526 South Church St.
Charlotte, NC 28202

P.O. Box 1006
Mail Code EC13K
Charlotte, NC 28201-1006

336-215-4576

704-382-6240 fax

July 23, 2014

North Carolina Department of Environmental and Natural Resources
Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, NC 27699-1649

Attn: Ms. Elizabeth Werner (submitted electronically)

Re: Closure Report for Beneficial Use Structural Fill
Roxboro Steam Electric plant
Catawba County, North Carolina
Record Number: CCB0076

Dear Ms. Werner,

Attached you will find the closure report for the Beneficial Use Structural Fill at Duke Energy Progress, Roxboro Steam Electric Plant. This report was completed by Blackrock Engineering in accordance with 15A NCAC 13B.1706 – Closure of Structural Fill Facilities.

The intended beneficial use of landfill cell construction and operation is ongoing with a construction completion estimate of August 2014. The Structural Fill areas within the lined portion of the landfill were covered with 12" compacted soil liner. The LLDPE liner has been installed above the compacted soil liner therefore no vegetative cover is warranted in those areas.

Landfill construction above the Structural Fill will be documented in the Construction Quality Assurance Report submitted to the Solid Waste Section as the application for landfill Permit to Operate Phase 6.

Please contact me if you have any questions or comments.

Respectfully submitted,

Kimberlee Hutchinson, PE
Environmental Services

Attachments: P6 Structural Fill Closure Report

cc (electronic): Larry Frost, NCDENR Solid Waste
Robert Howard, Duke Energy
Tony Dorminey, Duke Energy
Mike Mosley, Duke Energy

P6 STRUCTURAL FILL CLOSURE REPORT

Duke Energy Progress
Roxboro Lined Ash Monofill
N.C. Solid Waste Permit No. 73-02-INDUS
Person County, North Carolina

Prepared for:

Duke Energy Progress
Roxboro Steam Electric Station
1700 Dunnaway Road
Semora, North Carolina 27343

July 2014

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

P6 STRUCTURAL FILL - CERTIFICATION STATEMENT

Duke Energy Progress
Roxboro Lined Ash Monofill
Solid Waste Permit No. 7302-INDUS

Prepared for:
Duke Energy Progress
1700 Dunnaway Road
Semora, North Carolina 27343

Construction Certification Statement:
The engineering elements of this record document have been prepared by the undersigned Professional Engineer licensed to practice engineering in accordance with NCGS 89C and NC Administrative Rules developed thereunder. It is the opinion of the undersigned, that the results of periodic Construction Quality Assurance (CQA) activities conducted by BlackRock Engineers, Inc. and the review of testing by others, as summarized in this report, indicate that the P6 Structural Fill (NCDENR #CCB0076) was constructed in general accordance with the requirements of 15A NCAC 13B Section .1700 of the Solid Waste Rules, the Permit to Construct Phase 6, and the project drawings and specifications.

NORTH CAROLINA PROFESSIONAL SEAL 20100 ENGINEER GARY W. AHLBERG

7/23/2014

Gary W. Ahlberg, P.E.
Principal – Lead Engineer

NORTH CAROLINA PROFESSIONAL SEAL 26397 ENGINEER WILLIAM M. LUPI

7/25/2014

William M. Lupi, P.E.
Senior Engineer

July 2014

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

P6 Structural Fill Closure Report
for

Roxboro Lined Ash Monofill
NC Solid Waste Permit 7302-INDUS

July 2014

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B – Piezometer P-20 - Well Abandonment Record

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- Section 3 – Nuclear Density Testing Reports–Glover Construction

D – Compacted Soil Liner (CSL)
- Section 1 –Shelby Tube Permeability Test Results, and Shelby Tube Locations
- Section 2 – CSL Field Density Reports
- Section 3 – Test Pad Test Data
- Section 4 – Summary of CSL Laboratory Test Results, CSL Laboratory Test Data

E – Perimeter Structural Fill Cover Thickness Verification Field Report

F – Record Survey Drawings

1.0 INTRODUCTION

This Report documents Structural Fill construction and closure activities in general accordance with 15A NCAC 13B.1705 and 15A NCAC 13B.1706 for Phase 6 of the Roxboro Lined Ash Monofill at the Roxboro Steam Electric Plant, located in the northwest corner of Person County, North Carolina. The plant and landfill are owned by Duke Energy Progress, Inc. (Duke). The landfill facility is located at 1700 Dunnaway Road, approximately 7 miles northwest of Roxboro, near Semora, North Carolina. The P6 Structural Fill Notification was approved by the North Carolina Department of Environment and Natural Resources (NCDENR) Solid Waste Section (SWS) on September 8, 2011 (see Appendix A, Section 1). The Phase 6 - Permit to Construct (PTC) application was approved (DIN: 19895) by the Solid Waste Section on October 8, 2013.

As stated in the approved P6 Structural Fill Notification, the purpose of the structural fill is to use Coal Combustion Byproduct (CCB) to replace embankment soil as the foundation for Phase 6 of the Lined Ash Monofill. Accordingly, the Phase 6 PTC describes the complete subgrade and liner requirements for final closure of the P6 Structural Fill. The total limits of the P6 Structural Fill (P6, or P6 fill) are 27.7 Acres, including 6.4 Acres of perimeter slope and the 21.3 Acre lined footprint for Phase 6. As the Engineer of Record for the structural fill and the landfill, Blackrock Engineers, Inc. (BRE) objective of this report is to document and summarize the construction activities of the P6 Structural Fill, final cover on the 6.4-Acre perimeter slopes, and compacted soil liner component of the Phase 6 PTC. In accordance with 15A NCAC 13B Section .1700, engineering certification for the P6 Structural Fill and closure of the 6.4 Acre east and south perimeter is included in this report. Certification of the complete Phase 6 liner system will be made in accordance with the Phase 6 Permit to Construct.

