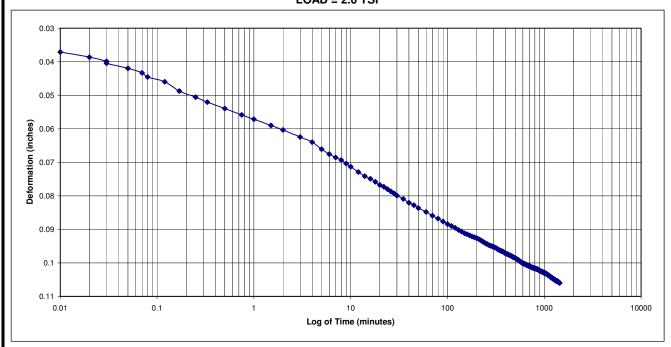
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 2.0 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



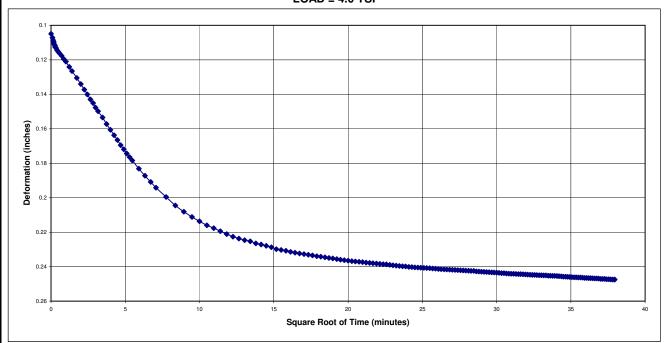
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

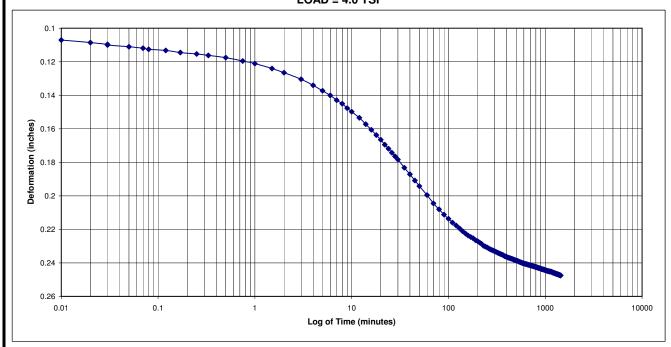
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 4.0 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 4.0 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



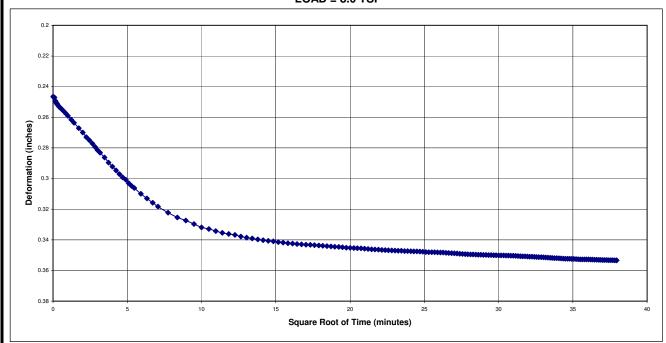
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

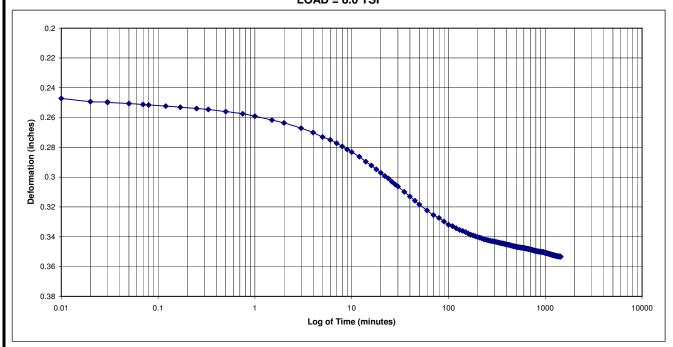
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 8.0 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 8.0 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



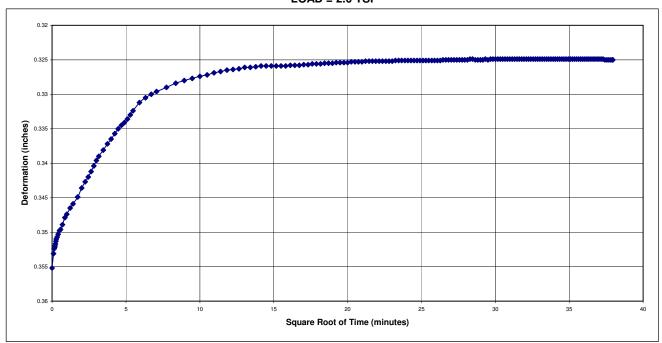
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

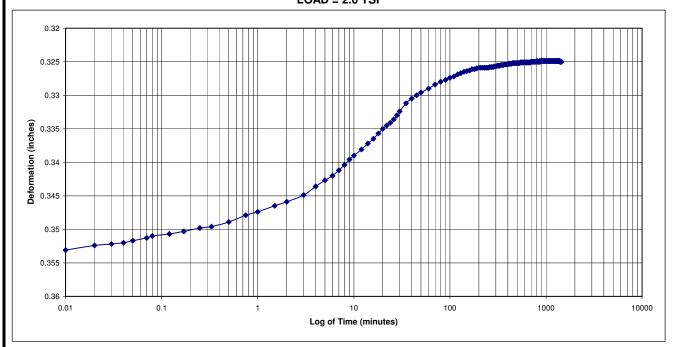
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 2.0 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



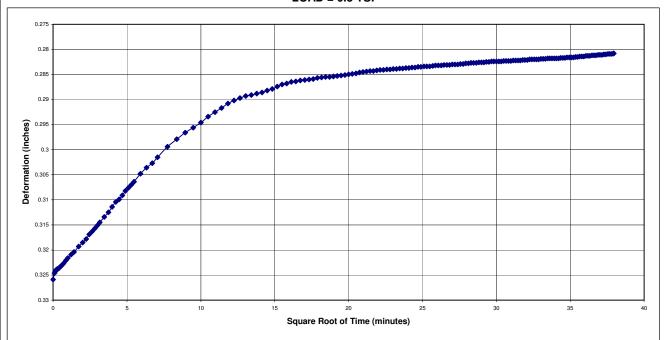
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

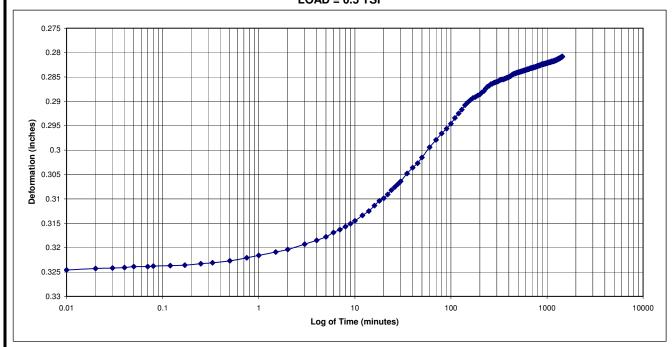
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 0.5 TSF



Sample No.: GTX B-55B, 36' Exploration No.: B-33B Depth: 35 - 37 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

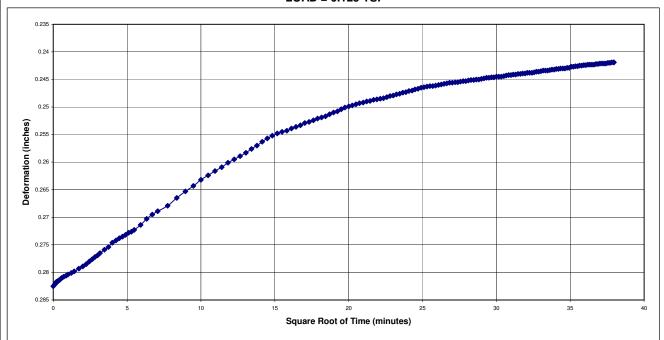
Richmond, Virginia 23228 Client: **SCDOT**

> Location: North Charleston, South Carolina

Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-55B, 35 to 37 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-55B, 35 to 37 feet LOAD = 0.125 TSF



Sample No.: GTX B-55B, 36'
Exploration No.: B-33B
Depth: 35 - 37 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

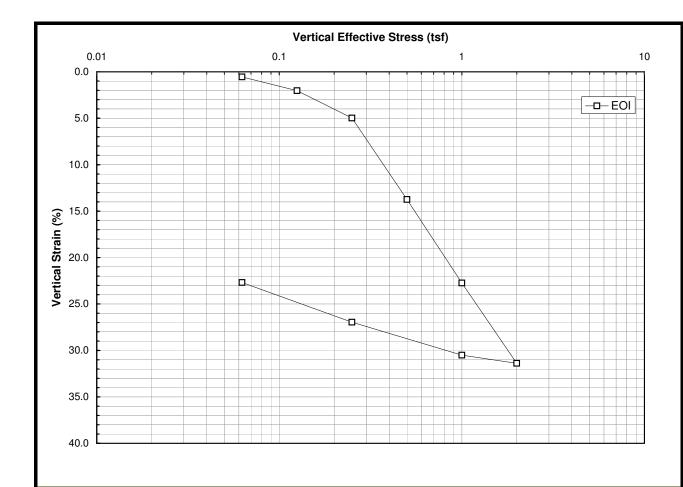
8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199



CONSOLIDA	Approx. Hydrostatic Effective Str Vertical Strain at P' _o (%): Compression Ratio (CR): Recompression Ratio (RR): Over Consolidation Ratio (OCR):		0.2 4.0 0.29 0.065 1.0
ЕТНОБ	Test Method: Trimming Procedure:	ASTM D-2435 A 2.5-inch Trimmin	g Lathe

Pressure at Inundation: 0.014 tsf Method to Compute C_v: ASTM D-2435 12.3.2

S&ME B-74A, 9' Test No.: SAMPLE ID Sample No.: UD1 Exploration No.: B-74A

Depth: 8 to 10 feet USCS Description: Elastic SILT (MH)

Sample Diameter (cm):	6.35
Sample Area (cm²): Measured Specific Gravity: Trimmings Moisture (%): % Passing #200 Sieve:	31.67
Measured Specific Gravity:	2.48
Trimmings Moisture (%):	108.2
% Passing #200 Sieve:	88.5

Liquid Limit: 86 Plastic Limit: 39 Plasticity Index: 47

	Initial	Final
Water Content (%):	124.8	91.3
Est. % Saturation:	98.3	100.0
Sample Height (cm):	2.540	1.964
Wet Sample Weight (g):	108.1	92.0
Dry Sample Weight (g):	48.1	48.1
Dry Unit Weight (pcf):	37.3	48.2
Void Ratio, e:	3.15	2.21
Solids Height (cm):	0.612	0.612



8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Port Access Road

Client: **SCDOT**

SAMPLE DATA

Location: North Charleston, South Carolina Page 1 of 2 Project No.: 1131-08-554

Test No.: S&ME B-74A, 9'

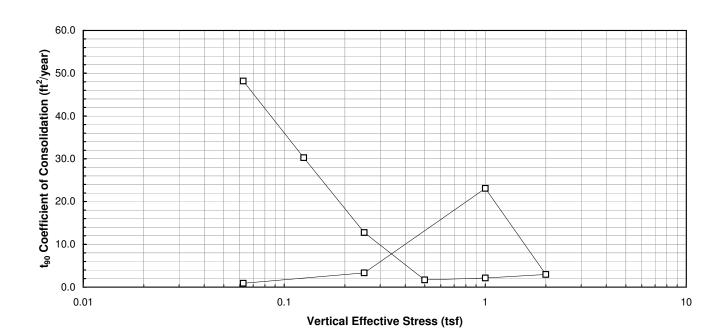
Sample No.: UD1

Exploration No.: B-74A

Depth: 8 to 10 feet

								TAYLOR
LOAD	STRESS	VERTICAL	VERTICAL	VERTICAL	VOID RATIO	VOID RATIO	STRESS	COEFFICIENT OF
INC.	DURATION	STRESS	STRAIN	STRAIN	е	е	RATIO	CONSOLIDATION
	(Hr - min)	(tsf)	(EOI*)	(EOP*)	(EOI*)	(EOP*)	(P'/P'c)	(ft²/year)
1	24-00	0.0625	0.6	0.2	3.13	3.14	0.3	48.2
2	24-00	0.125	2.0	1.2	3.06	3.10	0.6	30.3
3	24-10	0.25	5.0	3.9	2.94	2.99	1.1	12.8
4	24-00	0.5	13.8	12.6	2.58	2.62	2.3	1.7
5	24-28	1	22.7	22.0	2.20	2.23	4.5	2.1
6	24-22	2	31.4	30.9	1.85	1.86	9.1	3.0
7	24-04	1	30.5	30.8	1.88	1.87	4.5	23.1
8	24-00	0.25	27.0	27.8	2.03	2.00	1.1	3.3
9	64-15	0.0625	22.7	23.7	2.21	2.17	0.3	0.9

*EOI = End of Increment *EOP = End of Primary





8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

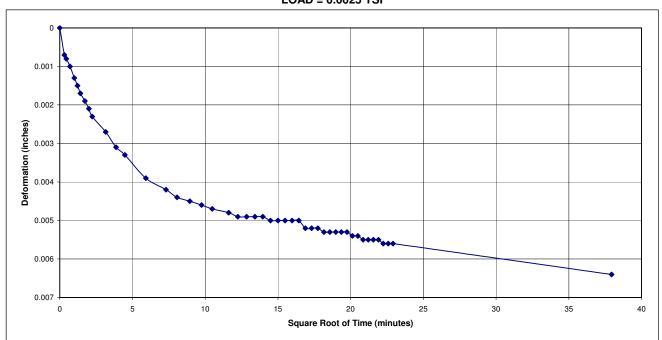
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No. 1131-08-554 Page 2 of 2

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.0625 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



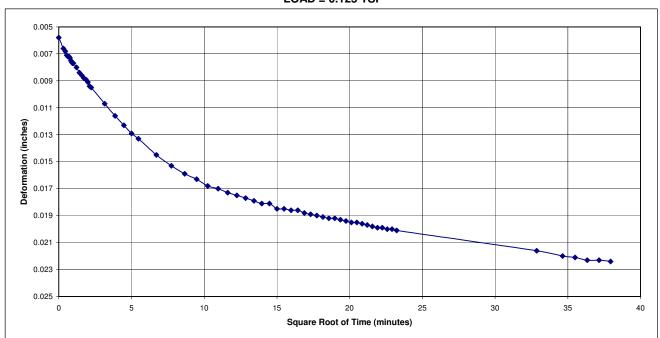
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.125 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.125 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



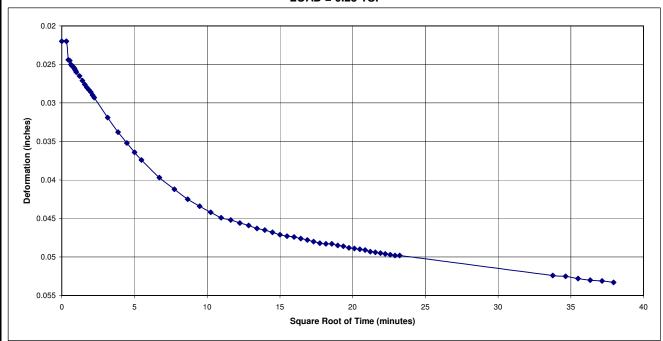
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

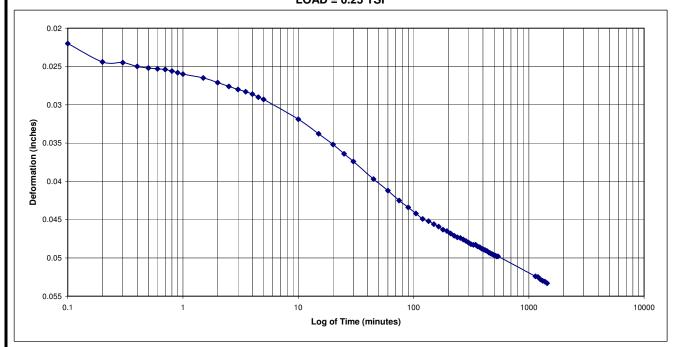
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.25 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



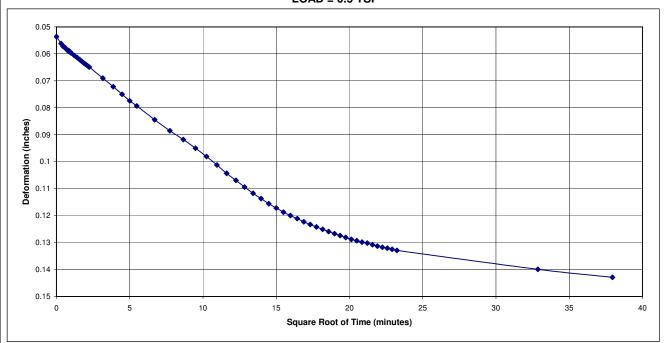
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.5 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.5 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



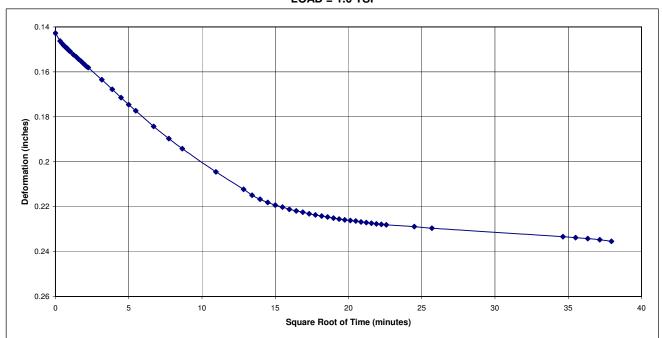
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 1.0 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



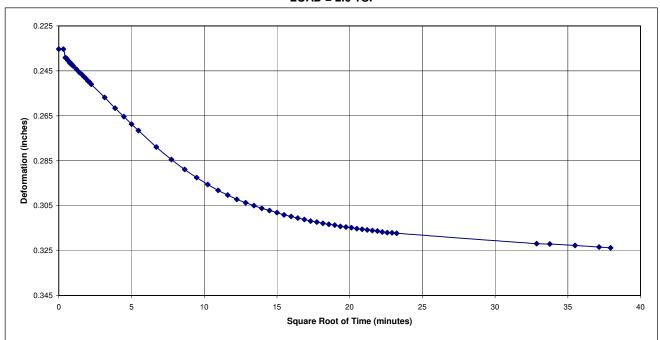
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

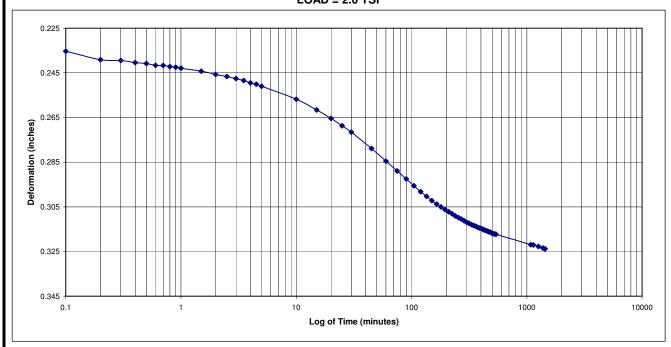
Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 2.0 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 2.0 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



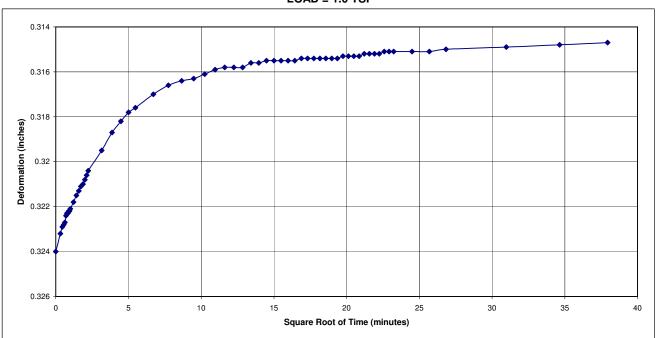
1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 1.0 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 1.0 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A
Depth: 8 - 10 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

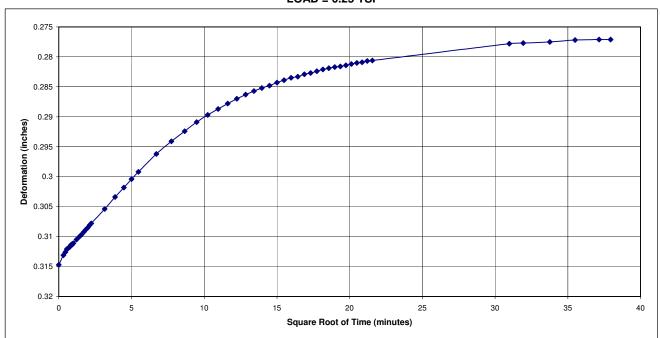
Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.25 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.25 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet



1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

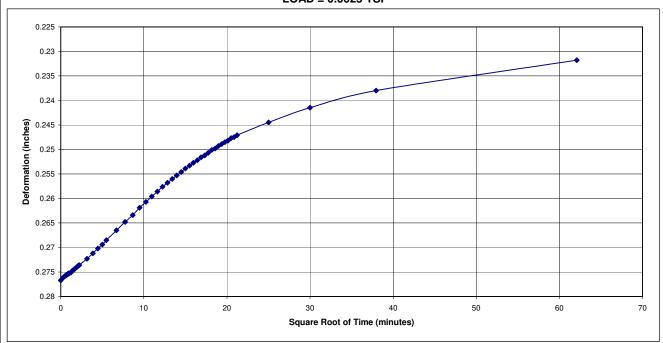
Richmond, Virginia 23228 Client: SCDOT

Location: North Charleston, South Carolina

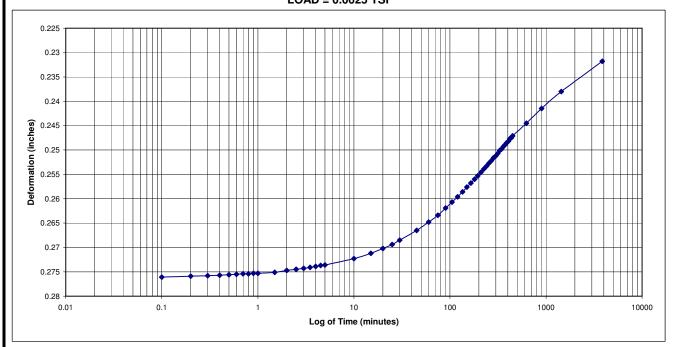
Fax: 804.261.5569 Project No.: 1131-08-554

Tel: 804.266.2199

DEFORMATION VS. SQUARE ROOT OF TIME B-74A, 8 to 10 feet LOAD = 0.0625 TSF



DEFORMATION VS. LOG OF TIME B-74A, 8 to 10 feet LOAD = 0.0625 TSF



Sample No.: S&ME B-74A, 9'
Exploration No.: B-74A

Depth: 8 - 10 feet

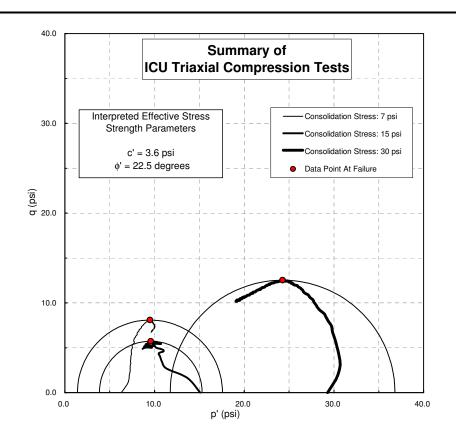


1-D CONSOLIDATION TIME-DEFORMATION CURVES

8211 Hermitage Road Project: Port Access Road

Richmond, Virginia 23228 Client: SCDOT

Tel: 804.266.2199 Location: North Charleston, South Carolina



₽	Exploration No.:	B-2A			Z	3/8-in (9.5-mm)		Liquid Limit, %	63
	Sample Depth:	23 to 25 feet			Ĕ	No. 4 (4.75-mm)		Plastic Limit, %	19
SAMPLE	USCS Classification:	Gray, fat CLA	Y (CH)		S	No. 10 (2.0-mm)		Plasticity Index, %	44
Iĕ					Ē	No. 40 (0.425-mm)		Classification	CH
S					SS	No. 100 (0.150-mm)		Measured Gs	2.64
					CLASSIFICATION	No. 200 (0.075-mm)	86.6		
	Sample No.	Α	В	С	ਹ	Notes:			
	Wet Weight, g	115.4	137.5	121.8		Notes.			
Щ	Dry Weight, g	66.1	82.7	77.9		Sample No.	Α	В	С
SAMPL	Water Content, %	74.6	66.2	56.4		Saturation Method	Wet	Wet	Wet
Ι¥	Wet Density, pcf	99.4	97.2	98.0		B-Parameter	1.00	1.00	1.00
	Dry Density, pcf	56.9	58.5	62.7		t ₅₀ , minutes	28.1	106.8	61.4
INITIAL	Saturation, %	100.0	96.2	91.4	Æ	Strain Rate, in/min	0.0001	0.0001	0.0001
ΙĒ	Void Ratio	1.97	1.82	1.63	SUMMA	Cell Pressure, psi	37.0	45.0	60.0
=	Diameter, in	1.400	1.400	1.375	Ī	Back Pressure, psi	30.0	30.0	30.0
	Height, in	2.875	3.500	3.188		Consolidation Stress, psi	7.0	15.0	30.0
	* Water	content data	obtained usin	g entire sample	TEST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
7	Wet Weight, g	113.6	135.5	117.6	Ţ	Deviator Stress at Failure, psi	16.2	11.5	25.1
Ιō	Dry Weight, g	66.1	82.7	77.9	ľ	Axial Strain at Failure, %	3.2	0.8	2.5
ΑT	Water Content, %	71.9	63.8	50.9		σ _{1F} , psi	17.6	15.3	36.8
CONSOLIDATION	Wet Density, pcf	103.5	98.0	103.1		σ _{3F} , psi	1.4	3.9	11.8
١٦	Dry Density, pcf	60.2	59.8	68.3		* Membrane correction su	btracted from	deviator stress for Sar	nples A-C
SS	Saturation, %	100.0	96.1	95.2		The effective stress strength pa			
18	Void Ratio	1.90	1.75	1.41	RKS	interpretation. Effective stress s	0 1		,
_	Area, in ²	1.485	1.517	1.389	AB	geotechnical engineer of record	ioi specilic al	oplication to the referer	icea project.
AFTER	Diameter, in	1.375	1.390	1.330	REMAI				
ΑF	Height, in	2.816	3.471	3.128	R				
1 7	* \^/		منامين المصمنا مقطام		ı				

Sieve Size



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ISOTROPICALLY CONSOLIDATED, UNDRAINED TRIAXIAL TEST

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Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554

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Atterberg Limits

X:\LB\Job Files\1131-08-554 Port Access Road\CU\[CU Report B-2A, 23 to 25 feet - SCI.xls]Report Page 1

* Water content data obtained using entire sample

SCI B-2A, 24'

Lab Sample No.:

Lab Sample No.: SCI B-2A, 24' Exploration No.: B-2A Sample Depth: 23 to 25 feet 30.0 25.0 20.0 Deviator Stress (psi) 10.0 ----- Specimen A -Specimen B Specimen C Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% Axial Strain Axial Strain 35.0 SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 30.0 Stress (psi) 50.0 50.0 Effective Confining 15.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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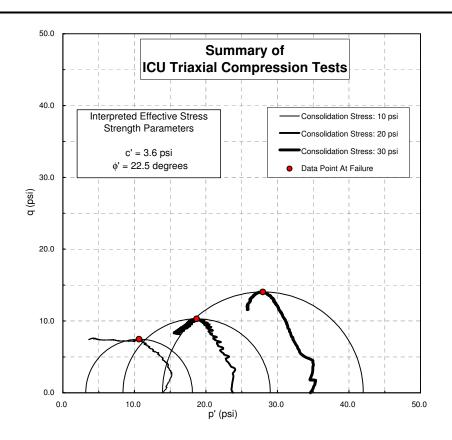
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

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	Lab Campio No	00. 5 27., 00				0.010 0.20	70 T 400Hig	7 tttorborg E			
₽	Exploration No.:	B-2A			Z	3/8-in (9.5-mm)		Liquid Limit, %	92		
	Sample Depth:	35 to 37 feet			۱¥	No. 4 (4.75-mm)		Plastic Limit, %	25		
SAMPLE	USCS Classification	: Gray, fat CLA	/ (CH)		SSIFICATION	No. 10 (2.0-mm)		Plasticity Index, %	67		
Į₽					ΙĔ	No. 40 (0.425-mm)		Classification	CH		
Š					SS	No. 100 (0.150-mm)		Measured Gs	2.67		
					CLAS	No. 200 (0.075-mm)	94.9				
	Sample No.	Α	В	С	ᄗ	Notes:					
	Wet Weight, g	123.3	130.1	133.0		Notes.					
Щ	Dry Weight, g	66.4	69.2	72.1		Sample No.	Α	В	С		
ᆸ	Water Content, %	85.5	88.1	84.5		Saturation Method	Wet	Wet	Wet		
AMPL	Wet Density, pcf	97.6	92.0	94.0		B-Parameter	0.95	0.95	0.95		
ဟ	Dry Density, pcf	52.6	48.9	51.0		t ₅₀ , minutes	380.7	286.1	200.6		
INITIAL	Saturation, %	100.0	97.8	99.4	Α	Strain Rate, in/min	0.0007	0.0007	0.0007		
ΙĒ	Void Ratio	2.28	2.41	2.27	SUMMA	Cell Pressure, psi	36.5	46.5	56.5		
=	Diameter, in	1.400	1.400	1.400	Ī	Back Pressure, psi	26.5	26.5	26.5		
	Height, in	3.125	3.500	3.500	ร	Consolidation Stress, psi	10.0	20.0	30.0		
	* Wate	r content data o	btained usir	ng entire sample	ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}		
_	Wet Weight, g	118.9	125.1	125.7	TEST	Deviator Stress at Failure, psi	14.9	20.6	28.1		
ಠ	Dry Weight, g	66.4	69.2	72.1	'	Axial Strain at Failure, %	5.1	1.4	2.9		
ATION	Water Content, %	78.9	80.9	74.4		σ _{1F} , psi	18.1	29.0	42.0		
₽	Wet Density, pcf	114.3	96.5	99.8		σ _{3F} , psi	3.2	8.4	13.9		
CONSOLID	Dry Density, pcf	63.9	53.3	57.2		* Membrane correction subtracted from deviator stress for Samples A-C					
SS	Saturation, %	100.0	100.0	100.0		The effective stress strength p					
18	Void Ratio	2.11	2.16	1.99	EMARKS	interpretation. Effective stress	• .		•		
	Area, in ²	1.356	1.444	1.408	AB	geotechnical engineer of recor	a for specific a	oplication to the referen	icea project.		
lΨ	Diameter, in	1.314	1.356	1.339	Ž	POINT A - Designing engineer	should confirm	the reliability of data a	as the plot of		
AFTER	Height, in	2.922	3.422	3.406	R	PSR is not consitent with Point		,	- 1		
Ľ	* Water content data obtained using entire sample										

Sieve Size



Lab Sample No.:

SCI B-2A, 36'

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Atterberg Limits

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Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 1 of 2

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Lab Sample No.: SCI B-2A, 36' Exploration No.: B-2A Sample Depth: 35 to 37 feet 15.0 30.0 25.0 20.0 Deviator Stress (psi) 10.0 -Specimen A ALL THE PROPERTY OF THE PROPER -Specimen B Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 45.0 35.0 30.0 Stress 25.0 Confining 20.0 15.0 10.0 Manney Comments Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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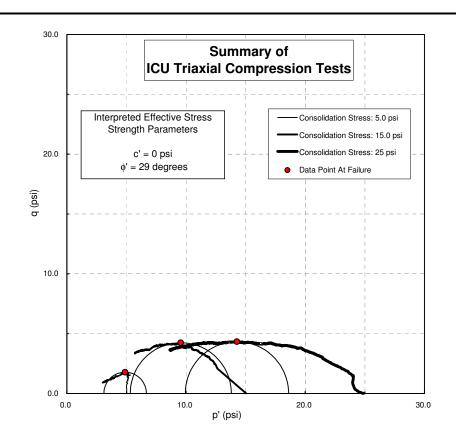
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

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	Lab Sample No.:	GTX B-33A, 2	21'			Sieve Size	%-Passing	Atterberg L	imits
₽	Exploration No.:	B-33A			Z	3/8-in (9.5-mm)		Liquid Limit, %	152
	Sample Depth:	20 to 22 feet			ı	No. 4 (4.75-mm)		Plastic Limit, %	66
ᅵచ	USCS Classification	: Gray, elastic	SILT (MH)		Ϋ́	No. 10 (2.0-mm)		Plasticity Index, %	86
SAMPLE					SSIFICATION	No. 40 (0.425-mm)		Classification	MH
ŝ					SSI	No. 100 (0.150-mm)		Measured Gs	2.62
					CLA	No. 200 (0.075-mm)	97.9		
	Sample No.	Α	В	С	ਹ	Notes:			
	Wet Weight, g	101.9	105.2	102.6		Notes.			
Щ	Dry Weight, g	43.8	44.8	42.2		Sample No.	Α	В	С
딥	Water Content, %	132.9	134.5	143.0		Saturation Method	Wet	Wet	Wet
AMPLE	Wet Density, pcf	84.1	84.0	79.8		B-Parameter	0.96	0.97	0.95
S	Dry Density, pcf	36.1	35.8	32.9		t ₅₀ , minutes	52.0	61.0	89.0
Ι¥	Saturation, %	98.7	98.8	94.2	ΡY	Strain Rate, in/min	0.004	0.004	0.004
INITIAL	Void Ratio	3.53	3.57	3.98	SUMMA	Cell Pressure, psi	90.0	43.0	98.0
=	Diameter, in	1.400	1.400	1.400	Ξ	Back Pressure, psi	85.0	28.0	73.0
	Height, in	3.000	3.100	3.180	S	Consolidation Stress, psi	5.0	15.0	25.0
	* Wate	er content data	obtained usir	ng entire sample	ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
7	Wet Weight, g	96.8	87.9	72.4	ΤË	Deviator Stress at Failure, psi	3.6	8.5	8.7
ATION	Dry Weight, g	43.8	44.8	42.2	-	Axial Strain at Failure, %	4.0	4.5	4.7
ΑT	Water Content, %	121.1	96.0	71.5		σ _{1F} , psi	6.7	13.8	18.6
19	Wet Density, pcf	89.0	94.3	97.4		σ _{3F} , psi	3.1	5.3	9.9
CONSOLID	Dry Density, pcf	40.2	48.1	56.8		* Membrane correction subtract	ted from devia	tor stress for Samples A	A-C
S	Saturation, %	100.0	100.0	99.8		The effective stress strength p			
18	Void Ratio	3.17	2.52	1.88	REMARKS	interpretation. Effective stress	0 1		,
	Area, in ²	1.400	1.200	0.950	AB	geotechnical engineer of recor	u for specific a	pplication to the referen	cea project.
AFTER	Diameter, in	1.335	1.236	1.100	Ž	POINT C - Not included for inte	erpretation of c	and φ'	
ΑF	Height, in	2.960	2.960	2.980	R		,	•	
L	* Wate	er content data	obtained usir	g entire sample					



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(:\LB\Job Files\1131-08-554 Port Access Road\CU\[CU Report B-33A, 20 to 22 feet - GTX.xls]Report Page 1

Lab Sample No.: GTX B-33A, 21' Exploration No.: B-33A Sample Depth: 20 to 22 feet Deviator Stress (psi) Principal Stress Ratio -Specimen B Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain 30.0 SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 25.0 Effective Confining Stress (psi) 5.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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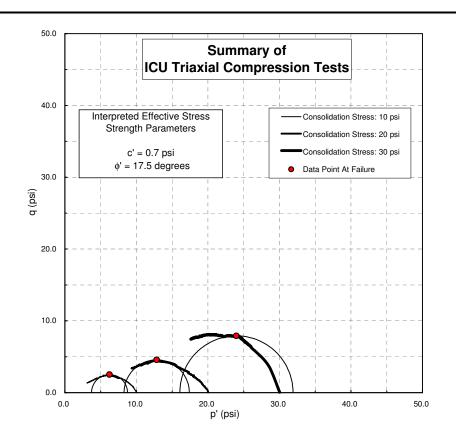
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Location: North Charleston, South Carolina

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	Lab Sample No.:	GTX B-33A, 31'
Ω	Exploration No.:	B-33A
Щ	Sample Depth:	30 to 32 feet
굽	USCS Classification:	Gray, fat CLAY (CH)
SAMPI		
S		

	Sample No.	Α	В	С	ᄗ
	Wet Weight, g	106.0	105.8	104.2	Ī
ш	Dry Weight, g	45.3	44.9	45.5	
Ы	Water Content, %	134.2	135.8	129.0	
Σ	Wet Density, pcf	85.8	85.6	82.8	
S	Dry Density, pcf	36.6	36.3	36.1	
INITIAL SAMPLE	Saturation, %	100.0	100.0	96.0	₽
E	Void Ratio	3.51	3.55	3.51	SUMMARY
2	Diameter, in	1.400	1.400	1.399	≥
	Height, in	3.060	3.060	3.120	S
	* Water	content data	obtained usin	g entire sample	ST
7	Wet Weight, g	97.1	92.2	79.7	ĮΫ
ō	Dry Weight, g	45.3	44.9	45.5	-
ΑT	Water Content, %	114.6	105.6	75.1	
Q.	Wet Density, pcf	91.1	95.0	99.2	
5	Dry Density, pcf	42.5	46.2	56.7	
SS	Saturation, %	100.0	100.0	100.0	
S	Void Ratio	3.00	2.76	1.97	SS
R	Area, in ²	1.430	1.370	0.990	REMARKS
끧	Diameter, in	1.349	1.321	1.123	Ž
AFTER CONSOLIDATION	Height, in	2.840	2.700	3.090	R
•	* Water	content data	obtained usin	g entire sample	

	Sieve Size	%-Passing	Atterberg Li	mits
×	3/8-in (9.5-mm)		Liquid Limit, %	141
≅	No. 4 (4.75-mm)		Plastic Limit, %	43
Ϋ́	No. 10 (2.0-mm)		Plasticity Index, %	98
₩	No. 40 (0.425-mm)		Classification	CH
ASSIFICATION	No. 100 (0.150-mm)		Measured Gs	2.62
ĕ	No. 200 (0.075-mm)	98.3		

Notes:

	Sample No.	Α	В	С				
	Saturation Method	Wet	Wet	Wet				
	B-Parameter	0.96	0.95	0.96				
	t ₅₀ , minutes	51.0	62.0	75.0				
¥	Strain Rate, in/min	0.005	0.005	0.005				
SUMMAR	Cell Pressure, psi	95.0	102.0	58.0				
Ξ	Back Pressure, psi	85.0	82.0	28.0				
S	Consolidation Stress, psi	10.0	20.0	30.0				
ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}				
rest	Deviator Stress at Failure, psi	5.0	9.1	15.8				
	Axial Strain at Failure, %	5.0	7.1	4.0				
	σ _{1F} , psi	8.8	17.4	31.9				
	σ _{3F} , psi	3.7	8.3	16.1				
	* Membrane correction subtracted from deviator stress for Samples A-C							

The effective stress strength parameters indicated on this sheet represent S&ME's interpretation. Effective stress strength parameters must be determined by the geotechnical engineer of record for specific application to the referenced project.