2.0 PROJECT DESCRIPTION

2.1 General Background Information

Originally permitted for disposal in 1988, the existing 1988 Landfill covers approximately 135 Acres, or 50% of the approved disposal area. From 1989 to 2003, the unlined landfill gradually loaded the pre-existing pond with ash deposits. Phase 1 of the lined ash monofill was constructed in 2003 and received the NCDENR SWS Permit to Operate in November 2003. Subsequently, four additional phases were constructed covering 71 acres of the existing landfill footprint with a liner and leachate collection system. Contiguous and south of the Phase 1 – 5 unit, the Phase 6 landfill increases the lined landfill footprint by 21.3 acres. The construction activities documented in this report include structural fill placement of CCB materials, vegetated soil cover (18-inch minimum) on the perimeter slopes outside the lined footprint and compacted soil liner installed within the lined footprint.

The Phase 6 landfill has been permitted by NC DENR SWS. As designed by BRE, the Phase 6 landfill incorporates a leachate collection system (LCS) installed above the primary liner, a leak detection system (LDS) above the secondary geosynthetic liner, and a compacted soil liner (CSL) layer has been installed to limit infiltration into the subgrade. The Phase 6 PTC also includes a layover liner component on the south slope of Phase 1-5 that is outside the P6 Structural Fill and not included in this report. Inside the lined landfill footprint, the layer of CSL is considered the structural fill cover for this report.

2.2 Construction Quality Assurance Personnel

During construction of P6 Structural Fill and Phase 6 CSL, BRE provided engineering, surveying, and Construction Quality Assurance (CQA) services to monitor and supervise construction according to the approved plans. The BRE CQA project team for the Phase 6 project includes the following personnel:

- Gary W. Ahlberg, P.E. – Principal, Lead Engineer
- William M. Lupi, P.E. – Senior Engineer
- Nick A. Parks, P.E. – Project Engineer
- William R. Berarducci – CQA Specialist
- Aaron D. Joplin, P.L.S. – Surveyor
- Mark Nunn – Survey Crew Chief

Key representatives of the other parties involved in the P6 and Phase 6 project include:

- Duke Energy Progress (Owner)
  - Tony Dorminey – Project Manager
  - Kimberley Hutchinson, P.E. – Senior Engineer
  - Richard Miller – Construction Manager
  - Evan Andrews, P.E. – Senior Engineer
- Charah, Inc. (Landfill Operations – Louisville, KY)
  - Justin Mize – Site Manager
  - Rob Long – Assistant Site Manager
  - Chris Robertson – Earthwork Foreman
- Glover Construction, Inc. (Earthwork Contractor – Pleasant Hill, NC)
  - John Glover – Project Manager
  - Rueben Williams – Superintendent

- Geotechnics, Inc. (Geosynthetic Testing Laboratory – Pittsburgh, PA)
  - J.P. Kline, P.E. – Geosynthetics Lab Director
  - Bob Finlay – Geosynthetics Lab Technician
- Geotechnics, Inc. (Soil Testing Laboratory – Raleigh, NC)
  - Michael P. Smith – Regional Manager
  - Abe Gaeta – Field Technician
  - Jacob Buda – Field Technician

2.3 Structural Fill Construction Quality Assurance

2.3.1 General

The structural fill and CSL earthwork CQA program consisted of visual monitoring, collection of samples for laboratory testing, in-place monitoring and testing, review and evaluation of the laboratory test results and documentation of construction of the structural fill and CSL. The primary structural fill included approximately 690,000 CY of ash placement by Charah, Inc. (Charah). Charah installed a minimum of 18 inches of cover soil on the perimeter slopes of the structural fill and 12 inches of intermediate cover soil in the cell floor area. According to the approved Phase 6 PTC plans, Glover Construction, Inc. (Glover) removed the intermediate cover soil, re-graded and added CCB structural fill, fine graded the CSL subgrade, and installed the CSL. Including the top of the CSL and perimeter soil cover, the total volume of the structural fill is 717,900 cubic yards.

The CQA program also included progress and record surveying to verify grades and required CSL thickness, the Record Survey Drawings are included in Appendix F.

2.3.2 CCB Structural Fill

2.3.2.1 P6 Structural Fill – Charah, Inc.

Charah, Inc. is the current landfill operator in charge of hauling, placing ash, cover soils and stormwater controls for the Phase 1-5 landfill site and was

responsible for placing and compacting ash for the P6 Structural Fill. Prior to placement of CCB materials in the P6 structural fill, piezometer P-20 was required to be abandoned. The piezometer abandonment was performed by Quantex, Inc. on September 16, 2011, the well abandonment record is presented in Appendix B of this report.

Charah placed and compacted CCB fill materials in the P6 Structural Fill from October 7, 2011 through October 25, 2012. Testing of the CCB fill was performed by Geotechnics and evaluated by BRE. The CCB fill material contains a percentage of unburned carbon, as a result, the nuclear density test wet density values required adjusting using laboratory oven dry moisture test for gypsum materials which is dried at 60 °C instead of the standard soils lab oven temperature at 100 °C. Moisture testing at increased temperature could burn off volatile components in the fly ash or drive off chemically bonded water from gypsum which would not simulate actual conditions in the field. The number of tests performed during the structural fill material placement and compaction by Charah was 399 tests. The minimum required number of tests per the project specifications was 69 tests, this was based on the P6 volume of 681,600 CY at the required frequency of 1 test per 10,000 CY. The number of tests was increased based on BRE's representative sampling for routine weekly observations of the fill progression. According to the standard CQA program developed for the project, tests within 100 feet of the perimeter slopes required 95 percent of Standard Proctor dry density and interior zone required 90 percent of Standard Proctor. The structural fill installed by Charah was found to meet the project requirements.