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Lab Sample No.: GTX B-33A, 31' Exploration No.: B-33A Sample Depth: 30 to 32 feet Deviator Stress (psi) Specimen A Specimen C Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 45.0 20.0 15.0 5.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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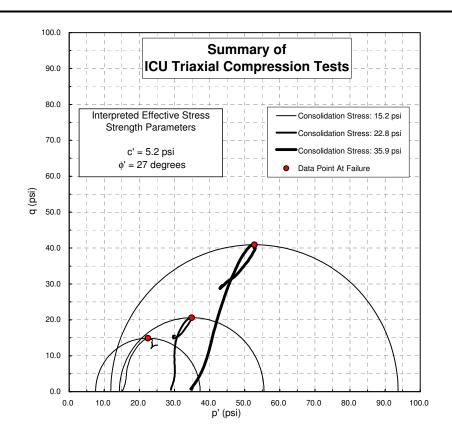
Project: Port Access Road

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Location: North Charleston, South Carolina

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	Lab Sample No.:	GTX B-33A, 51'				Sieve Size	%-Passing	Atterberg Li	mits
l □	Exploration No.:	B-33A			Z	3/8-in (9.5-mm)		Liquid Limit, %	118
ш	Sample Depth:	50 to 52 feet			≓	No. 4 (4.75-mm)		Plastic Limit, %	50
SAMPLI	USCS Classification	: Olive-gray, ela	astic SILT wi	th sand (MH)	SSIFICATION	No. 10 (2.0-mm)		Plasticity Index, %	68
IŞ					표	No. 40 (0.425-mm)		Classification	MH
S					SS	No. 100 (0.150-mm)		Measured Gs	2.65
					⋖	No. 200 (0.075-mm)	73.7		
	Sample No.	Α	В	С	CL	Notes:			
	Wet Weight, g	113.4	116.1	113.8		Notes.			
Щ	Dry Weight, g	67.2	66.6	67.4		Sample No.	Α	В	С
ᆸ	Water Content, %	68.8	74.2	68.9		Saturation Method	Wet	Wet	Wet
AMPL	Wet Density, pcf	96.4	102.6	98.4		B-Parameter	0.86	0.65	0.74
၂ တ	Dry Density, pcf	57.1	58.9	58.3		t ₅₀ , minutes	0.9	2.6	3.2
I₹	Saturation, %	96.2	100.0	99.3	¥	Strain Rate, in/min	0.05	0.05	0.05
INITIAL	Void Ratio	1.90	1.97	1.84	SUMMA	Cell Pressure, psi	149.0	144.0	148.0
=	Diameter, in	1.396	1.400	1.394	Ī	Back Pressure, psi	133.8	121.2	112.1
	Height, in	2.929	2.800	2.886	ร	Consolidation Stress, psi	15.2	22.8	35.9
	* Wate	r content data o	obtained usin	g entire sample	C)	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
_	Wet Weight, g	114.6	114.3	114.3	Ĭ	Deviator Stress at Failure, psi	29.8	41.2	81.9
Iō	Dry Weight, g	67.2	66.6	67.4		Axial Strain at Failure, %	2.1	2.6	2.9
ΑI	Water Content, %	70.6	71.6	69.6		σ _{1F} , psi	37.3	55.5	93.7
CONSOLIDATION	Wet Density, pcf	98.1	98.1	98.6		σ _{3F} , psi	7.5	14.3	11.9
Ιğ	Dry Density, pcf	57.5	57.2	58.1		* Membrane correction subtrac	ted from devia	tor stress for Samples A	N-C
l S	Saturation, %	99.7	100.0	100.0		The effective stress strength p			
18	Void Ratio	1.88	1.90	1.85	EMARKS	interpretation. Effective stress			
	Area, in ²	1.540	1.620	1.560	A'R	geotechnical engineer of recor	d for specific a	pplication to the referen	cea project.
l۳	Diameter, in	1.400	1.436	1.409	Ž	POINT C - Not included for interpretation of c' and ø'			
AFTER	Height, in	2.890	2.740	2.830	R			r	
Ľ	* Wate	r content data o	obtained usin	g entire sample	<u> </u>				



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Project: Port Access Road

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Location: North Charleston, South Carolina

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Lab Sample No.: GTX B-33A, 51' Exploration No.: B-33A Sample Depth: 50 to 52 feet 10.0 100.0 95.0 90.0 85.0 80.0 75.0 70.0 65.0 60.0 55.0 50.0 45.0 40.0 35.0 30.0 25.0 20.0 15.0 10.0 Interpreted Point of Failure 7.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 45.0 Confining Stress 30.0 25.0 20.0 15.0 10.0 5.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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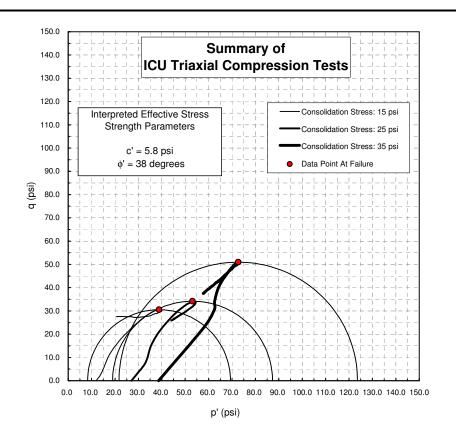
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Location: North Charleston, South Carolina

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	Lab Sample No.:	SCI B-23 Alt-	1, 51'			Sieve Size	%-Passing	Atterberg L	imits
₽	Exploration No.:	B-23 Alt-1			Z	3/8-in (9.5-mm)		Liquid Limit, %	40
	Sample Depth:	50 to 52 feet			l≓	No. 4 (4.75-mm)		Plastic Limit, %	29
SAMPLE	USCS Classification	: Yellow brown	, silty SAND	(SM)	×	No. 10 (2.0-mm)		Plasticity Index, %	11
ĮŞ					E	No. 40 (0.425-mm)		Classification	ML
S					SS	No. 100 (0.150-mm)		Measured Gs	2.62
					CLASSIFICATION	No. 200 (0.075-mm)	44.1		
	Sample No.	Α	В	С	ပ	Notes:			
	Wet Weight, g	153.0	151.4	156.1		Notes.			
Щ	Dry Weight, g	112.3	107.9	112.9		Sample No.	Α	В	С
14	Water Content, %	36.3	40.3	38.3		Saturation Method	Wet	Wet	Wet
AMPLE	Wet Density, pcf	108.2	107.0	110.4		B-Parameter	0.95	0.96	0.97
S	Dry Density, pcf	79.4	76.3	79.9		t ₅₀ , minutes	36.9	11.0	17.0
INITIAL	Saturation, %	89.8	92.4	95.7	ΡY	Strain Rate, in/min	0.0007	0.0007	0.0007
ΙĒ	Void Ratio	1.06	1.14	1.05	SUMMA	Cell Pressure, psi	40.0	50.0	60.0
=	Diameter, in	1.400	1.400	1.400	I	Back Pressure, psi	25.0	25.0	25.0
	Height, in	3.500	3.500	3.500	S	Consolidation Stress, psi	15.0	25.0	35.0
	* Wate	r content data o	obtained usin	g entire sample	(1)	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
7	Wet Weight, g	151.7	149.4	153.8	Ψ̈́	Deviator Stress at Failure, psi	61.0	68.3	101.9
ATION	Dry Weight, g	112.3	107.9	112.9	-	Axial Strain at Failure, %	3.0	3.0	2.9
ΑT	Water Content, %	35.1	38.4	36.2		σ _{1F} , psi	69.3	87.3	123.6
	Wet Density, pcf	109.0	108.1	111.7		σ΄ _{3F} , psi	8.3	19.0	21.7
CONSOLID	Dry Density, pcf	80.7	78.1	82.0		* Membrane correction s	subtracted from	deviator stress for Sar	nples A-C
NS.	Saturation, %	89.6	92.0	95.4		The effective stress strength p			
18	Void Ratio	1.03	1.09	0.99	REMARKS	interpretation. Effective stress			
	Area, in ²	1.528	1.517	1.520	AВ	geotechnical engineer of recor	a for specific a	pplication to the referer	icea project.
I۳	Diameter, in	1.395	1.390	1.391	Ž	POINT A - Designing engineer	should confirm	n the reliability of data a	s the plot of
AFTER	Height, in	3.469	3.469	3.453	R	POINT A - Designing engineer should confirm the reliability of data as the plot of PSR is not consitent with Points B and C.			
L	* Wate	r content data o	obtained usin	g entire sample					



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ISOTROPICALLY CONSOLIDATED, UNDRAINED TRIAXIAL TEST

Project: Port Access Road

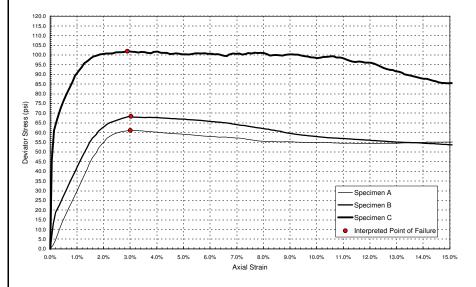
Client: SCDOT

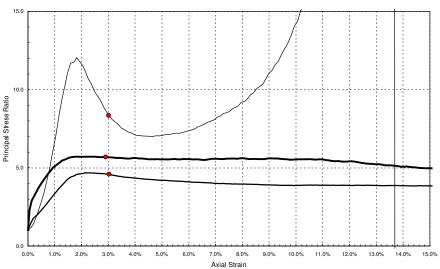
Location: North Charleston, South Carolina

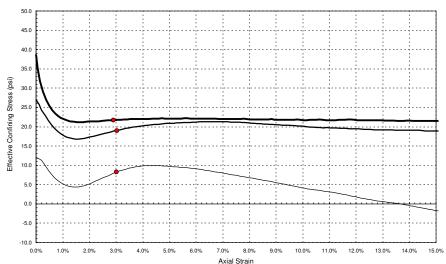
Project No.: 1131-08-554

Page 1 of 2

Lab Sample No.: SCI B-23 Alt-1, 51'
Exploration No.: B-23 Alt-1
Sample Depth: 50 to 52 feet













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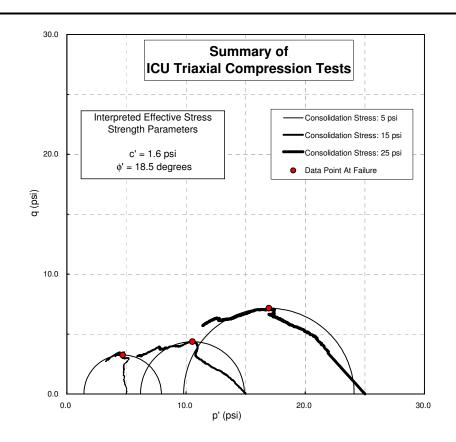
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554

Page 2 of 2



Sieve Size

lo	Exploration No.:	B-39A			Z	3/8-in (9.5-mm)		Liquid Limit, %	149
Ш	Sample Depth:	15 to 17 feet			ATION	No. 4 (4.75-mm)		Plastic Limit, %	43
SAMPL	USCS Classification:	Gray, fat CLA	AY (CH)		A	No. 10 (2.0-mm)		Plasticity Index, %	106
I₹					SIFIC,	No. 40 (0.425-mm)		Classification	CH
Ś					SS	No. 100 (0.150-mm)		Measured Gs	2.63
					⋖	No. 200 (0.075-mm)	99.2		
	Sample No.	Α	В	С	2	Notes:			
	Wet Weight, g	109.5	109.5	116.4					
Щ	Dry Weight, g	53.4	53.3	62.9		Sample No.	Α	В	С
ᆸ	Water Content, %	105.1	105.3	85.0		Saturation Method	Wet	Wet	Wet
AMPL	Wet Density, pcf	89.7	89.7	94.2		B-Parameter	0.93	0.95	0.95
ဟ	Dry Density, pcf	43.7	43.7	50.9		t ₅₀ , minutes	50.0	66.0	98.0
INITIAL	Saturation, %	100.0	100.0	100.0	ΡY	Strain Rate, in/min	0.004	0.004	0.004
ΙĒ	Void Ratio	2.76	2.77	2.23	SUMMA	Cell Pressure, psi	123.0	73.0	56.0
=	Diameter, in	1.400	1.400	1.400	₹	Back Pressure, psi	118.0	58.0	31.0
	Height, in	3.020	3.020	3.060	S	Consolidation Stress, psi	5.0	15.0	25.0
	* Water	content data	obtained usin	ng entire sample	ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
7	Wet Weight, g	105.2	104.6	117.1	Ä	Deviator Stress at Failure, psi	6.5	8.7	14.3
Ιō	Dry Weight, g	53.4	53.3	62.9		Axial Strain at Failure, %	5.0	4.4	5.9
ATION	Water Content, %	97.1	96.2	86.1		σ _{1F} , psi	7.9	14.9	24.1
Ì₽	Wet Density, pcf	91.8	93.6	96.3		σ' _{3F} , psi	1.4	6.2	9.8
NSOLID	Dry Density, pcf	46.6	47.7	51.8		* Membrane correction subtracte	ed from devia	tor stress for Samples	A-C
S	Saturation, %	100.0	100.0	100.0	4.0	The effective stress strength par		•	
lõ	Void Ratio	2.55	2.53	2.26	*KS	interpretation. Effective stress st	• .		•

REMARK



Area, in²

Diameter, in

Height, in

Lab Sample No.:

GTX B-39A, 16'

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1.620

1.436

2.860

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geotechnical engineer of record for specific application to the referenced project.

%-Passing

Atterberg Limits

Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 1 of 2

X:\LB\Job Files\1131-08-554 Port Access Road\CU\[CU Report B-39A, 15 to 17 feet - GTX.xls]Report Page 1

1.510

1.387

2.820

* Water content data obtained using entire sample

1.460

1.363

2.990

Lab Sample No.: GTX B-39A, 16' Exploration No.: B-39A Sample Depth: 15 to 17 feet 12.0 10.0 Deviator Stress (psi) Stress 5.0 Specimen A Specimen C Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) Effective Confining Stress (psi) 15.0 10.0 Α В С 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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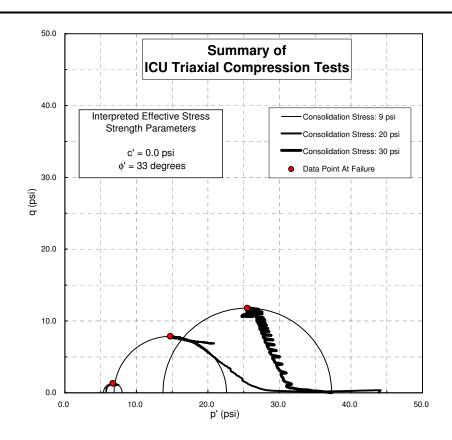
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554

Page 2 of 2



SAMPL	USCS Classification:	Gray, fat CLA	AY (CH)		CLASSIFICAT	No. 10 (2 No. 40 (0.4 No. 100 (0.4 No. 200 (0.4
	Sample No.	А	В	С	ರ	Notes:
	Wet Weight, g	147.3	141.9	142.7		Notes.
Щ	Dry Weight, g	95.3	91.6	93.7		Sample No.
ᆸ	Water Content, %	54.6	54.9	52.3		Saturation Meth
SAMPL	Wet Density, pcf	104.1	102.1	101.1		B-Parameter
		67.4	65.9	66.4		t ₅₀ , minutes
INITIAL	Saturation, %	98.2	95.2	91.7	SUMMARY	Strain Rate, in/r
ΙĒ	Void Ratio	1.50	1.56	1.54	₽	Cell Pressure, p
=	Diameter, in	1.400	1.388	1.399	I≣	Back Pressure,
	Height, in	3.500	3.500	3.500	S	Consolidation S
	* Water	e LEST	Failure Criteria			
	Wet Weight, g	145.8	136.6	140.0	ΠÜ	Deviator Stress
Ιō	Dry Weight, g	95.3	91.6	93.7	Ι'	Axial Strain at F
۲₽	Water Content, %	53.1	49.2	49.4		σ _{1F} , psi
2	Wet Density, pcf	104.8	104.5	102.2		σ _{3F} , psi
CONSOLIDATION	Dry Density, pcf	68.4	70.1	68.4		* Membra
1S	Saturation, %	98.1	94.6	91.2		The effective str
18	Void Ratio	1.46	1.40	1.46	S	interpretation. E
		1.515	1.436	1.504	EMARKS	geotechnical en
12	Diameter, in	1.389	1.352	1.384	I≧	Point B - Design
AFTER	Height, in	3.500	3.469	3.469	~	pressure of the
	* Water	content data	obtained usin	g entire sampl	е	during consolida

Lab Sample No.:

Exploration No.:

ы Sample Depth:

SCI B-47A, 25'

24 to 26 feet

B-47A

		Sieve Size	%-Passing	Atterberg Li	mits	
Z	Ň	3/8-in (9.5-mm)		Liquid Limit, %	81	
	ΤIC	No. 4 (4.75-mm)		Plastic Limit, %	19	
	ASSIFICATION	No. 10 (2.0-mm)		Plasticity Index, %	62	
	ΕĬ	No. 40 (0.425-mm)		Classification	CH	
	SSI	No. 100 (0.150-mm)		Measured Gs	2.70	
	-A	No. 200 (0.075-mm)	98.5			

	Sample No.	Α	В	С
	Saturation Method	Wet	Wet	Wet
	B-Parameter	0.95	0.97	0.95
	t ₅₀ , minutes	779.4	12.9	151.8
SUMMARY	Strain Rate, in/min	0.0001	0.0001	0.0001
₹	Cell Pressure, psi	44.0	55.0	65.0
₹	Back Pressure, psi	35.0	35.0	35.0
S	Consolidation Stress, psi	9.0	20.0	30.0
ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
TEST	Deviator Stress at Failure, psi	2.6	15.7	23.6
•	Axial Strain at Failure, %	1.1	1.0	0.9
	σ _{1F} , psi	8.0	22.6	37.3
	σ΄ _{3F} , psi	5.4	6.9	13.7
	* Membrane correction su	ibtracted from	deviator stress for 9	Samples A-C

* Membrane correction subtracted from deviator stress for Samples A-C

The effective stress strength parameters indicated on this sheet represent S&ME's nterpretation. Effective stress strength parameters must be determined by the geotechnical engineer of record for specific application to the referenced project.

Point B - Designing engineer should confirm the reliability of data as the initial pore pressure of the sample at the start of shearing was lower than the back pressure during consolidation due to a kink in the pressure line.



Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 1 of 2

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Lab Sample No.: SCI B-47A, 25' Exploration No.: B-47A Sample Depth: 24 to 26 feet 30.0 25.0 Deviator Stress (psi) Principal Stress Ratio Specimen A 5.0 Specimen C Interpreted Point of Failure 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 45.0 25.0 20.0 15.0 10.0 5.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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ISOTROPICALLY CONSOLIDATED, UNDRAINED TRIAXIAL TEST

Project: Port Access Road

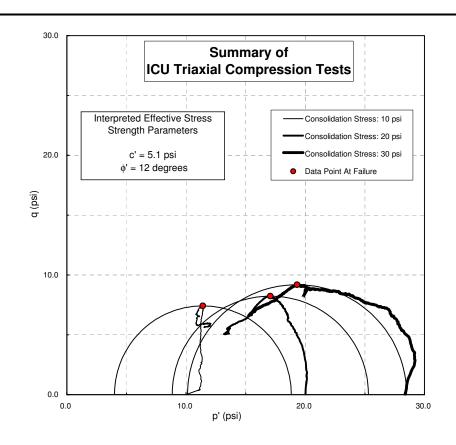
Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554

Page 2 of 2

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	Lab Sample No.:	GTX B-55B, 36	3'			Sieve Size	%-Passing	Atterberg L	imits
₽	Exploration No.:	B-55B			Z	3/8-in (9.5-mm)		Liquid Limit, %	104
ш	Sample Depth:	35 to 37 feet			ΙĔ	No. 4 (4.75-mm)		Plastic Limit, %	30
SAMPL	USCS Classification	: Gray, fat CLAY	(CH)		Y.	No. 10 (2.0-mm)		Plasticity Index, %	74
₹					표	No. 40 (0.425-mm)		Classification	CH
Ŝ					SS	No. 100 (0.150-mm)		Measured Gs	2.63
					CLASSIFICATION	No. 200 (0.075-mm)	98.9		
	Sample No.	Α	В	С	ပ	Notes:			
	Wet Weight, g	125.3	117.8	115.4		. 101001			
Щ	Dry Weight, g	71.7	67.2	62.3		Sample No.	Α	В	С
AMPL	Water Content, %	74.7	75.2	85.1		Saturation Method	Wet	Wet	Wet
₽	Wet Density, pcf	99.7	99.5	95.2		B-Parameter	0.89	0.96	0.94
S.	Dry Density, pcf	57.1	56.8	51.4		t ₅₀ , minutes	58.0	71.0	122.0
I₹	Saturation, %	100.0	100.0	100.0	ě	Strain Rate, in/min	0.003	0.003	0.003
INITIAL	Void Ratio	1.97	1.98	2.24	SUMMARY	Cell Pressure, psi	139.0	96.0	109.0
=	Diameter, in	1.400	1.400	1.400	₹	Back Pressure, psi	129.0	76.0	79.0
	Height, in	3.110	2.930	3.000		Consolidation Stress, psi	10.0	20.0	30.0
	* Wate	r content data ol	otained usi	ng entire sample	ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
7	Wet Weight, g	134.5	126.5	113.6	Ĭ	Deviator Stress at Failure, psi	14.8	16.5	18.4
Įō	Dry Weight, g	71.7	67.2	62.3	-	Axial Strain at Failure, %	2.5	2.4	7.0
ATION	Water Content, %	87.6	88.1	82.2		σ _{1F} , psi	18.8	25.3	28.5
19	Wet Density, pcf	95.8	96.8	98.5		σ _{3F} , psi	4.0	8.8	10.1
CONSOLID	Dry Density, pcf	51.1	51.4	54.1		* Membrane correction subtrac	ted from devia	tor stress for Samples	A-C
SS	Saturation, %	100.0	100.0	100.0		The effective stress strength pa			
18	Void Ratio	2.30	2.32	2.16	REMARKS	interpretation. Effective stress			
	Area, in ²	1.720	1.760	1.510	AB	geotechnical engineer of record	u ioi specilic aj	oplication to the referen	icea project.
12	Diameter, in	1.480	1.497	1.387	Ž				
AFTER	Height, in	3.110	2.830	2.910	RE				
Ĺ	* Wate	r content data ob	otained usi	ng entire sample					



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Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 1 of 2

X:\LB\Job Files\1131-08-554 Port Access Road\CU\[CU Report B-55B, 35 to 37 feet - GTX.xls]Report Page 1

Lab Sample No.: GTX B-55B, 36' Exploration No.: B-55B Sample Depth: 35 to 37 feet Deviator Stress (psi) Specimen B Interpreted Point of Failure 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% Axial Strain Axial Strain SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 45.0 25.0 20.0 15.0 10.0 5.0 Α В С 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain



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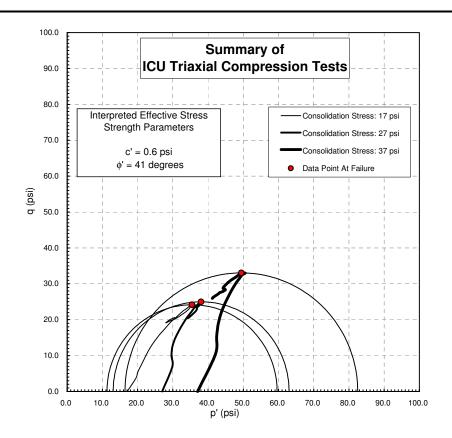
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554

Page 2 of 2



	Lab Sample No.:	S&ME B-74A	, 66'			Sieve Size	%-Passing	Atterberg L	imits
□	Exploration No.:	B-74A			z	3/8-in (9.5-mm)		Liquid Limit, %	59
. –	Sample Depth:	65 to 66.2 fee	et		ASSIFICATION	No. 4 (4.75-mm)		Plastic Limit, %	37
SAMPLE	USCS Classification	n: Yellow-brown	ı, sandy elast	ic SILT (MH)	Ϊ́ς	No. 10 (2.0-mm)		Plasticity Index, %	22
ĮŞ					E	No. 40 (0.425-mm)		Classification	MH
S					SS	No. 100 (0.150-mm)		Measured Gs	2.71
					¥	No. 200 (0.075-mm)	50.5		
	Sample No.	Α	В	С	강	Notes:			
	Wet Weight, g	142.2	130.4	137.9					
Щ	Dry Weight, g	95.6	87.9	95.2		Sample No.	Α	В	С
I₫	Water Content, %	48.6	48.4	44.8		Saturation Method	Wet	Wet	Wet
SAMPL	Wet Density, pcf	108.1	107.7	111.5		B-Parameter	0.95	0.96	1.00
	Dry Density, pcf	72.7	72.6	77.0		t ₅₀ , minutes	4.0	2.6	2.6
INITIAL	Saturation, %	99.5	98.6	100.0	Ϋ́	Strain Rate, in/min	0.003	0.003	0.003
ΙĒ	Void Ratio	1.32	1.33	1.21	SUMMA	Cell Pressure, psi	51.0	61.0	71.0
=	Diameter, in	1.378	1.368	1.343	I≣	Back Pressure, psi	34.0	34.0	34.0
	Height, in	3.360	3.140	3.326	ร	Consolidation Stress, psi	17.0	27.0	37.0
					ST	Failure Criteria	σ_{DMAX}	σ_{DMAX}	σ_{DMAX}
_	Wet Weight, g	141.2	129.5	136.4	TE	Deviator Stress at Failure, psi	48.3	49.9	66.1
Iō	Dry Weight, g	95.6	87.9	95.2	-	Axial Strain at Failure, %	4.4	3.2	3.5
ΑI	Water Content, %	47.6	47.4	43.3		σ _{1F} , psi	59.6	63.0	82.5
CONSOLIDATION	Wet Density, pcf	110.1	110.7	114.3		σ΄ _{3F} , psi	11.3	13.1	16.4
Ιğ	Dry Density, pcf	74.6	75.1	79.8		* Membrane correction s	subtracted from	deviator stress for San	nples A-C
18	Saturation, %	100.0	100.0	100.0		The effective stress strength p			
I S	Void Ratio	1.29	1.28	1.17	REMARKS	interpretation. Effective stress			
	Area, in ²	1.468	1.443	1.388	AB.	geotechnical engineer of recor	a for specific a	pplication to the referen	cea project.
lΨ	Diameter, in	1.367	1.355	1.329	Ž				
AFTER	Height, in	3.328	3.089	3.276	R				



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Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 1 of 2

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Lab Sample No.: S&ME B-74A, 66' Exploration No.: B-74A Sample Depth: 65 to 66.2 feet 70.0 65.0 55.0 ₹ 35.0 30.0 .≣ 6 _{2.5} 25.0 20.0 2.0 15.0 Interpreted Point of Failure 4.0% 5.0% 7.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% Axial Strain Axial Strain 65.0 SPECIMEN PHOTOGRAPHS (AFTER SHEARING) 60.0 55.0 50.0 45.0 40.0 g 35.0 25.0 20.0 15.0 5.0



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7.0% 8.0%

Axial Strain

9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0%

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В

Project: Port Access Road

Client: SCDOT

Α

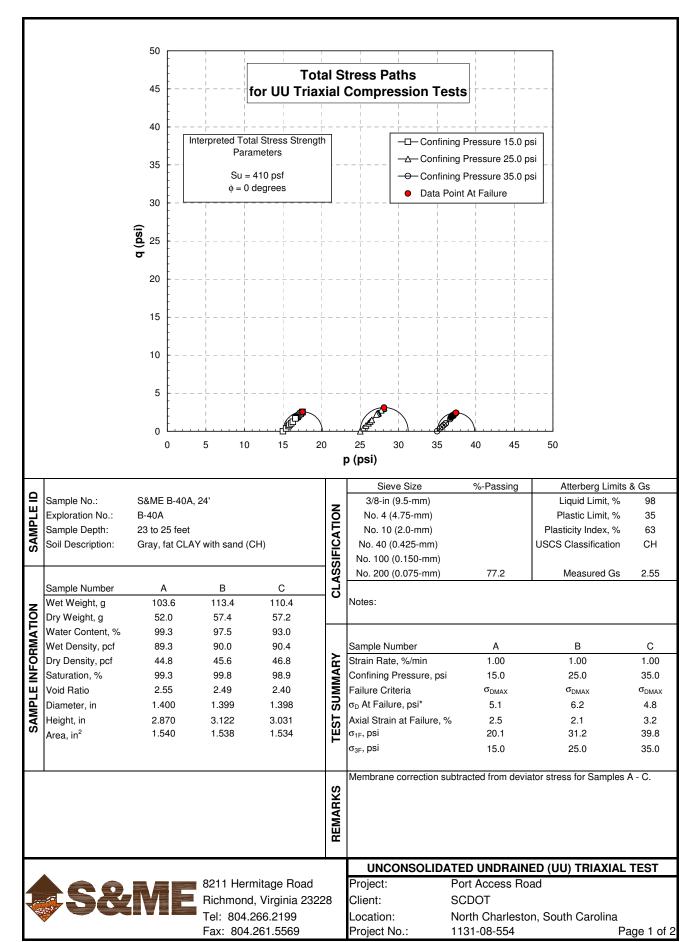
Location: North Charleston, South Carolina

Project No.: 1131-08-554

Page 2 of 2

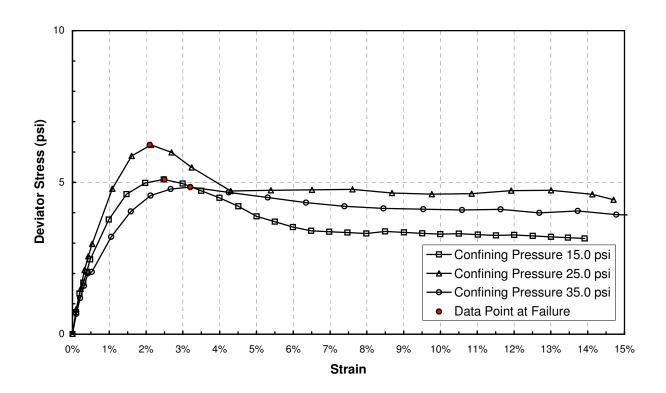
С

1.0% 2.0% 3.0% 4.0% 5.0%



Sample No.: S&ME B-40A, 24'

Exploration No.: B-40A Sample I.D. / Depth: 23 to 25 feet



SPECIMEN PHOTOGRAPHS (AFTER SHEARING)









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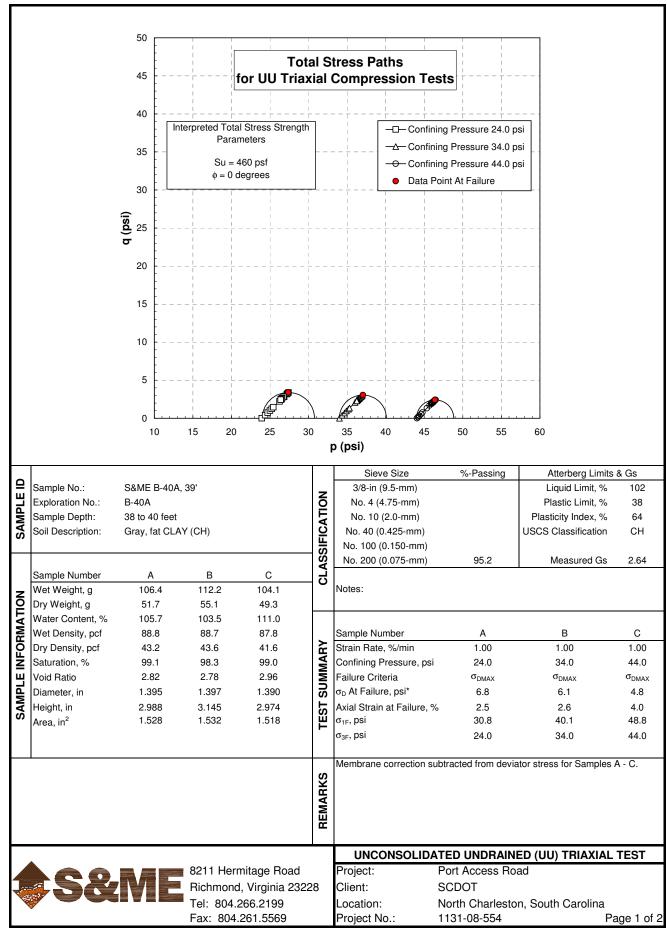
UNCONSOLIDATED UNDRAINED (UU) TRIAXIAL TEST

Project: Port Access Road

Client: SCDOT

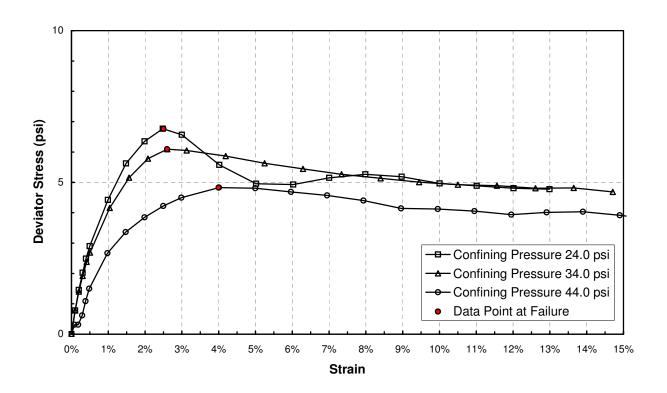
Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 2 of 2



Sample No.: S&ME B-40A, 39'

Exploration No.: B-40A Sample I.D. / Depth: 38 to 40 feet



SPECIMEN PHOTOGRAPHS (AFTER SHEARING)









8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

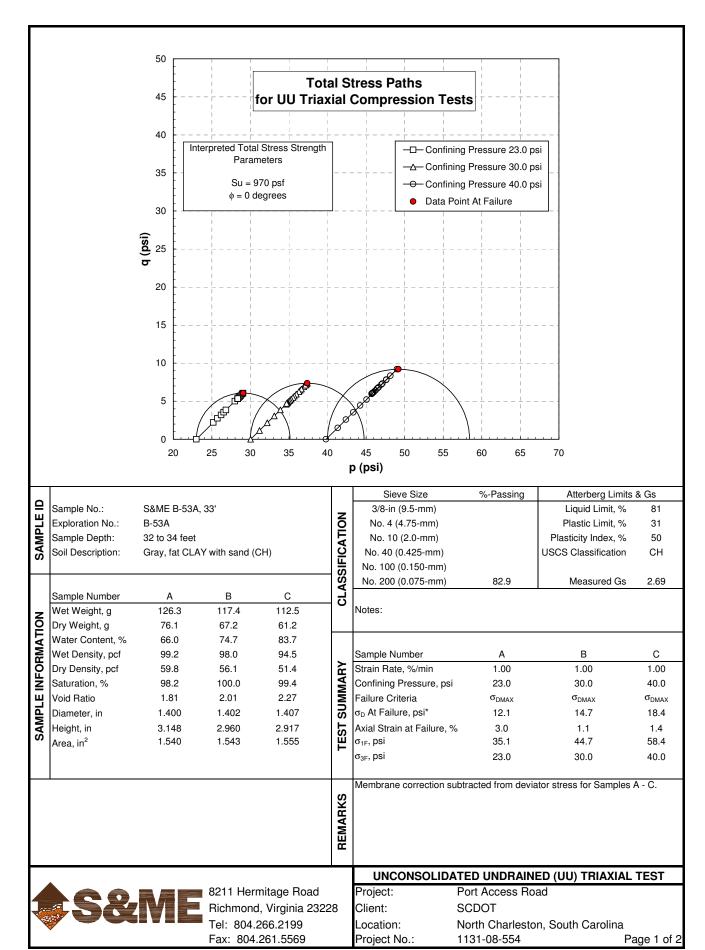
UNCONSOLIDATED UNDRAINED (UU) TRIAXIAL TEST

Project: Port Access Road

Client: SCDOT

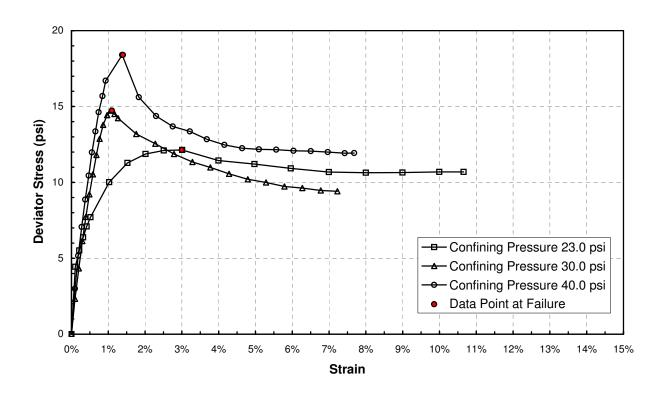
Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 2 of 2



Sample No.: S&ME B-53A, 33'

Exploration No.: B-53A Sample I.D. / Depth: 32 to 34 feet



SPECIMEN PHOTOGRAPHS (AFTER SHEARING)







\$S&ME

8211 Hermitage Road Richmond, Virginia 23228

Tel: 804.266.2199 Fax: 804.261.5569

UNCONSOLIDATED UNDRAINED (UU) TRIAXIAL TEST

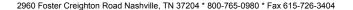
Project: Port Access Road

Client: SCDOT

Location: North Charleston, South Carolina

Project No.: 1131-08-554 Page 2 of 2

Appendix IV – IDW Environmental Characterization
Parameters; Charleston Naval Complex LUC Area Construction
Permit; City of North Charleston Encroachment Permit





December 15, 2008 4:56:39PM

Client: S&ME, Inc. (2420)

620 Wando Park Blvd.

Mt. Pleasant, SC 29464

Attn: Andrew Wertz

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Nbr: 1131-08-554 P/O Nbr: 32106 Date Received: 12/03/08

SAMPLE IDENTIFICATION

LAB NUMBER

COLLECTION DATE AND TIME

 Gas-Mud-Grab
 NRL0326-01
 12/02/08 08:50

 Gas-Mud-Comp
 NRL0326-02
 12/02/08 09:15

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this material is strictly prohibited. If you have received this material in error, please notify us immediately at 615-726-0177.

The Chain(s) of Custody, 3 pages, are included and are an integral part of this report.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of the laboratory.

All solids results are reported in wet weight unless specifically stated.

Estimated uncertainty is available upon request.

This report has been electronically signed.

Em & Hage

Report Approved By:

Ken A. Hayes

Senior Project Manager



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0326-01 (Gas-Mu	d-Grab - Soil)	Sampled:	12/02/08 08:50					
TCLP Volatile Organic Compounds by	EPA Method 13	311/8260B						
Benzene	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	8120939
2-Butanone	ND		mg/L	0.250	10	12/06/08 22:09	W846 1311/8260	
Carbon Tetrachloride	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Chlorobenzene	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Chloroform	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
1,2-Dichloroethane	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
1,1-Dichloroethene	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Tetrachloroethene	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Trichloroethene	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Vinyl chloride	ND		mg/L	0.0100	10	12/06/08 22:09	W846 1311/8260	
Surr: 1,2-Dichloroethane-d4 (60-140%)	98 %		mg/L	0.0100	10	12/06/08 22:09		
Surr: Dibromofluoromethane (75-124%)	96 %					12/06/08 22:09		
Surr: Toluene-d8 (78-121%)	92 %					12/06/08 22:09		8120939
Surr: 4-Bromofluorobenzene (79-124%)	100 %						W846 1311/8260	
Sample ID: NRL0326-02 (Gas-Muc TCLP Metals by 6000/7000 Series Met) Sampled	: 12/02/08 09:15					
Arsenic	ND		mg/L	0.100	1	12/05/08 23:50	W846 1311/6010	8120922
Barium	0.204		mg/L	0.100	1	12/05/08 23:50	W846 1311/6010	8120922
Cadmium	0.0100		mg/L	0.0100	1	12/05/08 23:50	W846 1311/6010	8120922
Chromium	ND		mg/L	0.0500	1	12/05/08 23:50	W846 1311/6010	8120922
Lead	ND		mg/L	0.0500	1	12/05/08 23:50	W846 1311/6010	8120922
Selenium	ND		mg/L	0.100	1	12/05/08 23:50	W846 1311/6010	8120922
Silver	ND		mg/L	0.0500	1	12/05/08 23:50	W846 1311/6010	8120922
Mercury	ND		mg/L	0.0100	1	12/05/08 17:13	W846 1311/7470.	8120910
TCLP Semivolatile Organic Compound	ls by EPA Metho	od 1311/82	70C					
Cresol(s)	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
1,4-Dichlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
2,4-Dinitrotoluene	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Hexachlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Hexachlorobutadiene	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Hexachloroethane	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Nitrobenzene	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Pentachlorophenol	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
Pyridine	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
2,4,6-Trichlorophenol	ND		mg/L	0.0200	2	12/12/08 00:10	W846 1311/8270	8121008
2,4,5-Trichlorophenol	ND		mg/L	0.0200	2		W846 1311/8270	
Surr: Terphenyl-d14 (21-123%)	72 %		-				W846 1311/8270	
Surr: 2,4,6-Tribromophenol (23-129%)	84 %						W846 1311/8270	8121008
Surr: Phenol-d5 (10-100%)	45 %						W846 1311/8270	8121008
Surr: 2-Fluorobiphenyl (34-108%)	73 %						W846 1311/8270	8121008
Surr: 2-Fluorophenol (34-108%)	53 %						W846 1311/8270	8121008
Surr: Nitrobenzene-d5 (29-116%)	75 %					12/12/08 00:10	W846 1311/8270	8121008



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
TCLP Extraction by EPA 1311							
SW846 1311	8120675	NRL0326-01	25.00	500.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120675	NRL0326-02	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
TCLP Metals by 6000/7000 Series Metal	nods						
SW846 1311/6010B	8120675	NRL0326-02	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0326-02	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/7470A	8120910	NRL0326-02	3.00	30.00	12/05/08 09:36	JMR	EPA 7470
TCLP Semivolatile Organic Compound	s by EPA Meth	od 1311/8270C					
SW846 1311/8270C	8120675	NRL0326-02	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/8270C	8121008	NRL0326-02	500.00	1.00	12/11/08 12:45	DXP	EPA 3510C Leachate

NRL0326



Client S&ME, Inc. (2420)

620 Wando Park Blvd. Former Crosby's Gas Project Name: Mt. Pleasant, SC 29464 1131-08-554 Project Number: 12/03/08 08:00 Received:

Andrew Wertz Attn

PROJECT QUALITY CONTROL DATA Blank

Work Order:

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
TCLP Metals by 6000/7000 Serie	es Methods					
8120910-BLK1						
Mercury	< 0.00150		mg/L	8120910	8120910-BLK1	12/05/08 15:47
8120922-BLK1						
Arsenic	< 0.0500		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Barium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Cadmium	< 0.00500		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Chromium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Lead	< 0.0280		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Selenium	< 0.0430		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Silver	< 0.0160		mg/L	8120922	8120922-BLK1	12/05/08 23:05
TCLP Volatile Organic Compou	nds by EPA Method 1	311/8260B				
8120939-BLK1						
Benzene	< 0.000270		mg/L	8120939	8120939-BLK1	12/06/08 18:29
2-Butanone	< 0.00240		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Carbon Tetrachloride	< 0.000350		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Chlorobenzene	< 0.000180		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Chloroform	0.00154		mg/L	8120939	8120939-BLK1	12/06/08 18:29
1,2-Dichloroethane	< 0.000370		mg/L	8120939	8120939-BLK1	12/06/08 18:29
1,1-Dichloroethene	< 0.000340		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Tetrachloroethene	< 0.000230		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Trichloroethene	0.000470		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Vinyl chloride	< 0.000290		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Surrogate: 1,2-Dichloroethane-d4	104%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: Dibromofluoromethane	99%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: Toluene-d8	100%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: 4-Bromofluorobenzene	101%			8120939	8120939-BLK1	12/06/08 18:29
TCLP Semivolatile Organic Com	npounds by EPA Meth	od 1311/827	'0C			
8121008-BLK1						
Cresol(s)	< 0.0188		mg/L	8121008	8121008-BLK1	12/11/08 23:24
1,4-Dichlorobenzene	< 0.0116		mg/L	8121008	8121008-BLK1	12/11/08 23:24
2,4-Dinitrotoluene	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Benzo (a) pyrene	< 0.00200		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachlorobenzene	< 0.00600		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachlorobutadiene	< 0.0102		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachloroethane	< 0.0118		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Nitrobenzene	< 0.00700		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Pentachlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Pyridine	< 0.00740		mg/L	8121008	8121008-BLK1	12/11/08 23:24
2,4,6-Trichlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Blank - Cont.

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time		
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C								
8121008-BLK1								
2,4,5-Trichlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: Terphenyl-d14	69%			8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: 2,4,6-Tribromophenol	71%			8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: Phenol-d5	45%			8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: 2-Fluorobiphenyl	70%			8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: 2-Fluorophenol	57%			8121008	8121008-BLK1	12/11/08 23:24		
Surrogate: Nitrobenzene-d5	74%			8121008	8121008-BLK1	12/11/08 23:24		



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
TCLP Metals by 6000/7000 Series I	Methods							
8120910-BS1								
Mercury	0.0200	0.0185		mg/L	92%	78 - 124	8120910	12/05/08 16:39
8120922-BS1								
Arsenic	10.0	10.0		mg/L	100%	80 - 120	8120922	12/05/08 23:09
Barium	50.0	51.4		mg/L	103%	80 - 120	8120922	12/05/08 23:09
Cadmium	10.0	9.90		mg/L	99%	80 - 120	8120922	12/05/08 23:09
Chromium	50.0	52.2		mg/L	104%	80 - 120	8120922	12/05/08 23:09
Lead	50.0	50.4		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Selenium	10.0	10.1		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Silver	10.0	10.2		mg/L	102%	80 - 120	8120922	12/05/08 23:09
TCLP Volatile Organic Compound	ls by EPA Method 131	1/8260B						
8120939-BS1								
Benzene	50.0	41.5		ug/L	83%	76 - 129	8120939	12/06/08 12:58
2-Butanone	250	208		ug/L	83%	63 - 138	8120939	12/06/08 12:58
Carbon Tetrachloride	50.0	44.0		ug/L	88%	56 - 150	8120939	12/06/08 12:58
Chlorobenzene	50.0	42.2		ug/L	84%	80 - 120	8120939	12/06/08 12:58
Chloroform	50.0	42.3	В	ug/L	85%	78 - 138	8120939	12/06/08 12:58
1,2-Dichloroethane	50.0	42.4		ug/L	85%	70 - 135	8120939	12/06/08 12:58
1,1-Dichloroethene	50.0	42.3		ug/L	85%	77 - 137	8120939	12/06/08 12:58
Tetrachloroethene	50.0	45.5		ug/L	91%	83 - 126	8120939	12/06/08 12:58
Trichloroethene	50.0	42.9		ug/L	86%	78 - 137	8120939	12/06/08 12:58
Vinyl chloride	50.0	43.8		ug/L	88%	62 - 124	8120939	12/06/08 12:58
Surrogate: 1,2-Dichloroethane-d4	25.0	25.2			101%	60 - 140	8120939	12/06/08 12:58
Surrogate: Dibromofluoromethane	25.0	25.0			100%	75 - 124	8120939	12/06/08 12:58
Surrogate: Toluene-d8	25.0	22.6			90%	78 - 121	8120939	12/06/08 12:58
Surrogate: 4-Bromofluorobenzene	25.0	24.6			98%	79 - 124	8120939	12/06/08 12:58
TCLP Semivolatile Organic Compo	ounds by EPA Method	1311/8270C						
8121008-BS1								
Cresol(s)	0.400	0.329		mg/L	82%	38 - 113	8121008	12/11/08 23:47
1,4-Dichlorobenzene	0.200	0.126		mg/L	63%	23 - 104	8121008	12/11/08 23:47
2,4-Dinitrotoluene	0.200	0.176		mg/L	88%	49 - 123	8121008	12/11/08 23:47
Hexachlorobenzene	0.200	0.156		mg/L	78%	50 - 125	8121008	12/11/08 23:47
Hexachlorobutadiene	0.200	0.123		mg/L	62%	19 - 117	8121008	12/11/08 23:47
Hexachloroethane	0.200	0.123		mg/L	62%	20 - 108	8121008	12/11/08 23:47
Nitrobenzene	0.200	0.142		mg/L	71%	35 - 110	8121008	12/11/08 23:47
Pentachlorophenol	0.200	0.150		mg/L	75%	39 - 146	8121008	12/11/08 23:47
Pyridine	0.200	0.0772		mg/L	39%	10 - 100	8121008	12/11/08 23:47
2,4,6-Trichlorophenol	0.200	0.167		mg/L	83%	34 - 131	8121008	12/11/08 23:47
2,4,5-Trichlorophenol	0.200	0.174		mg/L	87%	37 - 130	8121008	12/11/08 23:47



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS - Cont.

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
TCLP Semivolatile Organic Compoun	ds by EPA Method	1311/8270C						
8121008-BS1								
Surrogate: Terphenyl-d14	0.100	0.0668			67%	21 - 123	8121008	12/11/08 23:47
Surrogate: 2,4,6-Tribromophenol	0.100	0.0865			87%	23 - 129	8121008	12/11/08 23:47
Surrogate: Phenol-d5	0.100	0.0432			43%	10 - 100	8121008	12/11/08 23:47
Surrogate: 2-Fluorobiphenyl	0.100	0.0716			72%	34 - 108	8121008	12/11/08 23:47
Surrogate: 2-Fluorophenol	0.100	0.0516			52%	34 - 108	8121008	12/11/08 23:47
Surrogate: Nitrobenzene-d5	0.100	0.0683			68%	29 - 116	8121008	12/11/08 23:47



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Metals by 6000/7000 Series M	Methods											
8120910-BSD1												
Mercury		0.0203		mg/L	0.0200	102%	78 - 124	9	22	8120910		12/05/08 17:42
TCLP Volatile Organic Compound	s by EPA M	ethod 1311	/8260B									
8120939-BSD1												
Benzene		41.9		ug/L	50.0	84%	76 - 129	1	50	8120939		12/06/08 13:26
2-Butanone		217		ug/L	250	87%	63 - 138	4	50	8120939		12/06/08 13:26
Carbon Tetrachloride		44.6		ug/L	50.0	89%	56 - 150	1	50	8120939		12/06/08 13:26
Chlorobenzene		42.3		ug/L	50.0	85%	80 - 120	0.2	50	8120939		12/06/08 13:26
Chloroform		42.9	В	ug/L	50.0	86%	78 - 138	1	50	8120939		12/06/08 13:26
1,2-Dichloroethane		43.2		ug/L	50.0	86%	70 - 135	2	50	8120939		12/06/08 13:26
1,1-Dichloroethene		44.0		ug/L	50.0	88%	77 - 137	4	50	8120939		12/06/08 13:26
Tetrachloroethene		46.4		ug/L	50.0	93%	83 - 126	2	50	8120939		12/06/08 13:26
Trichloroethene		43.4		ug/L	50.0	87%	78 - 137	1	50	8120939		12/06/08 13:26
Vinyl chloride		45.3		ug/L	50.0	91%	62 - 124	3	50	8120939		12/06/08 13:26
Surrogate: 1,2-Dichloroethane-d4		25.2		ug/L	25.0	101%	60 - 140			8120939		12/06/08 13:26
Surrogate: Dibromofluoromethane		25.0		ug/L	25.0	100%	75 - 124			8120939		12/06/08 13:26
Surrogate: Toluene-d8		22.9		ug/L	25.0	92%	78 - 121			8120939		12/06/08 13:26
Surrogate: 4-Bromofluorobenzene		24.5		ug/L	25.0	98%	79 - 124			8120939		12/06/08 13:26



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike

Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
TCLP Metals by 6000/7000 Series	Methods									
8120910-MS1										
Mercury	ND	0.0207		mg/L	0.0200	104%	63 - 138	8120910	NRL0126-01	12/05/08 16:54
8120922-MS1										
Arsenic	ND	10.0		mg/L	10.0	100%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Barium	0.0350	50.5		mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Cadmium	ND	9.83		mg/L	10.0	98%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Chromium	ND	51.7		mg/L	50.0	103%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Lead	ND	50.5		mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Selenium	ND	10.2		mg/L	10.0	102%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Silver	ND	10.0		mg/L	10.0	100%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
TCLP Volatile Organic Compoun	ds hy FPA Meth	od 1311/826	n R							
8120939-MS1	us by ETA Meth	100 1511/020) D							
Benzene	ND	0.0486		mg/L	0.0500	97%	18 - 167	8120939	NRL0332-01	12/07/08 09:08
2-Butanone	ND	0.216		mg/L	0.250	86%	10 - 160	8120939	NRL0332-01	12/07/08 09:08
Carbon Tetrachloride	ND	0.0510		mg/L	0.0500	102%	10 - 189	8120939	NRL0332-01	12/07/08 09:08
Chlorobenzene	ND	0.0501		mg/L	0.0500	100%	23 - 160	8120939	NRL0332-01	12/07/08 09:08
Chloroform	ND	0.0494	В	mg/L	0.0500	99%	17 - 175	8120939	NRL0332-01	12/07/08 09:08
1,2-Dichloroethane	ND	0.0491		mg/L	0.0500	98%	14 - 151	8120939	NRL0332-01	12/07/08 09:08
1,1-Dichloroethene	ND	0.0465		mg/L	0.0500	93%	10 - 185	8120939	NRL0332-01	12/07/08 09:08
Tetrachloroethene	ND	0.0529		mg/L	0.0500	106%	16 - 170	8120939	NRL0332-01	12/07/08 09:08
Trichloroethene	0.00390	0.0494		mg/L	0.0500	91%	10 - 192	8120939	NRL0332-01	12/07/08 09:08
Vinyl chloride	ND	0.0382		mg/L	0.0500	76%	10 - 171	8120939	NRL0332-01	12/07/08 09:08
Surrogate: 1,2-Dichloroethane-d4		24.4		ug/L	25.0	98%	60 - 140	8120939	NRL0332-01	12/07/08 09:08
Surrogate: Dibromofluoromethane		24.9		ug/L	25.0	100%	75 - 124	8120939	NRL0332-01	12/07/08 09:08
Surrogate: Toluene-d8		22.3		ug/L	25.0	89%	78 - 121	8120939	NRL0332-01	12/07/08 09:08
				-						



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

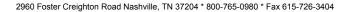
Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Metals by 6000/7000 Serie	es Methods											
8120910-MSD1												
Mercury	ND	0.0203		mg/L	0.0200	102%	63 - 138	2	22	8120910	NRL0126-01	12/05/08 16:56
8120922-MSD1												
Arsenic	ND	10.1		mg/L	10.0	101%	75 - 125	0.6	20	8120922	NRL0410-02	12/06/08 01:03
Barium	0.0350	51.2		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Cadmium	ND	9.92		mg/L	10.0	99%	75 - 125	0.9	20	8120922	NRL0410-02	12/06/08 01:03
Chromium	ND	52.3		mg/L	50.0	105%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Lead	ND	51.0		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Selenium	ND	10.3		mg/L	10.0	103%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Silver	ND	10.2		mg/L	10.0	102%	75 - 125	2	20	8120922	NRL0410-02	12/06/08 01:03
TCLP Volatile Organic Compou	nds by EPA M	ethod 1311	/8260B									
8120939-MSD1												
Benzene	ND	0.0468		mg/L	0.0500	94%	18 - 167	4	50	8120939	NRL0332-01	12/07/08 09:35
2-Butanone	ND	0.223		mg/L	0.250	89%	10 - 160	3	50	8120939	NRL0332-01	12/07/08 09:35
Carbon Tetrachloride	ND	0.0488		mg/L	0.0500	98%	10 - 189	4	50	8120939	NRL0332-01	12/07/08 09:35
Chlorobenzene	ND	0.0479		mg/L	0.0500	96%	23 - 160	4	50	8120939	NRL0332-01	12/07/08 09:35
Chloroform	ND	0.0475	В	mg/L	0.0500	95%	17 - 175	4	50	8120939	NRL0332-01	12/07/08 09:35
1,2-Dichloroethane	ND	0.0482		mg/L	0.0500	96%	14 - 151	2	50	8120939	NRL0332-01	12/07/08 09:35
1,1-Dichloroethene	ND	0.0462		mg/L	0.0500	92%	10 - 185	0.5	50	8120939	NRL0332-01	12/07/08 09:35
Tetrachloroethene	ND	0.0494		mg/L	0.0500	99%	16 - 170	7	50	8120939	NRL0332-01	12/07/08 09:35
Trichloroethene	0.00390	0.0472		mg/L	0.0500	87%	10 - 192	5	50	8120939	NRL0332-01	12/07/08 09:35
Vinyl chloride	ND	0.0384		mg/L	0.0500	77%	10 - 171	0.6	50	8120939	NRL0332-01	12/07/08 09:35
Surrogate: 1,2-Dichloroethane-d4		24.7		ug/L	25.0	99%	60 - 140			8120939	NRL0332-01	12/07/08 09:35
Surrogate: Dibromofluoromethane		25.2		ug/L	25.0	101%	75 - 124			8120939	NRL0332-01	12/07/08 09:35
Surrogate: Toluene-d8		22.2		ug/L	25.0	89%	78 - 121			8120939	NRL0332-01	12/07/08 09:35
Surrogate: 4-Bromofluorobenzene		24.1		ug/L	25.0	96%	79 - 124			8120939	NRL0332-01	12/07/08 09:35





620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order:

NRL0326

Former Crosby's Gas Project Name: Project Number:

1131-08-554

Received:

12/03/08 08:00

CERTIFICATION SUMMARY

TestAmerica Nashville

Attn

Method	Matrix	AIHA	Nelac	South Carolina	
SW846 1311/6010B	Soil	N/A	X	X	
SW846 1311/7470A	Soil	N/A	X	X	
SW846 1311/8260B	Soil	N/A	X	X	
SW846 1311/8270C	Soil	N/A	X	X	
SW846 1311	Soil	N/A	X	X	



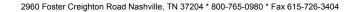
Attn

Client S&ME, Inc. (2420) Work Order: NRL0326

620 Wando Park Blvd. Project Name: Former Crosby's Gas
Mt. Pleasant, SC 29464 Project Number: 1131-08-554
Andrew Wertz Received: 12/03/08 08:00

TCLP REGULATORY LIMITS

Analyte	Regulatory Limit
1,1-Dichloroethene	0.7
1,2-Dichloroethane	0.5
1,4-Dichlorobenzene	7.5
2,4,5-Trichlorophenol	400
2,4,6-Trichlorophenol	2
2,4-Dinitrotoluene	0.13
2-Butanone	200
Arsenic	5
Barium	100
Benzene	0.5
Cadmium	1
Carbon Tetrachloride	0.5
Chlorobenzene	100
Chloroform	6
Chromium	5
Cresol(s)	200
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3
Lead	5
Mercury	0.2
Nitrobenzene	2
Pentachlorophenol	100
Pyridine	5
Selenium	1
Silver	5
Tetrachloroethene	0.7
Trichloroethene	0.5
Vinyl chloride	0.2





620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0326

Project Name: Former Crosby's Gas

Project Number: 1131-08-554 Received: 12/03/08 08:00

DATA QUALIFIERS AND DEFINITIONS

B Analyte was detected in the associated Method Blank.

ND Not detected at the reporting limit (or method detection limit if shown)

METHOD MODIFICATION NOTES



THE LEADER IN ENVIRONMENTAL TESTING Nashville, TN

COOLER RECE



Cooler Received/Opened On 12 / 03/ 08 @ 8:00	
1. Tracking # 3167 (last 4 digits, FedEx)	ŝ
Courier: FED-EX IR Gun ID 90942856	
2. Temperature of rep. sample or temp blank when opened: 2.2 Degrees Celsius	
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO. N.	\supset_{I}
4. Were custody seals on outside of cooler?	
If yes, how many and where: YES)NON	IA
5. Were the seals intact, signed, and dated correctly? YESNON	
6. Were custody papers inside cooler?	
I certify that I opened the cooler and answered questions 1-6 (intial)	
7. Were custody seals on containers: YES NO and Intact YESNO.()	- A
Were these signed and dated correctly? YESNON	\sim 1
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None	1 = = = =
9. Cooling process: (ice lce-pack lce (direct contact) Dry ice Other Non	() (/)
10. Did all containers arrive in good condition (unbroken)?	ر. ۱
11. Were all container labels complete (#, date, signed, pres., etc)?	
12. Did all container labels and tags agree with custody papers?	Over
13a. Were VOA vials received? YES. (NO)NA	. 31
b. Was there any observable headspace present in any VOA vial? YESNONA	
14. Was there a Trip Blank in this cooler? YESNONA If multiple coolers, sequence #	8,0
I certify that I unloaded the cooler and answered questions 7-14 (intial)	$\circ \gamma$
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YESNO	
b. Did the bottle labels indicate that the correct preservatives were used YESNONA	
If preservation in-house was needed, record standard ID of preservative used here	
16. Was residual chlorine present? YESNONA)
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial)	
17. Were custody papers properly filled out (ink, signed, etc)?	-
18. Did you sign the custody papers in the appropriate place?	
19. Were correct containers used for the analysis requested? YESNONA	
20. Was sufficient amount of sample sent in each container?	
I certify that I entered this project into LIMS and answered questions 17-20 (intial)	
I certify that I attached a label with the unique LIMS number to each container (intial)	
21. Were there Non-Conformance issues at login? YES(NO) Was a PIPE generated? YES(NO) #	

NRL0326 12/17/08 23:59

<u> TestAmeri</u>	SANGER SOURCE PROPERTY.	Nashville D	r Creiç	ghton					none: Free: Fax:	: 800		-098	30							metho	ds, is 1	n using his wor rposes	k being	oper ai condu	nalytica icted fo	l r					
THE LEADER IN ENVIRONMENTAL		Nashville,	IN 3/2	204																		c	Complia	nce M	onitorin	g?	Yes _		No_		
Client Name/Account #: 5		Pood																					Enforc	ement	Action ²	?	Yes_		No_		
-	520 Wando Park																	Site S	tate:	sc											
City/State/Zip:				ine cor	m														PO#:	3210	6										
Project Manager: /		eman, aweru	ZWSITIE	:110.001		Fax	No.:	843.	884-1	696							т	'A Quo	ote #:												
Telephone Number:	843.884.0005	Jamla	0															Proje	ct ID:	FORM	MER C	ROSBY	"S GAS	STAT	ION						
Sampler Name: (Print)	- 1 · 3	layli																Proje	ect #:	1134	08-55	<u> </u>									
Sampler Signature: _		g L	-					Pro	serva	ative		T		M	atrix		I					A	nalyze	For:			1 7		≈ ⊤	<1)	7A7
Sample ID / Description Gas - Mud-Grale Gas - Mud - Comy	15/5/08 15/5/08	7.16 Sampled	No. of Containers Shipped	★ Grab	X Composite		X K Ice	HCI (Blue Label)	NaOH (Orange Label)	H-SO ₄ Plastic (Tellow Label)	A None (Black Label)	-	Groundwater	Wastewater Drinking Water	espinis X		Other (specify):	X TCLP METALS	X TCLP VOCS	X X									RUSH TAT (Pre-Schedule)		,,,,
			<u> </u>						Ш			上	Ш			لــــــــــــــــــــــــــــــــــــــ	J		<u> </u>	Lab	orator	/ Comi	nents:				1	٠	⊥		
Special Instructions:			1 =		IBossi	ived b		od of	Ship	men	t: 1				Date	FE	DE)	Tim	e		Ter VO	peratu Ss Free	re Upo e of He	n Rece adspac	e?				Y		٠ ,
Relinquished by: Relinquished by:	/2/2/0	te)40 Ti	ime	Rece	eived b	3	(U	ica:	f				12	Pare	1 <u>08</u>	1	140 Grim			Fe	de	X	4o	Tes	f A	Frue	lu	(a-	- Nasi	hv.lle
J Bulde	12/2/	08	119	130		M	1		<u> </u>							Y	10	00	υ <u> </u>			, -							<u> </u>		

Macalloy Site

Analyze 1 semi-solid (drilling mud) sample and 1 water sample for :

Total Metals by 6010B/747/0A	TCLP Metals by 6010B/7470A
Arsenic	Arsenic
Antimony -	Barlum
Barlum	Cadmium
Cadmium	Chromium
Chromium	Lead
Hexavalent Chromlum	Selenium
Iron	Silver
Lead	Mercury
Manganese	
Nickel	
Selenium	
Silver	
Mercury	

Former Crosby's Gas Station

Analyze 1 semi-solid (drilling mud) sample and 4-water sample fer:

TCLPAVOCS by B260B	MANA A ATCUPISVOGE BY/827/0G	TG-RMEHE DV.6010B//AVOA
1,1-dichloroethene	cresols	Arsenic
1,2-dichloroethane	1,4-dichlorobenzene	Barium
benzene ·	2,4-dinitrotoluene	Cadmium
chlorobenzene	hexachlorobenzene	Chromium
trichloroethene	hexachlorobutadiene	Lead
vinyl chloride	hexachloroethane	Selenium
2-butanone	nitrobenzene	Silver
carbon tetrachloride	pentachlorophenol	Mercury
chloroform	pyridine	
tetrachloroethene	2,4,5-trichlorophenol	**************************************
	2,4,6-trichlorophenol	



December 16, 2008 10:45:48AM

Attn:

Client: S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Nbr:
 1131-08-554

 Andrew Wertz
 P/O Nbr:
 32106

 Date Received:
 12/03/08

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
CNC-SWS-Grab	NRL0332-01	12/02/08 09:55
CNC-TWR-Grab	NRL0332-02	12/02/08 10:50
CNC-661-Grab	NRL0332-03	12/02/08 11:40
CNC-Decon-Grab	NRL0332-04	12/02/08 12:15
CNC-Mid-Comp	NRL0332-05	12/02/08 12:00
CNC-Decon-Comp	NRL0332-06	12/02/08 12:00
Trip Blank	NRL0332-07	12/02/08 00:01

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this material is strictly prohibited. If you have received this material in error, please notify us immediately at 615-726-0177.

The Chain(s) of Custody, 3 pages, are included and are an integral part of this report.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of the laboratory.

All solids results are reported in wet weight unless specifically stated.

Estimated uncertainty is available upon request.

This report has been electronically signed.

Em & A Hage

Report Approved By:

Ken A. Hayes

Senior Project Manager



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-01 (CNC-SV	VS-Grab - Soil) Sampl	ed: 12/02/08 09:55					
General Chemistry Parameters								
% Dry Solids	68.7		%	0.500	1	12/12/08 06:46	SW-846	8121669
Volatile Organic Compounds by EPA	Method 8260B							
Benzene	0.00784		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
2-Butanone	ND		mg/kg dry	0.0674	1	12/10/08 04:59	SW846 8260B	8121404
Carbon Tetrachloride	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
Chlorobenzene	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
Chloroform	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
1,2-Dichloroethane	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
cis-1,2-Dichloroethene	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
1,1-Dichloroethene	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
Methylene Chloride	ND		mg/kg dry	0.0135	1	12/10/08 04:59	SW846 8260B	8121404
Naphthalene	ND		mg/kg dry	0.00674	1	12/10/08 04:59	SW846 8260B	8121404
Tetrachloroethene	ND		mg/kg dry	0.00268	1	12/10/08 15:23	SW846 8260B	8120937
Trichloroethene	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
Vinyl chloride	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
1,2-Dichloroethene (total)	ND		mg/kg dry	0.00270	1	12/10/08 04:59	SW846 8260B	8121404
Surr: 1,2-Dichloroethane-d4 (41-150%)	81 %					12/10/08 04:59	SW846 8260B	8121404
Surr: 1,2-Dichloroethane-d4 (41-150%)	93 %					12/10/08 15:23	SW846 8260B	8120937
Surr: Dibromofluoromethane (55-139%)	93 %					12/10/08 04:59	SW846 8260B	8121404
Surr: Dibromofluoromethane (55-139%)	105 %					12/10/08 15:23	SW846 8260B	8120937
Surr: Toluene-d8 (57-148%)	106 %					12/10/08 04:59	SW846 8260B	8121404
Surr: Toluene-d8 (57-148%)	103 %					12/10/08 15:23	SW846 8260B	8120937
Surr: 4-Bromofluorobenzene (58-150%)	113 %					12/10/08 04:59	SW846 8260B	8121404
Surr: 4-Bromofluorobenzene (58-150%)	107 %	11/02/01	5			12/10/08 15:23	SW846 8260B	8120937
TCLP Volatile Organic Compounds by		311/8260		0.0100	10	10/06/00 00 06	WY0.46.1011.100.60	010000
Benzene	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
2-Butanone	ND		mg/L	0.250	10	12/06/08 22:36	W846 1311/8260	
Carbon Tetrachloride	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
Chlorobenzene	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
Chloroform	ND	В	mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
1,2-Dichloroethane	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
1,1-Dichloroethene	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
Tetrachloroethene	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	8120939
Trichloroethene	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	8120939
Vinyl chloride	ND		mg/L	0.0100	10	12/06/08 22:36	W846 1311/8260	
Surr: 1,2-Dichloroethane-d4 (60-140%)	98 %						W846 1311/8260	
Surr: Dibromofluoromethane (75-124%)	98 %					12/06/08 22:36		
Surr: Toluene-d8 (78-121%)	95 %						W846 1311/8260	
Surr: 4-Bromofluorobenzene (79-124%)	98 %					12/06/08 22:36	W846 1311/8260	8120939



Attn

 $620\;Wando\;Park\;Blvd.$

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-02 (CNC-TV	WR-Grab - Soi	il) Samp	led: 12/02/08 10:50					
General Chemistry Parameters								
% Dry Solids	23.9		%	0.500	1	12/12/08 06:46	SW-846	8121669
Volatile Organic Compounds by EPA	Method 8260B							
Benzene	0.0210		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
2-Butanone	ND		mg/kg dry	0.270	1	12/10/08 05:29	SW846 8260B	8121404
Carbon Tetrachloride	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
Chlorobenzene	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
Chloroform	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
1,2-Dichloroethane	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
cis-1,2-Dichloroethene	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
1,1-Dichloroethene	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
Methylene Chloride	ND		mg/kg dry	0.0541	1	12/10/08 05:29	SW846 8260B	8121404
Naphthalene	ND		mg/kg dry	0.0270	1	12/10/08 05:29	SW846 8260B	8121404
Tetrachloroethene	ND		mg/kg dry	0.0103	1	12/10/08 15:53	SW846 8260B	8120937
Trichloroethene	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
Vinyl chloride	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
1,2-Dichloroethene (total)	ND		mg/kg dry	0.0108	1	12/10/08 05:29	SW846 8260B	8121404
Surr: 1,2-Dichloroethane-d4 (41-150%)	74 %					12/10/08 05:29	SW846 8260B	8121404
Surr: 1,2-Dichloroethane-d4 (41-150%)	89 %					12/10/08 15:53	SW846 8260B	8120937
Surr: Dibromofluoromethane (55-139%)	90 %					12/10/08 05:29	SW846 8260B	8121404
Surr: Dibromofluoromethane (55-139%)	107 %					12/10/08 15:53	SW846 8260B	8120937
Surr: Toluene-d8 (57-148%)	117 %					12/10/08 05:29	SW846 8260B	8121404
Surr: Toluene-d8 (57-148%)	109 % 138 %					12/10/08 15:53	SW846 8260B	8120937
Surr: 4-Bromofluorobenzene (58-150%) Surr: 4-Bromofluorobenzene (58-150%)	138 %					12/10/08 05:29 12/10/08 15:53	SW846 8260B SW846 8260B	8121404 8120937
		211/02601	0			12/10/06 15:55	SW 040 0200B	0120937
TCLP Volatile Organic Compounds by		011/02001		0.0100	10	12/07/09 22 04	W046 1211/0260	0120020
Benzene	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
2-Butanone	ND		mg/L	0.250	10	12/06/08 23:04	W846 1311/8260	
Carbon Tetrachloride	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Chlorobenzene	ND	ъ	mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Chloroform	ND	В	mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
1,2-Dichloroethane	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
1,1-Dichloroethene	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Tetrachloroethene	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Trichloroethene	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Vinyl chloride	ND		mg/L	0.0100	10	12/06/08 23:04	W846 1311/8260	
Surr: 1,2-Dichloroethane-d4 (60-140%)	100 %						W846 1311/8260	
Surr: Dibromofluoromethane (75-124%)	98 % 93 %					12/06/08 23:04	W846 1311/8260	
Surr: Toluene-d8 (78-121%) Surr: 4-Bromofluorobenzene (79-124%)	93 % 101 %						W846 1311/8260 W846 1311/8260	
5411. 4-DI OMOJIUOI OVENZENE (19-124/0)	101 /0					12/00/00 25:04	11 070 1311/0200	0120939



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Sample ID: NRL0332-03 (CNC-661-Grab - Soil) Sampled: 12/02/08 11:40 General Chemistry Parameters Supering of	Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Ceneral Chemistry Parameters % Dy Solisis 32.2 % 0.50 0.70 1.01 1.01/208 (ab.) 50%-84 \$18168 Volatile Organic Compounds by EPA Method S260B 18.02 mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 2-Buanone ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Carbon Tennethoride ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Chloroform ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Chloroform ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Chloroform ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Li-Dichloroethane ND mg/kg dy 0.0133 1 12.1008 600 80.846 82608 812440 Li-Dichloroethane ND mg/kg dy 0.0333 1 <td< td=""><td>Sample ID: NRL0332-03 (CNC-66</td><td>1-Grab - Soil)</td><td>Sampled</td><td>: 12/02/08 11:40</td><td></td><td></td><td></td><td></td><td></td></td<>	Sample ID: NRL0332-03 (CNC-66	1-Grab - Soil)	Sampled	: 12/02/08 11:40					
Polatile Organic Compounds by EPA Method 8260B Benzene 0.0273 mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 2-Buanone ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 Carbon Tetrachloride ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 Chlorobenzene ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 Chlorobenzene ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0065 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0065 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0033 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane ND mg/kg dry 0.0133 1 12/1008 06.00 SW846 8260B 8121404 12-Dichlorocthane SW846 8260B 812140		,	-						
Benzenc	•	23.2		%	0.500	1	12/12/08 06:46	SW-846	8121669
2-Butanone ND mg/kg dry 0.333 1 12/10/08 06:00 SW846 8208 8121404 Carbon Tetrachloride ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 Chlorobenzee ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 Chlorobram ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 L3-Dichlorocthane ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 L1-Dichlorocthene ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 Methylene Chloride ND mg/kg dry 0.0333 1 12/10/08 06:00 SW846 82068 8121404 Vimyl chloride ND mg/kg dry 0.0033 1 12/10/08 06:00 SW846 82068 8121404 Vimyl chloride ND mg/kg dry 0.0133 1 12/10/08 06:00 SW846 82068 8121404 </td <td>Volatile Organic Compounds by EPA</td> <td>Method 8260B</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Volatile Organic Compounds by EPA	Method 8260B							
Carbon Tetrachloride	Benzene	0.0273		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
Chlorobenzene ND	2-Butanone	ND		mg/kg dry	0.333	1	12/10/08 06:00	SW846 8260B	8121404
Chloroform	Carbon Tetrachloride	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
1.2-Dichloroethane ND	Chlorobenzene	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
1.2-Dichloroethane ND	Chloroform	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
I_1-Dichloroethene	1,2-Dichloroethane	ND		mg/kg dry		1	12/10/08 06:00	SW846 8260B	8121404
1-Dichloroethene ND	cis-1,2-Dichloroethene	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
Methylene Chloride	1,1-Dichloroethene	ND			0.0133	1	12/10/08 06:00	SW846 8260B	8121404
Naphthalene	Methylene Chloride	0.0869			0.0665	1	12/10/08 06:00	SW846 8260B	8121404
Trichloroethene	•	ND			0.0333	1	12/10/08 06:00	SW846 8260B	8121404
Vinyl chloride	Tetrachloroethene	ND		mg/kg dry	0.00933	1	12/10/08 16:22	SW846 8260B	8120937
Vinyl chloride	Trichloroethene	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
1,2-Dichloroethene (total)	Vinyl chloride	ND			0.0133	1	12/10/08 06:00	SW846 8260B	8121404
Surr: 1,2-Dichloroethane-d4 (41-150%) 87 % 12/10/88 16:22 SW846 8260B 812097 Surr: Dibromofluoromethane (55-139%) 92 % 12/10/88 06:02 SW846 8260B 8121040 Surr: Dibromofluoromethane (55-139%) 92 % 12/10/88 06:02 SW846 8260B 8121040 Surr: Toluene-d8 (57-148%) 113 % 12/10/88 06:02 SW846 8260B 8121040 Surr: Toluene-d8 (57-148%) 109 % 12/10/88 06:02 SW846 8260B 8121040 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/88 06:02 SW846 8260B 8121040 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/88 06:02 SW846 8260B 8121040 TCLP Volatile Organic Compounds by EPA Method 1311/8260B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 812093 TCLP Volatile Organic Compounds by EPA Method 1311/8260B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 812093 Patrick 10 organic Compounds by EPA Method 1311/8260B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 <td>1,2-Dichloroethene (total)</td> <td>ND</td> <td></td> <td>mg/kg dry</td> <td>0.0133</td> <td>1</td> <td>12/10/08 06:00</td> <td>SW846 8260B</td> <td>8121404</td>	1,2-Dichloroethene (total)	ND		mg/kg dry	0.0133	1	12/10/08 06:00	SW846 8260B	8121404
Surr: Dibromofluoromethane (55-139%) 92 % 12/10/08 66:02 SW846 8260B 8121444 Surr: Dibromofluoromethane (55-139%) 92 % 12/10/08 16:22 SW846 8260B 8120937 Surr: Toluene-d8 (57-148%) 113 % 12/10/08 66:00 SW846 8260B 8120937 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/08 16:02 SW846 8260B 8120937 TCLP Volatile Organic Compounds by EPA Method 1311/8260B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 Lip-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 <	Surr: 1,2-Dichloroethane-d4 (41-150%)	74 %					12/10/08 06:00	SW846 8260B	8121404
Surr: Dibromofluoromethane (55-139%) 92 % 12/10/08 16:22 SW846 8260B 8120937 Surr: Toluene-d8 (57-148%) 113 % 12/10/08 16:22 SW846 8260B 8121040 Surr: Toluene-d8 (57-148%) 109 % 12/10/08 16:22 SW846 8260B 81210937 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/08 16:22 SW846 8260B 8120937 TCLP Volatile Organic Compounds by EPA Method 1311/8260B Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120937 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Lj-Dichloroethane ND mg/L 0.0100 <td>Surr: 1,2-Dichloroethane-d4 (41-150%)</td> <td>87 %</td> <td></td> <td></td> <td></td> <td></td> <td>12/10/08 16:22</td> <td>SW846 8260B</td> <td>8120937</td>	Surr: 1,2-Dichloroethane-d4 (41-150%)	87 %					12/10/08 16:22	SW846 8260B	8120937
Surr: Toluene-d8 (57-148%) 113 % 12/10/08 06:00 SW846 8260B 8121404 Surr: Toluene-d8 (57-148%) 109 % 12/10/08 16:22 SW846 8260B 8120937 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/08 06:00 SW846 8260B 8120937 TCLP Volatile Organic Compounds by EPA Method 1311/8260B Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120937 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/826 8120939 1,2-Dichloroethane ND mg/	Surr: Dibromofluoromethane (55-139%)						12/10/08 06:00	SW846 8260B	8121404
Surr: Toluene-d8 (57-148%) 109 % 12/10/08 16:22 SW846 8260B 8120937 Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/08 06:00 SW846 8260B 8121043 TCLP Volatile Organic Compounds by EPA Method 1311/8260B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120937 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L<	,								
Surr: 4-Bromofluorobenzene (58-150%) 131 % 12/10/08 06:00 SW846 8260B 8121404 Surr: 4-Bromofluorobenzene (58-150%) 120 % 12/10/08 16:22 SW846 8260B 8121404 TCLP Volatile Organic Compounds by EPA Method 1311/8260B Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 2-Butanone ND mg/L 0.250 10 12/06/08 23:31 W846 1311/8260 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 <td>, , , , , , , , , , , , , , , , , , , ,</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	, , , , , , , , , , , , , , , , , , , ,								
Surr: 4-Bromofluorobenzene (58-150%) 120 % 12/10/08 16:22 SW846 8260B 8120937 TCLP Volatile Organic Compounds by EPA Method 1311/8260B Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 2-Butanone ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.01	,								
TCLP Volatile Organic Compounds by EPA Method 1311/8260B Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 2-Butanone ND mg/L 0.250 10 12/06/08 23:31 W846 1311/8260 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10	· · · · · · · · · · · · · · · · · · ·								
Benzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 2-Butanone ND mg/L 0.250 10 12/06/08 23:31 W846 1311/8260 8120939 Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939	·		011/0 2 /0D				12/10/08 10:22	SW 040 0200B	8120937
2-Butanone ND mg/L 0.250 10 12/06/08 23:31 W846 1311/8260 8120939	č 1 ,		011/0200D	/T	0.0100	10	12/07/09 22:21	W046 1211/0260	0120020
Carbon Tetrachloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Trichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 10 12/06/08 23:31 W846 1311/8260 8120939 <td></td> <td></td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td>				•					
Chlorobenzene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Chloroform ND B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939				•					
Chloroform ND B mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1 12/06/08 23:31 W846 1311/8260				•					
1,2-Dichloroethane ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 1,1-Dichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Trichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939			D	•					
Tetrachloroethene			В	•					
Tetrachloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Trichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939	,			•					
Trichloroethene ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939				•					
Vinyl chloride ND mg/L 0.0100 10 12/06/08 23:31 W846 1311/8260 8120939 Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939				•					
Surr: 1,2-Dichloroethane-d4 (60-140%) 100 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939				•					
Surr: Dibromofluoromethane (75-124%) 98 % 12/06/08 23:31 W846 1311/8260 8120939 Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939	•			mg/L	0.0100	10			
Surr: Toluene-d8 (78-121%) 99 % 12/06/08 23:31 W846 1311/8260 8120939									
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	, ,								



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

A lade				MDI	Dilution	Analysis	Mathad	D 4 3
Analyte	Result	Flag	Units	MRL	Factor	Date/Time	Method	Batch
Sample ID: NRL0332-04 (CNC-De	con-Grab - W	ater) Samp	oled: 12/02/08 1	2:15				
Volatile Organic Compounds by EPA M	Method 8260B							
Benzene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
2-Butanone	ND		ug/L	50.0	1	12/06/08 04:05	SW846 8260B	8120667
Carbon Tetrachloride	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Chlorobenzene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Chloroform	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
1,2-Dichloroethane	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
cis-1,2-Dichloroethene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
1,1-Dichloroethene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Methylene Chloride	ND		ug/L	5.00	1	12/06/08 04:05	SW846 8260B	8120667
Naphthalene	ND		ug/L	5.00	1	12/06/08 04:05	SW846 8260B	8120667
Tetrachloroethene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Trichloroethene	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Vinyl chloride	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
1,2-Dichloroethene (total)	ND		ug/L	1.00	1	12/06/08 04:05	SW846 8260B	8120667
Surr: 1,2-Dichloroethane-d4 (60-140%)	95 %					12/06/08 04:05	SW846 8260B	8120667
Surr: Dibromofluoromethane (75-124%)	96 %					12/06/08 04:05	SW846 8260B	8120667
Surr: Toluene-d8 (78-121%)	103 %					12/06/08 04:05	SW846 8260B	8120667
Surr: 4-Bromofluorobenzene (79-124%)	108 %					12/06/08 04:05	SW846 8260B	8120667
TCLP Volatile Organic Compounds by	EPA Method 13	11/8260B						
Benzene	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
2-Butanone	ND		mg/L	0.250	10	12/06/08 23:59	W846 1311/8260	8120939
Carbon Tetrachloride	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Chlorobenzene	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Chloroform	ND	В	mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
1,2-Dichloroethane	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
1,1-Dichloroethene	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Tetrachloroethene	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Trichloroethene	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Vinyl chloride	ND		mg/L	0.0100	10	12/06/08 23:59	W846 1311/8260	8120939
Surr: 1,2-Dichloroethane-d4 (60-140%)	99 %					12/06/08 23:59	W846 1311/8260.	8120939
Surr: Dibromofluoromethane (75-124%)	97 %					12/06/08 23:59	W846 1311/8260	8120939
Surr: Toluene-d8 (78-121%)	92 %					12/06/08 23:59	W846 1311/8260	8120939
Surr: 4-Bromofluorobenzene (79-124%)	100 %					12/06/08 23:59	W846 1311/8260	8120939



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620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Result	Flag Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-05 (CN	C-Mid-Comp - Soil) S	ampled: 12/02/08 12:00					
General Chemistry Parameters							
% Dry Solids	55.7	9%	0.500	1	12/12/08 06:46	SW-846	8121669
Total Metals by EPA Method 601	.0B						
Antimony	ND	mg/kg dry	18.0	1	12/11/08 12:07	SW846 6010B	8121573
Arsenic	4.78	mg/kg dry	1.80	1	12/11/08 12:07	SW846 6010B	8121573
Barium	22.8	mg/kg dry	3.59	1	12/11/08 12:07	SW846 6010B	8121573
Cadmium	ND	mg/kg dry	1.80	1	12/11/08 12:07	SW846 6010B	8121573
Chromium	29.1	mg/kg dry	1.80	1	12/11/08 12:07	SW846 6010B	8121573
Lead	6.82	mg/kg dry	1.80	1	12/11/08 12:07	SW846 6010B	8121573
Selenium	ND	mg/kg dry	3.59	1	12/11/08 12:07	SW846 6010B	8121573
Silver	ND	mg/kg dry	1.80	1	12/11/08 12:07	SW846 6010B	8121573
Mercury by EPA Methods 7470A	/7471A						
Mercury	ND	mg/kg dry	0.177	1	12/04/08 15:10	SW846 7471A	8120735
TCLP Metals by 6000/7000 Serie	es Methods						
Arsenic	ND	mg/L	0.100	1	12/05/08 23:59	W846 1311/6010	8120922
Barium	0.122	mg/L	0.100	1	12/05/08 23:59	W846 1311/6010	8120922
Cadmium	ND	mg/L	0.0100	1	12/05/08 23:59	W846 1311/6010	8120922
Chromium	ND	mg/L	0.0500	1	12/05/08 23:59	W846 1311/6010	8120922
Lead	ND	mg/L	0.0500	1	12/05/08 23:59	W846 1311/6010	8120922
Selenium	ND	mg/L	0.100	1	12/05/08 23:59	W846 1311/6010	8120922
Silver	ND	mg/L	0.0500	1	12/05/08 23:59	W846 1311/6010	8120922
Mercury	ND	mg/L	0.0100	1	12/05/08 17:18	W846 1311/7470.	8120910
Semivolatile Organic Compounds	s by EPA Method 8270C						
Acenaphthene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Acenaphthylene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Anthracene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Benzo (a) anthracene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Benzo (a) pyrene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Benzo (b) fluoranthene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Benzo (g,h,i) perylene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Benzo (k) fluoranthene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2-Chlorophenol	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	
Chrysene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Dibenz (a,h) anthracene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
1,4-Dichlorobenzene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2,4-Dimethylphenol	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2,4-Dinitrotoluene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Fluoranthene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Fluorene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Hexachlorobenzene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Hexachlorobutadiene	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Hexachloroethane	ND	mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

					Dilution	Analysis		
Analyte	Result	Flag	Units	MRL	Factor	Date/Time	Method	Batch
Sample ID: NRL0332-05 (CNC-M	id-Comp - Soil	l) - cont. S	ampled: 12/02/0	8 12:00				
Semivolatile Organic Compounds by E	EPA Method 8270	OC - cont.						
Indeno (1,2,3-cd) pyrene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2-Methylnaphthalene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2-Methylphenol	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
3/4-Methylphenol	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Naphthalene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Nitrobenzene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Pentachlorophenol	ND		mg/kg dry	2.91	1	12/05/08 19:26	SW846 8270C	8120320
Phenanthrene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Pyrene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
Pyridine	ND		mg/kg dry	2.33	1	12/05/08 19:26	SW846 8270C	8120320
1-Methylnaphthalene	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2,4,6-Trichlorophenol	ND		mg/kg dry	1.16	1	12/05/08 19:26	SW846 8270C	8120320
2,4,5-Trichlorophenol	ND		mg/kg dry	2.91	1	12/05/08 19:26	SW846 8270C	8120320
Surr: Terphenyl-d14 (26-128%)	69 %		8 8 . ,			12/05/08 19:26	SW846 8270C	8120320
Surr: 2,4,6-Tribromophenol (20-132%)	71 %					12/05/08 19:26	SW846 8270C	8120320
Surr: Phenol-d5 (23-113%)	71 %					12/05/08 19:26	SW846 8270C	8120320
Surr: 2-Fluorobiphenyl (19-109%)	63 %					12/05/08 19:26	SW846 8270C	8120320
Surr: 2-Fluorophenol (19-105%)	69 %					12/05/08 19:26	SW846 8270C	8120320
Surr: Nitrobenzene-d5 (22-104%)	63 %					12/05/08 19:26	SW846 8270C	8120320
TCLP Semivolatile Organic Compound	ds by EPA Metho	od 1311/82	70C					
Cresol(s)	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
1,4-Dichlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
2,4-Dinitrotoluene	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Hexachlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Hexachlorobutadiene	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Hexachloroethane	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Nitrobenzene	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Pentachlorophenol	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Pyridine	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
2,4,6-Trichlorophenol	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
2,4,5-Trichlorophenol	ND		mg/L	0.0200	2	12/12/08 00:33	W846 1311/8270	8121008
Surr: Terphenyl-d14 (21-123%)	29 %		C				W846 1311/8270	
Surr: 2,4,6-Tribromophenol (23-129%)	85 %						W846 1311/8270	
Surr: Phenol-d5 (10-100%)	45 %						W846 1311/8270	
Surr: 2-Fluorobiphenyl (34-108%)	70 %						W846 1311/8270	
Surr: 2-Fluorophenol (34-108%)	58 %					12/12/08 00:33	W846 1311/8270	8121008
Surr: Nitrobenzene-d5 (29-116%)	74 %					12/12/08 00:33	W846 1311/8270	8121008



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620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-06 (CI	NC-Decon-Comp - V	Vater) Sam	pled: 12/02/08	12:00				
Total Metals by EPA Method 60)10B							
Antimony	ND		mg/L	0.0100	1	12/05/08 00:06	SW846 6010B	8120688
Arsenic	ND		mg/L	0.0100	1	12/05/08 00:06	SW846 6010B	8120688
Barium	0.206		mg/L	0.0100	1	12/05/08 00:06	SW846 6010B	8120688
Cadmium	ND		mg/L	0.00100	1	12/05/08 00:06	SW846 6010B	8120688
Chromium	0.0398		mg/L	0.00500	1	12/05/08 00:06	SW846 6010B	8120688
Lead	0.0115		mg/L	0.00500	1	12/05/08 00:06	SW846 6010B	8120688
Selenium	ND		mg/L	0.0100	1	12/05/08 00:06	SW846 6010B	8120688
Silver	ND		mg/L	0.00500	1	12/05/08 00:06	SW846 6010B	8120688
Mercury by EPA Methods 7470.	A/7471A							
Mercury	ND		mg/L	0.000200	1	12/04/08 19:16	SW846 7470A	8120683
TCLP Metals by 6000/7000 Seri	ies Methods							
Arsenic	ND		mg/L	0.100	1	12/06/08 00:03	W846 1311/6010	8120922
Barium	0.274		mg/L	0.100	1	12/06/08 00:03	W846 1311/6010	8120922
Cadmium	ND		mg/L	0.0100	1	12/06/08 00:03	W846 1311/6010	8120922
Chromium	ND		mg/L	0.0500	1	12/06/08 00:03	W846 1311/6010	8120922
Lead	ND		mg/L	0.0500	1	12/06/08 00:03	W846 1311/6010	8120922
Selenium	ND		mg/L	0.100	1	12/06/08 00:03	W846 1311/6010	8120922
Silver	ND		mg/L	0.0500	1	12/06/08 00:03	W846 1311/6010	8120922
Mercury	ND		mg/L	0.0100	1	12/05/08 17:20	W846 1311/7470.	8120910
Semivolatile Organic Compound	ds by EPA Method 827	0C						
Acenaphthene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Acenaphthylene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Anthracene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Benzo (a) anthracene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Benzo (a) pyrene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Benzo (b) fluoranthene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Benzo (g,h,i) perylene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Benzo (k) fluoranthene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2-Chlorophenol	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Chrysene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Dibenz (a,h) anthracene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
1,4-Dichlorobenzene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2,4-Dimethylphenol	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2,4-Dinitrotoluene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Fluoranthene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Fluorene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Hexachlorobenzene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Hexachlorobutadiene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Hexachloroethane	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Indeno (1,2,3-cd) pyrene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2-Methylnaphthalene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2-Methylphenol	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709



Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

			NALI IICAL KI	I OKI				
Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-06 (CNC-De	econ-Comp - V	Vater) - cor	it. Sampled: 12	/02/08 12:00				
Semivolatile Organic Compounds by E	· -		•					
3/4-Methylphenol	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Naphthalene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Nitrobenzene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Pentachlorophenol	ND		ug/L	25.0	1	12/04/08 21:21	SW846 8270C	8120709
Phenanthrene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Pyrene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
Pyridine	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
1-Methylnaphthalene	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2,4,6-Trichlorophenol	ND		ug/L	10.0	1	12/04/08 21:21	SW846 8270C	8120709
2,4,5-Trichlorophenol	ND		ug/L	25.0	1	12/04/08 21:21	SW846 8270C	8120709
Surr: Terphenyl-d14 (21-123%)	40 %		-6-		_	12/04/08 21:21	SW846 8270C	8120709
Surr: 2,4,6-Tribromophenol (23-129%)	77 %					12/04/08 21:21	SW846 8270C	8120709
Surr: Phenol-d5 (10-100%)	27 %					12/04/08 21:21	SW846 8270C	8120709
Surr: 2-Fluorobiphenyl (34-108%)	62 %					12/04/08 21:21	SW846 8270C	8120709
Surr: 2-Fluorophenol (10-100%)	36 %					12/04/08 21:21	SW846 8270C	8120709
Surr: Nitrobenzene-d5 (29-116%)	72 %					12/04/08 21:21	SW846 8270C	8120709
TCLP Semivolatile Organic Compound	ds by EPA Metho	od 1311/827	0C					
Cresol(s)	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
1,4-Dichlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
2,4-Dinitrotoluene	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Hexachlorobenzene	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Hexachlorobutadiene	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Hexachloroethane	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Nitrobenzene	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Pentachlorophenol	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Pyridine	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
2,4,6-Trichlorophenol	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
2,4,5-Trichlorophenol	ND		mg/L	0.0200	2	12/12/08 00:56	W846 1311/8270	8121008
Surr: Terphenyl-d14 (21-123%)	59 %		C			12/12/08 00:56	W846 1311/8270	8121008
Surr: 2,4,6-Tribromophenol (23-129%)	82 %						W846 1311/8270	
Surr: Phenol-d5 (10-100%)	44 %						W846 1311/8270	
Surr: 2-Fluorobiphenyl (34-108%)	65 %						W846 1311/8270	
Surr: 2-Fluorophenol (34-108%)	54 %					12/12/08 00:56	W846 1311/8270	8121008
Surr: Nitrobenzene-d5 (29-116%)	64 %					12/12/08 00:56	W846 1311/8270	8121008



620 Wando Park Blvd.

Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NRL0332-07 (Trip Blan	ık - Water) Sa	ampled: 12	2/02/08 00:01					
Volatile Organic Compounds by EPA M	lethod 8260B							
Benzene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
2-Butanone	ND		ug/L	50.0	1	12/05/08 19:48	SW846 8260B	8120667
Carbon Tetrachloride	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Chlorobenzene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Chloroform	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
1,2-Dichloroethane	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
cis-1,2-Dichloroethene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
1,1-Dichloroethene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Methylene Chloride	ND		ug/L	5.00	1	12/05/08 19:48	SW846 8260B	8120667
Naphthalene	ND		ug/L	5.00	1	12/05/08 19:48	SW846 8260B	8120667
Tetrachloroethene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Trichloroethene	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Vinyl chloride	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
1,2-Dichloroethene (total)	ND		ug/L	1.00	1	12/05/08 19:48	SW846 8260B	8120667
Surr: 1,2-Dichloroethane-d4 (60-140%)	93 %					12/05/08 19:48	SW846 8260B	8120667
Surr: Dibromofluoromethane (75-124%)	95 %					12/05/08 19:48	SW846 8260B	8120667
Surr: Toluene-d8 (78-121%)	104 %					12/05/08 19:48	SW846 8260B	8120667
Surr: 4-Bromofluorobenzene (79-124%)	111 %					12/05/08 19:48	SW846 8260B	8120667