Charah's placement of ash was not segregated by waste source, therefore the CCB wastes mainly consisted of mixtures of CCB wastes [waste sources used include Roxboro Fly Ash, processed Roxboro Fly Ash (rejects), and Mayo Fly Ash]. Families of proctor curves were generated to facilitate the selection of the maximum laboratory Standard Proctor value. The mixed CCB waste materials had considerable variable maximum dry density properties based on the source material (multiple units/ coal types). In the field there were times where the reworking the recompacted fill would not improve the dry density. If this was encountered during additional compactive efforts and the moisture was near the acceptable family of curves, the work was stopped because the dry density was

not increasing. Approval was given to recompacted areas based on CQA observations that indicated the fill was adequately compacted and stable.

Structural Fill in-place density test locations are presented in Appendix C, Section 1. In-place density test results performed on CCB structural fill placed by Charah are presented in Appendix C, Section 2 of this report.

BRE directed and monitored intermediate grading and cover requirements for the P6 Structural Fill for stormwater control during the permitting period for the Phase 6 lined landfill.

2.3.2.2 Phase 6 Structural Fill/ CSL Subgrade – Glover Const.

The Permit to Construct Phase 6 of the lined landfill was issued on October 8, 2013. The work to complete the structural fill and install the CSL liner for the Phase 6 landfill was completed by Glover. The structural fill performed by Glover Construction, Inc. (Glover) was the contractor selected to construct Phase 6 of the landfill. Part of Phase 6 construction included completion of the Phase 6 liner subgrade. Glover placed and compacted CCB fill materials in the Phase 6 Structural Fill from November 5, 2013 through June 12, 2014.

CQA was conducted according to the requirements in the Phase 6 PTC. The initial testing of the CCB structural fill material installed by Glover was performed at approximately 100 foot intervals. The project encountered winter weather from January 6, 2014 through April 2, 2014 due to wet or freezing weather which made earthwork at the Phase 6 site not possible. After the weather related project slow down, areas where rework of the fill was directed by BRE or additional fill placements were necessary were tested at the 100 foot spacing. Areas that did not require additional CCB fill placements to meet CSL subgrade elevation were reevaluated by retesting the subgrade surface at a spacing of 200 feet on center maintaining the 1 test per 2,000 CY requirement in the Phase 6 specifications. The testing performed by Geotechnics was found to meet the project specifications.

Approximately 36,300 CY of CCB fill was quantity of fill placement for the Phase 6 project which would require 19 in-place density tests. Initially Geotechnics

performed 138 in-place density tests on the structural fill which met the specifications before weather related slowdowns. When work restarted in 2014 Geotechnics completed retests for 83 locations at the surface of the structural fill that required additional fill. The additional testing met the project specifications.

Structural Fill density test locations are presented on figures in Appendix C, Section 1, in-place density test results performed on fill material placed by Glover are presented in Appendix C, Section 3.

3.0 P6 STRUCTURAL FILL – PERIMETER VEGETATED SOIL COVER

The Phase 6 CSL layer is the base of the Phase 6 landfill liner and perimeter slopes are the final cover for the structural fill. Per the requirements of 15A NCAC 13B.1705, the structural fill is to be covered with 12 inches of compacted earth and an additional 6 inches capable of supporting native plant growth. Charah placed 18 inches of cover soil over the perimeter slopes. Geotechnics performed hand auger boreholes at locations near the mid slope of the P6 Structural Fill perimeter to confirm the installed cover thickness was a minimum 20 inches. The cover thickness locations are presented on Drawing 6SF2 which is presented in Appendix E of this report. Geotechnics Daily Field Reports presenting the measured cover thickness are presented in Appendix E.

The P6 Structural Fill is simultaneously being developed as a lined landfill. Construction of the CSL layer is the completion of cover placement for P6 Structural Fill. The P6 Structural Fill was constructed and is considered closed in accordance with 15A NCAC 13B.1700.

4.0 COMPACTED SOIL LINER (CSL)

Within the PTC limits of the Phase 6 liner system, the CSL component of the liner system completes the compacted soil layer for the structural fill. Based on the results of the CSL test pad, the approved CSL is a minimum 12-inch layer with a maximum permeability of 5.0×10^{-8} cm/sec. CSL production utilized the relationship between moisture-density-permeability to develop a zone of acceptance for construction monitoring. The CSL was constructed in two 6-inch

nominal compacted lifts. Conformance testing was performed for permeability of undisturbed Shelby tube samples. CSL subgrade and finish grade surveys verify the minimum 12-inch layer thickness.

4.1 CSL Test Pad

The borrow source for the CSL test pad constructed by Glover was a stockpile of material obtained from the clearing of Basins in Area A and Area B of the McGhees Mill Road Borrow Area (MMB). The CSL test pad was constructed by Glover on December 19, 2013 and December 20, 2013. The test pad was constructed 4 lifts of CSL. The material was mixed by Glover to break down clods and facilitate the removal of rocks or roots. The CSL material was compacted in-place with a sheepsfoot compactor and a smooth drum roller.
Permeability test results from the test pad demonstrated that Glover was able to meet the alternate 12-inch thick CSL layer requiring a maximum permeability of 5.0×10^{-8} cm/sec. Proctor samples (CL-1 through CL-4) obtained of the non-mixed materials were used to identify the range of Proctor curves for the in-situ materials that can be encountered in the field. Shelby tubes from the test pad ranged from 4.9×10^{-8} to 9.0×10^{-9} cm/ sec. The lower permeability tests were in the second lift.