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Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
Mercury by EPA Methods 7470A	\/7471A						
SW846 7470A	8120683	NRL0332-06	30.00	30.00	12/04/08 09:35	JMR	EPA 7470
SW846 7471A	8120735	NRL0332-05	0.61	100.00	12/04/08 12:00	JMR	EPA 7471
Semivolatile Organic Compounds	-		15.40	1.00	10/04/00 10 10	DMG	ED 4 2550D
SW846 8270C SW846 8270C	8120320 8120709	NRL0332-05 NRL0332-06	15.42 1000.00	1.00 1.00	12/04/08 12:10 12/04/08 11:55	DMG DXP	EPA 3550B EPA 3510C
TCLP Extraction by EPA 1311	8120709	NKL0332-00	1000.00	1.00	12/04/08 11.55	DAF	EFA 3310C
SW846 1311	8120674	NRL0332-01	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120674	NRL0332-02	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120674	NRL0332-03	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120674	NRL0332-04	1.00	1.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120674	NRL0332-05	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311	8120674	NRL0332-06	1.00	1.00	12/04/08 15:35	AML	EPA 1311
TCLP Metals by 6000/7000 Serie	es Methods						
SW846 1311/6010B	8120922	NRL0332-05	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-05	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-05	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-05 NRL0332-05	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B SW846 1311/6010B	8120922 8120922	NRL0332-05	5.00 5.00	50.00 50.00	12/05/08 14:20 12/05/08 14:20	JLS JLS	EPA 3015 EPA 3015
SW846 1311/6010B	8120922	NRL0332-05	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120674	NRL0332-05	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0332-06	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120674	NRL0332-06	1.00	1.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/7470A	8120910	NRL0332-05	3.00	30.00	12/05/08 09:36	JMR	EPA 7470
SW846 1311/7470A	8120910	NRL0332-06	3.00	30.00	12/05/08 09:36	JMR	EPA 7470
TCLP Semivolatile Organic Com SW846 1311/8270C	pounds by EPA Metho 8120674	NRL0332-05	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/8270C	8121008	NRL0332-05	500.00	1.00	12/11/08 12:45	DXP	EPA 3510C Leachate
SW846 1311/8270C	8121008	NRL0332-06	500.00	1.00	12/11/08 12:45	DXP	EPA 3510C Leachate
SW846 1311/8270C	8120674	NRL0332-06	1.00	1.00	12/04/08 15:35	AML	EPA 1311
Total Metals by EPA Method 601	10B						
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0332-05	0.50	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010



620 Wando Park Blvd.

Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

SAMPLE EXTRACTION DATA

SW846 6010B 8121573 NRL0332-05 0.50 100.00 12/10/08 19:30 JLS EPA 3051 / 6010 SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601	0
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601	
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
SW846 6010B 8120688 NRL0332-06 50.00 50.00 12/04/08 11:53 LTB EPA 3010A / 601)
Volatile Organic Compounds by EPA Method 8260B	
SW846 8260B 8121404 NRL0332-01 5.40 5.00 12/02/08 09:55 JRL EPA 5035	
SW846 8260B 8120937 NRL0332-01RE1 5.44 5.00 12/02/08 09:55 JRL EPA 5035	
SW846 8260B 8121404 NRL0332-02 3.87 5.00 12/02/08 10:50 JRL EPA 5035	
SW846 8260B 8120937 NRL0332-02RE1 4.07 5.00 12/02/08 10:50 JRL EPA 5035	
SW846 8260B 8121404 NRL0332-03 3.24 5.00 12/02/08 11:40 JRL EPA 5035	
SW846 8260B 8120937 NRL0332-03RE1 4.62 5.00 12/02/08 11:40 JRL EPA 5035	



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Blank

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time	
Total Metals by EPA Meth	od 6010B						
8120688-BLK1							
Antimony	< 0.00380		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Arsenic	< 0.00450		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Barium	< 0.00150		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Cadmium	< 0.000500		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Chromium	< 0.00150		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Lead	< 0.00280		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Selenium	< 0.00430		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
Silver	< 0.00160		mg/L	8120688	8120688-BLK1	12/04/08 21:04	
8121573-BLK1							
Antimony	<1.41		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Arsenic	< 0.904		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Barium	< 0.502		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Cadmium	0.120		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Chromium	0.361		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Lead	< 0.703		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Selenium	< 0.863		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Silver	<0.301		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28	
Mercury by EPA Methods	7470A/7471A						
8120683-BLK1							
Mercury	< 0.000150		mg/L	8120683	8120683-BLK1	12/04/08 18:21	
8120735-BLK1							
Mercury	<0.0240		mg/kg wet	8120735	8120735-BLK1	12/04/08 15:03	
TCLP Metals by 6000/7000	Series Methods						
8120910-BLK1 Mercury	< 0.00150		mg/L	8120910	8120910-BLK1	12/05/08 15:47	
Mercury	~0.00130		IIIg/L	8120910	8120910-BLK1	12/03/06 13.47	
8120922-BLK1 Arsenic	< 0.0500		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Barium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Cadmium	< 0.00500		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Chromium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Lead	<0.0280		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Selenium	<0.0430		mg/L	8120922	8120922-BLK1 8120922-BLK1	12/05/08 23:05	
Silver	< 0.0160		mg/L	8120922	8120922-BLK1	12/05/08 23:05	
Silver	\0.0100		mg/L	8120922	6120922-BLK1	12/03/08 23:03	
Volatile Organic Compoun	ds by EPA Method 8260B						
8120667-BLK1							
Acetone	<25.0		ug/L	8120667	8120667-BLK1	12/05/08 19:21	



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Parameter Para	Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Beanne	Volatile Organic Compounds b	by EPA Method 8260B					
Bromochiomenthane	8120667-BLK1						
Bromachinomethane -0.400 ug/L 8120667 8120667-BLK1 120508 921	Benzene	< 0.270		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Promoticithoromethane 0.150 ug/L 8120667 R120667-BLK1 120508 P21 P10000000000000000000000000000000000	Bromobenzene	< 0.360		ug/L	8120667	8120667-BLK1	12/05/08 19:21
December 0-4-30	Bromochloromethane	< 0.400		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Bromomethane	Bromodichloromethane	< 0.350		ug/L	8120667	8120667-BLK1	12/05/08 19:21
2-Dutanome	Bromoform	< 0.430		ug/L	8120667	8120667-BLK1	12/05/08 19:21
schellpribureme 0.140 ug/L 8120667 8120667-BLK1 120508 1921 n-Butylberzene 0.280 ug/L 8120667 8120667-BLK1 120508 1921 carbon disulfide 0.380 ug/L 8120667 8120667-BLK1 120508 1921 carbon Tetrachioride 0.350 ug/L 8120667 8120667-BLK1 120508 1921 carbon Tetrachioride 0.350 ug/L 8120667 8120667-BLK1 120508 1921 carbon Tetrachioride 0.280 ug/L 8120667 8120667-BLK1 120508 1921 chloroberzene 0.180 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.280 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.280 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.380 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.380 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.330 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.380 ug/L 8120667 8120667-BLK1 120508 1921 chlorochiane 0.400 ug/L 8120667 8120667-BLK1 120508 1921 chlorochi	Bromomethane	< 0.420		ug/L	8120667	8120667-BLK1	12/05/08 19:21
n-Brothphemene 40,280 ug/L 81,20667 81,20667-BLK1 120,508 1921 tert-Buylbenzene -0,330 ug/L 81,20667 81,20667-BLK1 120,508 1921 Carben disulfide -0,350 ug/L 81,20667 81,20667-BLK1 120,508 1921 Chroben Tetrachloride -0,180 ug/L 81,20667 812,0667-BLK1 120,508 1921 Chlorochezne -0,180 ug/L 81,20667 812,0667-BLK1 120,508 1921 Chlorochane -0,450 ug/L 81,20667 812,0667-BLK1 120,508 1921 Chlorochane -0,280 ug/L 81,20667 812,0667-BLK1 120,508 1921 Chlorochane -0,380 ug/L 81,20667 812,0667-BLK1 120,508 1921 Chlorotolune -0,330 ug/L 81,20667 812,0667-BLK1 120,508 1921 2-Chlorotolune -0,330 ug/L 81,20667 81,20667-BLK1 120,508 1921 2-Chlorotolune -0,380 ug/L 81,20667 81,20667-BLK1 120,508 1921 2	2-Butanone	<2.40		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Intr-BurlyPhenzene	sec-Butylbenzene	< 0.140		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Carbon disalifide -0.3880 ug/L 8120667 8120667-BLKI 120508 1921 Carbon Tetrachloride -0.350 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.180 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.450 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.450 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.480 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.380 ug/L 8120667 8120667-BLKI 120508 1921 Chlorochizene -0.330 ug/L 8120667 8120667-BLKI 120508 1921 1-Dibromochiane (EDB) -0.390 ug/L 8120667 8120667-BLKI 120508 1921 1-Di-Dibromochiane (EDB) -0.350 ug/L 8120667 8120667-BLKI 120508 1921 1-Di-Dibromochiane (EDB) -0.350 ug/L 8120667 8120667-BLKI 120508 1921 1	n-Butylbenzene	< 0.280		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Carbon Tetrachloride <0.350 ug/L 8120667 8120667-BLK1 120508 1921 Chlorobenzene <0.180	tert-Butylbenzene	< 0.330		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Chlorobenzene	Carbon disulfide	< 0.380		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Chlorodibromomethane <0.289 ug/L 8120667 8120667-BLK1 120508 19.21 Chlorochane <0.450	Carbon Tetrachloride	< 0.350		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Chloroethane <0.450 ug/L 8120667 8120667-BLK1 120508 1921 Chloroform <0.280	Chlorobenzene	< 0.180		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Chloroform	Chlorodibromomethane	< 0.280		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Chloromethane <0.380 ug/L 8120667 8120667-BLK1 1205/08 19:21 2-Chlorotoluene <0.300	Chloroethane	< 0.450		ug/L	8120667	8120667-BLK1	12/05/08 19:21
2-Chlorotoluene <0.300 ug/L 8120667 8120667-BLK1 12/05/08 19:21 4-Chlorotoluene <0.330	Chloroform	< 0.280		ug/L	8120667	8120667-BLK1	12/05/08 19:21
A-Chlorotoluene <0.330	Chloromethane	< 0.380		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2-Dibromo-3-chloropropane <0.860	2-Chlorotoluene	< 0.300		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2-Dibromoethane (EDB)	4-Chlorotoluene	< 0.330		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Dibromomethane \$0.350 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,4-Dichlorobenzene \$0.380 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,3-Dichlorobenzene \$0.350 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,2-Dichlorobenzene \$0.500 ug/L \$120667 \$120667-BLK1 1205/08 19:21 Dichlorodifluoromethane \$0.460 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloroethane \$0.540 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,2-Dichloroethane \$0.370 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloroethane \$0.390 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloroethene \$0.340 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloroethene \$0.340 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,3-Dichloroptopane \$0.290 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,2-Dichloropropane \$0.320 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,2-Dichloropropane \$0.320 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,2-Dichloropropane \$0.320 ug/L \$120667 \$120667-BLK1 1205/08 19:21 2,2-Dichloropropane \$0.320 ug/L \$120667 \$120667-BLK1 1205/08 19:21 2,2-Dichloropropane \$0.320 ug/L \$120667 \$120667-BLK1 1205/08 19:21 2,2-Dichloropropane \$0.330 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloropropene \$0.340 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloropropene \$0.340 ug/L \$120667 \$120667-BLK1 1205/08 19:21 1,1-Dichloropropene \$0.340 ug/L \$120667 \$120667-BL	1,2-Dibromo-3-chloropropane	< 0.860		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,4-Dichlorobenzene <0.380	1,2-Dibromoethane (EDB)	< 0.390		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,3-Dichlorobenzene <0.350	Dibromomethane	< 0.350		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2-Dichlorobenzene	1,4-Dichlorobenzene	< 0.380		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Dichlorodifluoromethane <0.460 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,1-Dichloroethane <0.540	1,3-Dichlorobenzene	< 0.350		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1-Dichloroethane <0.540 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,2-Dichloroethane <0.370	1,2-Dichlorobenzene	< 0.500		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2-Dichloroethane <0.370 ug/L 8120667 8120667-BLK1 12/05/08 19:21	Dichlorodifluoromethane	< 0.460		ug/L	8120667	8120667-BLK1	12/05/08 19:21
cis-1,2-Dichloroethene <0.390 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,1-Dichloroethene <0.340	1,1-Dichloroethane	< 0.540		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1-Dichloroethene <0.340 ug/L 8120667 8120667-BLK1 12/05/08 19:21 trans-1,2-Dichloroethene <0.470	1,2-Dichloroethane	< 0.370		ug/L	8120667	8120667-BLK1	12/05/08 19:21
trans-1,2-Dichloroethene <0.470 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,3-Dichloropropane <0.290 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,2-Dichloropropane <0.320 ug/L 8120667 8120667-BLK1 12/05/08 19:21 2,2-Dichloropropane <0.420 ug/L 8120667 8120667-BLK1 12/05/08 19:21 cis-1,3-Dichloropropene <0.290 ug/L 8120667 8120667-BLK1 12/05/08 19:21 trans-1,3-Dichloropropene <0.330 ug/L 8120667 8120667-BLK1 12/05/08 19:21 1,1-Dichloropropene <0.310 ug/L 8120667 8120667-BLK1 12/05/08 19:21 Ethylbenzene <0.240 ug/L 8120667 8120667-BLK1 12/05/08 19:21 Hexachlorobutadiene 3.44 ug/L 8120667 8120667-BLK1 12/05/08 19:21 2-Hexanone <16.7 ug/L 8120667 8120667-BLK1 12/05/08 19:21	cis-1,2-Dichloroethene	< 0.390		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,3-Dichloropropane <0.290	1,1-Dichloroethene	< 0.340		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2-Dichloropropane <0.320 ug/L 8120667 8120667-BLK1 12/05/08 19:21 2,2-Dichloropropane <0.420	trans-1,2-Dichloroethene	< 0.470		ug/L	8120667	8120667-BLK1	12/05/08 19:21
2,2-Dichloropropane <0.420	1,3-Dichloropropane	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
cis-1,3-Dichloropropene <0.290 ug/L 8120667 8120667-BLK1 12/05/08 19:21 trans-1,3-Dichloropropene <0.330	1,2-Dichloropropane	< 0.320		ug/L	8120667	8120667-BLK1	12/05/08 19:21
trans-1,3-Dichloropropene <0.330	2,2-Dichloropropane	< 0.420		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1-Dichloropropene <0.310 ug/L 8120667 8120667-BLK1 12/05/08 19:21 Ethylbenzene <0.240	cis-1,3-Dichloropropene	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Ethylbenzene <0.240 ug/L 8120667 8120667-BLK1 12/05/08 19:21 Hexachlorobutadiene 3.44 ug/L 8120667 8120667-BLK1 12/05/08 19:21 2-Hexanone <16.7	trans-1,3-Dichloropropene	< 0.330		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Hexachlorobutadiene 3.44 ug/L 8120667 8120667-BLK1 12/05/08 19:21 2-Hexanone <16.7	1,1-Dichloropropene	< 0.310		ug/L	8120667	8120667-BLK1	12/05/08 19:21
2-Hexanone <16.7 ug/L 8120667 8120667-BLK1 12/05/08 19:21	Ethylbenzene	< 0.240		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Ç .	Hexachlorobutadiene	3.44		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Isopropylbenzene <0.300 ug/L 8120667 8120667-BLK1 12/05/08 19:21	2-Hexanone	<16.7		ug/L	8120667	8120667-BLK1	12/05/08 19:21
	Isopropylbenzene	< 0.300		ug/L	8120667	8120667-BLK1	12/05/08 19:21



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8260B					
8120667-BLK1						
p-Isopropyltoluene	< 0.220		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Methyl tert-Butyl Ether	< 0.420		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Methylene Chloride	< 0.830		ug/L	8120667	8120667-BLK1	12/05/08 19:21
4-Methyl-2-pentanone	<3.49		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Naphthalene	< 0.540		ug/L	8120667	8120667-BLK1	12/05/08 19:21
n-Propylbenzene	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Styrene	< 0.330		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1,1,2-Tetrachloroethane	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1,2,2-Tetrachloroethane	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Tetrachloroethene	< 0.230		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Toluene	< 0.280		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2,3-Trichlorobenzene	< 0.940		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2,4-Trichlorobenzene	< 0.500		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1,2-Trichloroethane	< 0.400		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,1,1-Trichloroethane	< 0.370		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Trichloroethene	< 0.230		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Trichlorofluoromethane	< 0.350		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2,3-Trichloropropane	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,3,5-Trimethylbenzene	< 0.160		ug/L	8120667	8120667-BLK1	12/05/08 19:21
1,2,4-Trimethylbenzene	< 0.170		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Vinyl chloride	< 0.290		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Xylenes, total	< 0.860		ug/L	8120667	8120667-BLK1	12/05/08 19:21
Surrogate: 1,2-Dichloroethane-d4	100%			8120667	8120667-BLK1	12/05/08 19:21
Surrogate: Dibromofluoromethane	100%			8120667	8120667-BLK1	12/05/08 19:21
Surrogate: Toluene-d8	106%			8120667	8120667-BLK1	12/05/08 19:21
Surrogate: 4-Bromofluorobenzene	109%			8120667	8120667-BLK1	12/05/08 19:21
8120937-BLK1						
Acetone	< 0.0250		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Benzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Bromobenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Bromochloromethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Bromodichloromethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Bromoform	< 0.000530		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Bromomethane	< 0.00157		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
2-Butanone	< 0.00500		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
sec-Butylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
n-Butylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
tert-Butylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Carbon disulfide	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Carbon Tetrachloride	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
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Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Volatile Organic Compounds by El	PA Method 8260B					
8120937-BLK1						
Chlorobenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Chlorodibromomethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Chloroethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Chloroform	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Chloromethane	< 0.000880		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
2-Chlorotoluene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
4-Chlorotoluene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2-Dibromo-3-chloropropane	< 0.00100		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2-Dibromoethane (EDB)	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Dibromomethane	< 0.000540		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,4-Dichlorobenzene	< 0.000640		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,3-Dichlorobenzene	< 0.000530		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2-Dichlorobenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Dichlorodifluoromethane	< 0.000930		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1-Dichloroethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2-Dichloroethane	< 0.000800		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
cis-1,2-Dichloroethene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1-Dichloroethene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
trans-1,2-Dichloroethene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,3-Dichloropropane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2-Dichloropropane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
2,2-Dichloropropane	< 0.000420		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
cis-1,3-Dichloropropene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
trans-1,3-Dichloropropene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1-Dichloropropene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Ethylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Hexachlorobutadiene	< 0.000630		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
2-Hexanone	< 0.00407		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Isopropylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
p-Isopropyltoluene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Methyl tert-Butyl Ether	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Methylene Chloride	0.00373		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
4-Methyl-2-pentanone	< 0.00426		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Naphthalene	< 0.00151		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
n-Propylbenzene	< 0.000530		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Styrene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1,1,2-Tetrachloroethane	< 0.000500		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1,2,2-Tetrachloroethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Tetrachloroethene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Toluene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2,3-Trichlorobenzene	< 0.000660		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Volatile Organic Compounds by	y EPA Method 8260B					
8120937-BLK1						
1,2,4-Trichlorobenzene	< 0.000650		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1,2-Trichloroethane	< 0.00102		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,1,1-Trichloroethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Trichloroethene	< 0.000280		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Trichlorofluoromethane	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2,3-Trichloropropane	< 0.000550		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,3,5-Trimethylbenzene	< 0.000670		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
1,2,4-Trimethylbenzene	< 0.00127		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Vinyl chloride	< 0.000710		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Xylenes, total	< 0.00172		mg/kg wet	8120937	8120937-BLK1	12/10/08 14:53
Surrogate: 1,2-Dichloroethane-d4	92%			8120937	8120937-BLK1	12/10/08 14:53
Surrogate: Dibromofluoromethane	108%			8120937	8120937-BLK1	12/10/08 14:53
Surrogate: Toluene-d8	101%			8120937	8120937-BLK1	12/10/08 14:53
Surrogate: 4-Bromofluorobenzene	100%			8120937	8120937-BLK1	12/10/08 14:53
8121404-BLK1						
Acetone	< 0.0250		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Benzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Bromobenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Bromochloromethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Bromodichloromethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Bromoform	< 0.000530		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Bromomethane	< 0.00157		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
2-Butanone	0.00677		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
sec-Butylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
n-Butylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
tert-Butylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Carbon disulfide	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Carbon Tetrachloride	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Chlorobenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Chlorodibromomethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Chloroethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Chloroform	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Chloromethane	< 0.000880		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
2-Chlorotoluene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
4-Chlorotoluene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
1,2-Dibromo-3-chloropropane	< 0.00100		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
1,2-Dibromoethane (EDB)	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
Dibromomethane	< 0.000540		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
1,4-Dichlorobenzene	< 0.000640		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26
1,3-Dichlorobenzene	< 0.000530		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time	
Volatile Organic Compounds b	y EPA Method 8260B						
8121404-BLK1							
1,2-Dichlorobenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Dichlorodifluoromethane	< 0.000930		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1-Dichloroethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2-Dichloroethane	< 0.000800		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
cis-1,2-Dichloroethene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1-Dichloroethene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
trans-1,2-Dichloroethene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,3-Dichloropropane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2-Dichloropropane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
2,2-Dichloropropane	< 0.000420		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
cis-1,3-Dichloropropene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
trans-1,3-Dichloropropene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1-Dichloropropene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Ethylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Hexachlorobutadiene	< 0.000630		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
2-Hexanone	< 0.00407		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Isopropylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
p-Isopropyltoluene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Methyl tert-Butyl Ether	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Methylene Chloride	< 0.00348		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
4-Methyl-2-pentanone	< 0.00426		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Naphthalene	< 0.00151		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
n-Propylbenzene	< 0.000530		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Styrene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1,1,2-Tetrachloroethane	< 0.000500		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1,2,2-Tetrachloroethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Tetrachloroethene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Toluene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2,3-Trichlorobenzene	< 0.000660		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2,4-Trichlorobenzene	< 0.000650		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1,2-Trichloroethane	< 0.00102		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1,1-Trichloroethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Trichloroethene	< 0.000280		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Trichlorofluoromethane	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2,3-Trichloropropane	< 0.000550		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,3,5-Trimethylbenzene	< 0.000670		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,2,4-Trimethylbenzene	< 0.00127		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Vinyl chloride	< 0.000710		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Xylenes, total	< 0.00172		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
1,1,2-Trifluorotrichloroethane	< 0.000610		mg/kg wet	8121404	8121404-BLK1	12/10/08 01:26	
Surrogate: 1,2-Dichloroethane-d4	89%			8121404	8121404-BLK1	12/10/08 01:26	



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Volatile Organic Compounds by E	EPA Method 8260B					
8121404-BLK1						
Surrogate: Dibromofluoromethane	95%			8121404	8121404-BLK1	12/10/08 01:26
Surrogate: Toluene-d8	105%			8121404	8121404-BLK1	12/10/08 01:26
Surrogate: 4-Bromofluorobenzene	105%			8121404	8121404-BLK1	12/10/08 01:26
Semivolatile Organic Compounds	by EPA Method 8270	C				
8120320-BLK1						
Acenaphthene	< 0.0310		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Acenaphthylene	< 0.0320		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Anthracene	< 0.0330		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Benzo (a) anthracene	< 0.0380		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Benzo (a) pyrene	< 0.0290		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Benzo (b) fluoranthene	< 0.0320		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Benzo (g,h,i) perylene	< 0.0290		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Benzo (k) fluoranthene	< 0.0290		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
4-Bromophenyl phenyl ether	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Butyl benzyl phthalate	< 0.0890		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Carbazole	< 0.165		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
4-Chloro-3-methylphenol	< 0.100		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
4-Chloroaniline	< 0.289		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Bis(2-chloroethoxy)methane	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Bis(2-chloroethyl)ether	< 0.135		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Bis(2-chloroisopropyl)ether	< 0.102		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2-Chloronaphthalene	< 0.0680		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2-Chlorophenol	< 0.109		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
4-Chlorophenyl phenyl ether	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Chrysene	< 0.0390		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Dibenz (a,h) anthracene	< 0.0310		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Dibenzofuran	< 0.0890		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Di-n-butyl phthalate	< 0.0860		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
1,4-Dichlorobenzene	< 0.115		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
1,2-Dichlorobenzene	< 0.0880		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
1,3-Dichlorobenzene	< 0.0800		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
3,3-Dichlorobenzidine	< 0.270		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2,4-Dichlorophenol	< 0.0870		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Diethyl phthalate	< 0.0500		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2,4-Dimethylphenol	< 0.281		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
Dimethyl phthalate	< 0.0880		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
4,6-Dinitro-2-methylphenol	< 0.0910		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2,4-Dinitrophenol	< 0.135		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2,6-Dinitrotoluene	<0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37
2,4-Dinitrotoluene	< 0.0880		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time	
Semivolatile Organic Compound	ls by EPA Method 827	0C					
8120320-BLK1							
Di-n-octyl phthalate	< 0.132		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Bis(2-ethylhexyl)phthalate	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Fluoranthene	< 0.0340		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Fluorene	< 0.0390		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Hexachlorobenzene	< 0.0830		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Hexachlorobutadiene	< 0.108		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Hexachlorocyclopentadiene	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Hexachloroethane	< 0.105		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Indeno (1,2,3-cd) pyrene	< 0.0310		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Isophorone	< 0.100		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2-Methylnaphthalene	< 0.0330		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2-Methylphenol	< 0.0990		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
3/4-Methylphenol	< 0.145		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Naphthalene	< 0.0410		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
3-Nitroaniline	< 0.110		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2-Nitroaniline	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
4-Nitroaniline	< 0.275		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Nitrobenzene	< 0.106		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
4-Nitrophenol	< 0.276		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2-Nitrophenol	< 0.197		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
N-Nitrosodiphenylamine	< 0.109		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
N-Nitrosodi-n-propylamine	< 0.122		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Pentachlorophenol	< 0.0740		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Phenanthrene	< 0.0340		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Phenol	< 0.0690		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Pyrene	< 0.0410		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Pyridine	< 0.0940		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
1,2,4-Trichlorobenzene	< 0.111		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
1-Methylnaphthalene	< 0.0320		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2,4,6-Trichlorophenol	< 0.0870		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
2,4,5-Trichlorophenol	< 0.0680		mg/kg wet	8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: Terphenyl-d14	75%			8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: 2,4,6-Tribromophenol	85%			8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: Phenol-d5	83%			8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: 2-Fluorobiphenyl	78%			8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: 2-Fluorophenol	82%			8120320	8120320-BLK1	12/05/08 13:37	
Surrogate: Nitrobenzene-d5	76%			8120320	8120320-BLK1	12/05/08 13:37	
8120709-BLK1							
Acenaphthene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50	
Acenaphthylene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50	
- · ·			-				



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Semivolatile Organic Compounds	by EPA Method 8270	C				
8120709-BLK1						
Anthracene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Benzo (a) anthracene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Benzo (a) pyrene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Benzo (b) fluoranthene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Benzo (g,h,i) perylene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Benzo (k) fluoranthene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Bromophenyl phenyl ether	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Butyl benzyl phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Carbazole	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Chloro-3-methylphenol	<4.50		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Chloroaniline	<4.50		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Bis(2-chloroethoxy)methane	<4.20		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Bis(2-chloroethyl)ether	<4.70		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Bis(2-chloroisopropyl)ether	<4.20		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Chloronaphthalene	<3.50		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Chlorophenol	<4.10		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Chlorophenyl phenyl ether	<2.60		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Chrysene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Dibenz (a,h) anthracene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Dibenzofuran	<2.90		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Di-n-butyl phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
1,4-Dichlorobenzene	< 5.80		ug/L	8120709	8120709-BLK1	12/04/08 18:50
1,2-Dichlorobenzene	<6.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
1,3-Dichlorobenzene	<6.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
3,3-Dichlorobenzidine	< 2.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4-Dichlorophenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Diethyl phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4-Dimethylphenol	<4.10		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Dimethyl phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4,6-Dinitro-2-methylphenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4-Dinitrophenol	<3.40		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,6-Dinitrotoluene	<2.20		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4-Dinitrotoluene	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Di-n-octyl phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Bis(2-ethylhexyl)phthalate	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Fluoranthene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Fluorene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Hexachlorobenzene	<3.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Hexachlorobutadiene	<5.10		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Hexachlorocyclopentadiene	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Hexachloroethane	< 5.90		ug/L	8120709	8120709-BLK1	12/04/08 18:50



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Semivolatile Organic Compound	ds by EPA Method 827	0C				
8120709-BLK1						
Indeno (1,2,3-cd) pyrene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Isophorone	<4.70		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Methylnaphthalene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Methylphenol	<3.50		ug/L	8120709	8120709-BLK1	12/04/08 18:50
3/4-Methylphenol	<4.60		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Naphthalene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
3-Nitroaniline	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Nitroaniline	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Nitroaniline	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Nitrobenzene	<3.50		ug/L	8120709	8120709-BLK1	12/04/08 18:50
4-Nitrophenol	<4.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2-Nitrophenol	<3.20		ug/L	8120709	8120709-BLK1	12/04/08 18:50
N-Nitrosodiphenylamine	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
N-Nitrosodi-n-propylamine	<3.90		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Pentachlorophenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Phenanthrene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Phenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Pyrene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
1,2,4-Trichlorobenzene	<4.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
1-Methylnaphthalene	<1.00		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4,6-Trichlorophenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
2,4,5-Trichlorophenol	<3.30		ug/L	8120709	8120709-BLK1	12/04/08 18:50
Surrogate: Terphenyl-d14	68%			8120709	8120709-BLK1	12/04/08 18:50
Surrogate: 2,4,6-Tribromophenol	48%			8120709	8120709-BLK1	12/04/08 18:50
Surrogate: Phenol-d5	26%			8120709	8120709-BLK1	12/04/08 18:50
Surrogate: 2-Fluorobiphenyl	74%			8120709	8120709-BLK1	12/04/08 18:50
Surrogate: 2-Fluorophenol	29%			8120709	8120709-BLK1	12/04/08 18:50
Surrogate: Nitrobenzene-d5	86%			8120709	8120709-BLK1	12/04/08 18:50
TCLP Volatile Organic Compo	unds by EPA Method 1	311/8260B				
8120939-BLK1						
Benzene	< 0.000270		mg/L	8120939	8120939-BLK1	12/06/08 18:29
2-Butanone	< 0.00240		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Carbon Tetrachloride	< 0.000350		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Chlorobenzene	< 0.000180		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Chloroform	0.00154		mg/L	8120939	8120939-BLK1	12/06/08 18:29
1,2-Dichloroethane	< 0.000370		mg/L	8120939	8120939-BLK1	12/06/08 18:29
1,1-Dichloroethene	< 0.000340		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Tetrachloroethene	< 0.000230		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Trichloroethene	0.000470		mg/L	8120939	8120939-BLK1	12/06/08 18:29
Vinyl chloride	< 0.000290		mg/L	8120939	8120939-BLK1	12/06/08 18:29

NRL0332

Charleston Naval Complex



Client S&ME, Inc. (2420)

Attn

Work Order: 620 Wando Park Blvd. Project Name:

Mt. Pleasant, SC 29464 1131-08-554 Project Number: Andrew Wertz 12/03/08 08:00 Received:

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
TCLP Volatile Organic Compou	inds by EPA Method 1	311/8260B				
8120939-BLK1						
Surrogate: 1,2-Dichloroethane-d4	104%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: Dibromofluoromethane	99%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: Toluene-d8	100%			8120939	8120939-BLK1	12/06/08 18:29
Surrogate: 4-Bromofluorobenzene	101%			8120939	8120939-BLK1	12/06/08 18:29
TCLP Semivolatile Organic Con	npounds by EPA Meth	od 1311/827	70C			
8121008-BLK1	•					
Cresol(s)	< 0.0188		mg/L	8121008	8121008-BLK1	12/11/08 23:24
1,4-Dichlorobenzene	< 0.0116		mg/L	8121008	8121008-BLK1	12/11/08 23:24
2,4-Dinitrotoluene	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Benzo (a) pyrene	< 0.00200		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachlorobenzene	< 0.00600		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachlorobutadiene	< 0.0102		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Hexachloroethane	< 0.0118		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Nitrobenzene	< 0.00700		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Pentachlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Pyridine	< 0.00740		mg/L	8121008	8121008-BLK1	12/11/08 23:24
2,4,6-Trichlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
2,4,5-Trichlorophenol	< 0.00660		mg/L	8121008	8121008-BLK1	12/11/08 23:24
Surrogate: Terphenyl-d14	69%			8121008	8121008-BLK1	12/11/08 23:24
Surrogate: 2,4,6-Tribromophenol	71%			8121008	8121008-BLK1	12/11/08 23:24
Surrogate: Phenol-d5	45%			8121008	8121008-BLK1	12/11/08 23:24
Surrogate: 2-Fluorobiphenyl	70%			8121008	8121008-BLK1	12/11/08 23:24
Surrogate: 2-Fluorophenol	57%			8121008	8121008-BLK1	12/11/08 23:24
Surrogate: Nitrobenzene-d5	74%			8121008	8121008-BLK1	12/11/08 23:24



Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA

Duplicate

Analyte	Orig. Val.	Duplicate	Q	Units	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
General Chemistry Parameters 8121669-DUP1 % Dry Solids	90.4	90.0		%	0.4	20	8121669	NRL0150-04	12/12/08 06:46



Attn

 $620\;Wando\;Park\;Blvd.$

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Total Metals by EPA Method 6	5010B							
8120688-BS1								
Antimony	0.100	0.104		mg/L	104%	80 - 120	8120688	12/04/08 21:09
Arsenic	0.0500	0.0441		mg/L	88%	80 - 120	8120688	12/04/08 21:09
Barium	2.00	2.02		mg/L	101%	80 - 120	8120688	12/04/08 21:09
Cadmium	0.0500	0.0489		mg/L	98%	80 - 120	8120688	12/04/08 21:09
Chromium	0.200	0.206		mg/L	103%	80 - 120	8120688	12/04/08 21:09
Lead	0.0500	0.0479		mg/L	96%	80 - 120	8120688	12/04/08 21:09
Selenium	0.0500	0.0481		mg/L	96%	80 - 120	8120688	12/04/08 21:09
Silver	0.0500	0.0475		mg/L	95%	80 - 120	8120688	12/04/08 21:09
8121573-BS1								
Antimony	100	98.9		mg/kg wet	99%	80 - 120	8121573	12/11/08 11:33
Arsenic	20.0	19.4		mg/kg wet	97%	80 - 120	8121573	12/11/08 11:33
Barium	400	405		mg/kg wet	101%	80 - 120	8121573	12/11/08 11:33
Cadmium	20.0	21.2		mg/kg wet	106%	80 - 120	8121573	12/11/08 11:33
Chromium	40.0	43.2		mg/kg wet	108%	80 - 120	8121573	12/11/08 11:33
Lead	100	107		mg/kg wet	107%	80 - 120	8121573	12/11/08 11:33
Selenium	20.0	18.7		mg/kg wet	93%	80 - 120	8121573	12/11/08 11:33
Silver	10.0	10.6		mg/kg wet	106%	75 - 125	8121573	12/11/08 11:33
Mercury by EPA Methods 747	0A/7471A							
8120683-BS1								
Mercury	0.00100	0.000968		mg/L	97%	78 - 124	8120683	12/04/08 18:23
8120735-BS1								
Mercury	0.167	0.177		mg/kg wet	106%	78 - 120	8120735	12/04/08 15:05
TCLP Metals by 6000/7000 Ser	ries Methods							
8120910-BS1								
Mercury	0.0200	0.0185		mg/L	92%	78 - 124	8120910	12/05/08 16:39
8120922-BS1								
Arsenic	10.0	10.0		mg/L	100%	80 - 120	8120922	12/05/08 23:09
Barium	50.0	51.4		mg/L	103%	80 - 120	8120922	12/05/08 23:09
Cadmium	10.0	9.90		mg/L	99%	80 - 120	8120922	12/05/08 23:09
Chromium	50.0	52.2		mg/L	104%	80 - 120	8120922	12/05/08 23:09
Lead	50.0	50.4		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Selenium	10.0	10.1		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Silver	10.0	10.2		mg/L	102%	80 - 120	8120922	12/05/08 23:09
Volatile Organic Compounds b	y EPA Method 8260B							
8120667-BS1								
Acetone	250	280		ug/L	112%	62 - 150	8120667	12/05/08 17:37



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8260B							
8120667-BS1								
Benzene	50.0	53.2		ug/L	106%	80 - 137	8120667	12/05/08 17:37
Bromobenzene	50.0	51.8		ug/L	104%	74 - 131	8120667	12/05/08 17:37
Bromochloromethane	50.0	54.2		ug/L	108%	80 - 128	8120667	12/05/08 17:37
Bromodichloromethane	50.0	45.7		ug/L	91%	80 - 129	8120667	12/05/08 17:37
Bromoform	50.0	38.3		ug/L	77%	69 - 127	8120667	12/05/08 17:37
Bromomethane	50.0	50.9		ug/L	102%	62 - 148	8120667	12/05/08 17:37
2-Butanone	250	274		ug/L	110%	77 - 141	8120667	12/05/08 17:37
sec-Butylbenzene	50.0	52.0		ug/L	104%	78 - 133	8120667	12/05/08 17:37
n-Butylbenzene	50.0	55.2		ug/L	110%	72 - 136	8120667	12/05/08 17:37
tert-Butylbenzene	50.0	50.6		ug/L	101%	77 - 135	8120667	12/05/08 17:37
Carbon disulfide	50.0	58.7		ug/L	117%	80 - 126	8120667	12/05/08 17:37
Carbon Tetrachloride	50.0	51.6		ug/L	103%	76 - 143	8120667	12/05/08 17:37
Chlorobenzene	50.0	50.8		ug/L	102%	80 - 120	8120667	12/05/08 17:37
Chlorodibromomethane	50.0	42.9		ug/L	86%	76 - 123	8120667	12/05/08 17:37
Chloroethane	50.0	54.5		ug/L	109%	77 - 127	8120667	12/05/08 17:37
Chloroform	50.0	52.3		ug/L	105%	80 - 133	8120667	12/05/08 17:37
Chloromethane	50.0	41.9		ug/L	84%	33 - 125	8120667	12/05/08 17:37
2-Chlorotoluene	50.0	51.8		ug/L	104%	80 - 127	8120667	12/05/08 17:37
4-Chlorotoluene	50.0	51.0		ug/L	102%	80 - 127	8120667	12/05/08 17:37
1,2-Dibromo-3-chloropropane	50.0	37.7		ug/L	75%	60 - 136	8120667	12/05/08 17:37
1,2-Dibromoethane (EDB)	50.0	51.8		ug/L	104%	80 - 125	8120667	12/05/08 17:37
Dibromomethane	50.0	50.2		ug/L	100%	80 - 124	8120667	12/05/08 17:37
1,4-Dichlorobenzene	50.0	46.8		ug/L	94%	80 - 120	8120667	12/05/08 17:37
1,3-Dichlorobenzene	50.0	47.1		ug/L	94%	80 - 123	8120667	12/05/08 17:37
1,2-Dichlorobenzene	50.0	47.7		ug/L	95%	80 - 122	8120667	12/05/08 17:37
Dichlorodifluoromethane	50.0	36.2		ug/L	72%	36 - 120	8120667	12/05/08 17:37
1,1-Dichloroethane	50.0	55.6		ug/L	111%	76 - 130	8120667	12/05/08 17:37
1,2-Dichloroethane	50.0	49.3		ug/L	99%	69 - 136	8120667	12/05/08 17:37
cis-1,2-Dichloroethene	50.0	57.4		ug/L	115%	80 - 129	8120667	12/05/08 17:37
1,1-Dichloroethene	50.0	56.2		ug/L	112%	80 - 127	8120667	12/05/08 17:37
trans-1,2-Dichloroethene	50.0	56.1		ug/L	112%	80 - 131	8120667	12/05/08 17:37
1,3-Dichloropropane	50.0	52.4		ug/L	105%	80 - 122	8120667	12/05/08 17:37
1,2-Dichloropropane	50.0	49.0		ug/L	98%	80 - 120	8120667	12/05/08 17:37
2,2-Dichloropropane	50.0	62.2		ug/L	124%	62 - 142	8120667	12/05/08 17:37
cis-1,3-Dichloropropene	50.0	52.9		ug/L	106%	76 - 135	8120667	12/05/08 17:37
trans-1,3-Dichloropropene	50.0	47.3		ug/L	95%	70 - 137	8120667	12/05/08 17:37
1,1-Dichloropropene	50.0	55.0		ug/L	110%	80 - 127	8120667	12/05/08 17:37
Ethylbenzene	50.0	53.6		ug/L	107%	80 - 128	8120667	12/05/08 17:37
Hexachlorobutadiene	50.0	44.8	В	ug/L	90%	68 - 148	8120667	12/05/08 17:37
2-Hexanone	250	271		ug/L	108%	69 - 148	8120667	12/05/08 17:37
Isopropylbenzene	50.0	56.0		ug/L	112%	80 - 121	8120667	12/05/08 17:37



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by E	PA Method 8260B							
8120667-BS1								
p-Isopropyltoluene	50.0	50.8		ug/L	102%	79 - 127	8120667	12/05/08 17:37
Methyl tert-Butyl Ether	50.0	57.1		ug/L	114%	70 - 129	8120667	12/05/08 17:37
Methylene Chloride	50.0	48.0		ug/L	96%	76 - 135	8120667	12/05/08 17:37
4-Methyl-2-pentanone	250	268		ug/L	107%	67 - 143	8120667	12/05/08 17:37
Naphthalene	50.0	47.5		ug/L	95%	62 - 141	8120667	12/05/08 17:37
n-Propylbenzene	50.0	52.6		ug/L	105%	80 - 132	8120667	12/05/08 17:37
Styrene	50.0	57.3		ug/L	115%	80 - 139	8120667	12/05/08 17:37
1,1,1,2-Tetrachloroethane	50.0	46.2		ug/L	92%	80 - 135	8120667	12/05/08 17:37
1,1,2,2-Tetrachloroethane	50.0	52.3		ug/L	105%	65 - 145	8120667	12/05/08 17:37
Tetrachloroethene	50.0	49.1		ug/L	98%	80 - 125	8120667	12/05/08 17:37
Toluene	50.0	53.0		ug/L	106%	80 - 125	8120667	12/05/08 17:37
1,2,3-Trichlorobenzene	50.0	44.9		ug/L	90%	57 - 144	8120667	12/05/08 17:37
1,2,4-Trichlorobenzene	50.0	45.2		ug/L	90%	60 - 140	8120667	12/05/08 17:37
1,1,2-Trichloroethane	50.0	50.6		ug/L	101%	80 - 122	8120667	12/05/08 17:37
1,1,1-Trichloroethane	50.0	57.2		ug/L	114%	80 - 131	8120667	12/05/08 17:37
Trichloroethene	50.0	51.4		ug/L	103%	80 - 131	8120667	12/05/08 17:37
Trichlorofluoromethane	50.0	43.4		ug/L	87%	68 - 125	8120667	12/05/08 17:37
1,2,3-Trichloropropane	50.0	49.0		ug/L	98%	60 - 127	8120667	12/05/08 17:37
1,3,5-Trimethylbenzene	50.0	52.3		ug/L	105%	80 - 129	8120667	12/05/08 17:37
1,2,4-Trimethylbenzene	50.0	52.1		ug/L	104%	80 - 128	8120667	12/05/08 17:37
Vinyl chloride	50.0	43.5		ug/L	87%	69 - 120	8120667	12/05/08 17:37
Xylenes, total	150	164		ug/L	110%	80 - 129	8120667	12/05/08 17:37
Surrogate: 1,2-Dichloroethane-d4	25.0	23.5			94%	60 - 140	8120667	12/05/08 17:37
Surrogate: Dibromofluoromethane	25.0	25.4			102%	75 - 124	8120667	12/05/08 17:37
Surrogate: Toluene-d8	25.0	25.6			102%	78 - 121	8120667	12/05/08 17:37
Surrogate: 4-Bromofluorobenzene	25.0	26.2			105%	79 - 124	8120667	12/05/08 17:37
8120937-BS1								
Acetone	250	244		ug/kg	98%	49 - 150	8120937	12/10/08 13:14
Benzene	50.0	43.9		ug/kg	88%	76 - 130	8120937	12/10/08 13:14
Bromobenzene	50.0	46.2		ug/kg	92%	80 - 128	8120937	12/10/08 13:14
Bromochloromethane	50.0	45.1		ug/kg	90%	70 - 135	8120937	12/10/08 13:14
Bromodichloromethane	50.0	46.9		ug/kg	94%	78 - 135	8120937	12/10/08 13:14
Bromoform	50.0	45.4		ug/kg	91%	67 - 143	8120937	12/10/08 13:14
Bromomethane	50.0	45.4		ug/kg	91%	58 - 150	8120937	12/10/08 13:14
2-Butanone	250	235		ug/kg	94%	61 - 143	8120937	12/10/08 13:14
sec-Butylbenzene	50.0	46.9		ug/kg	94%	80 - 134	8120937	12/10/08 13:14
n-Butylbenzene	50.0	46.4		ug/kg	93%	71 - 141	8120937	12/10/08 13:14
tert-Butylbenzene	50.0	46.6		ug/kg	93%	79 - 132	8120937	12/10/08 13:14
Carbon disulfide	50.0	42.4		ug/kg	85%	70 - 134	8120937	12/10/08 13:14
Carbon Tetrachloride	50.0	44.6		ug/kg	89%	75 - 137	8120937	12/10/08 13:14