Laboratory remolded permeability testing was not able to duplicate the kneading action from the sheepsfoot roller that was utilized by Glover in the test pad construction. Due to the kneading action required to meet the permeability, BRE utilized an angled zone of acceptance which approximately paralleled the line of Proctor optimums. Above 100 pcf zone of acceptance line of optimum became significantly steeper.

One bag sample and bulk samples were obtained from each lift of the test pad for a total of four (4) samples. The samples were tested in the laboratory for natural moisture content, particle size distribution and Atterberg limits. All test data from the bag samples are reported in Section 3 of Appendix D.

4.2 CSL Conformance Testing

Glover installed CSL material in the Phase 6 liner footprint from April 14, 2014 through June 19, 2014. Approximately 34,360 CY of CSL/ protective cover material were hauled, placed, mixed by disking, moisture conditioned, and compacted to form the alternate CSL liner material.

A total of 45 undisturbed Shelby tubes were sampled for conformance testing of the CSL materials. One undisturbed permeability sample for Acre 15, Lift 2 did not meet the project permeability requirement (5.0×10^{-8} cm/sec). Lift 2 over Acre 15 was reworked and retested, the retest was found to meet the project specifications. The Shelby tube locations, summary table and laboratory permeability test results are presented in Section 1 of Appendix D.

The in-place density testing of CSL was performed in accordance with the project specifications. A zone of acceptance was prepared and was used in the field testing of the CSL materials. In place density testing results of CSL materials are presented in Section 2 of Appendix D.

Laboratory testing of the CSL material required additional Proctor samples due to material variability. Seven (7) bulk samples were tested in the laboratory for natural moisture content, particle size distribution Atterberg limits and Standard Proctor were obtained during the CSL placement in Phase 6. An additional four (4) bag samples were obtained and tested in the laboratory for natural moisture content, particle size distribution and Atterberg limits. The specifications required conformance testing of four (4) bulk and four (4) bag samples of CSL to be tested. The CSL conformance laboratory test results are presented in in Section 4 of Appendix D.

4.3 Record Survey

Upon completion of the CSL, BRE surveyed the finished surface to confirm the CSL thickness and to prepare a record drawing. Elevations were taken on a pattern equal to the project requirement (100-foot grid) and at the top and toe of slope along the berms. The thicknesses for the CSL are shown on the record drawings provided in Appendix F. Review of the CSL drawing demonstrates that

the required minimum thickness of 12 inches was obtained at all certification points.

In general, a review of the laboratory testing, in-place testing, and visual observations showed that the CSL provided a firm, smooth, durable surface upon which to construct the liner system in accordance with the Construction Drawings and Project Specifications.

5.0 SUMMARY

BRE provided CQA services to Duke for monitoring and testing of the structural fill, perimeter soil cover, and the CSL placed during Phase 6 construction at the Roxboro Lined Ash Monofill. During construction of each component, BRE documented conformance of the construction materials and installation methods with the requirements of the Construction Drawings and Project Specifications. BRE performed and/or observed the required testing using the methods and frequencies outlined in these references. BRE also identified and documented any material, site condition, or test result that indicated nonconformance. These nonconforming areas were reported for subsequent re-testing, repair, or replacement as required. BRE utilized record survey information (Appendix F) to verify conformance of construction to the limits and tolerances as per the Project Specifications.

6.0 CONCLUSIONS

In conclusion, based on observations during construction and the test results presented in this report, it is BRE's opinion that the structural fill, perimeter cover soil, and CSL components of the Roxboro Lined Ash Monofill, Phase 6 were constructed in conformance with the P6 Structural Fill Notification, and the Phase 6 PTC Construction Drawings and Project Specifications. The Engineering Certification for the P6 Structural Fill is included with this report.

Appendix A – Permit Document
– Coal Ash Structural Fill Notification

North Carolina Department of Environment and Natural Resources
Division of Waste Management

Beverly Eaves Perdue
Governor

Dexter R. Matthews
Director

Dee Freeman
Secretary

September 8, 2011

Mr. Mike Mosley
Plant Manager
Progress Energy Roxboro
1700 Dunnaway Road
Semora, NC 27343

Subject: Notification - Coal Ash Structural Fill
Progress Energy Roxboro Steam Station – Phase 6
Semora, NC
Person County
Doc ID 15084

Reference: Coal Ash Structural Fill Notification Application dated August 8, 2011, received by the Solid Waste Section on August 10, 2011

Dear Mr. Mosley:

The Solid Waste Section (Section) has reviewed the Structural Fill Notification Application (Doc ID 15083) dated August 8, 2011 submitted by Blackrock Engineers, Inc. The application meets all of the requirements specified in Section .1700 of the North Carolina Solid Waste Management 15A NCAC 13B Rules. This notification includes the following information as required by Rule .1703:

1. **Nature, Purpose and location of the project**: This project proposes the use of approximately 725,000 cubic yards of coal ash generated from the Roxboro Steam Station and the Mayo Steam Station as structural fill to construct a suitable subgrade for the Phase 6 expansion of the existing lined industrial landfill, permit number 73-02

   Quad sheet: Olive Hill, NC (Person Co): 36.480044 North Lat; 78.059856 W Long

2. **Estimated start**: September 2011
   Estimated completion: September 2012
3. **Estimated volume**: 725,000 cubic yards
4. **TCLP analysis from coal ash**: included in application

5. **Signed statement from the owner**: Mike Mosley singed a cover letter stating his acknowledgment and consent to use coal combustion by-products as structural fill for the Phase 6 project dated August 8, 2011.
6. **CCB generator:** Progress Energy Roxboro Steam Electric Plant
   CCB generator: Progress Energy Mayo Steam Electric Plant
   Location of generating plant: Roxboro – 1700 Dunnaway Road, Semora, NC 27343
   Location of generating plant: Mayo – 10660 Boston Road, Roxboro, NC 27574
   Mailing address: same as above
   Contact: Roxboro – Mike Mosley
   Contact: Mayo – Jody Thacker
   Telephone number: Roxboro – 336.597.6101
   Telephone number: Mayo – 336.597.7301
   Statement that notification will be given to DWM if changes are to occur.

Construction may now begin on this project. However, the start date of the Phase 6 liner construction is unknown, so in the interim, the coal ash must be covered with a minimum 12 inches of compacted earth and an additional six inches of soil suitable for plant growth in accordance with 15A NCAC 13B .1705 (j). Also, the structural fill application indicated piezometer PZ-20 will be abandoned during site preparation. Submit the abandonment record (Form GW-30) for this piezometer upon completion of the abandonment.

During the construction process, North Carolina Solid Waste Management 15A NCAC 13B Rules .1701, .1702, .1704, .1705, .1706, .1707, .1708, .1709, and .1710 shall also be adhered to.

If you have any questions or concerns, please contact myself at (919) 508-8495 or Elizabeth Werner via email elizabeth.werner@ncdenr.gov or phone at (919) 508-8496.

Sincerely,

Edward F. Mussler
Permitting Branch Supervisor
Solid Waste Section

Cc: John Toepfer – Progress Energy
Caroline Broughton – Progress Energy
Gary Ahlberg – Blackrock Engineering, Inc.
John Patrone – SWS
Dennis Shackelford – SWS
Elizabeth Werner - SWS
Central file

Appendix B – Piezometer P-20 – Well Abandonment Record

WELL ABANDONMENT RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3106

1. WELL CONTRACTOR:

James D. Barker
Well Contractor (Individual) Name

Quantex, Inc.
Well Contractor Company Name

STREET ADDRESS P.O. Box 41673

Raleigh NC 27629
City or Town State Zip Code

(919) - 219-9604
Area code - Phone number

2. WELL INFORMATION:

SITE WELL ID # (if applicable) NA

STATE WELL PERMIT # (if applicable) NA

COUNTY WELL PERMIT # (if applicable) NA

DWQ or OTHER PERMIT # (if applicable) NA

WELL USE (Check applicable use): ☑ **Monitoring** ☐ **Residential**

☐ **Municipal/Public** ☐ **Industrial/Commercial** ☐ **Agricultural**

☐ **Recovery** ☐ **Injection** ☐ **Irrigation**

☐ Other (list use) _____

3. WELL LOCATION:

COUNTY Person QUADRANGLE NAME NA

NEAREST TOWN: 1700 Dunnaway Road
Semora, NC 27343

(Street/Road Name, Number, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other _____

(Check appropriate setting)

LATITUDE 36.484504

LONGITUDE 79.057446

May be in degrees, minutes, seconds, or in a decimal format

Latitude/longitude source: ☑ **GPS** ☐ **Topographic map**

(Location of well must be shown on a USGS topo map and attached to this form if not using GPS.)

4a. FACILITY- The name of the business where the well is located. Complete 4a and4b (If a residential well, skip 4a; complete 4b, well owner information only.)

FACILITY ID #(if applicable) _____

NAME OF FACILITY Progress Energy - Roxboro

STREET ADDRESS 1700 Dunnaway Road

Semora NC 27343
City or Town State Zip Code

4b. CONTACT PERSON/WELL OWNER:

NAME Robert Howard / Progress Energy Carolinas, Inc.

STREET ADDRESS Roxboro Steam Electric Plant
1700 Dunnaway Road, Semora, NC 27343

5. WELL DETAILS:

a. Total Depth: 40 ft. Diameter: 2" in.

b. Water Level (Below Measuring Point): 32' ft.

Measuring point is (-0.20) ft. above land surface.

6. CASING:

	Length	Diameter
a. Casing Depth (if known):	NA ft.	2" in.
b. Casing Removed:	~ ft.	~ in.

Casing & Screen removed and over drilled to 41' BLS

7. DISINFECTION: NA Monitoring well

(Amount of 65%-75% calcium hypochlorite used)

8. SEALING MATERIAL:

Neat Cement

Cement 282 lb.
Water 33 gal.

Sand Cement

Cement ~ lb.
Water ~ gal.

Bentonite

Bentonite lb.

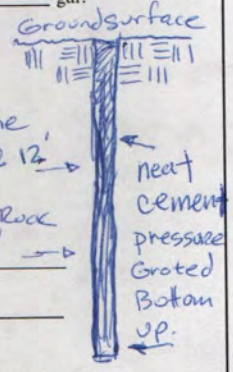
Type: ☐ Slurry ☐ Pellets

Water _____ gal.

Other

Type material ~

Amount ~



9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL:

Pumped Neat Cement through 1" pipe bottum-up.

Note: Riser & Screen Removed
Borehole overdrilled w/Air Rotary to 41'

10. WELL DIAGRAM: Draw a detailed sketch of the well on the back of this form showing total depth, depth and diameter of screens (if any) remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.