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8260B							
8120937-BS1								
Chlorobenzene	50.0	46.2		ug/kg	92%	80 - 121	8120937	12/10/08 13:14
Chlorodibromomethane	50.0	48.7		ug/kg	97%	77 - 130	8120937	12/10/08 13:14
Chloroethane	50.0	46.1		ug/kg	92%	62 - 149	8120937	12/10/08 13:14
Chloroform	50.0	43.2		ug/kg	86%	75 - 130	8120937	12/10/08 13:14
Chloromethane	50.0	43.5		ug/kg	87%	35 - 130	8120937	12/10/08 13:14
2-Chlorotoluene	50.0	45.9		ug/kg	92%	80 - 131	8120937	12/10/08 13:14
4-Chlorotoluene	50.0	44.8		ug/kg	90%	80 - 129	8120937	12/10/08 13:14
1,2-Dibromo-3-chloropropane	50.0	49.5		ug/kg	99%	62 - 142	8120937	12/10/08 13:14
1,2-Dibromoethane (EDB)	50.0	48.6		ug/kg	97%	81 - 130	8120937	12/10/08 13:14
Dibromomethane	50.0	48.0		ug/kg	96%	77 - 133	8120937	12/10/08 13:14
1,4-Dichlorobenzene	50.0	45.0		ug/kg	90%	75 - 128	8120937	12/10/08 13:14
1,3-Dichlorobenzene	50.0	44.4		ug/kg	89%	79 - 128	8120937	12/10/08 13:14
1,2-Dichlorobenzene	50.0	46.1		ug/kg	92%	80 - 130	8120937	12/10/08 13:14
Dichlorodifluoromethane	50.0	47.1		ug/kg	94%	11 - 129	8120937	12/10/08 13:14
1,1-Dichloroethane	50.0	44.7		ug/kg	89%	68 - 150	8120937	12/10/08 13:14
1,2-Dichloroethane	50.0	45.3		ug/kg	91%	72 - 132	8120937	12/10/08 13:14
cis-1,2-Dichloroethene	50.0	45.5		ug/kg	91%	77 - 132	8120937	12/10/08 13:14
1,1-Dichloroethene	50.0	43.0		ug/kg	86%	75 - 133	8120937	12/10/08 13:14
trans-1,2-Dichloroethene	50.0	43.4		ug/kg	87%	79 - 133	8120937	12/10/08 13:14
1,3-Dichloropropane	50.0	47.8		ug/kg	96%	80 - 125	8120937	12/10/08 13:14
1,2-Dichloropropane	50.0	43.3		ug/kg	87%	75 - 124	8120937	12/10/08 13:14
2,2-Dichloropropane	50.0	43.7		ug/kg	87%	59 - 144	8120937	12/10/08 13:14
cis-1,3-Dichloropropene	50.0	47.9		ug/kg	96%	80 - 137	8120937	12/10/08 13:14
trans-1,3-Dichloropropene	50.0	47.6		ug/kg	95%	75 - 133	8120937	12/10/08 13:14
1,1-Dichloropropene	50.0	43.8		ug/kg	88%	76 - 133	8120937	12/10/08 13:14
Ethylbenzene	50.0	46.1		ug/kg	92%	80 - 128	8120937	12/10/08 13:14
Hexachlorobutadiene	50.0	50.8		ug/kg	102%	60 - 150	8120937	12/10/08 13:14
2-Hexanone	250	251		ug/kg	100%	63 - 149	8120937	12/10/08 13:14
Isopropylbenzene	50.0	48.3		ug/kg	97%	74 - 131	8120937	12/10/08 13:14
p-Isopropyltoluene	50.0	45.6		ug/kg	91%	75 - 133	8120937	12/10/08 13:14
Methyl tert-Butyl Ether	50.0	46.0		ug/kg	92%	67 - 130	8120937	12/10/08 13:14
Methylene Chloride	50.0	46.1		ug/kg	92%	65 - 144	8120937	12/10/08 13:14
4-Methyl-2-pentanone	250	244		ug/kg	98%	64 - 142	8120937	12/10/08 13:14
Naphthalene	50.0	45.2		ug/kg	90%	63 - 144	8120937	12/10/08 13:14
n-Propylbenzene	50.0	44.8		ug/kg	90%	80 - 131	8120937	12/10/08 13:14
Styrene	50.0	49.2		ug/kg	98%	80 - 144	8120937	12/10/08 13:14
1,1,1,2-Tetrachloroethane	50.0	47.8		ug/kg	96%	80 - 129	8120937	12/10/08 13:14
1,1,2,2-Tetrachloroethane	50.0	49.0		ug/kg	98%	73 - 139	8120937	12/10/08 13:14
Tetrachloroethene	50.0	43.2		ug/kg	86%	76 - 128	8120937	12/10/08 13:14
Toluene	50.0	45.3		ug/kg	91%	80 - 125	8120937	12/10/08 13:14
1,2,3-Trichlorobenzene	50.0	46.4		ug/kg	93%	64 - 136	8120937	12/10/08 13:14



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by E	CPA Method 8260B							
8120937-BS1								
1,2,4-Trichlorobenzene	50.0	44.8		ug/kg	90%	58 - 145	8120937	12/10/08 13:14
1,1,2-Trichloroethane	50.0	47.8		ug/kg	96%	80 - 127	8120937	12/10/08 13:14
1,1,1-Trichloroethane	50.0	44.0		ug/kg	88%	76 - 134	8120937	12/10/08 13:14
Trichloroethene	50.0	49.6		ug/kg	99%	75 - 131	8120937	12/10/08 13:14
Trichlorofluoromethane	50.0	50.3		ug/kg	101%	63 - 130	8120937	12/10/08 13:14
1,2,3-Trichloropropane	50.0	43.0		ug/kg	86%	66 - 129	8120937	12/10/08 13:14
1,3,5-Trimethylbenzene	50.0	45.7		ug/kg	91%	78 - 133	8120937	12/10/08 13:14
1,2,4-Trimethylbenzene	50.0	45.6		ug/kg	91%	76 - 135	8120937	12/10/08 13:14
Vinyl chloride	50.0	42.1		ug/kg	84%	58 - 134	8120937	12/10/08 13:14
Xylenes, total	150	138		ug/kg	92%	79 - 130	8120937	12/10/08 13:14
Surrogate: 1,2-Dichloroethane-d4	50.0	50.0			100%	41 - 150	8120937	12/10/08 13:14
Surrogate: Dibromofluoromethane	50.0	49.9			100%	55 - 139	8120937	12/10/08 13:14
Surrogate: Toluene-d8	50.0	50.8			102%	57 - 148	8120937	12/10/08 13:14
Surrogate: 4-Bromofluorobenzene	50.0	49.9			100%	58 - 150	8120937	12/10/08 13:14
8121404-BS1								
Acetone	250	251		ug/kg	101%	49 - 150	8121404	12/09/08 23:54
Benzene	50.0	49.3		ug/kg	99%	76 - 130	8121404	12/09/08 23:54
Bromobenzene	50.0	56.8		ug/kg	114%	80 - 128	8121404	12/09/08 23:54
Bromochloromethane	50.0	42.2		ug/kg	84%	70 - 135	8121404	12/09/08 23:54
Bromodichloromethane	50.0	41.6		ug/kg	83%	78 - 135	8121404	12/09/08 23:54
Bromoform	50.0	39.4		ug/kg	79%	67 - 143	8121404	12/09/08 23:54
Bromomethane	50.0	42.9		ug/kg	86%	58 - 150	8121404	12/09/08 23:54
2-Butanone	250	237		ug/kg	95%	61 - 143	8121404	12/09/08 23:54
sec-Butylbenzene	50.0	52.9		ug/kg	106%	80 - 134	8121404	12/09/08 23:54
n-Butylbenzene	50.0	54.1		ug/kg	108%	71 - 141	8121404	12/09/08 23:54
tert-Butylbenzene	50.0	48.9		ug/kg	98%	79 - 132	8121404	12/09/08 23:54
Carbon disulfide	50.0	50.9		ug/kg	102%	70 - 134	8121404	12/09/08 23:54
Carbon Tetrachloride	50.0	41.6		ug/kg	83%	75 - 137	8121404	12/09/08 23:54
Chlorobenzene	50.0	47.3		ug/kg	95%	80 - 121	8121404	12/09/08 23:54
Chlorodibromomethane	50.0	43.2		ug/kg	86%	77 - 130	8121404	12/09/08 23:54
Chloroethane	50.0	59.6		ug/kg	119%	62 - 149	8121404	12/09/08 23:54
Chloroform	50.0	47.0		ug/kg	94%	75 - 130	8121404	12/09/08 23:54
Chloromethane	50.0	46.3		ug/kg	93%	35 - 130	8121404	12/09/08 23:54
2-Chlorotoluene	50.0	53.9		ug/kg	108%	80 - 131	8121404	12/09/08 23:54
4-Chlorotoluene	50.0	53.8		ug/kg	108%	80 - 129	8121404	12/09/08 23:54
1,2-Dibromo-3-chloropropane	50.0	44.5		ug/kg	89%	62 - 142	8121404	12/09/08 23:54
1,2-Dibromoethane (EDB)	50.0	46.2		ug/kg	92%	81 - 130	8121404	12/09/08 23:54
Dibromomethane	50.0	43.5		ug/kg	87%	77 - 133	8121404	12/09/08 23:54
1,4-Dichlorobenzene	50.0	49.5		ug/kg	99%	75 - 128	8121404	12/09/08 23:54
1,3-Dichlorobenzene	50.0	49.3		ug/kg	99%	79 - 128	8121404	12/09/08 23:54



Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by E	PA Method 8260B							
8121404-BS1								
1,2-Dichlorobenzene	50.0	49.4		ug/kg	99%	80 - 130	8121404	12/09/08 23:54
Dichlorodifluoromethane	50.0	49.1		ug/kg	98%	11 - 129	8121404	12/09/08 23:54
1,1-Dichloroethane	50.0	47.6		ug/kg	95%	68 - 150	8121404	12/09/08 23:54
1,2-Dichloroethane	50.0	40.8		ug/kg	82%	72 - 132	8121404	12/09/08 23:54
cis-1,2-Dichloroethene	50.0	48.5		ug/kg	97%	77 - 132	8121404	12/09/08 23:54
1,1-Dichloroethene	50.0	46.9		ug/kg	94%	75 - 133	8121404	12/09/08 23:54
trans-1,2-Dichloroethene	50.0	47.6		ug/kg	95%	79 - 133	8121404	12/09/08 23:54
1,3-Dichloropropane	50.0	48.7		ug/kg	97%	80 - 125	8121404	12/09/08 23:54
1,2-Dichloropropane	50.0	48.6		ug/kg	97%	75 - 124	8121404	12/09/08 23:54
2,2-Dichloropropane	50.0	42.5		ug/kg	85%	59 - 144	8121404	12/09/08 23:54
cis-1,3-Dichloropropene	50.0	50.9		ug/kg	102%	80 - 137	8121404	12/09/08 23:54
trans-1,3-Dichloropropene	50.0	45.8		ug/kg	92%	75 - 133	8121404	12/09/08 23:54
1,1-Dichloropropene	50.0	48.2		ug/kg	96%	76 - 133	8121404	12/09/08 23:54
Ethylbenzene	50.0	48.6		ug/kg	97%	80 - 128	8121404	12/09/08 23:54
Hexachlorobutadiene	50.0	42.7		ug/kg	85%	60 - 150	8121404	12/09/08 23:54
2-Hexanone	250	260		ug/kg	104%	63 - 149	8121404	12/09/08 23:54
Isopropylbenzene	50.0	48.2		ug/kg	96%	74 - 131	8121404	12/09/08 23:54
p-Isopropyltoluene	50.0	49.5		ug/kg	99%	75 - 133	8121404	12/09/08 23:54
Methyl tert-Butyl Ether	50.0	43.3		ug/kg	87%	67 - 130	8121404	12/09/08 23:54
Methylene Chloride	50.0	51.6		ug/kg	103%	65 - 144	8121404	12/09/08 23:54
4-Methyl-2-pentanone	250	258		ug/kg	103%	64 - 142	8121404	12/09/08 23:54
Naphthalene	50.0	48.6		ug/kg	97%	63 - 144	8121404	12/09/08 23:54
n-Propylbenzene	50.0	54.2		ug/kg	108%	80 - 131	8121404	12/09/08 23:54
Styrene	50.0	49.6		ug/kg	99%	80 - 144	8121404	12/09/08 23:54
1,1,1,2-Tetrachloroethane	50.0	44.2		ug/kg	88%	80 - 129	8121404	12/09/08 23:54
1,1,2,2-Tetrachloroethane	50.0	58.0		ug/kg	116%	73 - 139	8121404	12/09/08 23:54
Tetrachloroethene	50.0	40.3		ug/kg	81%	76 - 128	8121404	12/09/08 23:54
Toluene	50.0	49.5		ug/kg	99%	80 - 125	8121404	12/09/08 23:54
1,2,3-Trichlorobenzene	50.0	47.2		ug/kg	94%	64 - 136	8121404	12/09/08 23:54
1,2,4-Trichlorobenzene	50.0	47.6		ug/kg	95%	58 - 145	8121404	12/09/08 23:54
1,1,2-Trichloroethane	50.0	44.5		ug/kg	89%	80 - 127	8121404	12/09/08 23:54
1,1,1-Trichloroethane	50.0	41.7		ug/kg	83%	76 - 134	8121404	12/09/08 23:54
Trichloroethene	50.0	41.6		ug/kg	83%	75 - 131	8121404	12/09/08 23:54
Trichlorofluoromethane	50.0	46.1		ug/kg	92%	63 - 130	8121404	12/09/08 23:54
1,2,3-Trichloropropane	50.0	45.7		ug/kg	91%	66 - 129	8121404	12/09/08 23:54
1,3,5-Trimethylbenzene	50.0	51.8		ug/kg	104%	78 - 133	8121404	12/09/08 23:54
1,2,4-Trimethylbenzene	50.0	50.3		ug/kg	101%	76 - 135	8121404	12/09/08 23:54
Vinyl chloride	50.0	53.4		ug/kg	107%	58 - 134	8121404	12/09/08 23:54
Xylenes, total	150	140		ug/kg	94%	79 - 130	8121404	12/09/08 23:54
1,1,2-Trifluorotrichloroethane	50.0	46.8		ug/kg	94%	73 - 126	8121404	12/09/08 23:54
Surrogate: 1,2-Dichloroethane-d4	50.0	43.3			87%	41 - 150	8121404	12/09/08 23:54



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by El	PA Method 8260B							
8121404-BS1								
Surrogate: Dibromofluoromethane	50.0	47.5			95%	55 - 139	8121404	12/09/08 23:54
Surrogate: Toluene-d8	50.0	51.8			104%	57 - 148	8121404	12/09/08 23:54
Surrogate: 4-Bromofluorobenzene	50.0	53.5			107%	58 - 150	8121404	12/09/08 23:54
Semivolatile Organic Compounds b	oy EPA Method 8270C							
8120320-BS1								
Acenaphthene	1.67	1.47		mg/kg wet	88%	52 - 106	8120320	12/05/08 13:59
Acenaphthylene	1.67	1.52		mg/kg wet	91%	53 - 109	8120320	12/05/08 13:59
Anthracene	1.67	1.70		mg/kg wet	102%	54 - 124	8120320	12/05/08 13:59
Benzo (a) anthracene	1.67	1.58		mg/kg wet	95%	53 - 111	8120320	12/05/08 13:59
Benzo (a) pyrene	1.67	1.62		mg/kg wet	97%	52 - 122	8120320	12/05/08 13:59
Benzo (b) fluoranthene	1.67	1.54		mg/kg wet	92%	48 - 115	8120320	12/05/08 13:59
Benzo (g,h,i) perylene	1.67	1.66		mg/kg wet	99%	46 - 114	8120320	12/05/08 13:59
Benzo (k) fluoranthene	1.67	1.62		mg/kg wet	97%	41 - 121	8120320	12/05/08 13:59
4-Bromophenyl phenyl ether	1.67	1.43		mg/kg wet	86%	47 - 102	8120320	12/05/08 13:59
Butyl benzyl phthalate	1.67	1.75		mg/kg wet	105%	56 - 127	8120320	12/05/08 13:59
Carbazole	1.67	1.53		mg/kg wet	92%	53 - 113	8120320	12/05/08 13:59
4-Chloro-3-methylphenol	1.67	1.38		mg/kg wet	83%	42 - 121	8120320	12/05/08 13:59
4-Chloroaniline	1.67	1.13		mg/kg wet	68%	40 - 112	8120320	12/05/08 13:59
Bis(2-chloroethoxy)methane	1.67	1.31		mg/kg wet	79%	45 - 105	8120320	12/05/08 13:59
Bis(2-chloroethyl)ether	1.67	1.21		mg/kg wet	72%	45 - 106	8120320	12/05/08 13:59
Bis(2-chloroisopropyl)ether	1.67	1.25		mg/kg wet	75%	46 - 109	8120320	12/05/08 13:59
2-Chloronaphthalene	1.67	1.42		mg/kg wet	85%	49 - 105	8120320	12/05/08 13:59
2-Chlorophenol	1.67	1.29		mg/kg wet	77%	44 - 119	8120320	12/05/08 13:59
4-Chlorophenyl phenyl ether	1.67	1.56		mg/kg wet	94%	53 - 110	8120320	12/05/08 13:59
Chrysene	1.67	1.62		mg/kg wet	97%	49 - 113	8120320	12/05/08 13:59
Dibenz (a,h) anthracene	1.67	1.63		mg/kg wet	98%	47 - 117	8120320	12/05/08 13:59
Dibenzofuran	1.67	1.46		mg/kg wet	88%	55 - 111	8120320	12/05/08 13:59
Di-n-butyl phthalate	1.67	1.69		mg/kg wet	102%	54 - 150	8120320	12/05/08 13:59
1,4-Dichlorobenzene	1.67	1.08		mg/kg wet	65%	35 - 109	8120320	12/05/08 13:59
1,2-Dichlorobenzene	1.67	1.12		mg/kg wet	67%	36 - 112	8120320	12/05/08 13:59
1,3-Dichlorobenzene	1.67	1.07		mg/kg wet	64%	36 - 110	8120320	12/05/08 13:59
3,3-Dichlorobenzidine	1.67	1.44		mg/kg wet	87%	42 - 111	8120320	12/05/08 13:59
2,4-Dichlorophenol	1.67	1.24		mg/kg wet	74%	40 - 118	8120320	12/05/08 13:59
Diethyl phthalate	1.67	1.60		mg/kg wet	96%	43 - 122	8120320	12/05/08 13:59
2,4-Dimethylphenol	1.67	1.47		mg/kg wet	88%	31 - 128	8120320	12/05/08 13:59
Dimethyl phthalate	1.67	1.63		mg/kg wet	98%	54 - 111	8120320	12/05/08 13:59
4,6-Dinitro-2-methylphenol	1.67	1.49		mg/kg wet	89%	24 - 131	8120320	12/05/08 13:59
2,4-Dinitrophenol	1.67	1.54		mg/kg wet	93%	11 - 148	8120320	12/05/08 13:59
2,6-Dinitrotoluene	1.67	1.71		mg/kg wet	102%	51 - 119	8120320	12/05/08 13:59
2,4-Dinitrotoluene	1.67	1.69		mg/kg wet	101%	54 - 113	8120320	12/05/08 13:59



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Semivolatile Organic Compounds	by EPA Method 8270C							
8120320-BS1								
Di-n-octyl phthalate	1.67	1.61		mg/kg wet	97%	45 - 134	8120320	12/05/08 13:59
Bis(2-ethylhexyl)phthalate	1.67	1.56		mg/kg wet	94%	52 - 122	8120320	12/05/08 13:59
Fluoranthene	1.67	1.63		mg/kg wet	98%	52 - 113	8120320	12/05/08 13:59
Fluorene	1.67	1.52		mg/kg wet	91%	54 - 107	8120320	12/05/08 13:59
Hexachlorobenzene	1.67	1.52		mg/kg wet	91%	51 - 117	8120320	12/05/08 13:59
Hexachlorobutadiene	1.67	1.06		mg/kg wet	64%	38 - 117	8120320	12/05/08 13:59
Hexachlorocyclopentadiene	1.67	1.18		mg/kg wet	71%	14 - 123	8120320	12/05/08 13:59
Hexachloroethane	1.67	1.04		mg/kg wet	63%	40 - 114	8120320	12/05/08 13:59
Indeno (1,2,3-cd) pyrene	1.67	1.64		mg/kg wet	99%	47 - 115	8120320	12/05/08 13:59
Isophorone	1.67	1.25		mg/kg wet	75%	35 - 107	8120320	12/05/08 13:59
2-Methylnaphthalene	1.67	1.16		mg/kg wet	69%	42 - 112	8120320	12/05/08 13:59
2-Methylphenol	1.67	1.41		mg/kg wet	85%	44 - 119	8120320	12/05/08 13:59
3/4-Methylphenol	1.67	1.66		mg/kg wet	100%	49 - 129	8120320	12/05/08 13:59
Naphthalene	1.67	1.15		mg/kg wet	69%	34 - 107	8120320	12/05/08 13:59
3-Nitroaniline	1.67	1.49		mg/kg wet	90%	50 - 123	8120320	12/05/08 13:59
2-Nitroaniline	1.67	1.50		mg/kg wet	90%	54 - 120	8120320	12/05/08 13:59
4-Nitroaniline	1.67	1.53		mg/kg wet	92%	46 - 124	8120320	12/05/08 13:59
Nitrobenzene	1.67	1.12		mg/kg wet	67%	35 - 102	8120320	12/05/08 13:59
4-Nitrophenol	1.67	1.70		mg/kg wet	102%	32 - 138	8120320	12/05/08 13:59
2-Nitrophenol	1.67	1.16		mg/kg wet	70%	34 - 119	8120320	12/05/08 13:59
N-Nitrosodiphenylamine	1.67	1.70		mg/kg wet	102%	61 - 139	8120320	12/05/08 13:59
N-Nitrosodi-n-propylamine	1.67	1.42		mg/kg wet	85%	44 - 117	8120320	12/05/08 13:59
Pentachlorophenol	1.67	1.58		mg/kg wet	95%	38 - 141	8120320	12/05/08 13:59
Phenanthrene	1.67	1.57		mg/kg wet	94%	53 - 108	8120320	12/05/08 13:59
Phenol	1.67	1.40		mg/kg wet	84%	43 - 122	8120320	12/05/08 13:59
Pyrene	1.67	1.59		mg/kg wet	95%	54 - 113	8120320	12/05/08 13:59
Pyridine	1.67	0.995		mg/kg wet	60%	30 - 103	8120320	12/05/08 13:59
1,2,4-Trichlorobenzene	1.67	1.09		mg/kg wet	65%	35 - 102	8120320	12/05/08 13:59
1-Methylnaphthalene	1.67	1.18		mg/kg wet	71%	36 - 100	8120320	12/05/08 13:59
2,4,6-Trichlorophenol	1.67	1.49		mg/kg wet	89%	50 - 122	8120320	12/05/08 13:59
2,4,5-Trichlorophenol	1.67	1.55		mg/kg wet	93%	45 - 122	8120320	12/05/08 13:59
Surrogate: Terphenyl-d14	1.67	1.19			72%	26 - 128	8120320	12/05/08 13:59
Surrogate: 2,4,6-Tribromophenol	1.67	1.44			86%	20 - 132	8120320	12/05/08 13:59
Surrogate: Phenol-d5	1.67	1.14			68%	23 - 113	8120320	12/05/08 13:59
Surrogate: 2-Fluorobiphenyl	1.67	1.12			67%	19 - 109	8120320	12/05/08 13:59
Surrogate: 2-Fluorophenol	1.67	1.05			63%	19 - 105	8120320	12/05/08 13:59
Surrogate: Nitrobenzene-d5	1.67	0.931			56%	22 - 104	8120320	12/05/08 13:59
8120709-BS1								
Acenaphthene	50.0	42.4	MNR1	ug/L	85%	49 - 107	8120709	12/04/08 19:20
Acenaphthylene	50.0	40.3	MNR1	ug/L	81%	50 - 108	8120709	12/04/08 19:20



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Semivolatile Organic Compound	s by EPA Method 8270C							
8120709-BS1	v							
Anthracene	50.0	49.5	MNR1	ug/L	99%	45 - 133	8120709	12/04/08 19:20
Benzo (a) anthracene	50.0	42.2	MNR1	ug/L	84%	53 - 118	8120709	12/04/08 19:20
Benzo (a) pyrene	50.0	48.0	MNR1	ug/L	96%	35 - 138	8120709	12/04/08 19:20
Benzo (b) fluoranthene	50.0	50.3	MNR1	ug/L	101%	50 - 122	8120709	12/04/08 19:20
Benzo (g,h,i) perylene	50.0	36.2	MNR1	ug/L	72%	47 - 123	8120709	12/04/08 19:20
Benzo (k) fluoranthene	50.0	47.1	MNR1	ug/L	94%	46 - 125	8120709	12/04/08 19:20
4-Bromophenyl phenyl ether	50.0	42.6	MNR1	ug/L	85%	48 - 107	8120709	12/04/08 19:20
Butyl benzyl phthalate	50.0	53.7	MNR1	ug/L	107%	55 - 134	8120709	12/04/08 19:20
Carbazole	50.0	44.4	MNR1	ug/L	89%	55 - 119	8120709	12/04/08 19:20
4-Chloro-3-methylphenol	50.0	38.9	MNR1	ug/L	78%	33 - 122	8120709	12/04/08 19:20
4-Chloroaniline	50.0	29.9	MNR1	ug/L	60%	39 - 108	8120709	12/04/08 19:20
Bis(2-chloroethoxy)methane	50.0	43.2	MNR1	ug/L	86%	48 - 107	8120709	12/04/08 19:20
Bis(2-chloroethyl)ether	50.0	45.1	MNR1	ug/L	90%	48 - 104	8120709	12/04/08 19:20
Bis(2-chloroisopropyl)ether	50.0	44.6	MNR1	ug/L	89%	46 - 105	8120709	12/04/08 19:20
2-Chloronaphthalene	50.0	40.0	MNR1	ug/L	80%	42 - 103	8120709	12/04/08 19:20
2-Chlorophenol	50.0	39.6	MNR1	ug/L	79%	35 - 112	8120709	12/04/08 19:20
4-Chlorophenyl phenyl ether	50.0	45.7	MNR1	ug/L	91%	50 - 116	8120709	12/04/08 19:20
Chrysene	50.0	40.8	MNR1	ug/L	82%	53 - 116	8120709	12/04/08 19:20
Dibenz (a,h) anthracene	50.0	37.6	MNR1	ug/L	75%	50 - 124	8120709	12/04/08 19:20
Dibenzofuran	50.0	40.7	MNR1	ug/L	81%	53 - 114	8120709	12/04/08 19:20
Di-n-butyl phthalate	50.0	57.6	MNR1	ug/L	115%	56 - 126	8120709	12/04/08 19:20
1,4-Dichlorobenzene	50.0	35.6	MNR1	ug/L	71%	28 - 100	8120709	12/04/08 19:20
1,2-Dichlorobenzene	50.0	36.2	MNR1	ug/L	72%	29 - 100	8120709	12/04/08 19:20
1,3-Dichlorobenzene	50.0	34.4	MNR1	ug/L	69%	28 - 100	8120709	12/04/08 19:20
3,3-Dichlorobenzidine	50.0	30.7	MNR1	ug/L	61%	37 - 122	8120709	12/04/08 19:20
2,4-Dichlorophenol	50.0	35.7	MNR1	ug/L	71%	37 - 117	8120709	12/04/08 19:20
Diethyl phthalate	50.0	47.6	MNR1	ug/L	95%	49 - 119	8120709	12/04/08 19:20
2,4-Dimethylphenol	50.0	43.4	MNR1	ug/L	87%	10 - 131	8120709	12/04/08 19:20
Dimethyl phthalate	50.0	45.1	MNR1	ug/L	90%	42 - 126	8120709	12/04/08 19:20
4,6-Dinitro-2-methylphenol	50.0	49.7	MNR1	ug/L	99%	28 - 135	8120709	12/04/08 19:20
2,4-Dinitrophenol	50.0	48.5	MNR1	ug/L	97%	10 - 150	8120709	12/04/08 19:20
2,6-Dinitrotoluene	50.0	43.7	MNR1	ug/L	87%	56 - 122	8120709	12/04/08 19:20
2,4-Dinitrotoluene	50.0	46.4	MNR1	ug/L	93%	56 - 118	8120709	12/04/08 19:20
Di-n-octyl phthalate	50.0	58.5	MNR1	ug/L	117%	46 - 141	8120709	12/04/08 19:20
Bis(2-ethylhexyl)phthalate	50.0	48.9	MNR1	ug/L	98%	54 - 127	8120709	12/04/08 19:20
Fluoranthene	50.0	47.2	MNR1	ug/L	94%	55 - 120	8120709	12/04/08 19:20
Fluorene	50.0	42.4	MNR1	ug/L	85%	53 - 113	8120709	12/04/08 19:20
Hexachlorobenzene	50.0	45.7	MNR1	ug/L	91%	55 - 122	8120709	12/04/08 19:20
Hexachlorobutadiene	50.0	33.5	MNR1	ug/L	67%	23 - 106	8120709	12/04/08 19:20
Hexachlorocyclopentadiene	50.0	26.7	MNR1	ug/L	53%	10 - 106	8120709	12/04/08 19:20
Hexachloroethane	50.0	35.8	MNR1	ug/L	72%	25 - 100	8120709	12/04/08 19:20

NRL0332



Attn

Client S&ME, Inc. (2420) Work Order:

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Semivolatile Organic Compounds	by EPA Method 8270C							
8120709-BS1	•							
Indeno (1,2,3-cd) pyrene	50.0	40.1	MNR1	ug/L	80%	50 - 123	8120709	12/04/08 19:20
Isophorone	50.0	42.5	MNR1	ug/L	85%	38 - 107	8120709	12/04/08 19:20
2-Methylnaphthalene	50.0	34.0	MNR1	ug/L	68%	35 - 105	8120709	12/04/08 19:20
2-Methylphenol	50.0	35.0	MNR1	ug/L	70%	21 - 108	8120709	12/04/08 19:20
3/4-Methylphenol	50.0	38.1	MNR1	ug/L	76%	20 - 109	8120709	12/04/08 19:20
Naphthalene	50.0	36.4	MNR1	ug/L	73%	39 - 150	8120709	12/04/08 19:20
3-Nitroaniline	50.0	38.1	MNR1	ug/L	76%	48 - 123	8120709	12/04/08 19:20
2-Nitroaniline	50.0	43.3	MNR1	ug/L	87%	56 - 125	8120709	12/04/08 19:20
4-Nitroaniline	50.0	39.5	MNR1	ug/L	79%	49 - 127	8120709	12/04/08 19:20
Nitrobenzene	50.0	43.5	MNR1	ug/L	87%	39 - 100	8120709	12/04/08 19:20
4-Nitrophenol	50.0	5.13	MNR1	ug/L	10%	10 - 100	8120709	12/04/08 19:20
2-Nitrophenol	50.0	38.9	MNR1	ug/L	78%	38 - 116	8120709	12/04/08 19:20
N-Nitrosodiphenylamine	50.0	50.5	MNR1	ug/L	101%	59 - 147	8120709	12/04/08 19:20
N-Nitrosodi-n-propylamine	50.0	49.5	MNR1	ug/L	99%	51 - 111	8120709	12/04/08 19:20
Pentachlorophenol	50.0	50.8	MNR1	ug/L	102%	34 - 147	8120709	12/04/08 19:20
Phenanthrene	50.0	46.9	MNR1	ug/L	94%	53 - 116	8120709	12/04/08 19:20
Phenol	50.0	19.0	MNR1	ug/L	38%	11 - 100	8120709	12/04/08 19:20
Pyrene	50.0	43.2	MNR1	ug/L	86%	53 - 123	8120709	12/04/08 19:20
1,2,4-Trichlorobenzene	50.0	30.5	MNR1	ug/L	61%	24 - 100	8120709	12/04/08 19:20
1-Methylnaphthalene	50.0	34.8	MNR1	ug/L	70%	28 - 100	8120709	12/04/08 19:20
2,4,6-Trichlorophenol	50.0	40.6	MNR1	ug/L	81%	51 - 121	8120709	12/04/08 19:20
2,4,5-Trichlorophenol	50.0	43.1	MNR1	ug/L	86%	45 - 127	8120709	12/04/08 19:20
Surrogate: Terphenyl-d14	50.0	32.2			64%	21 - 123	8120709	12/04/08 19:20
Surrogate: 2,4,6-Tribromophenol	50.0	44.4			89%	23 - 129	8120709	12/04/08 19:20
Surrogate: Phenol-d5	50.0	15.4			31%	10 - 100	8120709	12/04/08 19:20
Surrogate: 2-Fluorobiphenyl	50.0	34.9			70%	34 - 108	8120709	12/04/08 19:20
Surrogate: 2-Fluorophenol	50.0	21.7			43%	10 - 100	8120709	12/04/08 19:20
Surrogate: Nitrobenzene-d5	50.0	38.0			76%	29 - 116	8120709	12/04/08 19:20
TCLP Volatile Organic Compound	ds by EPA Method 1311/	/8260B						
8120939-BS1								
Benzene	50.0	41.5		ug/L	83%	76 - 129	8120939	12/06/08 12:58
2-Butanone	250	208		ug/L	83%	63 - 138	8120939	12/06/08 12:58
Carbon Tetrachloride	50.0	44.0		ug/L	88%	56 - 150	8120939	12/06/08 12:58
Chlorobenzene	50.0	42.2		ug/L	84%	80 - 120	8120939	12/06/08 12:58
Chloroform	50.0	42.3	В	ug/L	85%	78 - 138	8120939	12/06/08 12:58
1,2-Dichloroethane	50.0	42.4		ug/L	85%	70 - 135	8120939	12/06/08 12:58
1,1-Dichloroethene	50.0	42.3		ug/L	85%	77 - 137	8120939	12/06/08 12:58
Tetrachloroethene	50.0	45.5		ug/L	91%	83 - 126	8120939	12/06/08 12:58
Trichloroethene	50.0	42.9		ug/L	86%	78 - 137	8120939	12/06/08 12:58
Vinyl chloride	50.0	43.8		ug/L	88%	62 - 124	8120939	12/06/08 12:58



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
TCLP Volatile Organic Compounds	s by EPA Method 1311	/8260B						
8120939-BS1								
Surrogate: 1,2-Dichloroethane-d4	25.0	25.2			101%	60 - 140	8120939	12/06/08 12:58
Surrogate: Dibromofluoromethane	25.0	25.0			100%	75 - 124	8120939	12/06/08 12:58
Surrogate: Toluene-d8	25.0	22.6			90%	78 - 121	8120939	12/06/08 12:58
Surrogate: 4-Bromofluorobenzene	25.0	24.6			98%	79 - 124	8120939	12/06/08 12:58
TCLP Semivolatile Organic Compo	ounds by EPA Method	1311/8270C						
8121008-BS1								
Cresol(s)	0.400	0.329		mg/L	82%	38 - 113	8121008	12/11/08 23:47
1,4-Dichlorobenzene	0.200	0.126		mg/L	63%	23 - 104	8121008	12/11/08 23:47
2,4-Dinitrotoluene	0.200	0.176		mg/L	88%	49 - 123	8121008	12/11/08 23:47
Hexachlorobenzene	0.200	0.156		mg/L	78%	50 - 125	8121008	12/11/08 23:47
Hexachlorobutadiene	0.200	0.123		mg/L	62%	19 - 117	8121008	12/11/08 23:47
Hexachloroethane	0.200	0.123		mg/L	62%	20 - 108	8121008	12/11/08 23:47
Nitrobenzene	0.200	0.142		mg/L	71%	35 - 110	8121008	12/11/08 23:47
Pentachlorophenol	0.200	0.150		mg/L	75%	39 - 146	8121008	12/11/08 23:47
Pyridine	0.200	0.0772		mg/L	39%	10 - 100	8121008	12/11/08 23:47
2,4,6-Trichlorophenol	0.200	0.167		mg/L	83%	34 - 131	8121008	12/11/08 23:47
2,4,5-Trichlorophenol	0.200	0.174		mg/L	87%	37 - 130	8121008	12/11/08 23:47
Surrogate: Terphenyl-d14	0.100	0.0668			67%	21 - 123	8121008	12/11/08 23:47
Surrogate: 2,4,6-Tribromophenol	0.100	0.0865			87%	23 - 129	8121008	12/11/08 23:47
Surrogate: Phenol-d5	0.100	0.0432			43%	10 - 100	8121008	12/11/08 23:47
Surrogate: 2-Fluorobiphenyl	0.100	0.0716			72%	34 - 108	8121008	12/11/08 23:47
Surrogate: 2-Fluorophenol	0.100	0.0516			52%	34 - 108	8121008	12/11/08 23:47
Surrogate: Nitrobenzene-d5	0.100	0.0683			68%	29 - 116	8121008	12/11/08 23:47



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS Dup

Analyte Orig. Val. Duplicate Q Units Conc % Rec. Range RPD Limit Batch Duplicate Total Metals by EPA Method 6010B 8120688-BSD1 Antimony 0.104 mg/L 0.100 104% 80 - 120 0 20 8120688 Arsenic 0.0442 mg/L 0.0500 88% 80 - 120 0.2 20 8120688 Barium 1.99 mg/L 2.00 99% 80 - 120 2 20 8120688 Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 2 20 8120688 Silver 0.0479 mg/L 0.0500 98% 80 - 120 0.8 20 8120688	-
8120688-BSD1 Antimony 0.104 mg/L 0.100 104% 80 - 120 0 20 8120688 Arsenic 0.0442 mg/L 0.0500 88% 80 - 120 0.2 20 8120688 Barium 1.99 mg/L 2.00 99% 80 - 120 2 20 8120688 Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Antimony 0.104 mg/L 0.100 104% 80 - 120 0 20 8120688 Arsenic 0.0442 mg/L 0.0500 88% 80 - 120 0.2 20 8120688 Barium 1.99 mg/L 2.00 99% 80 - 120 2 20 8120688 Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Arsenic 0.0442 mg/L 0.0500 88% 80 - 120 0.2 20 8120688 Barium 1.99 mg/L 2.00 99% 80 - 120 2 20 8120688 Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Barium 1.99 mg/L 2.00 99% 80 - 120 2 20 8120688 Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Cadmium 0.0485 mg/L 0.0500 97% 80 - 120 0.8 20 8120688 Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Chromium 0.204 mg/L 0.200 102% 80 - 120 0.7 20 8120688 Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30 12/04/08 21:30
Lead 0.0491 mg/L 0.0500 98% 80 - 120 2 20 8120688 Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30 12/04/08 21:30
Selenium 0.0488 mg/L 0.0500 98% 80 - 120 1 20 8120688 Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	12/04/08 21:30
Silver 0.0479 mg/L 0.0500 96% 80 - 120 0.8 20 8120688	
	12/04/08 21:30
M EDAM 1 #4804 #4814	
Mercury by EPA Methods 7470A/7471A	
8120683-BSD1	
Mercury 0.000783 mg/L 0.00100 78% 78 - 124 21 22 8120683	12/04/08 20:10
TCLP Metals by 6000/7000 Series Methods	
8120910-BSD1	
Mercury 0.0203 mg/L 0.0200 102% 78 - 124 9 22 8120910	12/05/08 17:42
Volatile Organic Compounds by EPA Method 8260B	
8120667-BSD1	
Acetone 295 ug/L 250 118% 62 - 150 5 29 8120667	12/05/08 18:03
Benzene 51.7 ug/L 50.0 103% 80 - 137 3 23 8120667	12/05/08 18:03
Bromobenzene 50.7 ug/L 50.0 101% 74 - 131 2 18 8120667	12/05/08 18:03
Bromochloromethane 52.2 ug/L 50.0 104% 80 - 128 4 18 8120667	12/05/08 18:03
Bromodichloromethane 46.8 ug/L 50.0 94% 80 - 129 2 18 8120667	12/05/08 18:03
Bromoform 38.6 ug/L 50.0 77% 69 - 127 0.9 24 8120667	12/05/08 18:03
Bromomethane 50.8 ug/L 50.0 102% 62 - 148 0.2 45 8120667	12/05/08 18:03
2-Butanone 283 ug/L 250 113% 77 - 141 3 36 8120667	12/05/08 18:03
sec-Butylbenzene 50.7 ug/L 50.0 101% 78 - 133 3 17 8120667	12/05/08 18:03
n-Butylbenzene 53.9 ug/L 50.0 108% 72 - 136 2 18 8120667	12/05/08 18:03
tert-Butylbenzene 48.6 ug/L 50.0 97% 77 - 135 4 17 8120667	12/05/08 18:03
Carbon disulfide 58.7 ug/L 50.0 117% 80 - 126 0.02 16 8120667	12/05/08 18:03
Carbon Tetrachloride 49.4 ug/L 50.0 99% 76 - 143 4 29 8120667	12/05/08 18:03
Chlorobenzene 48.9 ug/L 50.0 98% 80 - 120 4 27 8120667	12/05/08 18:03
Chlorodibromomethane 42.6 ug/L 50.0 85% 76 - 123 0.7 21 8120667	12/05/08 18:03
Chloroethane 54.7 ug/L 50.0 109% 77 - 127 0.3 32 8120667	12/05/08 18:03
Chloroform 49.4 ug/L 50.0 99% 80 - 133 6 28 8120667	12/05/08 18:03
Chloromethane 38.7 ug/L 50.0 77% 33 - 125 8 21 8120667	12/05/08 18:03
2-Chlorotoluene 49.4 ug/L 50.0 99% 80 - 127 5 16 8120667	12/05/08 18:03
4-Chlorotoluene 49.0 ug/L 50.0 98% 80 - 127 4 17 8120667	12/05/08 18:03
1,2-Dibromo-3-chloropropane 37.4 ug/L 50.0 75% 60 - 136 0.9 29 8120667	12/05/08 18:03
1,2-Dibromoethane (EDB) 52.6 ug/L 50.0 105% 80 - 125 1 21 8120667	



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val. Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Volatile Organic Compounds by EP.	A Method 8260B										
8120667-BSD1											
Dibromomethane	49.9		ug/L	50.0	100%	80 - 124	0.6	20	8120667		12/05/08 18:03
1,4-Dichlorobenzene	45.3		ug/L	50.0	91%	80 - 120	3	19	8120667		12/05/08 18:03
1,3-Dichlorobenzene	45.9		ug/L	50.0	92%	80 - 123	3	18	8120667		12/05/08 18:03
1,2-Dichlorobenzene	47.2		ug/L	50.0	94%	80 - 122	0.9	23	8120667		12/05/08 18:03
Dichlorodifluoromethane	35.5		ug/L	50.0	71%	36 - 120	2	14	8120667		12/05/08 18:03
1,1-Dichloroethane	53.2		ug/L	50.0	106%	76 - 130	5	15	8120667		12/05/08 18:03
1,2-Dichloroethane	49.3		ug/L	50.0	99%	69 - 136	0	26	8120667		12/05/08 18:03
cis-1,2-Dichloroethene	54.2		ug/L	50.0	108%	80 - 129	6	14	8120667		12/05/08 18:03
1,1-Dichloroethene	55.7		ug/L	50.0	111%	80 - 127	1	26	8120667		12/05/08 18:03
trans-1,2-Dichloroethene	54.4		ug/L	50.0	109%	80 - 131	3	14	8120667		12/05/08 18:03
1,3-Dichloropropane	52.0		ug/L	50.0	104%	80 - 122	0.8	21	8120667		12/05/08 18:03
1,2-Dichloropropane	48.1		ug/L	50.0	96%	80 - 120	2	16	8120667		12/05/08 18:03
2,2-Dichloropropane	59.2		ug/L	50.0	118%	62 - 142	5	14	8120667		12/05/08 18:03
cis-1,3-Dichloropropene	52.7		ug/L	50.0	105%	76 - 135	0.3	19	8120667		12/05/08 18:03
trans-1,3-Dichloropropene	46.9		ug/L	50.0	94%	70 - 137	0.9	20	8120667		12/05/08 18:03
1,1-Dichloropropene	51.9		ug/L	50.0	104%	80 - 127	6	14	8120667		12/05/08 18:03
Ethylbenzene	51.2		ug/L	50.0	102%	80 - 128	4	17	8120667		12/05/08 18:03
Hexachlorobutadiene	46.6	В	ug/L	50.0	93%	68 - 148	4	34	8120667		12/05/08 18:03
2-Hexanone	276		ug/L	250	111%	69 - 148	2	34	8120667		12/05/08 18:03
Isopropylbenzene	53.7		ug/L	50.0	107%	80 - 121	4	18	8120667		12/05/08 18:03
p-Isopropyltoluene	49.0		ug/L	50.0	98%	79 - 127	3	17	8120667		12/05/08 18:03
Methyl tert-Butyl Ether	61.7		ug/L	50.0	123%	70 - 129	8	32	8120667		12/05/08 18:03
Methylene Chloride	48.0		ug/L	50.0	96%	76 - 135	0.1	18	8120667		12/05/08 18:03
4-Methyl-2-pentanone	270		ug/L	250	108%	67 - 143	0.7	31	8120667		12/05/08 18:03
Naphthalene	48.9		ug/L	50.0	98%	62 - 141	3	39	8120667		12/05/08 18:03
n-Propylbenzene	50.3		ug/L	50.0	101%	80 - 132	4	17	8120667		12/05/08 18:03
Styrene	55.2		ug/L	50.0	110%	80 - 139	4	16	8120667		12/05/08 18:03
1,1,1,2-Tetrachloroethane	45.1		ug/L	50.0	90%	80 - 135	2	17	8120667		12/05/08 18:03
1,1,2,2-Tetrachloroethane	52.3		ug/L	50.0	105%	65 - 145	0.04	28	8120667		12/05/08 18:03
Tetrachloroethene	47.2		ug/L	50.0	94%	80 - 125	4	27	8120667		12/05/08 18:03
Toluene	50.7		ug/L	50.0	101%	80 - 125	4	19	8120667		12/05/08 18:03
1,2,3-Trichlorobenzene	46.8		ug/L	50.0	94%	57 - 144	4	31	8120667		12/05/08 18:03
1,2,4-Trichlorobenzene	45.9		ug/L	50.0	92%	60 - 140	1	26	8120667		12/05/08 18:03
1,1,2-Trichloroethane	50.2		ug/L	50.0	100%	80 - 122	0.8	21	8120667		12/05/08 18:03
1,1,1-Trichloroethane	55.7		ug/L	50.0	111%	80 - 131	3	16	8120667		12/05/08 18:03
Trichloroethene	49.4		ug/L	50.0	99%	80 - 131	4	28	8120667		12/05/08 18:03
Trichlorofluoromethane	43.5		ug/L	50.0	87%	68 - 125	0.1	20	8120667		12/05/08 18:03
1,2,3-Trichloropropane	48.5		ug/L	50.0	97%	60 - 127	0.9	26	8120667		12/05/08 18:03
1,3,5-Trimethylbenzene	50.4		ug/L	50.0	101%	80 - 129	4	16	8120667		12/05/08 18:03
1,2,4-Trimethylbenzene	50.2		ug/L	50.0	100%	80 - 128	4	22	8120667		12/05/08 18:03
Vinyl chloride	44.1		ug/L	50.0	88%	69 - 120	1	26	8120667		12/05/08 18:03