11. DATE WELL ABANDONED 9/16/11

I DO HEREBY CERTIFY THAT THIS WELL WAS ABANDONED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

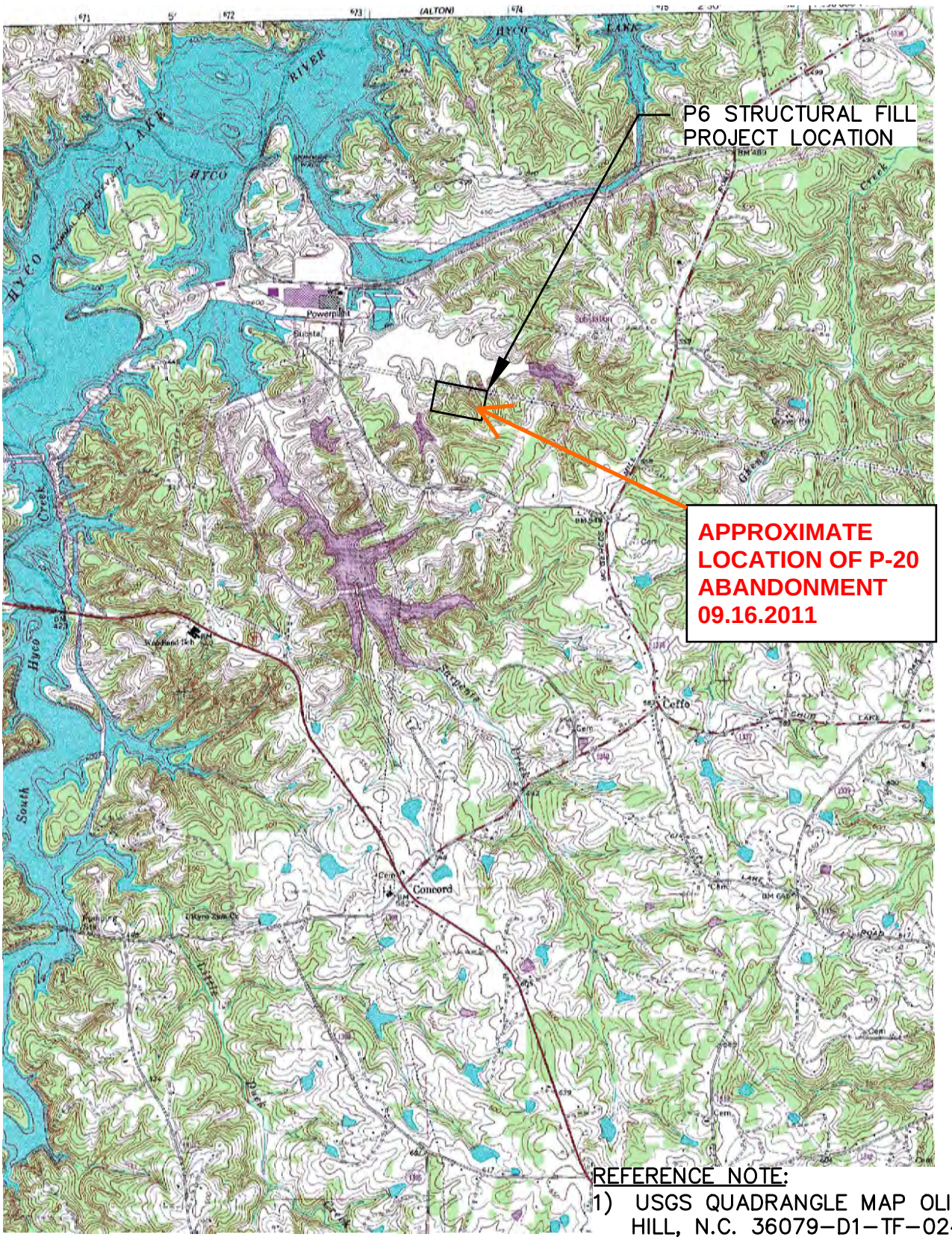
James D. Barker 9/19/11
SIGNATURE OF CERTIFIED WELL CONTRACTOR **DATE**

SIGNATURE OF PRIVATE WELL OWNER ABANDONING THE WELL **DATE**
(The private well owner must be an individual who personally abandons his/her residential well in accordance with 15A NCAC 2C .0113.)

James D. Barker
PRINTED NAME OF PERSON ABANDONING THE WELL

Submit a copy to the owner and the original to the Division of Water Quality within 30 days.
Attn: Information Management, 1617 Mail Service Center – Raleigh, NC 27699-1617, Phone No. (919) 733-7015 ext 568.