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val. Duplicate Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8260R									
	El A Method 6200B									
8120667-BSD1 Xylenes, total	157	ug/L	150	104%	80 - 129	5	18	8120667		12/05/08 18:03
Surrogate: 1,2-Dichloroethane-d4	23.2	ug/L	25.0	93%	60 - 140		10	8120667		12/05/08 18:03
Surrogate: Dibromofluoromethane	25.3	ug/L	25.0	101%	75 - 124			8120667		12/05/08 18:03
Surrogate: Toluene-d8	25.6	ug/L	25.0	102%	78 - 121			8120667		12/05/08 18:03
Surrogate: 4-Bromofluorobenzene	26.3	ug/L	25.0	105%	79 - 124			8120667		12/05/08 18:03
8120937-BSD1										
Acetone	247	ug/kg	250	99%	49 - 150	1	45	8120937		12/10/08 13:43
Benzene	46.6	ug/kg	50.0	93%	76 - 130	6	43	8120937		12/10/08 13:43
Bromobenzene	46.9	ug/kg	50.0	94%	80 - 128	1	50	8120937		12/10/08 13:43
Bromochloromethane	50.7	ug/kg	50.0	101%	70 - 135	12	32	8120937		12/10/08 13:43
Bromodichloromethane	54.8	ug/kg	50.0	110%	78 - 135	15	37	8120937		12/10/08 13:43
Bromoform	44.4	ug/kg	50.0	89%	67 - 143	2	50	8120937		12/10/08 13:43
Bromomethane	54.6	ug/kg	50.0	109%	58 - 150	18	50	8120937		12/10/08 13:43
2-Butanone	242	ug/kg	250	97%	61 - 143	3	43	8120937		12/10/08 13:43
sec-Butylbenzene	48.8	ug/kg	50.0	98%	80 - 134	4	50	8120937		12/10/08 13:43
n-Butylbenzene	47.5	ug/kg	50.0	95%	71 - 141	2	50	8120937		12/10/08 13:43
tert-Butylbenzene	49.1	ug/kg	50.0	98%	79 - 132	5	50	8120937		12/10/08 13:43
Carbon disulfide	49.8	ug/kg	50.0	100%	70 - 134	16	47	8120937		12/10/08 13:43
Carbon Tetrachloride	45.8	ug/kg	50.0	92%	75 - 137	3	44	8120937		12/10/08 13:43
Chlorobenzene	48.2	ug/kg	50.0	96%	80 - 121	4	44	8120937		12/10/08 13:43
Chlorodibromomethane	50.6	ug/kg	50.0	101%	77 - 130	4	45	8120937		12/10/08 13:43
Chloroethane	53.9	ug/kg	50.0	108%	62 - 149	16	50	8120937		12/10/08 13:43
Chloroform	49.7	ug/kg	50.0	99%	75 - 130	14	36	8120937		12/10/08 13:43
Chloromethane	49.2	ug/kg	50.0	98%	35 - 130	12	50	8120937		12/10/08 13:43
2-Chlorotoluene	47.4	ug/kg	50.0	95%	80 - 131	3	50	8120937		12/10/08 13:43
4-Chlorotoluene	45.8	ug/kg	50.0	92%	80 - 129	2	50	8120937		12/10/08 13:43
1,2-Dibromo-3-chloropropane	46.1	ug/kg	50.0	92%	62 - 142	7	50	8120937		12/10/08 13:43
1,2-Dibromoethane (EDB)	49.2	ug/kg	50.0	98%	81 - 130	1	50	8120937		12/10/08 13:43
Dibromomethane	53.3	ug/kg	50.0	107%	77 - 133	10	45	8120937		12/10/08 13:43
1,4-Dichlorobenzene	46.0	ug/kg	50.0	92%	75 - 128	2	50	8120937		12/10/08 13:43
1,3-Dichlorobenzene	45.9	ug/kg	50.0	92%	79 - 128	3	50	8120937		12/10/08 13:43
1,2-Dichlorobenzene	47.7	ug/kg	50.0	95%	80 - 130	3	50	8120937		12/10/08 13:43
Dichlorodifluoromethane	53.3	ug/kg	50.0	107%	11 - 129	12	43	8120937		12/10/08 13:43
1,1-Dichloroethane	51.2	ug/kg	50.0	102%	68 - 150	14	37	8120937		12/10/08 13:43
1,2-Dichloroethane	45.0	ug/kg	50.0	90%	72 - 132	0.8	44	8120937		12/10/08 13:43
cis-1,2-Dichloroethene	52.2	ug/kg	50.0	104%	77 - 132	14	35	8120937		12/10/08 13:43
1,1-Dichloroethene	51.1	ug/kg	50.0	102%	75 - 133	17	41	8120937		12/10/08 13:43
trans-1,2-Dichloroethene	50.5	ug/kg	50.0	101%	79 - 133	15	37	8120937		12/10/08 13:43
1,3-Dichloropropane	48.0	ug/kg	50.0	96%	80 - 125	0.4	44	8120937		12/10/08 13:43
1,2-Dichloropropane	49.7	ug/kg	50.0	99%	75 - 124	14	35	8120937		12/10/08 13:43
.,2 Siemoropropune	77.1	ME/ NE	50.0	2270	75 124	17	55	0120731		12/10/00 13.73



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620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

			Spike		Target				Sample	Analyzed
Analyte	Orig. Val. Duplicate Q	Units	Conc	% Rec.	Range	RPD 1	Limit	Batch	Duplicated	Date/Time
Volatile Organic Compounds by El	PA Method 8260B									
8120937-BSD1										
2,2-Dichloropropane	50.3	ug/kg	50.0	101%	59 - 144	14	33	8120937		12/10/08 13:43
cis-1,3-Dichloropropene	50.5	ug/kg	50.0	101%	80 - 137	5	43	8120937		12/10/08 13:43
trans-1,3-Dichloropropene	49.5	ug/kg	50.0	99%	75 - 133	4	50	8120937		12/10/08 13:43
1,1-Dichloropropene	46.2	ug/kg	50.0	92%	76 - 133	5	41	8120937		12/10/08 13:43
Ethylbenzene	48.4	ug/kg	50.0	97%	80 - 128	5	48	8120937		12/10/08 13:43
Hexachlorobutadiene	51.9	ug/kg	50.0	104%	60 - 150	2	50	8120937		12/10/08 13:43
2-Hexanone	228	ug/kg	250	91%	63 - 149	9	50	8120937		12/10/08 13:43
Isopropylbenzene	50.5	ug/kg	50.0	101%	74 - 131	4	50	8120937		12/10/08 13:43
p-Isopropyltoluene	46.6	ug/kg	50.0	93%	75 - 133	2	50	8120937		12/10/08 13:43
Methyl tert-Butyl Ether	50.9	ug/kg	50.0	102%	67 - 130	10	45	8120937		12/10/08 13:43
Methylene Chloride	52.0	ug/kg	50.0	104%	65 - 144	12	39	8120937		12/10/08 13:43
4-Methyl-2-pentanone	227	ug/kg	250	91%	64 - 142	7	50	8120937		12/10/08 13:43
Naphthalene	44.1	ug/kg	50.0	88%	63 - 144	2	50	8120937		12/10/08 13:43
n-Propylbenzene	46.5	ug/kg	50.0	93%	80 - 131	4	50	8120937		12/10/08 13:43
Styrene	50.9	ug/kg	50.0	102%	80 - 144	3	50	8120937		12/10/08 13:43
1,1,1,2-Tetrachloroethane	49.9	ug/kg	50.0	100%	80 - 129	4	43	8120937		12/10/08 13:43
1,1,2,2-Tetrachloroethane	46.2	ug/kg	50.0	92%	73 - 139	6	50	8120937		12/10/08 13:43
Tetrachloroethene	45.6	ug/kg	50.0	91%	76 - 128	5	45	8120937		12/10/08 13:43
Toluene	48.4	ug/kg	50.0	97%	80 - 125	7	44	8120937		12/10/08 13:43
1,2,3-Trichlorobenzene	45.7	ug/kg	50.0	91%	64 - 136	1	50	8120937		12/10/08 13:43
1,2,4-Trichlorobenzene	44.6	ug/kg	50.0	89%	58 - 145	0.6	50	8120937		12/10/08 13:43
1,1,2-Trichloroethane	48.6	ug/kg	50.0	97%	80 - 127	2	41	8120937		12/10/08 13:43
1,1,1-Trichloroethane	51.3	ug/kg	50.0	103%	76 - 134	15	39	8120937		12/10/08 13:43
Trichloroethene	50.7	ug/kg	50.0	101%	75 - 131	2	40	8120937		12/10/08 13:43
Trichlorofluoromethane	58.9	ug/kg	50.0	118%	63 - 130	16	42	8120937		12/10/08 13:43
1,2,3-Trichloropropane	40.5	ug/kg	50.0	81%	66 - 129	6	50	8120937		12/10/08 13:43
1,3,5-Trimethylbenzene	47.7	ug/kg	50.0	95%	78 - 133	4	50	8120937		12/10/08 13:43
1,2,4-Trimethylbenzene	47.6	ug/kg	50.0	95%	76 - 135	4	50	8120937		12/10/08 13:43
Vinyl chloride	49.2	ug/kg	50.0	98%	58 - 134	16	41	8120937		12/10/08 13:43
Xylenes, total	144	ug/kg	150	96%	79 - 130	4	48	8120937		12/10/08 13:43
Surrogate: 1,2-Dichloroethane-d4	47.8	ug/kg	50.0	96%	41 - 150			8120937		12/10/08 13:43
Surrogate: Dibromofluoromethane	54.5	ug/kg	50.0	109%	55 - 139			8120937		12/10/08 13:43
Surrogate: Toluene-d8	51.5	ug/kg	50.0	103%	57 - 148			8120937		12/10/08 13:43
Surrogate: 4-Bromofluorobenzene	48.9	ug/kg	50.0	98%	58 - 150			8120937		12/10/08 13:43
8121404-BSD1										
Acetone	263	ug/kg	250	105%	49 - 150	4	45	8121404		12/10/08 00:25
Benzene	49.4	ug/kg	50.0	99%	76 - 130	0.2	43	8121404		12/10/08 00:25
Bromobenzene	56.3	ug/kg	50.0	113%	80 - 128	0.9	50	8121404		12/10/08 00:25
Bromochloromethane	41.8	ug/kg	50.0	84%	70 - 135	0.8	32	8121404		12/10/08 00:25
Bromodichloromethane	41.5	ug/kg	50.0	83%	78 - 135	0.2	37	8121404		12/10/08 00:25



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

			Spike	0/ D	Target	DDD	T : :/	D. ()	Sample	Analyzed
Analyte	Orig. Val. Duplicate Q	Units	Conc	% Rec.	Range	RPD	Limit	Batch	Duplicated	Date/Time
Volatile Organic Compounds by	y EPA Method 8260B									
8121404-BSD1										
Bromoform	40.1	ug/kg	50.0	80%	67 - 143	2	50	8121404		12/10/08 00:25
Bromomethane	44.0	ug/kg	50.0	88%	58 - 150	3	50	8121404		12/10/08 00:25
2-Butanone	246	ug/kg	250	98%	61 - 143	4	43	8121404		12/10/08 00:25
sec-Butylbenzene	52.1	ug/kg	50.0	104%	80 - 134	1	50	8121404		12/10/08 00:25
n-Butylbenzene	53.9	ug/kg	50.0	108%	71 - 141	0.3	50	8121404		12/10/08 00:25
tert-Butylbenzene	48.2	ug/kg	50.0	96%	79 - 132	1	50	8121404		12/10/08 00:25
Carbon disulfide	50.0	ug/kg	50.0	100%	70 - 134	2	47	8121404		12/10/08 00:25
Carbon Tetrachloride	41.9	ug/kg	50.0	84%	75 - 137	0.6	44	8121404		12/10/08 00:25
Chlorobenzene	47.1	ug/kg	50.0	94%	80 - 121	0.3	44	8121404		12/10/08 00:25
Chlorodibromomethane	44.0	ug/kg	50.0	88%	77 - 130	2	45	8121404		12/10/08 00:25
Chloroethane	59.5	ug/kg	50.0	119%	62 - 149	0.2	50	8121404		12/10/08 00:25
Chloroform	47.1	ug/kg	50.0	94%	75 - 130	0.1	36	8121404		12/10/08 00:25
Chloromethane	48.0	ug/kg	50.0	96%	35 - 130	4	50	8121404		12/10/08 00:25
2-Chlorotoluene	53.2	ug/kg	50.0	106%	80 - 131	1	50	8121404		12/10/08 00:25
4-Chlorotoluene	52.6	ug/kg	50.0	105%	80 - 129	2	50	8121404		12/10/08 00:25
1,2-Dibromo-3-chloropropane	46.6	ug/kg	50.0	93%	62 - 142	5	50	8121404		12/10/08 00:25
1,2-Dibromoethane (EDB)	46.8	ug/kg	50.0	94%	81 - 130	1	50	8121404		12/10/08 00:25
Dibromomethane	44.3	ug/kg	50.0	89%	77 - 133	2	45	8121404		12/10/08 00:25
1,4-Dichlorobenzene	48.3	ug/kg	50.0	97%	75 - 128	2	50	8121404		12/10/08 00:25
1,3-Dichlorobenzene	48.8	ug/kg	50.0	98%	79 - 128	1	50	8121404		12/10/08 00:25
1,2-Dichlorobenzene	49.5	ug/kg	50.0	99%	80 - 130	0.2	50	8121404		12/10/08 00:25
Dichlorodifluoromethane	49.5	ug/kg	50.0	99%	11 - 129	0.9	43	8121404		12/10/08 00:25
1,1-Dichloroethane	47.2	ug/kg	50.0	94%	68 - 150	0.9	37	8121404		12/10/08 00:25
1,2-Dichloroethane	40.8	ug/kg	50.0	82%	72 - 132	0.2	44	8121404		12/10/08 00:25
cis-1,2-Dichloroethene	48.3	ug/kg	50.0	97%	77 - 132	0.4	35	8121404		12/10/08 00:25
1,1-Dichloroethene	46.1	ug/kg	50.0	92%	75 - 133	2	41	8121404		12/10/08 00:25
trans-1,2-Dichloroethene	47.4	ug/kg	50.0	95%	79 - 133	0.4	37	8121404		12/10/08 00:25
1,3-Dichloropropane	49.9	ug/kg	50.0	100%	80 - 125	2	44	8121404		12/10/08 00:25
1,2-Dichloropropane	45.8	ug/kg	50.0	92%	75 - 124	6	35	8121404		12/10/08 00:25
2,2-Dichloropropane	41.9	ug/kg	50.0	84%	59 - 144	1	33	8121404		12/10/08 00:25
cis-1,3-Dichloropropene	51.3	ug/kg	50.0	103%	80 - 137	0.8	43	8121404		12/10/08 00:25
trans-1,3-Dichloropropene	46.0	ug/kg	50.0	92%	75 - 133	0.4	50	8121404		12/10/08 00:25
1,1-Dichloropropene	47.9	ug/kg	50.0	96%	76 - 133	0.6	41	8121404		12/10/08 00:25
Ethylbenzene	48.7	ug/kg	50.0	97%	80 - 128	0.2	48	8121404		12/10/08 00:25
Hexachlorobutadiene	40.4	ug/kg	50.0	81%	60 - 150	6	50	8121404		12/10/08 00:25
2-Hexanone	273	ug/kg	250	109%	63 - 149	5	50	8121404		12/10/08 00:25
Isopropylbenzene	48.2	ug/kg	50.0	96%	74 - 131	0.02	50	8121404		12/10/08 00:25
p-Isopropyltoluene	48.5	ug/kg	50.0	97%	75 - 133	2	50	8121404		12/10/08 00:25
Methyl tert-Butyl Ether	43.6	ug/kg	50.0	87%	67 - 130	0.6	45	8121404		12/10/08 00:25
Methylene Chloride	52.3	ug/kg	50.0	105%	65 - 144	1	39	8121404		12/10/08 00:25
4-Methyl-2-pentanone	270	ug/kg	250	108%	64 - 142	4	50	8121404		12/10/08 00:25



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Volatile Organic Compounds by E	PA Method 8	3260B										
8121404-BSD1												
Naphthalene		49.3		ug/kg	50.0	99%	63 - 144	1	50	8121404		12/10/08 00:25
n-Propylbenzene		52.9		ug/kg	50.0	106%	80 - 131	2	50	8121404		12/10/08 00:25
Styrene		49.9		ug/kg	50.0	100%	80 - 144	0.5	50	8121404		12/10/08 00:25
1,1,1,2-Tetrachloroethane		44.0		ug/kg	50.0	88%	80 - 129	0.4	43	8121404		12/10/08 00:25
1,1,2,2-Tetrachloroethane		59.3		ug/kg	50.0	119%	73 - 139	2	50	8121404		12/10/08 00:25
Tetrachloroethene		40.0		ug/kg	50.0	80%	76 - 128	0.7	45	8121404		12/10/08 00:25
Toluene		49.7		ug/kg	50.0	99%	80 - 125	0.4	44	8121404		12/10/08 00:25
1,2,3-Trichlorobenzene		45.8		ug/kg	50.0	92%	64 - 136	3	50	8121404		12/10/08 00:25
1,2,4-Trichlorobenzene		46.0		ug/kg	50.0	92%	58 - 145	3	50	8121404		12/10/08 00:25
1,1,2-Trichloroethane		45.4		ug/kg	50.0	91%	80 - 127	2	41	8121404		12/10/08 00:25
1,1,1-Trichloroethane		41.7		ug/kg	50.0	83%	76 - 134	0.1	39	8121404		12/10/08 00:25
Trichloroethene		41.6		ug/kg	50.0	83%	75 - 131	0.1	40	8121404		12/10/08 00:25
Trichlorofluoromethane		45.6		ug/kg	50.0	91%	63 - 130	1	42	8121404		12/10/08 00:25
1,2,3-Trichloropropane		46.6		ug/kg	50.0	93%	66 - 129	2	50	8121404		12/10/08 00:25
1,3,5-Trimethylbenzene		51.4		ug/kg	50.0	103%	78 - 133	0.9	50	8121404		12/10/08 00:25
1,2,4-Trimethylbenzene		49.4		ug/kg	50.0	99%	76 - 135	2	50	8121404		12/10/08 00:25
Vinyl chloride		53.8		ug/kg	50.0	108%	58 - 134	0.8	41	8121404		12/10/08 00:25
Xylenes, total		140		ug/kg	150	93%	79 - 130	0.2	48	8121404		12/10/08 00:25
1,1,2-Trifluorotrichloroethane		45.8		ug/kg	50.0	92%	73 - 126	2	50	8121404		12/10/08 00:25
Surrogate: 1,2-Dichloroethane-d4		44.2		ug/kg	50.0	88%	41 - 150			8121404		12/10/08 00:25
Surrogate: Dibromofluoromethane		47.1		ug/kg	50.0	94%	55 - 139			8121404		12/10/08 00:25
Surrogate: Toluene-d8		52.2		ug/kg	50.0	104%	57 - 148			8121404		12/10/08 00:25
Surrogate: 4-Bromofluorobenzene		53.0		ug/kg	50.0	106%				8121404		12/10/08 00:25
TCLP Volatile Organic Compound	ls by EPA M	ethod 1311	/8260B									
8120939-BSD1												
Benzene		41.9		ug/L	50.0	84%	76 - 129	1	50	8120939		12/06/08 13:26
2-Butanone		217		ug/L	250	87%	63 - 138	4	50	8120939		12/06/08 13:26
Carbon Tetrachloride		44.6		ug/L	50.0	89%	56 - 150	1	50	8120939		12/06/08 13:26
Chlorobenzene		42.3		ug/L	50.0	85%	80 - 120	0.2	50	8120939		12/06/08 13:26
Chloroform		42.9	В	ug/L	50.0	86%	78 - 138	1	50	8120939		12/06/08 13:26
1,2-Dichloroethane		43.2		ug/L	50.0	86%	70 - 135	2	50	8120939		12/06/08 13:26
1,1-Dichloroethene		44.0		ug/L	50.0	88%	77 - 137	4	50	8120939		12/06/08 13:26
Tetrachloroethene		46.4		ug/L	50.0	93%	83 - 126	2	50	8120939		12/06/08 13:26
Trichloroethene		43.4		ug/L	50.0	87%	78 - 137	1	50	8120939		12/06/08 13:26
Vinyl chloride		45.3		ug/L	50.0	91%	62 - 124	3	50	8120939		12/06/08 13:26
Surrogate: 1,2-Dichloroethane-d4		25.2		ug/L	25.0	101%	60 - 140			8120939		12/06/08 13:26
Surrogate: Dibromofluoromethane		25.0		ug/L	25.0	100%	75 - 124			8120939		12/06/08 13:26
Surrogate: Toluene-d8		22.9		ug/L	25.0	92%	78 - 121			8120939		12/06/08 13:26
Surrogate: 4-Bromofluorobenzene		24.5		ug/L	25.0	98%	79 - 124			8120939		12/06/08 13:26



Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike

Analyse	Orig Vol	MC Vol	O Unito	Smiles Come	0/ P.aa	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Analyte	Orig. Val.	MS Val	Q Units	Spike Conc	% Rec.	····			
Total Metals by EPA Method 60	10B								
8120688-MS1									
Antimony	ND	0.109	mg/L	0.100	109%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Arsenic	ND	0.0456	mg/L	0.0500	91%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Barium	0.0316	2.09	mg/L	2.00	103%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Cadmium	ND	0.0496	mg/L	0.0500	99%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Chromium	ND	0.207	mg/L	0.200	104%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Lead	ND	0.0547	mg/L	0.0500	109%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Selenium	0.00560	0.0518	mg/L	0.0500	92%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
Silver	ND	0.0522	mg/L	0.0500	104%	75 - 125	8120688	NRL0178-05	12/04/08 21:39
8121573-MS1									
Antimony	ND	91.7	mg/kg wet	97.5	94%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Arsenic	12.5	31.5	mg/kg wet	19.5	97%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Barium	72.7	446	mg/kg wet	390	96%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Cadmium	ND	17.9	mg/kg wet	19.5	92%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Chromium	34.4	78.8	mg/kg wet	39.0	114%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Lead	18.7	119	mg/kg wet	97.5	103%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Selenium	ND	17.8	mg/kg wet	19.5	91%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Silver	0.516	10.0	mg/kg wet	9.75	98%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Mercury by EPA Methods 7470A	A/7471A								
8120683-MS1									
Mercury	0.000189	0.00111	mg/L	0.00100	92%	63 - 138	8120683	NRL0036-01	12/04/08 18:57
8120735-MS1									
Mercury	ND	0.342	mg/kg dry	0.287	119%	60 - 149	8120735	NRL0332-05	12/04/08 15:12
TCLP Metals by 6000/7000 Serie	es Methods								
8120910-MS1									
Mercury	ND	0.0207	mg/L	0.0200	104%	63 - 138	8120910	NRL0126-01	12/05/08 16:54
8120922-MS1									
Arsenic	ND	10.0	mg/L	10.0	100%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Barium	0.0350	50.5	mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Cadmium	ND	9.83	mg/L	10.0	98%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Chromium	ND	51.7	mg/L	50.0	103%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Lead	ND	50.5	mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
	170	10.2	~	400	4000/			3 TD T 0 44 0 00	12/06/00 00 50
Selenium	ND	10.2	mg/L	10.0	102%	75 - 125	8120922	NRL0410-02	12/06/08 00:59



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Marcine Marc	Analyte	Orig. Val.	MS Val	Q Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Betacane	Volatile Organic Compounds by l		 0R							
Bonzenic ND		El 11 Michiga 020	OD.							
Carbon Tetrachloride		ND	34.4	ug/kg	50.0	69%	33 - 146	8120937	NRL0877-03	12/10/08 23:11
Chlorochemene	2-Butanone	ND	125	ug/kg	250	50%	37 - 151	8120937	NRL0877-03	12/10/08 23:11
Chloroform	Carbon Tetrachloride	ND	35.5	ug/kg	50.0	71%	33 - 155	8120937	NRL0877-03	12/10/08 23:11
L2-Dichlorouchane	Chlorobenzene	ND	31.3	ug/kg	50.0	63%	23 - 147	8120937	NRL0877-03	12/10/08 23:11
Cise 1,2-Dichloroethene	Chloroform	0.861	32.2	ug/kg	50.0	63%	39 - 140	8120937	NRL0877-03	12/10/08 23:11
1,1-Dichlorouchene	1,2-Dichloroethane	ND	28.9	ug/kg	50.0	58%	27 - 145	8120937	NRL0877-03	12/10/08 23:11
Methylene Chloride	cis-1,2-Dichloroethene	ND	36.9	ug/kg	50.0	74%	39 - 143	8120937	NRL0877-03	12/10/08 23:11
Namuthalene ND 8.86 ug/kg 50.0 18% 10-151 8120937 NRL0877-03 12/1008 23:11 Tetrachloroethene ND 34.4 ug/kg 50.0 69% 27-151 8120937 NRL0877-03 12/1008 23:11 Trichloroethene ND 39.1 ug/kg 50.0 78% 33-144 8120937 NRL0877-03 12/1008 23:11 L2-Dichloroethene (total) ND 49.6 ug/kg 50.0 79% 33-144 8120937 NRL0877-03 12/1008 23:11 L2-Dichloroethene (total) ND 77.1 ug/kg 100 77% 40-144 8120937 NRL0877-03 12/1008 23:11 Surrogate: /1.2-Dichloroethane-d4 49.8 ug/kg 50.0 00% 41-150 8120937 NRL0877-03 12/1008 23:11 Surrogate: /1.2-Dichloroethene (total) ND 77.1 ug/kg 50.0 00% 41-150 8120937 NRL0877-03 12/1008 23:11 Surrogate: /1.2-Dichloroethane-d4 49.8 ug/kg 50.0 00% 57-148 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.9 ug/kg 50.0 00% 57-148 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.2 ug/kg 50.0 00% 57-148 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.9 ug/kg 50.0 00% 57-148 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.9 ug/kg 50.0 00% 57-148 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.9 ug/kg 50.0 50% 53-150 8120937 NRL0877-03 12/1008 23:11 Surrogate: Tolune-d8 49.9 ug/kg 50.0 60% 33-146 812144 NRL0745-08 12/1008 20:31 Surrogate: Tolune-d8 49.9 ug/kg 50.0 60% 33-146 812144 NRL0745-08 12/1008 20:31 Surrogate: Tolune-d8 40.0 44.6 ug/kg 50.0 60% 33-146 812144 NRL0745-08 12/1008 20:31 Surrogate: Tolune-d8 40.0 40	1,1-Dichloroethene	ND	43.2	ug/kg	50.0	86%	42 - 145	8120937	NRL0877-03	12/10/08 23:11
Petrachioroethene ND 34.4 ug/kg 50.0 69% 27.151 8120937 NRL0877-03 12/1008 23:11	Methylene Chloride	15.5	49.5	ug/kg	50.0	68%	31 - 160	8120937	NRL0877-03	12/10/08 23:11
Trichloroethene	Naphthalene	ND	8.86	ug/kg	50.0	18%	10 - 151	8120937	NRL0877-03	12/10/08 23:11
Vinyl chloride	Tetrachloroethene	ND	34.4	ug/kg	50.0	69%	27 - 151	8120937	NRL0877-03	12/10/08 23:11
1.2-Dichloroethene (total) ND 77.1 ug/kg 100 77% 40 - 144 8120937 NRL0877-03 12/1008 23:11	Trichloroethene	ND	39.1	ug/kg	50.0	78%	33 - 145	8120937	NRL0877-03	12/10/08 23:11
Surrogate: 1,2-Dichloroethane-el4	Vinyl chloride	ND	49.6	ug/kg	50.0	99%	32 - 144	8120937	NRL0877-03	12/10/08 23:11
Surrogate: Dibromofluoromethane	1,2-Dichloroethene (total)	ND	77.1	ug/kg	100	77%	40 - 144	8120937	NRL0877-03	12/10/08 23:11
Surrogate: Toluene-d8	Surrogate: 1,2-Dichloroethane-d4		49.8	ug/kg	50.0	100%	41 - 150	8120937	NRL0877-03	12/10/08 23:11
Marcolate: +Bromofluorobenzene	Surrogate: Dibromofluoromethane		48.7	ug/kg	50.0	97%	55 - 139	8120937	NRL0877-03	12/10/08 23:11
ND 149 144	Surrogate: Toluene-d8		49.9	ug/kg	50.0	100%	57 - 148	8120937	NRL0877-03	12/10/08 23:11
Acetone ND 149 ug/kg 250 60% 32-163 8121404 NRL0745-08 12/10/08 09:03 Benzene ND 44.6 ug/kg 50.0 89% 33-146 8121404 NRL0745-08 12/10/08 09:03 Bromobenzene ND 55.0 ug/kg 50.0 110% 10-156 8121404 NRL0745-08 12/10/08 09:03 Bromochloromethane ND 33.7 ug/kg 50.0 66% 31-149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 34.2 ug/kg 50.0 68% 31-149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 37.6 ug/kg 50.0 56% 14-167 8121404 NRL0745-08 12/10/08 09:03 Bromomethane ND 37.6 ug/kg 50.0 75% 16-172 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18-165 81214	Surrogate: 4-Bromofluorobenzene		49.2	ug/kg	50.0	98%	58 - 150	8120937	NRL0877-03	12/10/08 23:11
Benzene ND 44.6 ug/kg 50.0 89% 33 - 146 8121404 NRL0745-08 12/10/08 09:03 Bromobenzene ND 55.0 ug/kg 50.0 110% 10 - 156 8121404 NRL0745-08 12/10/08 09:03 Bromochloromethane ND 33.7 ug/kg 50.0 67% 43 - 138 8121404 NRL0745-08 12/10/08 09:03 Bromodichloromethane ND 34.2 ug/kg 50.0 68% 31 - 149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 37.6 ug/kg 50.0 56% 14 - 167 8121404 NRL0745-08 12/10/08 09:03 Bromoferm ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 Bromoferm ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 Bromoferm ND 50.7 ug/kg 50.0 101% 18 - 165 </td <td>8121404-MS1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	8121404-MS1									
Bromobenzene ND 55.0 ug/kg 50.0 110% 10 - 156 8121404 NRL0745-08 12/10/08 09:03 Bromochloromethane ND 33.7 ug/kg 50.0 67% 43 - 138 8121404 NRL0745-08 12/10/08 09:03 Bromodichloromethane ND 34.2 ug/kg 50.0 68% 31 - 149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 27.9 ug/kg 50.0 56% 14 - 167 8121404 NRL0745-08 12/10/08 09:03 Bromomethane ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93%<	Acetone	ND	149	ug/kg	250	60%	32 - 163	8121404	NRL0745-08	12/10/08 09:03
Bromochloromethane ND 33.7 ug/kg 50.0 67% 43 - 138 8121404 NRL0745-08 12/10/08 09:03 Bromodichloromethane ND 34.2 ug/kg 50.0 68% 31 - 149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 27.9 ug/kg 50.0 56% 14 - 167 8121404 NRL0745-08 12/10/08 09:03 Bromomethane ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 2-Butanone 4.02 143 ug/kg 250 56% 37 - 151 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 85%	Benzene	ND	44.6	ug/kg	50.0	89%	33 - 146	8121404	NRL0745-08	12/10/08 09:03
Bromodichloromethane ND 34.2 ug/kg 50.0 68% 31 - 149 8121404 NRL0745-08 12/10/08 09:03 Bromoform ND 27.9 ug/kg 50.0 56% 14 - 167 8121404 NRL0745-08 12/10/08 09:03 Bromomethane ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 2-Butanone 4.02 143 ug/kg 250 56% 37 - 151 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 36.8 ug/kg 50.0 85%	Bromobenzene	ND	55.0	ug/kg	50.0	110%	10 - 156	8121404	NRL0745-08	12/10/08 09:03
Bromoform ND 27.9 ug/kg 50.0 56% 14 - 167 8121404 NRL0745-08 12/10/08 09:03 Bromomethane ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 2-Butanone 4.02 143 ug/kg 250 56% 37 - 151 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 86%	Bromochloromethane	ND	33.7	ug/kg	50.0	67%	43 - 138	8121404	NRL0745-08	12/10/08 09:03
Bromomethane ND 37.6 ug/kg 50.0 75% 16 - 172 8121404 NRL0745-08 12/10/08 09:03 2-Butanone 4.02 143 ug/kg 250 56% 37 - 151 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane	Bromodichloromethane	ND	34.2	ug/kg	50.0	68%	31 - 149	8121404	NRL0745-08	12/10/08 09:03
2-Butanone 4.02 143 ug/kg 250 56% 37 - 151 8121404 NRL0745-08 12/10/08 09:03 sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodethane	Bromoform	ND	27.9	ug/kg	50.0	56%	14 - 167	8121404	NRL0745-08	12/10/08 09:03
sec-Butylbenzene ND 50.7 ug/kg 50.0 101% 18 - 165 8121404 NRL0745-08 12/10/08 09:03 n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 74% 33 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0	Bromomethane	ND	37.6	ug/kg	50.0	75%	16 - 172	8121404	NRL0745-08	12/10/08 09:03
n-Butylbenzene ND 53.8 ug/kg 50.0 108% 10 - 168 8121404 NRL0745-08 12/10/08 09:03 tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 74% 33 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane	2-Butanone	4.02	143	ug/kg	250	56%	37 - 151	8121404	NRL0745-08	12/10/08 09:03
tert-Butylbenzene ND 46.4 ug/kg 50.0 93% 17 - 165 8121404 NRL0745-08 12/10/08 09:03 Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 74% 33 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03 NRL0745-08 12/10/08 09:03 NRL0745-08 12/10/08 09:03 NRL0745-08 12/10/08 09:03 NRL0745-08 NRL0745-08 12/10/08 09:03 NRL0745-08	sec-Butylbenzene	ND	50.7	ug/kg	50.0	101%	18 - 165	8121404	NRL0745-08	12/10/08 09:03
Carbon disulfide ND 42.6 ug/kg 50.0 85% 34 - 147 8121404 NRL0745-08 12/10/08 09:03 Carbon Tetrachloride ND 36.8 ug/kg 50.0 74% 33 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03	n-Butylbenzene	ND	53.8	ug/kg	50.0	108%	10 - 168	8121404	NRL0745-08	12/10/08 09:03
Carbon Tetrachloride ND 36.8 ug/kg 50.0 74% 33 - 155 8121404 NRL0745-08 12/10/08 09:03 Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03	tert-Butylbenzene	ND	46.4	ug/kg	50.0	93%	17 - 165	8121404	NRL0745-08	12/10/08 09:03
Chlorobenzene ND 43.0 ug/kg 50.0 86% 23 - 147 8121404 NRL0745-08 12/10/08 09:03 Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03	Carbon disulfide	ND	42.6	ug/kg	50.0	85%	34 - 147	8121404	NRL0745-08	12/10/08 09:03
Chlorodibromomethane ND 34.0 ug/kg 50.0 68% 21 - 155 8121404 NRL0745-08 12/10/08 09:03 Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03	Carbon Tetrachloride	ND	36.8	ug/kg	50.0	74%	33 - 155	8121404	NRL0745-08	12/10/08 09:03
Chloroethane ND 51.4 ug/kg 50.0 103% 44 - 155 8121404 NRL0745-08 12/10/08 09:03	Chlorobenzene	ND	43.0	ug/kg	50.0	86%	23 - 147	8121404	NRL0745-08	12/10/08 09:03
	Chlorodibromomethane	ND	34.0	ug/kg	50.0	68%	21 - 155	8121404	NRL0745-08	12/10/08 09:03
Chloroform ND 41.1 ug/kg 50.0 82% 39 - 140 8121404 NRL0745-08 12/10/08 09:03	Chloroethane	ND	51.4	ug/kg	50.0	103%	44 - 155	8121404	NRL0745-08	12/10/08 09:03
	Chloroform	ND	41.1	ug/kg	50.0	82%	39 - 140	8121404	NRL0745-08	12/10/08 09:03



Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	MS Val	Q Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Volatile Organic Compounds by	y EPA Method 8260)B							
8121404-MS1									
Chloromethane	ND	32.2	ug/kg	50.0	64%	14 - 143	8121404	NRL0745-08	12/10/08 09:03
2-Chlorotoluene	ND	49.8	ug/kg	50.0	100%	21 - 154	8121404	NRL0745-08	12/10/08 09:03
4-Chlorotoluene	ND	49.6	ug/kg	50.0	99%	10 - 156	8121404	NRL0745-08	12/10/08 09:03
1,2-Dibromo-3-chloropropane	ND	27.6	ug/kg	50.0	55%	10 - 159	8121404	NRL0745-08	12/10/08 09:03
1,2-Dibromoethane (EDB)	ND	34.5	ug/kg	50.0	69%	19 - 151	8121404	NRL0745-08	12/10/08 09:03
Dibromomethane	ND	32.1	ug/kg	50.0	64%	32 - 147	8121404	NRL0745-08	12/10/08 09:03
1,4-Dichlorobenzene	ND	44.8	ug/kg	50.0	90%	10 - 152	8121404	NRL0745-08	12/10/08 09:03
1,3-Dichlorobenzene	ND	45.4	ug/kg	50.0	91%	10 - 153	8121404	NRL0745-08	12/10/08 09:03
1,2-Dichlorobenzene	ND	43.5	ug/kg	50.0	87%	10 - 155	8121404	NRL0745-08	12/10/08 09:03
Dichlorodifluoromethane	ND	22.6	ug/kg	50.0	45%	10 - 143	8121404	NRL0745-08	12/10/08 09:03
1,1-Dichloroethane	ND	42.0	ug/kg	50.0	84%	49 - 156	8121404	NRL0745-08	12/10/08 09:03
1,2-Dichloroethane	ND	30.1	ug/kg	50.0	60%	27 - 145	8121404	NRL0745-08	12/10/08 09:03
cis-1,2-Dichloroethene	ND	42.1	ug/kg	50.0	84%	39 - 143	8121404	NRL0745-08	12/10/08 09:03
1,1-Dichloroethene	ND	41.9	ug/kg	50.0	84%	42 - 145	8121404	NRL0745-08	12/10/08 09:03
trans-1,2-Dichloroethene	ND	43.6	ug/kg	50.0	87%	41 - 146	8121404	NRL0745-08	12/10/08 09:03
1,3-Dichloropropane	ND	37.6	ug/kg	50.0	75%	30 - 143	8121404	NRL0745-08	12/10/08 09:03
1,2-Dichloropropane	ND	41.8	ug/kg	50.0	84%	37 - 136	8121404	NRL0745-08	12/10/08 09:03
2,2-Dichloropropane	ND	37.5	ug/kg	50.0	75%	30 - 145	8121404	NRL0745-08	12/10/08 09:03
cis-1,3-Dichloropropene	ND	43.4	ug/kg	50.0	87%	29 - 149	8121404	NRL0745-08	12/10/08 09:03
trans-1,3-Dichloropropene	ND	36.1	ug/kg	50.0	72%	17 - 146	8121404	NRL0745-08	12/10/08 09:03
1,1-Dichloropropene	ND	44.3	ug/kg	50.0	89%	36 - 147	8121404	NRL0745-08	12/10/08 09:03
Ethylbenzene	ND	45.8	ug/kg	50.0	92%	16 - 160	8121404	NRL0745-08	12/10/08 09:03
Hexachlorobutadiene	ND	40.9	ug/kg	50.0	82%	10 - 191	8121404	NRL0745-08	12/10/08 09:03
2-Hexanone	ND	158	ug/kg	250	63%	19 - 154	8121404	NRL0745-08	12/10/08 09:03
Isopropylbenzene	ND	45.6	ug/kg	50.0	91%	16 - 156	8121404	NRL0745-08	12/10/08 09:03
p-Isopropyltoluene	ND	48.2	ug/kg	50.0	96%	13 - 160	8121404	NRL0745-08	12/10/08 09:03
Methyl tert-Butyl Ether	ND	32.2	ug/kg	50.0	64%	30 - 136	8121404	NRL0745-08	12/10/08 09:03
Methylene Chloride	ND	44.9	ug/kg	50.0	90%	31 - 160	8121404	NRL0745-08	12/10/08 09:03
4-Methyl-2-pentanone	ND	164	ug/kg	250	66%	25 - 149	8121404	NRL0745-08	12/10/08 09:03
Naphthalene	ND	33.8	ug/kg	50.0	68%	10 - 151	8121404	NRL0745-08	12/10/08 09:03
n-Propylbenzene	ND	52.1	ug/kg	50.0	104%	17 - 158	8121404	NRL0745-08	12/10/08 09:03
Styrene	ND	44.9	ug/kg	50.0	90%	11 - 168	8121404	NRL0745-08	12/10/08 09:03
1,1,1,2-Tetrachloroethane	ND	38.4	ug/kg	50.0	77%	30 - 147	8121404	NRL0745-08	12/10/08 09:03
1,1,2,2-Tetrachloroethane	ND	42.8	ug/kg	50.0	86%	20 - 155	8121404	NRL0745-08	12/10/08 09:03
Tetrachloroethene	ND	41.2	ug/kg	50.0	82%	27 - 151	8121404	NRL0745-08	12/10/08 09:03
Toluene	ND	45.8	ug/kg ug/kg	50.0	92%	30 - 145	8121404	NRL0745-08	12/10/08 09:03
								NRL0745-08 NRL0745-08	12/10/08 09:03
1,2,3-Trichlorobenzene	ND	37.2	ug/kg	50.0	74%	10 - 158	8121404	NKLU/45-08	12/10/08 09:03