Form GW-30
Rev. 5/06



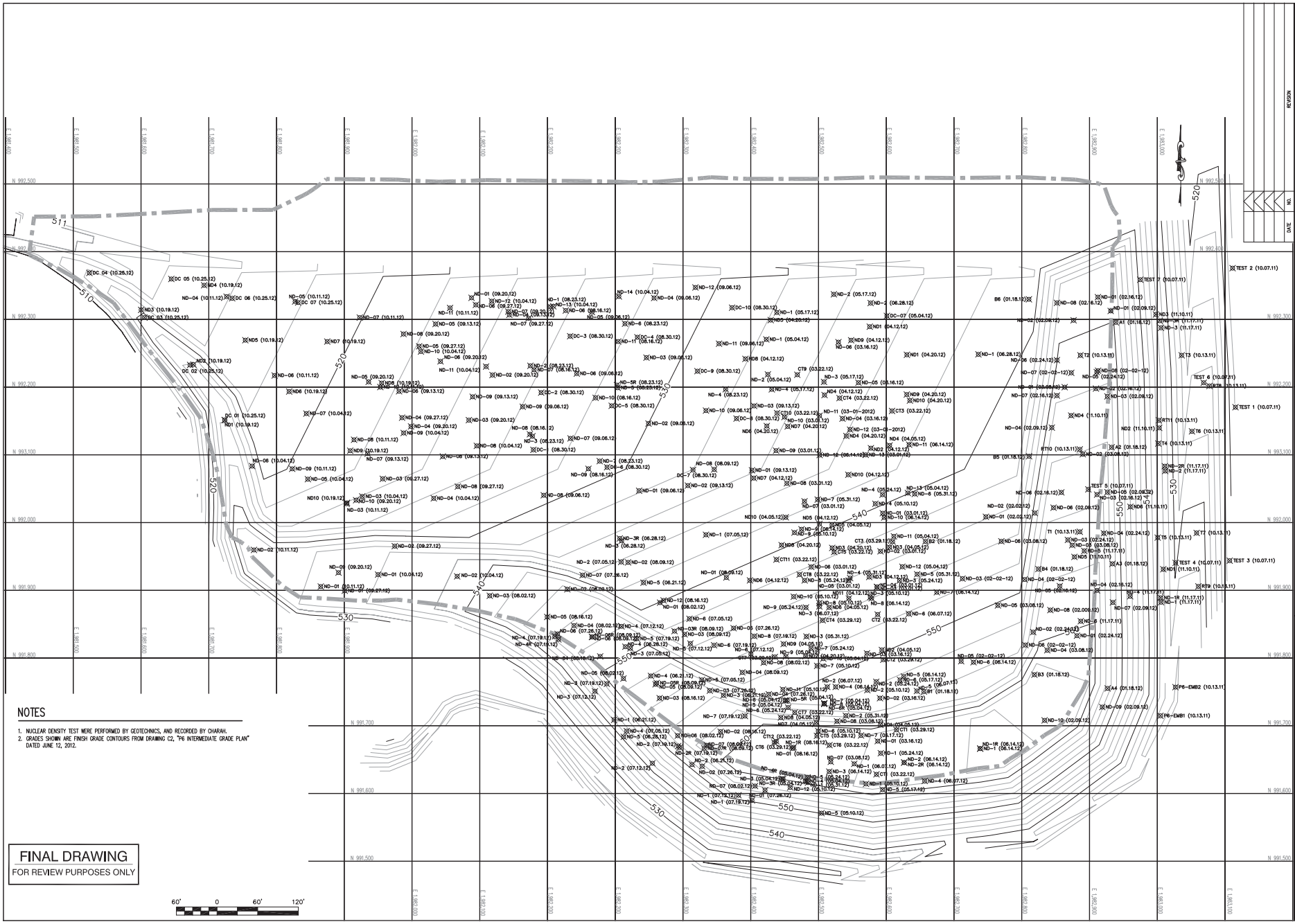
REFERENCE NOTE:

1) USGS QUADRANGLE MAP OLIVE HILL, N.C. 36079–D1–TF–024 REVISED 1994.

TITLE: FIG. 1 – LOCATION MAP PROGRESS ENERGY CAROLINAS ROXBORO, N.C.	DATE: 07.27.11 SCALE: NTS DRAWN BY: JWG	BLACKROCK ENGINEERS, INC. POST OFFICE BOX 58 WILMINGTON, NORTH CAROLINA 28401 PHONE: 910.232.6696

Appendix C – P6 Structural Fill Testing

Appendix C – P6 Structural Fill Testing
Section 1 – Structural Fill ND Test Location Figures



NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY CHARAH.
2. GRADES SHOWN ARE FINISH GRADE CONTOURS FROM DRAWING C2, "P6 INTERMEDIATE GRADE PLAN" DATED JUNE 12, 2012.