Attn

 $620\;Wando\;Park\;Blvd.$

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	MS Val	Q Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Volatile Organic Compounds by l	EPA Method 826	0В							
8121404-MS1									
1,2,4-Trichlorobenzene	ND	41.6	ug/kg	50.0	83%	10 - 160	8121404	NRL0745-08	12/10/08 09:03
1,1,2-Trichloroethane	ND	34.4	ug/kg	50.0	69%	34 - 140	8121404	NRL0745-08	12/10/08 09:03
1,1,1-Trichloroethane	ND	36.7	ug/kg	50.0	73%	36 - 150	8121404	NRL0745-08	12/10/08 09:03
Trichloroethene	ND	39.0	ug/kg	50.0	78%	33 - 145	8121404	NRL0745-08	12/10/08 09:03
Trichlorofluoromethane	ND	40.0	ug/kg	50.0	80%	31 - 150	8121404	NRL0745-08	12/10/08 09:03
1,2,3-Trichloropropane	ND	30.8	ug/kg	50.0	62%	14 - 143	8121404	NRL0745-08	12/10/08 09:03
1,3,5-Trimethylbenzene	ND	49.1	ug/kg	50.0	98%	20 - 158	8121404	NRL0745-08	12/10/08 09:03
1,2,4-Trimethylbenzene	ND	46.5	ug/kg	50.0	93%	10 - 166	8121404	NRL0745-08	12/10/08 09:03
Vinyl chloride	ND	40.4	ug/kg	50.0	81%	32 - 144	8121404	NRL0745-08	12/10/08 09:03
Xylenes, total	ND	130	ug/kg	150	87%	16 - 159	8121404	NRL0745-08	12/10/08 09:03
1,1,2-Trifluorotrichloroethane	ND	42.9	ug/kg	50.0	86%	35 - 143	8121404	NRL0745-08	12/10/08 09:03
Surrogate: 1,2-Dichloroethane-d4		39.1	ug/kg	50.0	78%	41 - 150	8121404	NRL0745-08	12/10/08 09:03
Surrogate: Dibromofluoromethane		46.1	ug/kg	50.0	92%	55 - 139	8121404	NRL0745-08	12/10/08 09:03
Surrogate: Toluene-d8		52.8	ug/kg	50.0	106%	57 - 148	8121404	NRL0745-08	12/10/08 09:03
Surrogate: 4-Bromofluorobenzene		53.3	ug/kg	50.0	107%	58 - 150	8121404	NRL0745-08	12/10/08 09:03
Semivolatile Organic Compounds	by FPA Method	8270C							
8120320-MS1	by El A Method	02700							
Acenaphthene	ND	1.42	mg/kg wet	1.64	87%	28 - 117	8120320	NRL0191-01	12/05/08 17:59
Acenaphthylene	ND	1.48	mg/kg wet		90%	33 - 113	8120320	NRL0191-01	12/05/08 17:59
Anthracene	ND	1.63	mg/kg wet		100%	31 - 131	8120320	NRL0191-01	12/05/08 17:59
Benzo (a) anthracene	ND	1.57	mg/kg wet		96%	29 - 124	8120320	NRL0191-01	12/05/08 17:59
Benzo (a) pyrene	ND	1.59	mg/kg wet		97%	30 - 127	8120320	NRL0191-01	12/05/08 17:59
Benzo (b) fluoranthene	ND	1.65	mg/kg wet		101%	26 - 128	8120320	NRL0191-01	12/05/08 17:59
Benzo (g,h,i) perylene	ND	1.64	mg/kg wet		100%	21 - 122	8120320	NRL0191-01	12/05/08 17:59
Benzo (k) fluoranthene	ND	1.50	mg/kg wet		91%	20 - 130	8120320	NRL0191-01	12/05/08 17:59
4-Bromophenyl phenyl ether	ND	1.39	mg/kg wet		85%	30 - 106	8120320	NRL0191-01	12/05/08 17:59
Butyl benzyl phthalate	ND	1.78	mg/kg wet		109%	40 - 131	8120320	NRL0191-01	12/05/08 17:59
Carbazole	ND	1.51	mg/kg wet		92%	37 - 116	8120320	NRL0191-01	12/05/08 17:59
4-Chloro-3-methylphenol	ND	1.31	mg/kg wet		80%	19 - 128	8120320	NRL0191-01	12/05/08 17:59
4-Chloroaniline	ND	1.17	mg/kg wet		71%	10 - 119	8120320	NRL0191-01	12/05/08 17:59
Bis(2-chloroethoxy)methane	ND	1.31	mg/kg wet		80%	30 - 110	8120320	NRL0191-01	12/05/08 17:59
Bis(2-chloroethyl)ether	ND	1.37	mg/kg wet		84%	36 - 106	8120320	NRL0191-01	12/05/08 17:59
Bis(2-chloroisopropyl)ether	ND	1.42	mg/kg wet		86%	34 - 109	8120320	NRL0191-01	12/05/08 17:59
2-Chloronaphthalene	ND	1.40	mg/kg wet		85%	31 - 107	8120320	NRL0191-01	12/05/08 17:59
2-Chlorophenol	ND	1.37	mg/kg wet		84%	32 - 119	8120320	NRL0191-01	12/05/08 17:59
4-Chlorophenyl phenyl ether	ND ND	1.51	mg/kg wet		92%	35 - 113	8120320	NRL0191-01	12/05/08 17:59
4-Cinorophenyi phenyi ether	ND	1.31	mg/kg wei	1.04	<i>9</i> 270	33 - 113	0120320	INICUISI-UI	12/03/08 17.39



Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	MS Val	Q Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Semivolatile Organic Compoun	nds by EPA Method	8270C							
8120320-MS1	•								
Chrysene	ND	1.57	mg/kg v	ret 1.64	96%	30 - 119	8120320	NRL0191-01	12/05/08 17:59
Dibenz (a,h) anthracene	ND	1.65	mg/kg v	ret 1.64	101%	27 - 122	8120320	NRL0191-01	12/05/08 17:59
Dibenzofuran	ND	1.40	mg/kg v	ret 1.64	85%	33 - 121	8120320	NRL0191-01	12/05/08 17:59
Di-n-butyl phthalate	ND	1.68	mg/kg v	ret 1.64	103%	38 - 123	8120320	NRL0191-01	12/05/08 17:59
1,4-Dichlorobenzene	ND	1.29	mg/kg v	ret 1.64	79%	26 - 109	8120320	NRL0191-01	12/05/08 17:59
1,2-Dichlorobenzene	ND	1.32	mg/kg v	ret 1.64	81%	26 - 112	8120320	NRL0191-01	12/05/08 17:59
1,3-Dichlorobenzene	ND	1.30	mg/kg v	ret 1.64	79%	26 - 110	8120320	NRL0191-01	12/05/08 17:59
3,3-Dichlorobenzidine	ND	1.46	mg/kg v	ret 1.64	89%	10 - 112	8120320	NRL0191-01	12/05/08 17:59
2,4-Dichlorophenol	ND	1.20	mg/kg v	ret 1.64	73%	28 - 118	8120320	NRL0191-01	12/05/08 17:59
Diethyl phthalate	ND	1.58	mg/kg v	ret 1.64	97%	29 - 122	8120320	NRL0191-01	12/05/08 17:59
2,4-Dimethylphenol	ND	1.34	mg/kg v	ret 1.64	82%	10 - 128	8120320	NRL0191-01	12/05/08 17:59
Dimethyl phthalate	ND	1.60	mg/kg v	ret 1.64	98%	31 - 118	8120320	NRL0191-01	12/05/08 17:59
4,6-Dinitro-2-methylphenol	ND	1.51	mg/kg v	ret 1.64	92%	10 - 136	8120320	NRL0191-01	12/05/08 17:59
2,4-Dinitrophenol	ND	1.48	mg/kg v	ret 1.64	91%	10 - 148	8120320	NRL0191-01	12/05/08 17:59
2,6-Dinitrotoluene	ND	1.68	mg/kg v	ret 1.64	103%	28 - 125	8120320	NRL0191-01	12/05/08 17:59
2,4-Dinitrotoluene	ND	1.72	mg/kg v	ret 1.64	105%	30 - 119	8120320	NRL0191-01	12/05/08 17:59
Di-n-octyl phthalate	ND	1.70	mg/kg v	ret 1.64	104%	31 - 137	8120320	NRL0191-01	12/05/08 17:59
Bis(2-ethylhexyl)phthalate	ND	1.70	mg/kg v	ret 1.64	104%	38 - 125	8120320	NRL0191-01	12/05/08 17:59
Fluoranthene	ND	1.60	mg/kg v	ret 1.64	98%	23 - 132	8120320	NRL0191-01	12/05/08 17:59
Fluorene	ND	1.51	mg/kg v	ret 1.64	92%	38 - 110	8120320	NRL0191-01	12/05/08 17:59
Hexachlorobenzene	ND	1.51	mg/kg v	ret 1.64	92%	35 - 120	8120320	NRL0191-01	12/05/08 17:59
Hexachlorobutadiene	ND	1.16	mg/kg v	ret 1.64	71%	28 - 113	8120320	NRL0191-01	12/05/08 17:59
Hexachlorocyclopentadiene	ND	1.16	mg/kg v	ret 1.64	71%	10 - 123	8120320	NRL0191-01	12/05/08 17:59
Hexachloroethane	ND	1.28	mg/kg v	ret 1.64	78%	20 - 120	8120320	NRL0191-01	12/05/08 17:59
Indeno (1,2,3-cd) pyrene	ND	1.64	mg/kg v	ret 1.64	100%	24 - 122	8120320	NRL0191-01	12/05/08 17:59
Isophorone	ND	1.22	mg/kg v	ret 1.64	75%	23 - 108	8120320	NRL0191-01	12/05/08 17:59
2-Methylnaphthalene	ND	1.16	mg/kg v	ret 1.64	71%	26 - 116	8120320	NRL0191-01	12/05/08 17:59
2-Methylphenol	ND	1.44	mg/kg v	ret 1.64	88%	23 - 122	8120320	NRL0191-01	12/05/08 17:59
3/4-Methylphenol	ND	1.66	mg/kg v	ret 1.64	102%	23 - 138	8120320	NRL0191-01	12/05/08 17:59
Naphthalene	ND	1.19	mg/kg v	ret 1.64	73%	14 - 117	8120320	NRL0191-01	12/05/08 17:59
3-Nitroaniline	ND	1.52	mg/kg v	ret 1.64	93%	27 - 124	8120320	NRL0191-01	12/05/08 17:59
2-Nitroaniline	ND	1.47	mg/kg v	ret 1.64	90%	35 - 122	8120320	NRL0191-01	12/05/08 17:59
4-Nitroaniline	ND	1.59	mg/kg v	ret 1.64	97%	25 - 124	8120320	NRL0191-01	12/05/08 17:59
Nitrobenzene	ND	1.16	mg/kg v	ret 1.64	71%	19 - 105	8120320	NRL0191-01	12/05/08 17:59
4-Nitrophenol	ND	1.68	mg/kg v	ret 1.64	103%	14 - 144	8120320	NRL0191-01	12/05/08 17:59
2-Nitrophenol	ND	1.25	mg/kg v	ret 1.64	76%	23 - 119	8120320	NRL0191-01	12/05/08 17:59
N-Nitrosodiphenylamine	ND	1.64	mg/kg v	ret 1.64	100%	37 - 144	8120320	NRL0191-01	12/05/08 17:59



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Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Semivolatile Organic Compounds	by EPA Method	8270C								
8120320-MS1										
N-Nitrosodi-n-propylamine	ND	1.44		mg/kg wet	1.64	88%	28 - 121	8120320	NRL0191-01	12/05/08 17:59
Pentachlorophenol	ND	1.53		mg/kg wet	1.64	94%	13 - 149	8120320	NRL0191-01	12/05/08 17:59
Phenanthrene	ND	1.52		mg/kg wet	1.64	93%	21 - 130	8120320	NRL0191-01	12/05/08 17:59
Phenol	ND	1.44		mg/kg wet	1.64	88%	31 - 116	8120320	NRL0191-01	12/05/08 17:59
Pyrene	ND	1.58		mg/kg wet	1.64	97%	24 - 133	8120320	NRL0191-01	12/05/08 17:59
Pyridine	ND	0.987		mg/kg wet	1.64	60%	10 - 103	8120320	NRL0191-01	12/05/08 17:59
1,2,4-Trichlorobenzene	ND	1.14		mg/kg wet	1.64	70%	27 - 102	8120320	NRL0191-01	12/05/08 17:59
1-Methylnaphthalene	ND	1.16		mg/kg wet	1.64	71%	10 - 121	8120320	NRL0191-01	12/05/08 17:59
2,4,6-Trichlorophenol	ND	1.44		mg/kg wet	1.64	88%	32 - 122	8120320	NRL0191-01	12/05/08 17:59
2,4,5-Trichlorophenol	ND	1.51		mg/kg wet	1.64	92%	30 - 122	8120320	NRL0191-01	12/05/08 17:59
Surrogate: Terphenyl-d14		1.14		mg/kg wet	1.64	70%	26 - 128	8120320	NRL0191-01	12/05/08 17:59
Surrogate: 2,4,6-Tribromophenol		1.41		mg/kg wet	1.64	86%	20 - 132	8120320	NRL0191-01	12/05/08 17:59
Surrogate: Phenol-d5		1.14		mg/kg wet	1.64	70%	23 - 113	8120320	NRL0191-01	12/05/08 17:59
Surrogate: 2-Fluorobiphenyl		1.09		mg/kg wet	1.64	66%	19 - 109	8120320	NRL0191-01	12/05/08 17:59
Surrogate: 2-Fluorophenol		1.12		mg/kg wet	1.64	68%	19 - 105	8120320	NRL0191-01	12/05/08 17:59
Surrogate: Nitrobenzene-d5		0.967		mg/kg wet	1.64	59%	22 - 104	8120320	NRL0191-01	12/05/08 17:59
TCLP Volatile Organic Compoun	ds by EPA Meth	od 1311/826	0B							
8120939-MS1										
Benzene	ND	0.0486		mg/L	0.0500	97%	18 - 167	8120939	NRL0332-01	12/07/08 09:08
2-Butanone	ND	0.216		mg/L	0.250	86%	10 - 160	8120939	NRL0332-01	12/07/08 09:08
Carbon Tetrachloride	ND	0.0510		mg/L	0.0500	102%	10 - 189	8120939	NRL0332-01	12/07/08 09:08
Chlorobenzene	ND	0.0501		mg/L	0.0500	100%	23 - 160	8120939	NRL0332-01	12/07/08 09:08
Chloroform	ND	0.0494	В	mg/L	0.0500	99%	17 - 175	8120939	NRL0332-01	12/07/08 09:08
1,2-Dichloroethane	ND	0.0491		mg/L	0.0500	98%	14 - 151	8120939	NRL0332-01	12/07/08 09:08
1,1-Dichloroethene	ND	0.0465		mg/L	0.0500	93%	10 - 185	8120939	NRL0332-01	12/07/08 09:08
Tetrachloroethene	ND	0.0529		mg/L	0.0500	106%	16 - 170	8120939	NRL0332-01	12/07/08 09:08
Trichloroethene	0.00390	0.0494		mg/L	0.0500	91%	10 - 192	8120939	NRL0332-01	12/07/08 09:08
Vinyl chloride	ND	0.0382		mg/L	0.0500	76%	10 - 171	8120939	NRL0332-01	12/07/08 09:08
Surrogate: 1,2-Dichloroethane-d4		24.4		ug/L	25.0	98%	60 - 140	8120939	NRL0332-01	12/07/08 09:08
Surrogate: Dibromofluoromethane		24.9		ug/L	25.0	100%	75 - 124	8120939	NRL0332-01	12/07/08 09:08
Surrogate: Toluene-d8		22.3		ug/L	25.0	89%	78 - 121	8120939	NRL0332-01	12/07/08 09:08
Surrogate: 4-Bromofluorobenzene		24.0		ug/L	25.0	96%	79 - 124	8120939	NRL0332-01	12/07/08 09:08



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620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Total Metals by EPA Method 6010B												
8120688-MSD1				_								
Antimony	ND	0.103		mg/L	0.100	103%	75 - 125	6	20	8120688	NRL0178-05	12/04/08 21:44
Arsenic	ND	0.0429		mg/L	0.0500	86%	75 - 125	6	20	8120688	NRL0178-05	12/04/08 21:44
Barium	0.0316	1.95		mg/L	2.00	96%	75 - 125	7	20	8120688	NRL0178-05	12/04/08 21:44
Cadmium	ND	0.0468		mg/L	0.0500	94%	75 - 125	6	20	8120688	NRL0178-05	12/04/08 21:44
Chromium	ND	0.193		mg/L	0.200	97%	75 - 125	7	20	8120688	NRL0178-05	12/04/08 21:44
Lead	ND	0.0519		mg/L	0.0500	104%	75 - 125	5	20	8120688	NRL0178-05	12/04/08 21:44
Selenium	0.00560	0.0506		mg/L	0.0500	90%	75 - 125	2	20	8120688	NRL0178-05	12/04/08 21:44
Silver	ND	0.0480		mg/L	0.0500	96%	75 - 125	8	20	8120688	NRL0178-05	12/04/08 21:44
8121573-MSD1												
Antimony	ND	95.9		mg/kg wet	101	95%	75 - 125	4	20	8121573	NRL0510-02	12/11/08 12:33
Arsenic	12.5	32.6		mg/kg wet	20.2	100%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Barium	72.7	468		mg/kg wet	403	98%	75 - 125	5	20	8121573	NRL0510-02	12/11/08 12:33
Cadmium	ND	18.7		mg/kg wet	20.2	93%	75 - 125	4	20	8121573	NRL0510-02	12/11/08 12:33
Chromium	34.4	119	M1, R3	mg/kg wet	40.3	211%	75 - 125	41	20	8121573	NRL0510-02	12/11/08 12:33
Lead	18.7	123		mg/kg wet	101	103%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Selenium	ND	19.2		mg/kg wet	20.2	95%	75 - 125	7	20	8121573	NRL0510-02	12/11/08 12:33
Silver	0.516	10.4		mg/kg wet	10.1	98%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Mercury by EPA Methods 7470A/74	71A											
8120683-MSD1												
Mercury	0.000189	0.00108		mg/L	0.00100	89%	63 - 138	3	22	8120683	NRL0036-01	12/04/08 19:00
8120735-MSD1												
Mercury	ND	0.373		mg/kg dry	0.299	125%	60 - 149	9	26	8120735	NRL0332-05	12/04/08 15:14
TCLP Metals by 6000/7000 Series Me	ethods											
8120910-MSD1												
Mercury	ND	0.0203		mg/L	0.0200	102%	63 - 138	2	22	8120910	NRL0126-01	12/05/08 16:56
8120922-MSD1												
Arsenic	ND	10.1		mg/L	10.0	101%	75 - 125	0.6	20	8120922	NRL0410-02	12/06/08 01:03
Barium	0.0350	51.2		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Cadmium	ND	9.92		mg/L	10.0	99%	75 - 125	0.9	20	8120922	NRL0410-02	12/06/08 01:03
Chromium	ND	52.3		mg/L	50.0	105%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Lead	ND	51.0		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Selenium	ND	10.3		mg/L	10.0	103%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Silver	ND	10.2		mg/L	10.0	102%	75 - 125	2	20	8120922	NRL0410-02	12/06/08 01:03

Volatile Organic Compounds by EPA Method 8260B 8120937-MSD1



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

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Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	Duplicate Q	Units	Spike Conc	% Rec.	Target Range	RPD Limit	Batch	Sample Duplicated	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8	3260B								
8120937-MSD1										
Benzene	ND	31.0	ug/kg	50.0	62%	33 - 146	11 43	8120937	NRL0877-03	12/10/08 23:40
2-Butanone	ND	162	ug/kg	250	65%	37 - 151	25 43	8120937	NRL0877-03	12/10/08 23:40
Carbon Tetrachloride	ND	30.7	ug/kg	50.0	61%	33 - 155	15 44	8120937	NRL0877-03	12/10/08 23:40
Chlorobenzene	ND	30.0	ug/kg	50.0	60%	23 - 147	4 44	8120937	NRL0877-03	12/10/08 23:40
Chloroform	0.861	29.2	ug/kg	50.0	57%	39 - 140	10 36	8120937	NRL0877-03	12/10/08 23:40
1,2-Dichloroethane	ND	29.5	ug/kg	50.0	59%	27 - 145	2 44	8120937	NRL0877-03	12/10/08 23:40
cis-1,2-Dichloroethene	ND	35.3	ug/kg	50.0	71%	39 - 143	4 35	8120937	NRL0877-03	12/10/08 23:40
1,1-Dichloroethene	ND	36.3	ug/kg	50.0	73%	42 - 145	17 41	8120937	NRL0877-03	12/10/08 23:40
Methylene Chloride	15.5	46.7	ug/kg	50.0	62%	31 - 160	6 39	8120937	NRL0877-03	12/10/08 23:40
Naphthalene	ND	14.6	ug/kg	50.0	29%	10 - 151	49 50	8120937	NRL0877-03	12/10/08 23:40
Tetrachloroethene	ND	30.0	ug/kg	50.0	60%	27 - 151	14 45	8120937	NRL0877-03	12/10/08 23:40
Trichloroethene	ND	34.0	ug/kg	50.0	68%	33 - 145	14 40	8120937	NRL0877-03	12/10/08 23:40
Vinyl chloride	ND	41.1	ug/kg	50.0	82%	32 - 144	19 41	8120937	NRL0877-03	12/10/08 23:40
1,2-Dichloroethene (total)	ND	70.5	ug/kg	100	70%	40 - 144	9 35	8120937	NRL0877-03	12/10/08 23:40
Surrogate: 1,2-Dichloroethane-d4		48.2	ug/kg	50.0	96%	41 - 150		8120937	NRL0877-03	12/10/08 23:40
Surrogate: Dibromofluoromethane		48.4	ug/kg	50.0	97%	55 - 139		8120937	NRL0877-03	12/10/08 23:40
Surrogate: Toluene-d8		49.8	ug/kg	50.0	100%	57 - 148		8120937	NRL0877-03	12/10/08 23:40
Surrogate: 4-Bromofluorobenzene		48.4	ug/kg	50.0	97%	58 - 150		8120937	NRL0877-03	12/10/08 23:40
8121404-MSD1										
Acetone	ND	111	ug/kg	250	44%	32 - 163	29 45	8121404	NRL0745-08	12/10/08 09:33
Benzene	ND	39.5	ug/kg	50.0	79%	33 - 146	12 43	8121404	NRL0745-08	12/10/08 09:33
Bromobenzene	ND	42.4	ug/kg	50.0	85%	10 - 156	26 50	8121404	NRL0745-08	12/10/08 09:33
Bromochloromethane	ND	26.6	ug/kg	50.0	53%	43 - 138	24 32	8121404	NRL0745-08	12/10/08 09:33
Bromodichloromethane	ND	27.8	ug/kg	50.0	56%	31 - 149	21 37	8121404	NRL0745-08	12/10/08 09:33
Bromoform	ND	20.2	ug/kg	50.0	40%	14 - 167	32 50	8121404	NRL0745-08	12/10/08 09:33
Bromomethane	ND	32.2	ug/kg	50.0	64%	16 - 172	15 50	8121404	NRL0745-08	12/10/08 09:33
2-Butanone	3.90	106	ug/kg	250	41%	37 - 151	30 43	8121404	NRL0745-08	12/10/08 09:33
sec-Butylbenzene	ND	43.2	ug/kg	50.0	86%	18 - 165	16 50	8121404	NRL0745-08	12/10/08 09:33
n-Butylbenzene	ND	45.3	ug/kg	50.0	91%	10 - 168	17 50	8121404	NRL0745-08	12/10/08 09:33
tert-Butylbenzene	ND	39.4	ug/kg	50.0	79%	17 - 165	16 50	8121404	NRL0745-08	12/10/08 09:33
Carbon disulfide	ND	40.2	ug/kg	50.0	80%	34 - 147	6 47	8121404	NRL0745-08	12/10/08 09:33
Carbon Tetrachloride	ND	33.5	ug/kg	50.0	67%	33 - 155	9 44	8121404	NRL0745-08	12/10/08 09:33
Chlorobenzene	ND	36.1	ug/kg	50.0	72%	23 - 147	17 44	8121404	NRL0745-08	12/10/08 09:33
Chlorodibromomethane	ND	25.9	ug/kg	50.0	52%	21 - 155	27 45	8121404	NRL0745-08	12/10/08 09:33
Chloroethane	ND	46.2	ug/kg	50.0	92%	44 - 155	11 50	8121404	NRL0745-08	12/10/08 09:33
Chloroform	ND	35.0	ug/kg	50.0	70%	39 - 140	16 36	8121404	NRL0745-08	12/10/08 09:33
Chloromethane	ND	28.9	ug/kg	50.0	58%	14 - 143	11 50	8121404	NRL0745-08	12/10/08 09:33
2-Chlorotoluene	ND	41.8	ug/kg	50.0	84%	21 - 154	17 50	8121404	NRL0745-08	12/10/08 09:33
4-Chlorotoluene	ND	42.2	ug/kg	50.0	84%	10 - 156	16 50	8121404	NRL0745-08	12/10/08 09:33
1,2-Dibromo-3-chloropropane	ND	19.7	ug/kg	50.0	39%	10 - 159	34 50	8121404	NRL0745-08	12/10/08 09:33



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620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Part	Analyte	Orig. Val.	Duplicate Q	Units	Spike Conc	% Rec.	Target Range	RPD Limit	Batch	Sample Duplicated	Analyzed Date/Time
1.2. Dehomenenthme (EIDH)	Volatile Organic Compounds I	by EPA Method 8	8260B								
1.2.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	-	•									
1.1 1.2 1.2 1.3		ND	26.0	ug/kg	50.0	52%	19 - 151	28 50	8121404	NRL0745-08	12/10/08 09:33
1.1. Dichlorobenzene	Dibromomethane	ND	25.0	ug/kg	50.0	50%	32 - 147	25 45	8121404	NRL0745-08	12/10/08 09:33
1.1 1.2	1,4-Dichlorobenzene	ND	36.7	ug/kg	50.0	73%	10 - 152	20 50	8121404	NRL0745-08	12/10/08 09:33
Dichlorodifluromethane ND 21.0 ug/kg 50.0 42% 10.143 7.0 43.0 8121444 NRL0745-08 12.1018 09.33 1.1-Dichlorocethane ND 37.1 ug/kg 50.0 74% 49.15 12. 37. 43.1 8121444 NRL0745-08 12.1018 09.33 12.1-Dichlorocethane ND 24.1 ug/kg 50.0 74% 49.15 12.2 44 8121444 NRL0745-08 12.1018 09.33 11.1-Dichlorocethene ND 36.3 ug/kg 50.0 77% 42.14 8.0 4.1 8121444 NRL0745-08 12.1018 09.33 11.1-Dichlorocethene ND 38.8 ug/kg 50.0 77% 42.14 8.0 4.1 8121444 NRL0745-08 12.1018 09.33 13.1-Dichlorocethene ND 38.8 ug/kg 50.0 77% 42.14 8.0 4.1 8121444 NRL0745-08 12.1018 09.33 13.1-Dichlorocethene ND 38.8 ug/kg 50.0 77% 42.14 8.0 4.1 8121444 NRL0745-08 12.1018 09.33 13.1-Dichlorocethene ND 38.1 ug/kg 50.0 67% 50.14 50.1 50.	1,3-Dichlorobenzene	ND	37.7	ug/kg	50.0	75%	10 - 153	19 50	8121404	NRL0745-08	12/10/08 09:33
	1,2-Dichlorobenzene	ND	34.0	ug/kg	50.0	68%	10 - 155	24 50	8121404	NRL0745-08	12/10/08 09:33
Part Part	Dichlorodifluoromethane	ND	21.0	ug/kg	50.0	42%	10 - 143	7 43	8121404	NRL0745-08	12/10/08 09:33
1.1 1.1 1.2 1.2 1.2 1.3	1,1-Dichloroethane	ND	37.1	ug/kg	50.0	74%	49 - 156	12 37	8121404	NRL0745-08	12/10/08 09:33
	1,2-Dichloroethane	ND	24.1	ug/kg	50.0	48%	27 - 145	22 44	8121404	NRL0745-08	12/10/08 09:33
Trans-1,2-Dichlorocethene ND 3.8.8 ug/kg 500 58% 41-146 11 37 8121404 NRL0745-08 12/1008 09/33 12/2-Dichloropopane ND 28.8 ug/kg 500 58% 30-143 27 35 8121404 NRL0745-08 12/1008 09/33 22-Dichloropropane ND 35.1 ug/kg 500 69% 37-136 7 35 8121404 NRL0745-08 12/1008 09/33 22-Dichloropropane ND 34.7 ug/kg 500 69% 37-136 7 35 8121404 NRL0745-08 12/1008 09/33 22-Dichloropropane ND 34.7 ug/kg 500 69% 57-146 7 8 41 8121404 NRL0745-08 12/1008 09/33 11-Dichloropropane ND 27.6 ug/kg 500 58% 17-146 7 8 41 8121404 NRL0745-08 12/1008 09/33 11-Dichloropropane ND 41.0 ug/kg 500 69% 17-146 7 8 41 8121404 NRL0745-08 12/1008 09/33 11-Dichloropropane ND 40.2 ug/kg 500 69% 16-169 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 69% 16-169 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 69% 16-169 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 69% 16-159 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 89% 16-159 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 89% 16-159 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 89% 16-159 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 89% 16-159 13 48 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 40.2 ug/kg 500 89% 13-159 13 50 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 41.8 ug/kg 500 89% 13-159 13 50 8121404 NRL0745-08 12/1008 09/33 14-Dichloropropane ND 41.8 ug/kg 500 89% 13-159 13 50 8121404 NRL0745-08 12/1008 09	cis-1,2-Dichloroethene	ND	36.3	ug/kg	50.0	73%	39 - 143	15 35	8121404	NRL0745-08	12/10/08 09:33
1,3-Dichloropropane ND 28.8 ug/kg 50.0 58% 30-145 27 44 812140 NRL0745-08 12/1008 09-38 12,2-Dichloropropane ND 35.1 ug/kg 50.0 69% 30-145 27 35 812140 NRL0745-08 12/1008 09-38 22,2-Dichloropropane ND 34.7 ug/kg 50.0 69% 30-145 27 28 812140 NRL0745-08 12/1008 09-38 23,3-Dichloropropene ND 27.6 ug/kg 50.0 69% 29-14 22 23 812140 NRL0745-08 12/1008 09-38 13,1-Dichloropropene ND 41.0 ug/kg 50.0 69% 29-14 22 43 812140 NRL0745-08 12/1008 09-38 11,1-Dichloropropene ND 41.0 ug/kg 50.0 69% 29-14 22 43 812140 NRL0745-08 12/1008 09-38 11,1-Dichloropropene ND 40.2 ug/kg 50.0 80% 61-147 81 812140 NRL0745-08 12/1008 09-38	1,1-Dichloroethene	ND	38.6	ug/kg	50.0	77%	42 - 145	8 41	8121404	NRL0745-08	12/10/08 09:33
1-Dichloropropane	trans-1,2-Dichloroethene	ND	38.8	ug/kg	50.0	78%	41 - 146	11 37	8121404	NRL0745-08	12/10/08 09:33
2-Dichloropropane ND 34.3 ug/kg S00 69% 30-145 9 33 812140 NRL0745-08 12/1008 09.33 17.35 17.46 17.46 18.46	1,3-Dichloropropane	ND	28.8	ug/kg	50.0	58%	30 - 143	27 44	8121404	NRL0745-08	12/10/08 09:33
Care 1,3-Dichloropropene ND 34.7 Ug/kg S00 69% 29-149 22 43 8121404 NRL0745-08 12/1008 09.33 17151-16166 171511-1616 171511-16166 171511-1616 171511-1616 171511-1616 171511-1616 1715	1,2-Dichloropropane	ND	35.1	ug/kg	50.0	70%	37 - 136	17 35	8121404	NRL0745-08	12/10/08 09:33
Trans-1,3-Dichloropropene	2,2-Dichloropropane	ND	34.3	ug/kg	50.0	69%	30 - 145	9 33	8121404	NRL0745-08	12/10/08 09:33
1,1-Dichloropropene	cis-1,3-Dichloropropene	ND	34.7	ug/kg	50.0	69%	29 - 149	22 43	8121404	NRL0745-08	12/10/08 09:33
Ethylbenzene	trans-1,3-Dichloropropene	ND	27.6	ug/kg	50.0	55%	17 - 146	27 50	8121404	NRL0745-08	12/10/08 09:33
Plexachlorobutadiene ND 30.1 ug/kg 50.0 60.0 10-191 31 50.0 8121404 NRL0745-08 12/10/08 09.33 13/10/09	1,1-Dichloropropene	ND	41.0	ug/kg	50.0	82%	36 - 147	8 41	8121404	NRL0745-08	12/10/08 09:33
Part Part	Ethylbenzene	ND	40.2	ug/kg	50.0	80%	16 - 160	13 48	8121404	NRL0745-08	12/10/08 09:33
Propertion ND 40.2 ug/kg 50.0 80% 16 - 156 12 50 8121404 NRL0745-08 12/10/08 09.3 12 12/10/08 09.3 13 14 14 14 14 14 14 1	Hexachlorobutadiene	ND	30.1	ug/kg	50.0	60%	10 - 191	31 50	8121404	NRL0745-08	12/10/08 09:33
P-Isopropyltoluene ND 40.4 ug/kg 50.0 81% 13 - 160 17 50 8121404 NRL0745-08 12/10/08 09:33 Methyl terr-Butyl Ether ND 25.2 ug/kg 50.0 50% 30 - 136 25 45 8121404 NRL0745-08 12/10/08 09:33 Methyl-e Chloride ND 36.9 ug/kg 50.0 74% 31 - 160 20 39 8121404 NRL0745-08 12/10/08 09:33 A-Methyl-2-pentanone ND 117 ug/kg 250 47% 25 - 149 34 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 24.5 ug/kg 50.0 49% 10 - 151 32 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 37.5 ug/kg 50.0 67% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 37.5 ug/kg 50.0 67% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 31.0 ug/kg 50.0 67% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 31.0 ug/kg 50.0 67% 31 - 168 18 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 31.0 ug/kg 50.0 67% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 37.3 ug/kg 50.0 67% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 37.3 ug/kg 50.0 67% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 37.3 ug/kg 50.0 67% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 32.0 ug/kg 50.0 67% 30 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 34.0 ug/kg 50.0 67% 30 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 34.0 ug/kg 50.0 67% 30 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 34.0 ug/kg 50.0 67% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 34.0 ug/kg 50.0 68% 33 - 148 13 40 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 34.0 ug/kg	2-Hexanone	ND	112	ug/kg	250	45%	19 - 154	34 50	8121404	NRL0745-08	12/10/08 09:33
Methyl tert-Butyl Ether ND 25.2 ug/kg 50.0 50% 30 - 136 25 45 8121404 NRL0745-08 12/10/08 09:33 Methylene Chloride ND 36.9 ug/kg 50.0 74% 31 - 160 20 39 8121404 NRL0745-08 12/10/08 09:33 4-Methyl-2-pentanone ND 117 ug/kg 250 47% 25 - 149 34 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 24.5 ug/kg 50.0 49% 10 - 151 32 50 8121404 NRL0745-08 12/10/08 09:33 Np 44.8 ug/kg 50.0 90% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Styrene ND 31.0 ug/kg 50.0 60% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tertarchloroethane ND 31.0 ug/kg 50.0 60% 20 - 155 35	Isopropylbenzene	ND	40.2	ug/kg	50.0	80%	16 - 156	12 50	8121404	NRL0745-08	12/10/08 09:33
Methylene Chloride ND 36.9 ug/kg 50.0 74% 31 - 160 20 39 8121404 NRL0745-08 12/10/08 09:33 4-Methyl-2-pentanone ND 117 ug/kg 250 47% 25 - 149 34 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 24.5 ug/kg 50.0 49% 10 - 151 32 50 8121404 NRL0745-08 12/10/08 09:33 n-Propylbenzene ND 44.8 ug/kg 50.0 90% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Styrene ND 37.5 ug/kg 50.0 75% 11 - 168 18 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tetrachloroethane ND 31.0 ug/kg 50.0 60% 20 - 155 35 50 8121404 NRL0745-08 12/10/08 09:33 Tetrachloroethane ND 37.3 ug/kg 50.0 60% 20 - 155 <td>p-Isopropyltoluene</td> <td>ND</td> <td>40.4</td> <td>ug/kg</td> <td>50.0</td> <td>81%</td> <td>13 - 160</td> <td>17 50</td> <td>8121404</td> <td>NRL0745-08</td> <td>12/10/08 09:33</td>	p-Isopropyltoluene	ND	40.4	ug/kg	50.0	81%	13 - 160	17 50	8121404	NRL0745-08	12/10/08 09:33
4-Methyl-2-pentanone ND 117 ug/kg 250 47% 25-149 34 50 8121404 NRL0745-08 12/10/08 09:33 Naphthalene ND 24.5 ug/kg 50.0 49% 10-151 32 50 8121404 NRL0745-08 12/10/08 09:33 n-Propylbenzene ND 44.8 ug/kg 50.0 75% 11-168 18 50 8121404 NRL0745-08 12/10/08 09:33 Styrene ND 37.5 ug/kg 50.0 62% 30-147 21 43 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tetrachloroethane ND 31.0 ug/kg 50.0 60% 20-155 35 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tetrachloroethane ND 37.3 ug/kg 50.0 60% 20-155 35 50 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND 40.1 ug/kg 50.0 60% 30-145	Methyl tert-Butyl Ether	ND	25.2	ug/kg	50.0	50%	30 - 136	25 45	8121404	NRL0745-08	12/10/08 09:33
Naphthalene ND 24.5 ug/kg 50.0 49% 10 - 151 32 50 8121404 NRL0745-08 12/10/08 09:33 n-Propylbenzene ND 44.8 ug/kg 50.0 90% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 09:33 Styrene ND 37.5 ug/kg 50.0 75% 11 - 168 18 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tetrachloroethane ND 31.0 ug/kg 50.0 62% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Tetrachloroethane ND 30.0 ug/kg 50.0 66% 20 - 155 35 50 8121404 NRL0745-08 12/10/08 09:33 Tetrachloroethane ND 37.3 ug/kg 50.0 66% 27 - 151 10 45 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND	Methylene Chloride	ND	36.9	ug/kg	50.0	74%	31 - 160	20 39	8121404	NRL0745-08	12/10/08 09:33
ND 44.8 ug/kg 50.0 90% 17 - 158 15 50 8121404 NRL0745-08 12/10/08 99:33 Styrene ND 37.5 ug/kg 50.0 62% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 99:33 1,1,2-Tetrachloroethane ND 31.0 ug/kg 50.0 62% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 99:33 1,1,2-Tetrachloroethane ND 37.3 ug/kg 50.0 60% 20 - 155 35 50 8121404 NRL0745-08 12/10/08 69:33 Tetrachloroethene ND 37.3 ug/kg 50.0 60% 27 - 151 10 45 8121404 NRL0745-08 12/10/08 69:33 1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 80% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 69:33 1,2,4-Trichloroethane ND 32.0 ug/kg 50.0 64% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 69:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 69:33 1,1,1-Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 69:33 Trichloroethene ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 69:33 Trichloroethane ND 36.9 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 69:33 1,2,3-Trichloropopane ND 22.2 ug/kg 50.0 64% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 69:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 69:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 69:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 69:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 69:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 69:33 1,2,10-10-10-10	4-Methyl-2-pentanone	ND	117	ug/kg	250	47%	25 - 149	34 50	8121404	NRL0745-08	12/10/08 09:33
Styrene ND 37.5 ug/kg 50.0 75% 11 - 168 18 50 8121404 NRL0745-08 12/10/08 09:33 1,1,1,2-Tetrachloroethane ND 31.0 ug/kg 50.0 62% 30 - 147 21 43 8121404 NRL0745-08 12/10/08 09:33 1,1,2,2-Tetrachloroethane ND 30.0 ug/kg 50.0 60% 20 - 155 35 50 8121404 NRL0745-08 12/10/08 09:33 Tetrachloroethene ND 37.3 ug/kg 50.0 75% 27 - 151 10 45 8121404 NRL0745-08 12/10/08 09:33 Toluene ND 40.1 ug/kg 50.0 80% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 56% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 32.0 ug/kg 50.0 64% <	Naphthalene	ND	24.5	ug/kg	50.0	49%	10 - 151	32 50	8121404	NRL0745-08	12/10/08 09:33
1,1,1,2-TetrachloroethaneND31.0ug/kg50.062%30 - 14721438121404NRL0745-0812/10/08 09:331,1,2,2-TetrachloroethaneND30.0ug/kg50.060%20 - 15535508121404NRL0745-0812/10/08 09:33TetrachloroetheneND37.3ug/kg50.075%27 - 15110458121404NRL0745-0812/10/08 09:33TolueneND40.1ug/kg50.080%30 - 14513448121404NRL0745-0812/10/08 09:331,2,3-TrichlorobenzeneND27.8ug/kg50.056%10 - 15829508121404NRL0745-0812/10/08 09:331,2,4-TrichlorobenzeneND32.0ug/kg50.064%10 - 16026508121404NRL0745-0812/10/08 09:331,1,1-TrichloroethaneND34.0ug/kg50.068%36 - 1507398121404NRL0745-0812/10/08 09:33TrichloroetheneND34.2ug/kg50.068%36 - 1507398121404NRL0745-0812/10/08 09:33TrichlorofluoromethaneND36.9ug/kg50.068%33 - 14513408121404NRL0745-0812/10/08 09:331,2,3-TrichloropropaneND36.9ug/kg50.068%31 - 1508428121404NRL0745-0812/10/08 09:331,3,5-TrimethylbenzeneND41.9	n-Propylbenzene	ND	44.8	ug/kg	50.0	90%	17 - 158	15 50	8121404	NRL0745-08	12/10/08 09:33
1,1,2,2-Tetrachloroethane ND 30.0 ug/kg 50.0 60% 20 - 155 35 50 8121404 NRL0745-08 12/10/08 09:33 Tetrachloroethene ND 37.3 ug/kg 50.0 75% 27 - 151 10 45 8121404 NRL0745-08 12/10/08 09:33 Toluene ND 40.1 ug/kg 50.0 80% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 56% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 1,2,4-Trichlorobenzene ND 32.0 ug/kg 50.0 66% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 34.0 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68%	Styrene	ND	37.5	ug/kg	50.0	75%	11 - 168	18 50	8121404	NRL0745-08	12/10/08 09:33
Tetrachloroethene ND 37.3 ug/kg 50.0 75% 27 - 151 10 45 8121404 NRL0745-08 12/10/08 09:33 Toluene ND 40.1 ug/kg 50.0 80% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 56% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 1,2,4-Trichlorobenzene ND 32.0 ug/kg 50.0 64% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 26.6 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichloroethene ND 36.9 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33 12/10/08 09:33	1,1,1,2-Tetrachloroethane	ND	31.0	ug/kg	50.0	62%	30 - 147	21 43	8121404	NRL0745-08	12/10/08 09:33
Toluene ND 40.1 ug/kg 50.0 80% 30 - 145 13 44 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 56% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 1,2,4-Trichlorobenzene ND 32.0 ug/kg 50.0 64% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 26.6 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 36.9 ug/kg 50.0 74% <td< td=""><td>1,1,2,2-Tetrachloroethane</td><td>ND</td><td>30.0</td><td>ug/kg</td><td>50.0</td><td>60%</td><td>20 - 155</td><td>35 50</td><td>8121404</td><td>NRL0745-08</td><td>12/10/08 09:33</td></td<>	1,1,2,2-Tetrachloroethane	ND	30.0	ug/kg	50.0	60%	20 - 155	35 50	8121404	NRL0745-08	12/10/08 09:33
1,2,3-Trichlorobenzene ND 27.8 ug/kg 50.0 56% 10 - 158 29 50 8121404 NRL0745-08 12/10/08 09:33 1,2,4-Trichlorobenzene ND 32.0 ug/kg 50.0 64% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 26.6 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 41.9 ug/kg 50.0 <td< td=""><td>Tetrachloroethene</td><td>ND</td><td>37.3</td><td>ug/kg</td><td>50.0</td><td>75%</td><td>27 - 151</td><td>10 45</td><td>8121404</td><td>NRL0745-08</td><td>12/10/08 09:33</td></td<>	Tetrachloroethene	ND	37.3	ug/kg	50.0	75%	27 - 151	10 45	8121404	NRL0745-08	12/10/08 09:33
1,2,4-Trichlorobenzene ND 32.0 ug/kg 50.0 64% 10 - 160 26 50 8121404 NRL0745-08 12/10/08 09:33 1,1,2-Trichloroethane ND 26.6 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 <td< td=""><td>Toluene</td><td>ND</td><td>40.1</td><td>ug/kg</td><td>50.0</td><td>80%</td><td>30 - 145</td><td>13 44</td><td>8121404</td><td>NRL0745-08</td><td>12/10/08 09:33</td></td<>	Toluene	ND	40.1	ug/kg	50.0	80%	30 - 145	13 44	8121404	NRL0745-08	12/10/08 09:33
1,1,2-Trichloroethane ND 26.6 ug/kg 50.0 53% 34 - 140 25 41 8121404 NRL0745-08 12/10/08 09:33 1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethane ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	1,2,3-Trichlorobenzene	ND	27.8	ug/kg	50.0	56%	10 - 158	29 50	8121404	NRL0745-08	12/10/08 09:33
1,1,1-Trichloroethane ND 34.0 ug/kg 50.0 68% 36 - 150 7 39 8121404 NRL0745-08 12/10/08 09:33 Trichloroethene ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	1,2,4-Trichlorobenzene	ND	32.0	ug/kg	50.0	64%	10 - 160	26 50	8121404	NRL0745-08	12/10/08 09:33
Trichloroethene ND 34.2 ug/kg 50.0 68% 33 - 145 13 40 8121404 NRL0745-08 12/10/08 09:33 Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	1,1,2-Trichloroethane	ND	26.6	ug/kg	50.0	53%	34 - 140	25 41	8121404	NRL0745-08	12/10/08 09:33
Trichlorofluoromethane ND 36.9 ug/kg 50.0 74% 31 - 150 8 42 8121404 NRL0745-08 12/10/08 09:33 1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	1,1,1-Trichloroethane	ND	34.0	ug/kg	50.0	68%	36 - 150	7 39	8121404	NRL0745-08	12/10/08 09:33
1,2,3-Trichloropropane ND 22.2 ug/kg 50.0 44% 14 - 143 33 50 8121404 NRL0745-08 12/10/08 09:33 1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	Trichloroethene	ND	34.2	ug/kg	50.0	68%	33 - 145	13 40	8121404	NRL0745-08	12/10/08 09:33
1,3,5-Trimethylbenzene ND 41.9 ug/kg 50.0 84% 20 - 158 16 50 8121404 NRL0745-08 12/10/08 09:33	Trichlorofluoromethane	ND	36.9	ug/kg	50.0	74%	31 - 150	8 42	8121404	NRL0745-08	12/10/08 09:33
	1,2,3-Trichloropropane	ND	22.2	ug/kg	50.0	44%	14 - 143	33 50	8121404	NRL0745-08	12/10/08 09:33
1,2,4-Trimethylbenzene ND 39.7 ug/kg 50.0 79% 10 - 166 16 50 8121404 NRL0745-08 12/10/08 09:33	1,3,5-Trimethylbenzene	ND	41.9	ug/kg	50.0	84%	20 - 158	16 50	8121404	NRL0745-08	12/10/08 09:33
	1,2,4-Trimethylbenzene	ND	39.7	ug/kg	50.0	79%	10 - 166	16 50	8121404	NRL0745-08	12/10/08 09:33



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Volatile Organic Compounds by	EPA Method 8	3260B										
8121404-MSD1												
Vinyl chloride	ND	37.4		ug/kg	50.0	75%	32 - 144	8	41	8121404	NRL0745-08	12/10/08 09:33
Xylenes, total	ND	114		ug/kg	150	76%	16 - 159	13	48	8121404	NRL0745-08	12/10/08 09:33
1,1,2-Trifluorotrichloroethane	ND	39.5		ug/kg	50.0	79%	35 - 143	8	50	8121404	NRL0745-08	12/10/08 09:33
Surrogate: 1,2-Dichloroethane-d4		40.3		ug/kg	50.0	81%	41 - 150			8121404	NRL0745-08	12/10/08 09:33
Surrogate: Dibromofluoromethane		46.7		ug/kg	50.0	93%	55 - 139			8121404	NRL0745-08	12/10/08 09:33
Surrogate: Toluene-d8		51.9		ug/kg	50.0	104%	57 - 148			8121404	NRL0745-08	12/10/08 09:33
Surrogate: 4-Bromofluorobenzene		52.7		ug/kg	50.0	105%	58 - 150			8121404	NRL0745-08	12/10/08 09:33
Semivolatile Organic Compound	ls by EPA Metl	nod 8270C										
8120320-MSD1												
Acenaphthene	ND	1.55		mg/kg wet	1.67	93%	28 - 117	9	33	8120320	NRL0191-01	12/05/08 18:21
Acenaphthylene	ND	1.61		mg/kg wet	1.67	97%	33 - 113	9	38	8120320	NRL0191-01	12/05/08 18:21
Anthracene	ND	1.67		mg/kg wet	1.67	100%	31 - 131	2	32	8120320	NRL0191-01	12/05/08 18:21
Benzo (a) anthracene	ND	1.60		mg/kg wet	1.67	96%	29 - 124	2	26	8120320	NRL0191-01	12/05/08 18:21
Benzo (a) pyrene	ND	1.62		mg/kg wet	1.67	97%	30 - 127	1	31	8120320	NRL0191-01	12/05/08 18:21
Benzo (b) fluoranthene	ND	1.52		mg/kg wet	1.67	91%	26 - 128	8	37	8120320	NRL0191-01	12/05/08 18:21
Benzo (g,h,i) perylene	ND	1.67		mg/kg wet	1.67	100%	21 - 122	2	28	8120320	NRL0191-01	12/05/08 18:21
Benzo (k) fluoranthene	ND	1.66		mg/kg wet	1.67	100%	20 - 130	10	35	8120320	NRL0191-01	12/05/08 18:21
4-Bromophenyl phenyl ether	ND	1.43		mg/kg wet	1.67	86%	30 - 106	3	38	8120320	NRL0191-01	12/05/08 18:21
Butyl benzyl phthalate	ND	1.79		mg/kg wet	1.67	108%	40 - 131	0.4	37	8120320	NRL0191-01	12/05/08 18:21
Carbazole	ND	1.53		mg/kg wet	1.67	92%	37 - 116	1	31	8120320	NRL0191-01	12/05/08 18:21
4-Chloro-3-methylphenol	ND	1.42		mg/kg wet	1.67	85%	19 - 128	8	38	8120320	NRL0191-01	12/05/08 18:21
4-Chloroaniline	ND	1.22		mg/kg wet	1.67	73%	10 - 119	4	44	8120320	NRL0191-01	12/05/08 18:21
Bis(2-chloroethoxy)methane	ND	1.44		mg/kg wet	1.67	86%	30 - 110	10	34	8120320	NRL0191-01	12/05/08 18:21
Bis(2-chloroethyl)ether	ND	1.57		mg/kg wet	1.67	95%	36 - 106	14	38	8120320	NRL0191-01	12/05/08 18:21
Bis(2-chloroisopropyl)ether	ND	1.60		mg/kg wet	1.67	96%	34 - 109	12	40	8120320	NRL0191-01	12/05/08 18:21
2-Chloronaphthalene	ND	1.53		mg/kg wet	1.67	92%	31 - 107	9	38	8120320	NRL0191-01	12/05/08 18:21
2-Chlorophenol	ND	1.57		mg/kg wet	1.67	94%	32 - 119	13	40	8120320	NRL0191-01	12/05/08 18:21
4-Chlorophenyl phenyl ether	ND	1.60		mg/kg wet	1.67	96%	35 - 113	6	37	8120320	NRL0191-01	12/05/08 18:21
Chrysene	ND	1.60		mg/kg wet	1.67	96%	30 - 119	1	31	8120320	NRL0191-01	12/05/08 18:21
Dibenz (a,h) anthracene	ND	1.66		mg/kg wet	1.67	99%	27 - 122	0.5	32	8120320	NRL0191-01	12/05/08 18:21
Dibenzofuran	ND	1.51		mg/kg wet	1.67	91%	33 - 121	8	35	8120320	NRL0191-01	12/05/08 18:21
Di-n-butyl phthalate	ND	1.73		mg/kg wet	1.67	104%	38 - 123	3	31	8120320	NRL0191-01	12/05/08 18:21
1,4-Dichlorobenzene	ND	1.45		mg/kg wet	1.67	87%	26 - 109	12	41	8120320	NRL0191-01	12/05/08 18:21
1,2-Dichlorobenzene	ND	1.50		mg/kg wet	1.67	90%	26 - 112	12	40	8120320	NRL0191-01	12/05/08 18:21
1,3-Dichlorobenzene	ND	1.47		mg/kg wet	1.67	88%	26 - 110	12	41	8120320	NRL0191-01	12/05/08 18:21
3,3-Dichlorobenzidine	ND	1.45		mg/kg wet	1.67	87%	10 - 112	0.8	48	8120320	NRL0191-01	12/05/08 18:21
2,4-Dichlorophenol	ND	1.35		mg/kg wet	1.67	81%	28 - 118	12	32	8120320	NRL0191-01	12/05/08 18:21
Diethyl phthalate	ND	1.64		mg/kg wet	1.67	98%	29 - 122	3	37	8120320	NRL0191-01	12/05/08 18:21
2,4-Dimethylphenol	ND	1.54		mg/kg wet	1.67	92%	10 - 128	14	50	8120320	NRL0191-01	12/05/08 18:21
Dimethyl phthalate	ND	1.69		mg/kg wet	1.67	102%	31 - 118	5	39	8120320	NRL0191-01	12/05/08 18:21



Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

Analyte	Orig. Val.	Duplicate Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Semivolatile Organic Compoun	ds by EPA Met	hod 8270C									
8120320-MSD1											
4,6-Dinitro-2-methylphenol	ND	1.52	mg/kg wet	1.67	91%	10 - 136	0.6	45	8120320	NRL0191-01	12/05/08 18:21
2,4-Dinitrophenol	ND	1.57	mg/kg wet	1.67	94%	10 - 148	6	50	8120320	NRL0191-01	12/05/08 18:21
2,6-Dinitrotoluene	ND	1.76	mg/kg wet	1.67	106%	28 - 125	5	37	8120320	NRL0191-01	12/05/08 18:21
2,4-Dinitrotoluene	ND	1.74	mg/kg wet	1.67	105%	30 - 119	1	41	8120320	NRL0191-01	12/05/08 18:21
Di-n-octyl phthalate	ND	1.72	mg/kg wet	1.67	103%	31 - 137	1	34	8120320	NRL0191-01	12/05/08 18:21
Bis(2-ethylhexyl)phthalate	ND	1.69	mg/kg wet	1.67	102%	38 - 125	0.4	38	8120320	NRL0191-01	12/05/08 18:21
Fluoranthene	ND	1.62	mg/kg wet	1.67	97%	23 - 132	1	36	8120320	NRL0191-01	12/05/08 18:21
Fluorene	ND	1.56	mg/kg wet	1.67	94%	38 - 110	4	35	8120320	NRL0191-01	12/05/08 18:21
Hexachlorobenzene	ND	1.52	mg/kg wet	1.67	91%	35 - 120	1	37	8120320	NRL0191-01	12/05/08 18:21
Hexachlorobutadiene	ND	1.31	mg/kg wet	1.67	79%	28 - 113	12	35	8120320	NRL0191-01	12/05/08 18:21
Hexachlorocyclopentadiene	ND	1.29	mg/kg wet	1.67	77%	10 - 123	11	36	8120320	NRL0191-01	12/05/08 18:21
Hexachloroethane	ND	1.42	mg/kg wet	1.67	85%	20 - 120	11	42	8120320	NRL0191-01	12/05/08 18:21
Indeno (1,2,3-cd) pyrene	ND	1.67	mg/kg wet	1.67	100%	24 - 122	2	28	8120320	NRL0191-01	12/05/08 18:21
Isophorone	ND	1.35	mg/kg wet	1.67	81%	23 - 108	10	33	8120320	NRL0191-01	12/05/08 18:21
2-Methylnaphthalene	ND	1.28	mg/kg wet	1.67	77%	26 - 116	10	33	8120320	NRL0191-01	12/05/08 18:21
2-Methylphenol	ND	1.63	mg/kg wet	1.67	98%	23 - 122	13	43	8120320	NRL0191-01	12/05/08 18:21
3/4-Methylphenol	ND	1.89	mg/kg wet	1.67	113%	23 - 138	13	47	8120320	NRL0191-01	12/05/08 18:21
Naphthalene	ND	1.33	mg/kg wet	1.67	80%	14 - 117	11	34	8120320	NRL0191-01	12/05/08 18:21
3-Nitroaniline	ND	1.57	mg/kg wet	1.67	94%	27 - 124	3	41	8120320	NRL0191-01	12/05/08 18:21
2-Nitroaniline	ND	1.56	mg/kg wet	1.67	94%	35 - 122	6	33	8120320	NRL0191-01	12/05/08 18:21
4-Nitroaniline	ND	1.58	mg/kg wet	1.67	95%	25 - 124	0.7	35	8120320	NRL0191-01	12/05/08 18:21
Nitrobenzene	ND	1.31	mg/kg wet	1.67	79%	19 - 105	13	36	8120320	NRL0191-01	12/05/08 18:21
4-Nitrophenol	ND	1.70	mg/kg wet	1.67	102%	14 - 144	0.7	39	8120320	NRL0191-01	12/05/08 18:21
2-Nitrophenol	ND	1.39	mg/kg wet	1.67	83%	23 - 119	11	37	8120320	NRL0191-01	12/05/08 18:21
N-Nitrosodiphenylamine	ND	1.70	mg/kg wet	1.67	102%	37 - 144	3	32	8120320	NRL0191-01	12/05/08 18:21
N-Nitrosodi-n-propylamine	ND	1.63	mg/kg wet	1.67	98%	28 - 121	12	41	8120320	NRL0191-01	12/05/08 18:21
Pentachlorophenol	ND	1.54	mg/kg wet	1.67	93%	13 - 149	0.6	41	8120320	NRL0191-01	12/05/08 18:21
Phenanthrene	ND	1.56	mg/kg wet	1.67	94%	21 - 130	3	33	8120320	NRL0191-01	12/05/08 18:21
Phenol	ND	1.63	mg/kg wet	1.67	98%	31 - 116	13	40	8120320	NRL0191-01	12/05/08 18:21
Pyrene	ND	1.63	mg/kg wet	1.67	98%	24 - 133	3	36	8120320	NRL0191-01	12/05/08 18:21
Pyridine	ND	1.08	mg/kg wet	1.67	65%	10 - 103	9	50	8120320	NRL0191-01	12/05/08 18:21
1,2,4-Trichlorobenzene	ND	1.27	mg/kg wet	1.67	76%	27 - 102	11	34	8120320	NRL0191-01	12/05/08 18:21
1-Methylnaphthalene	ND	1.30	mg/kg wet	1.67	78%	10 - 121	11	34	8120320	NRL0191-01	12/05/08 18:21
2,4,6-Trichlorophenol	ND	1.56	mg/kg wet	1.67	94%	32 - 122	8	41	8120320	NRL0191-01	12/05/08 18:21
2,4,5-Trichlorophenol	ND	1.64	mg/kg wet	1.67	98%	30 - 122	8	39	8120320	NRL0191-01	12/05/08 18:21
Surrogate: Terphenyl-d14		1.21	mg/kg wet	1.67	73%	26 - 128			8120320	NRL0191-01	12/05/08 18:21
Surrogate: 2,4,6-Tribromophenol		1.46	mg/kg wet	1.67	88%	20 - 132			8120320	NRL0191-01	12/05/08 18:21
Surrogate: Phenol-d5		1.36	mg/kg wet	1.67	82%	23 - 113			8120320	NRL0191-01	12/05/08 18:21
Surrogate: 2-Fluorobiphenyl		1.27	mg/kg wet	1.67	76%	19 - 109			8120320	NRL0191-01	12/05/08 18:21
Surrogate: 2-Fluorophenol		1.34	mg/kg wet	1.67	80%	19 - 105			8120320	NRL0191-01	12/05/08 18:21
Surrogate: Nitrobenzene-d5		1.13	mg/kg wet	1.67	68%	22 - 104			8120320	NRL0191-01	12/05/08 18:21
0			2 2								



Surrogate: 4-Bromofluorobenzene

Attn

620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike Dup - Cont.

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Semivolatile Organic Compounds b	y EPA Meth	nod 8270C										
TCLP Volatile Organic Compound	s by EPA M	ethod 1311/	/8260B									
8120939-MSD1												
Benzene	ND	0.0468		mg/L	0.0500	94%	18 - 167	4	50	8120939	NRL0332-01	12/07/08 09:35
2-Butanone	ND	0.223		mg/L	0.250	89%	10 - 160	3	50	8120939	NRL0332-01	12/07/08 09:35
Carbon Tetrachloride	ND	0.0488		mg/L	0.0500	98%	10 - 189	4	50	8120939	NRL0332-01	12/07/08 09:35
Chlorobenzene	ND	0.0479		mg/L	0.0500	96%	23 - 160	4	50	8120939	NRL0332-01	12/07/08 09:35
Chloroform	ND	0.0475	В	mg/L	0.0500	95%	17 - 175	4	50	8120939	NRL0332-01	12/07/08 09:35
1,2-Dichloroethane	ND	0.0482		mg/L	0.0500	96%	14 - 151	2	50	8120939	NRL0332-01	12/07/08 09:35
1,1-Dichloroethene	ND	0.0462		mg/L	0.0500	92%	10 - 185	0.5	50	8120939	NRL0332-01	12/07/08 09:35
Tetrachloroethene	ND	0.0494		mg/L	0.0500	99%	16 - 170	7	50	8120939	NRL0332-01	12/07/08 09:35
Trichloroethene	0.00390	0.0472		mg/L	0.0500	87%	10 - 192	5	50	8120939	NRL0332-01	12/07/08 09:35
Vinyl chloride	ND	0.0384		mg/L	0.0500	77%	10 - 171	0.6	50	8120939	NRL0332-01	12/07/08 09:35
Surrogate: 1,2-Dichloroethane-d4		24.7		ug/L	25.0	99%	60 - 140			8120939	NRL0332-01	12/07/08 09:35
Surrogate: Dibromofluoromethane		25.2		ug/L	25.0	101%	75 - 124			8120939	NRL0332-01	12/07/08 09:35
Surrogate: Toluene-d8		22.2		ug/L	25.0	89%	78 - 121			8120939	NRL0332-01	12/07/08 09:35

ug/L

25.0

96%

79 - 124

8120939

NRL0332-01

12/07/08 09:35

24.1



620 Wando Park Blvd.

Mt. Pleasant, SC 29464 Andrew Wertz Work Order: NRL0332

Project Name: Charleston Naval Complex

Project Number: 1131-08-554 Received: 12/03/08 08:00

CERTIFICATION SUMMARY

TestAmerica Nashville

Attn

Method	Matrix	AIHA	Nelac	South Carolina	
SW846 1311/6010B	Soil	N/A	X	X	
SW846 1311/6010B	Water	N/A	X	X	
SW846 1311/7470A	Soil	N/A	X	X	
SW846 1311/7470A	Water	N/A	X	X	
SW846 1311/8260B	Soil	N/A	X	X	
SW846 1311/8260B	Water	N/A	X	X	
SW846 1311/8270C	Soil	N/A	X	X	
SW846 1311/8270C	Water		X	X	
SW846 1311	Soil	N/A	X	X	
SW846 1311	Water	N/A	X	X	
SW846 6010B	Soil	N/A	X	X	
SW846 6010B	Water	N/A	X	X	
SW846 7470A	Water	N/A	X	X	
SW846 7471A	Soil		X	X	
SW846 8260B	Soil	N/A	X	X	
SW846 8260B	Water	N/A	X	X	
SW846 8270C	Soil	N/A	X	X	
SW846 8270C	Water	N/A	X	X	
SW-846	Soil				



Attn

Client S&ME, Inc. (2420) Work Order: NRL0332

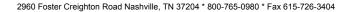
620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

TCLP REGULATORY LIMITS

Analyte	Regulatory Limit
1,1-Dichloroethene	0.7
1,2-Dichloroethane	0.5
1,4-Dichlorobenzene	7.5
2,4,5-Trichlorophenol	400
2,4,6-Trichlorophenol	2
2,4-Dinitrotoluene	0.13
2-Butanone	200
Arsenic	5
Barium	100
Benzene	0.5
Cadmium	1
Carbon Tetrachloride	0.5
Chlorobenzene	100
Chloroform	6
Chromium	5
Cresol(s)	200
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3
Lead	5
Mercury	0.2
Nitrobenzene	2
Pentachlorophenol	100
Pyridine	5
Selenium	1
Silver	5
Tetrachloroethene	0.7
Trichloroethene	0.5
Vinyl chloride	0.2





Attn

Client S&ME, Inc. (2420) Work Order: NRL0332

620 Wando Park Blvd. Project Name: Charleston Naval Complex

 Mt. Pleasant, SC 29464
 Project Number:
 1131-08-554

 Andrew Wertz
 Received:
 12/03/08 08:00

DATA QUALIFIERS AND DEFINITIONS

B Analyte was detected in the associated Method Blank.

C Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.

M1 The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

MNR1 There was no MS/MSD analyzed with this batch due to insufficient sample volume. See Blank Spike.

R3 The RPD exceeded the acceptance limit due to sample matrix effects.ND Not detected at the reporting limit (or method detection limit if shown)

METHOD MODIFICATION NOTES



Nashville, TN COOLER RECE



Cooler Received/Opened On 12 / 03/ 08 @ 8:00	NRL0332
1. Tracking #(last 4 digits, FedEx)	
Courier: FED-EX IR Gun ID 90942856	
2. Temperature of rep. sample or temp blank when opened: 3, 2 Degrees Celsius	
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen	n? YES NO NA
4. Were custody seals on outside of cooler?	(YES)NONA
If yes, how many and where:	
5. Were the seals intact, signed, and dated correctly?	YESNONA
6. Were custody papers inside cooler?	YES NONA
I certify that I opened the cooler and answered questions 1-6 (intial)	7
7. Were custody seals on containers: YES NO and Intact	YESNONA
Were these signed and dated correctly?	YESNONA
8. Packing mat'l used? Subblewrap Plastic bag Peanuts Vermiculite Foam Insert Pap	
9. Cooling process: //ce Ice-pack Ice (direct contact) Dry ic	
10. Did all containers arrive in good condition (unbroken)?	YESNONA
11. Were all container labels complete (#, date, signed, pres., etc)?	ESNONA
12. Did all container labels and tags agree with custody papers?	E8NONA
13a. Were VOA vials received?	ESNONA
b. Was there any observable headspace present in any VOA vial?	YESNO.).NA
14. Was there a Trip Blank in this cooler? (ESNONA If multiple coolers, sequer	
I certify that I unloaded the cooler and answered questions 7-14 (intial)	Pm
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level?	YESNO.NA
b. Did the bottle labels indicate that the correct preservatives were used	WESNONA
If preservation in-house was needed, record standard ID of preservative used here_	
16. Was residual chlorine present?	YES(NONA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial)	
17. Were custody papers properly filled out (ink, signed, etc)?	YESNONA
18. Did you sign the custody papers in the appropriate place?	(YESNONA
19. Were correct containers used for the analysis requested?	(YES)NONA
20. Was sufficient amount of sample sent in each container?	(YESNONA
I certify that I entered this project into LIMS and answered questions 17-20 (intial)	TRO
I certify that I attached a label with the unique LIMS number to each container (intial)	17
21. Were there Non-Conformance issues at login? YES. NO Was a PIPE generated? YES	6.).#

NRL0332

	12/1
	7/08
To assi	23:59

TestAmerica Nashville Division
2960 Foster Creighton
Nashville, TN 37204

Client Name/Account #: S&ME # 2420

Telephone Number: 843.884.0005

Project Manager: Andrew Wertz email: awertz@smeinc.com

City/State/Zip: Mt. Pleasant, SC 29464 Address: 620 Wando Park Road

Fax No.: 843.884-1696 Phone: 615-726-0177 Toll Free: 800-765-0980 Fax: 615-726-3404 TA Quote #: Project ID: CHARLESTON NAVAL COMPLEX Site State: SC Project #: 1134-08-554 PO#: 32106 To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes? Compliance Monitoring? Enforcement Action? es 1 Yes | |8

* See a	Relinquished by	Relinquished by:	Special Instructions:				C	CNC- Decon-Comp	CNC - Mid-Comp.	CNC - Decon-Grad	CNC - 661 - 6008	11	-6-1	CNC - CIMS - Good-	Sample ID / Description		Sampler Signature:	Sampler Name: (Print)
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		<u> </u>		-	-	-	+	-	-		\	×	×	×	TCLP VOCS	-	Project #: 1134-08-554	Project ID: CHARLESTON NAVAL COMPLEX
	3		Laboratory Comments: Temperature Upo VOCs Free of He	_	\perp	-	+	~	\top	+	\dashv		_	╄	TOTAL SVOCS TCLP SVOCS TOTAL RCRA METAL TCLP METALS	+	08	, IAR
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	%		Temperature Upon Receipt: VOCs Free of Headspace?					K	×						TOTAL RCRA METAL	 -\$>		Ž
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Charleston Naval Complex

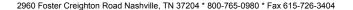
.

Analyze 1 semi-solid (drilling mud) sample and 1 water sample for:

2,4,6-trichlorophenol	2,4,5-trichigrophenol	pyridine	pentachlorophenol	nitrobenzene	hexachloroethane 2,	hexachiorobutadiene [2,	hexachlorobenzene	2,4-dinitrotoluene pe	1,4-dichlorobenzene ni	PAHs h	4-methylphenol (p-cresol) h	2-methylphenol (o-cresol)	2-methylnaphthalene 2,	2-chlorophenol 1,	2,4-dimethylphenol	Total SVCcs by 8270C
					2,4,6-trichlorophenol	2,4,5-trichlorophenol	pyridine	pentachiorophenol	nitrobenzene	nexachioroethane	nexachlorobutadiene	hexachlorobenzene	2,4-dinitrotoluene	,4-dichlorobenzene	cresols	TCLP SVOCs by 8270C
							Mercury	Silver	Selenium	Lead	Chromium	Cadmium	Barium	Antimony	Arsenic	Total Metals by 6010B/7470A TCLP N
						•		Mercury	Silver	Selenium	Lead	Chromium	Cadmium	Barium	Arsenic	TCLP Metals by 6010B/7470A

Analyze 3 semi-solid (drilling mud) samples and 1 water sample for:

		TO DVOCE SOROD
	Control of the Control of the Control	
	1 2 dichloroethana	4 O'Alichianothana
	(total)	henzene
		chlorobenzene
	chlorobenzene	trichloroethene
	cis-1,2-dichloroethene	vinyl chloride
¥.	naphthalene	2-butanone
	methylene chloride (dichloromethane)	carbon tetrachloride
	trichloroethene	chloroform
	vinyl chloride	tetrachloroethene
	2-butanone	
	carbon tetrachloride	
	chloroform	
	tetrachloroethene	



NRL0331

32106

12/03/08

Macalloy Site

1131-08-554

Work Order:

Project Nbr:

Project Name:



December 17, 2008 12:41:56PM

Client: S&ME, Inc. (2420)

620 Wando Park Blvd. Mt. Pleasant, SC 29464

SAMPLE IDENTIFICATION

Attn: Andrew Wertz

lrew Wertz P/O Nbr:
Date Received:

COLLECTION DATE AND TIME

Mac-Mud NRL0331-01 12/02/08 13:15

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this material is strictly prohibited. If you have received this material in error, please notify us immediately at 615-726-0177.

LAB NUMBER

The Chain(s) of Custody, 3 pages, are included and are an integral part of this report.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of the laboratory.

All solids results are reported in wet weight unless specifically stated.

Estimated uncertainty is available upon request.

Roxanne L. Connor

This report has been electronically signed.

Report Approved By:

Roxanne Connor

Program Manager - Conventional Accounts



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

Received: 12/03/08 08:00

ANALYTICAL REPORT

					Dilution	Analysis		
Analyte	Result	Flag	Units	MRL	Factor	Date/Time	Method	Batch
Sample ID: NRL0331-01 (Mac-	Mud - Soil) Samı	oled: 12/02/08	13:15					
General Chemistry Parameters								
% Dry Solids	33.0		%	0.500	1	12/12/08 06:46	SW-846	8121669
Chromium (VI)	ND	m	g/kg dry	6.06	1	12/08/08 12:07	SW846 7196A	8120897
Total Metals by EPA Method 6010	В							
Antimony	ND	m	g/kg dry	29.5	1	12/11/08 11:37	SW846 6010B	8121573
Arsenic	4.30	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Barium	21.6	m	g/kg dry	5.90	1	12/11/08 11:37	SW846 6010B	8121573
Cadmium	ND	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Chromium	60.2	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Iron	6690	m	g/kg dry	29.5	1	12/11/08 11:37	SW846 6010B	8121573
Lead	6.30	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Manganese	44.3	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Nickel	19.0	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Selenium	ND	m	g/kg dry	5.90	1	12/11/08 11:37	SW846 6010B	8121573
Silver	ND	m	g/kg dry	2.95	1	12/11/08 11:37	SW846 6010B	8121573
Mercury by EPA Methods 7470A/7	'471A							
Mercury	ND	m	g/kg dry	0.298	1	12/04/08 15:07	SW846 7471A	8120735
TCLP Metals by 6000/7000 Series	Methods							
Arsenic	ND		mg/L	0.100	1	12/05/08 23:55	W846 1311/6010	8120922
Barium	0.114		mg/L	0.100	1	12/05/08 23:55	W846 1311/6010	8120922
Cadmium	ND		mg/L	0.0100	1	12/05/08 23:55	W846 1311/6010	8120922
Chromium	ND		mg/L	0.0500	1	12/05/08 23:55	W846 1311/6010	8120922
Lead	ND		mg/L	0.0500	1	12/05/08 23:55	W846 1311/6010	8120922
Selenium	ND		mg/L	0.100	1	12/05/08 23:55	W846 1311/6010	8120922
Silver	ND		mg/L	0.0500	1	12/05/08 23:55	W846 1311/6010	8120922
Mercury	ND		mg/L	0.0100	1	12/05/08 17:16	W846 1311/7470.	8120910



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order:

NRL0331

Project Name: Project Number:

Received:

Macalloy Site 1131-08-554

12/03/08 08:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
Mercury by EPA Methods 7470A/7471A							
SW846 7471A	8120735	NRL0331-01	0.61	100.00	12/04/08 12:00	JMR	EPA 7471
TCLP Extraction by EPA 1311							
SW846 1311	8120675	NRL0331-01	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
TCLP Metals by 6000/7000 Series Metho	ds						
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120922	NRL0331-01	5.00	50.00	12/05/08 14:20	JLS	EPA 3015
SW846 1311/6010B	8120675	NRL0331-01	100.00	2000.00	12/04/08 15:35	AML	EPA 1311
SW846 1311/7470A	8120910	NRL0331-01	3.00	30.00	12/05/08 09:36	JMR	EPA 7470
Total Metals by EPA Method 6010B							
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010
SW846 6010B	8121573	NRL0331-01	0.51	100.00	12/10/08 19:30	JLS	EPA 3051 / 6010

1131-08-554



Client S&ME, Inc. (2420)

620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order: NRL0331 Macalloy Site Project Name:

Project Number: 12/03/08 08:00 Received:

PROJECT QUALITY CONTROL DATA Blank

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
General Chemistry Parameters						
8120897-BLK1						
Chromium (VI)	0.840		mg/kg wet	8120897	8120897-BLK1	12/08/08 12:07
Total Metals by EPA Method 601	10B					
8121573-BLK1						
Antimony	<1.41		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Arsenic	< 0.904		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Barium	< 0.502		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Cadmium	0.120		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Chromium	0.361		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Iron	9.24		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Lead	< 0.703		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Manganese	0.201		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Nickel	< 0.502		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Selenium	< 0.863		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Silver	<0.301		mg/kg wet	8121573	8121573-BLK1	12/11/08 11:28
Mercury by EPA Methods 7470A	A/7471A					
8120735-BLK1						
Mercury	< 0.0240		mg/kg wet	8120735	8120735-BLK1	12/04/08 15:03
TCLP Metals by 6000/7000 Serie	es Methods					
8120910-BLK1						
Mercury	< 0.00150		mg/L	8120910	8120910-BLK1	12/05/08 15:47
8120922-BLK1						
Arsenic	< 0.0500		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Barium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Cadmium	< 0.00500		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Chromium	< 0.0150		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Lead	< 0.0280		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Selenium	< 0.0430		mg/L	8120922	8120922-BLK1	12/05/08 23:05
Silver	< 0.0160		mg/L	8120922	8120922-BLK1	12/05/08 23:05



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA

Duplicate

Analyte	Orig. Val.	Duplicate	Q	Units	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
General Chemistry Parameters 8120897-DUP1 Chromium (VI)	3.82	3.82		mg/kg dry	0	20	8120897	NRL0331-01	12/08/08 12:07
8121669-DUP1 % Dry Solids	90.4	90.0		%	0.4	20	8121669	NRL0150-04	12/12/08 06:46



Andrew Wertz

Attn

620 Wando Park Blvd. Mt. Pleasant, SC 29464 Work Order: NRL0331

Project Name: Macalloy Site
Project Number: 1131-08-554
Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
General Chemistry Parameters								
8120897-BS1								
Chromium (VI)	40.0	43.6		mg/kg wet	109%	90 - 114	8120897	12/08/08 12:07
Total Metals by EPA Method 601	0B							
8121573-BS1								
Antimony	100	98.9		mg/kg wet	99%	80 - 120	8121573	12/11/08 11:33
Arsenic	20.0	19.4		mg/kg wet	97%	80 - 120	8121573	12/11/08 11:33
Barium	400	405		mg/kg wet	101%	80 - 120	8121573	12/11/08 11:33
Cadmium	20.0	21.2		mg/kg wet	106%	80 - 120	8121573	12/11/08 11:33
Chromium	40.0	43.2		mg/kg wet	108%	80 - 120	8121573	12/11/08 11:33
Iron	200	227		mg/kg wet	114%	80 - 120	8121573	12/11/08 11:33
Lead	100	107		mg/kg wet	107%	80 - 120	8121573	12/11/08 11:33
Manganese	100	106		mg/kg wet	106%	80 - 120	8121573	12/11/08 11:33
Nickel	100	107		mg/kg wet	107%	80 - 120	8121573	12/11/08 11:33
Selenium	20.0	18.7		mg/kg wet	93%	80 - 120	8121573	12/11/08 11:33
Silver	10.0	10.6		mg/kg wet	106%	75 - 125	8121573	12/11/08 11:33
Mercury by EPA Methods 7470A	./7471A							
8120735-BS1								
Mercury	0.167	0.177		mg/kg wet	106%	78 - 120	8120735	12/04/08 15:05
TCLP Metals by 6000/7000 Series	s Methods							
8120910-BS1								
Mercury	0.0200	0.0185		mg/L	92%	78 - 124	8120910	12/05/08 16:39
8120922-BS1								
Arsenic	10.0	10.0		mg/L	100%	80 - 120	8120922	12/05/08 23:09
Barium	50.0	51.4		mg/L	103%	80 - 120	8120922	12/05/08 23:09
Cadmium	10.0	9.90		mg/L	99%	80 - 120	8120922	12/05/08 23:09
Chromium	50.0	52.2		mg/L	104%	80 - 120	8120922	12/05/08 23:09
Lead	50.0	50.4		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Selenium	10.0	10.1		mg/L	101%	80 - 120	8120922	12/05/08 23:09
Silver	10.0	10.2		mg/L	102%	80 - 120	8120922	12/05/08 23:09



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order:

Received:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

12/03/08 08:00

PROJECT QUALITY CONTROL DATA LCS Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Metals by 6000/7000 Series Me	ethods											
8120910-BSD1 Mercury		0.0203		mg/L	0.0200	102%	78 - 124	9	22	8120910		12/05/08 17:42



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

Work Order:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

Received: 12/03/08 08:00

PROJECT QUALITY CONTROL DATA Matrix Spike

				viuti ix Spii						
Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
General Chemistry Parameters										
8120897-MS1										
Chromium (VI)	0.520	41.1		mg/kg wet	40.0	101%	75 - 125	8120897	NRL0191-01	12/08/08 12:07
Total Metals by EPA Method 601	0B									
8121573-MS1										
Antimony	ND	107		mg/kg dry	113	94%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Arsenic	14.5	36.6		mg/kg dry	22.7	97%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Barium	84.5	519		mg/kg dry	453	96%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Cadmium	ND	20.8		mg/kg dry	22.7	92%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Chromium	40.0	91.6		mg/kg dry	45.3	114%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Iron	25800	27400	MHA	mg/kg dry	227	690%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Lead	21.7	138		mg/kg dry	113	103%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Manganese	949	1160	MHA	mg/kg dry	113	190%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Nickel	6.81	119		mg/kg dry	113	99%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Selenium	ND	20.7		mg/kg dry	22.7	91%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Silver	0.600	11.7		mg/kg dry	11.3	98%	75 - 125	8121573	NRL0510-02	12/11/08 12:29
Mercury by EPA Methods 7470A	7471A									
8120735-MS1										
Mercury	ND	0.342		mg/kg dry	0.287	119%	60 - 149	8120735	NRL0332-05	12/04/08 15:12
TCLP Metals by 6000/7000 Series	Methods									
8120910-MS1										
Mercury	ND	0.0207		mg/L	0.0200	104%	63 - 138	8120910	NRL0126-01	12/05/08 16:54
8120922-MS1										
Arsenic	ND	10.0		mg/L	10.0	100%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Barium	0.0350	50.5		mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Cadmium	ND	9.83		mg/L	10.0	98%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Chromium	ND	51.7		mg/L	50.0	103%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Lead	ND	50.5		mg/L	50.0	101%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Selenium	ND	10.2		mg/L	10.0	102%	75 - 125	8120922	NRL0410-02	12/06/08 00:59
Silver	ND	10.0		mg/L	10.0	100%	75 - 125	8120922	NRL0410-02	12/06/08 00:59



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Attn

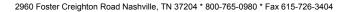
Work Order:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

Received: 12/03/08 08:00

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
General Chemistry Parameters												
8120897-MSD1												
Chromium (VI)	0.520	41.0		mg/kg wet	40.0	101%	75 - 125	0.1	20	8120897	NRL0191-01	12/08/08 12:07
Total Metals by EPA Method 6010B												
8121573-MSD1												
Antimony	ND	111		mg/kg dry	117	95%	75 - 125	4	20	8121573	NRL0510-02	12/11/08 12:33
Arsenic	14.5	37.9		mg/kg dry	23.4	100%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Barium	84.5	544		mg/kg dry	469	98%	75 - 125	5	20	8121573	NRL0510-02	12/11/08 12:33
Cadmium	ND	21.8		mg/kg dry	23.4	93%	75 - 125	4	20	8121573	NRL0510-02	12/11/08 12:33
Chromium	40.0	139	M1, R3	mg/kg dry	46.9	211%	75 - 125	41	20	8121573	NRL0510-02	12/11/08 12:33
Iron	25800	27100	MHA	mg/kg dry	234	548%	75 - 125	1	20	8121573	NRL0510-02	12/11/08 12:33
Lead	21.7	143		mg/kg dry	117	103%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Manganese	949	1030	MHA	mg/kg dry	117	73%	75 - 125	12	20	8121573	NRL0510-02	12/11/08 12:33
Nickel	6.81	124		mg/kg dry	117	100%	75 - 125	4	20	8121573	NRL0510-02	12/11/08 12:33
Selenium	ND	22.3		mg/kg dry	23.4	95%	75 - 125	7	20	8121573	NRL0510-02	12/11/08 12:33
Silver	0.600	12.0		mg/kg dry	11.7	98%	75 - 125	3	20	8121573	NRL0510-02	12/11/08 12:33
Mercury by EPA Methods 7470A/74	71A											
8120735-MSD1												
Mercury	ND	0.373		mg/kg dry	0.299	125%	60 - 149	9	26	8120735	NRL0332-05	12/04/08 15:14
TCLP Metals by 6000/7000 Series M	ethods											
8120910-MSD1												
Mercury	ND	0.0203		mg/L	0.0200	102%	63 - 138	2	22	8120910	NRL0126-01	12/05/08 16:56
8120922-MSD1												
Arsenic	ND	10.1		mg/L	10.0	101%	75 - 125	0.6	20	8120922	NRL0410-02	12/06/08 01:03
Barium	0.0350	51.2		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Cadmium	ND	9.92		mg/L	10.0	99%	75 - 125	0.9	20	8120922	NRL0410-02	12/06/08 01:03
Chromium	ND	52.3		mg/L	50.0	105%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Lead	ND	51.0		mg/L	50.0	102%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Selenium	ND	10.3		mg/L	10.0	103%	75 - 125	1	20	8120922	NRL0410-02	12/06/08 01:03
Silver	ND	10.2		mg/L	10.0	102%	75 - 125	2	20	8120922	NRL0410-02	12/06/08 01:03





620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0331

Project Name: Macalloy Site Project Number: 1131-08-554

Received: 12/03/08 08:00

General Chemistry Parameters

8120897-PS1



620 Wando Park Blvd. Mt. Pleasant, SC 29464

Andrew Wertz

Work Order:

NRL0331

Project Name: Project Number: Macalloy Site 1131-08-554

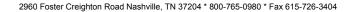
Received: 12/03/08 08:00

CERTIFICATION SUMMARY

TestAmerica Nashville

Attn

Method	Matrix	AIHA	Nelac	South Carolina	
SW846 1311/6010B	Soil	N/A	X	X	
SW846 1311/7470A	Soil	N/A	X	X	
SW846 1311	Soil	N/A	X	X	
SW846 6010B	Soil	N/A	X	X	
SW846 7196A	Soil		X		
SW846 7471A	Soil		X	X	
SW-846	Soil				





620 Wando Park Blvd. Mt. Pleasant, SC 29464

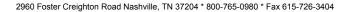
Attn Andrew Wertz

Work Order: NRL0331
Project Name: Macalloy Site

Project Number: 1131-08-554 Received: 12/03/08 08:00

TCLP REGULATORY LIMITS

Analyte	Regulatory Limit
Arsenic	5
Barium	100
Cadmium	1
Chromium	5
Lead	5
Mercury	0.2
Selenium	1
Silver	5





620 Wando Park Blvd. Mt. Pleasant, SC 29464

Attn Andrew Wertz

Work Order: NRL0331
Project Name: Macalloy Site

Project Number: 1131-08-554 Received: 12/03/08 08:00

DATA QUALIFIERS AND DEFINITIONS

M1 The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

MHA Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See

Blank Spike (LCS).

R3 The RPD exceeded the acceptance limit due to sample matrix effects.ND Not detected at the reporting limit (or method detection limit if shown)

METHOD MODIFICATION NOTES



COOLER RECEIPT



NRL0331

Cooler Received/Opened On 12 / 03/ 08 @ 8:00	NRL0331	
1. Tracking # 3 6 7 (last 4 digits, FedEx)		
Courier: FED-EX IR Gun ID 90942856		
2. Temperature of rep. sample or temp blank when opened: 3 Degrees Celsius		
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen?	YES NO NA	
4. Were custody seals on outside of cooler?	YES)NONA	
If yes, how many and where:		
5. Were the seals intact, signed, and dated correctly?	YESNONA	
6. Were custody papers inside cooler?	YES)NONA	
I certify that I opened the cooler and answered questions 1-6 (intial)	J	
7. Were custody seals on containers: YES YO and Intact	YESNONA	
Were these signed and dated correctly?	YESNONA	
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper	Other None	
9. Cooling process: / Ice Ice-pack Ice (direct contact) Dry ice	Other None	only
10. Did all containers arrive in good condition (unbroken)?	YESNONA	2 jans
11. Were all container labels complete (#, date, signed, pres., etc)?	YESNONA	0 200
12. Did all container labels and tags agree with custody papers?	YESNONA	2) (1)
13a. Were VOA vials received?	YES.(.NO)NA	Keewe
b. Was there any observable headspace present in any VOA vial?	YESNO., NA	
14. Was there a Trip Blank in this cooler? YESNO(NA) If multiple coolers, sequence	e #	
I certify that I unloaded the cooler and answered questions 7-14 (intial)	07	
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level?	YESNO.,NÃ)	
b. Did the bottle labels indicate that the correct preservatives were used	YESNO. (NA	
If preservation in-house was needed, record standard ID of preservative used here		
16. Was residual chlorine present?	YESNO(NA)	
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial)	<i>d</i> ?	
17. Were custody papers properly filled out (ink, signed, etc)?	YES)NONA	
18. Did you sign the custody papers in the appropriate place?	YESNONA	
19. Were correct containers used for the analysis requested?	YESNONA	
20. Was sufficient amount of sample sent in each container?	YESNONA	
I certify that I entered this project into LIMS and answered questions 17-20 (intial)	V2	
I certify that I attached a label with the unique LIMS number to each container (intial)	<i>y</i> ×	
21. Were there Non-Conformance issues at login? YES(16) Was a PIPE generated? YES(16)	(o)#	

T1	
TestAmerica	Nashville Division
	2960 Foster Creighton
THE LEADER IN ENVIRONMENTAL TESTING	Nashville, TN 37204

Phone: 615-726-0177 Toll Free: 800-765-0980 Fax: 615-726-3404 To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?

Client Name/Account #	: S&ME # 2420															_						C	omplia	ance M	onitorin	g?	Yes_		No_	
Address	: 620 Wando Pa	rk Road														_							Enforc	ement	Action?	?	Yes_		No_	
City/State/Zip	: Mt. Pleasant, S	C 29464																Site	State:	sc										
Project Manager	r: Andrew Wertz	email: awe	rtz@sm	einc.co	om											_			PO#:	32106	3									
Telephone Number	r: 843.884.0005					Fa	ax No	.: 84	3.884	-169	6					_		TA Qu	ote #:											
Sampler Name: (Print	1) F.SI	arche	_												u			Proje	ct ID:	MACA	LLOY	SITE								
Sampler Signature	: F-S															_		Pro	ect #:	1134-0	8-554									
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NRL0331 12/17/08 23:59	Date Sampled	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	lce	HCI (Blue Label)	NaOH (Orange Label)	H ₂ SO ₄ Plastic (Yellow Label)	H ₂ SO ₄ Glass(Yellow Label)	Other (Specify)	Groundwater	Wastewater	Drinking Water	Soil	Other (specify):	TCLP METALS	TOTAL METALS -As,S	Ba, Cd, Cr, Fe, Pb, Mn	Ni, Se, Ag, Hg,	Hexavalent Chromium						~	RUSH TAT (Pre-Schedule)	Sto TA
MAC-MUD	12/2/08	1318	4		¥		×	\top		7	4	,	T		٦,	+-	П	X	*	×	X.	X						Ą		
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Special Instructions:		<u> </u>	L		1		Meth	od of	Ship	men			┼ ┐	Lk		F	EDE)	.		Labor	Temp	Comm erature Free o	Upon			L	<u>. </u>		Y	
Relinquished by:	12/2/0	8	Tin	0	Recei	ved b	5	u	با	24	/_	/ -()		1	Date	2/0	8	Time) ()	_	ار -	دارد	را_ ر	~ ~	Toc	+1	Im.	011.	(A ·	- Nashville
Relinguished by (J-Brulafy)	12/2/	08	17 17	ne ろり	Recei	ved b	y Test	Amer	ca:	-				1	43	D&		0 8 D	ა _ ა	re	<i>W</i>	<i>-X</i>	<i></i>	<i>U /</i>	·ビラ			υι(I		* . * . * (* (
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Macalloy Site

Analyze 1 semi-solid (dritting mud) sample and 1 water sample for :

	Total Metals by 6010B/7470A	TCLP Metals by 6010B/7470A
-	Arsenic	Arsenic
	Antimony	Barium
`_	Barlum	Cadmium
-	Cadmium	Chromium
-	Chromium	Lead
	Hexavalent Chromium	Selenium
	Iron	Silver
	Lead	Mercury
	Manganese	
	Nickel	·
-	Selenium	
-	Silver	
-	Mercury	

NRL0331 12/17/08 23:59

Former Crosby's Gas Station

Analyze 1 semi-solid (drilling mud) sample and 4-water sample for:

CL:AVOCD BY B260B	TGLP/SVØG# By/8270C	TCLP Metals by 6010B/7470A
1,1-dichloroethene	cresols	Arsenic
1,2-dichloroethane	1,4-dichlorobenzene	Barium
benzene	2,4-dinitrotoluene	Cadmium
chlorobenzene	hexachlorobenzene	Chromium
trichloroethene	hexachlorobutadiene	Lead
vinyl chloride	hexachloroethane	Selenium
2-butanone	nitrobenzene	Silver
carbon tetrachioride	pentachlorophenol	Mercury
chloroform	pyridine	
tetrachloroethene	2,4,5-trichlorophenol	
	2,4,6-trichlorophenol	