FINAL DRAWING
FOR REVIEW PURPOSES ONLY

NO.	DATE	REVISION

BLACKROCK ENGINEERS, INC.
5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

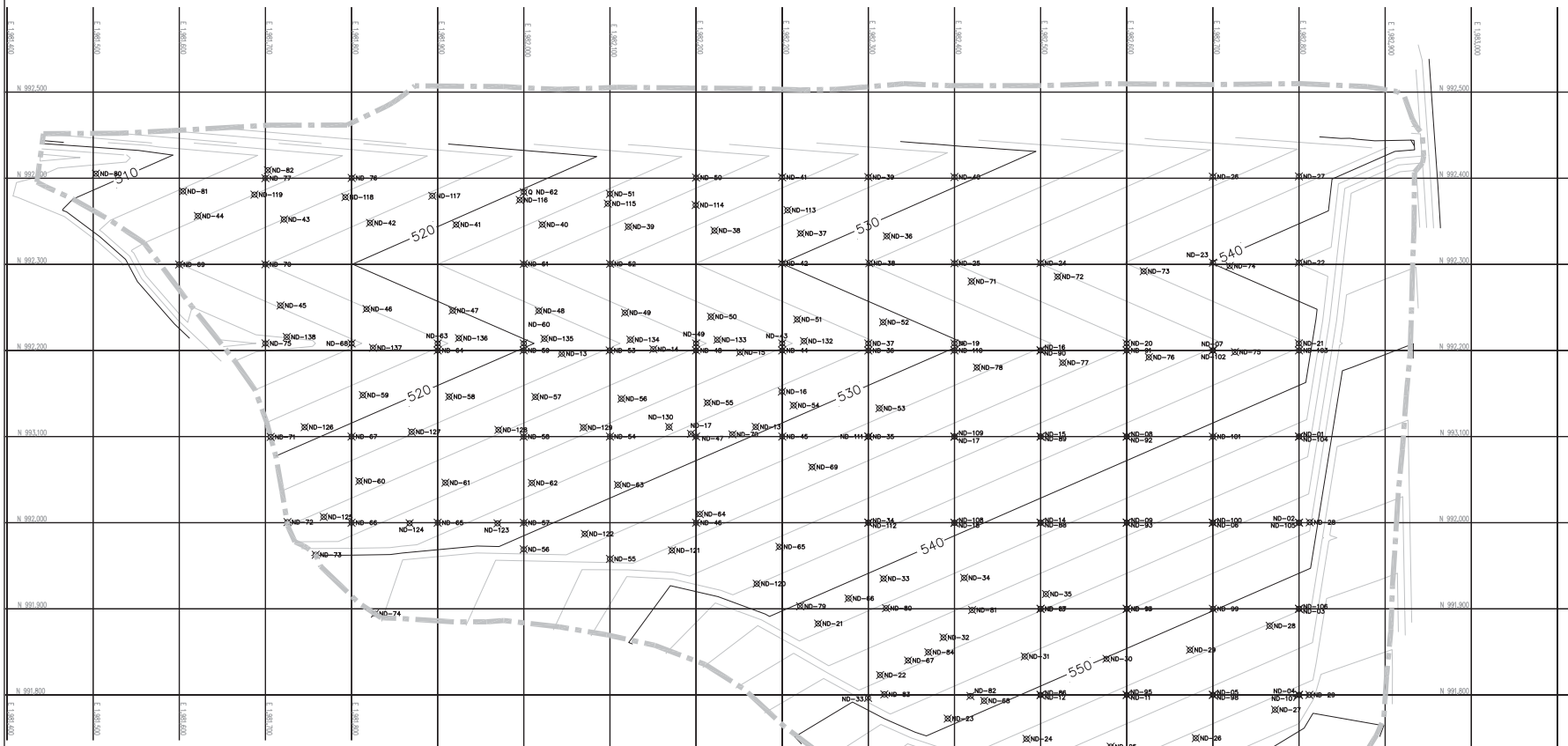
SEAL

SEAL

PROJECT TITLE:
DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
P6 STRUCTURAL FILL

DRAWING TITLE:
P6 STRUCTURAL FILL - CHARAH
COMPACTION TEST LOCATIONS
0-7021

DESIGNED BY: WML	DRAWN BY: NAP
CHECKED BY: GWA	PROJECT NO.: 11001
SCALE: 1"=60'	DATE: 07.17.14
FILE NAME: P6-ST-FILL-CT	
SHEET NO. 1	DRAWING NO. 6SF1



NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING
FOR REVIEW PURPOSES ONLY

60' 0 60' 120'

NO.	DATE	REVISION

BLACKROCK ENGINEERS, INC.
5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

SEAL

SEAL

PROJECT TITLE:
DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
P6 STRUCTURAL FILL

DRAWING TITLE:
P6 STRUCTURAL FILL - GLOVER
COMPACTION TEST LOCATIONS
0-7021

DESIGNED BY: WML	DRAWN BY: NAP
CHECKED BY: GWA	PROJECT NO.: 11001
SCALE: 1"=60'	DATE: 07.17.14
FILE NAME: P6-ST-FILL-CT-ALL GLOVER ASH	
SHEET NO. 3	DRAWING NO. 6SF3

Appendix C – P6 Structural Fill Testing
Section 2 – Nuclear Density Testing Reports
– Charah

Day:	**Thurs.**
Date:	**10.13.11**
Log No.:	**5**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Dam Safety	**Project No.:**	2011-845
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:00AM **Departed:** 4:15PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Jon Giles

Weather Conditions:	Party Cloudy	**Temperature:**	70s

Contractor's Equipment: Ingersand Smoothdrum Roller, Water Truck, Dozer

Contractor's Personnel: ~5

Description of Daily Activities & Events

- Geotechnics representative Stephen Crockett arrived on site and met with Jon Giles (Blackrock)
- Geotechnics representative performed moisture/density testing in locations selected by Blackrock representative Jon Giles.
- Moisture/Density tests ND-1&2 performed on soil berm near GMW-9. Tests performed 6 inches below existing ground surface. Probe depth was 6 inches. (Total depth 12")
- Moisture/Density tests ND-3,4,5,6,7,8,9 performed on in-place fly ash in Cell 6. Tests performed 6 inches below existing ground surface. Probe depth was 6 inches. (Total depth 12")
- Due to low compaction results, Blackrock representative Jon Giles asked Charah to rework compaction efforts in Cell 6 using a water truck and smoothdrum compactor.
- Observed water truck make pass on areas and smoothdrum compactor make 4-5 passes.
- Moisture/Density tests ND-10,11,12,13 performed on reworked fly ash in Cell 6.
- 1 point proctor test performed on material from test ND-3.
- Collected moisture content from each nuclear density test for verification of results.
- Geotechnics representative departed the stie.

Prepared By:	SC	**Date:**	10.13.11	**Checked By:**	mms	**Date:**	10/19

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO FLY ASH DAM SAFETY
Project Number : 2011-845

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-05**	Geotechnics Representative : Stephen Crockett	Page : 1
Date (s) : **10.13.11**	Reviewed By : [illegible]	Date : 10/19

Contractor : Charah, Inc.	Borrow Source : Fly Ash Silo

Compaction Equipment : Ingersand Smoothdrum Vibratory Roller

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 01	CELL 6	NA	6"	845-01-03	111.0	15.4	**112.9**	**21.3**	**93.1**	**83.9%**	**95.0%**	
ND 02	CELL 6	NA	6"	845-01-03	111.0	15.4	**114.0**	**21.9**	**93.5**	**84.3%**	**95.0%**	
ND 03	CELL 6	NA	6"	723-01-02	63.8	38.2	**63.5**	**30.2**	**48.8**	**76.4%**	**95.0%**	
ND 04	CELL 6	NA	6"	723-01-02	63.8	38.2	**63.1**	**32.5**	**47.6**	**74.6%**	**95.0%**	
ND 05	CELL 6	NA	6"	723-01-01	80.9	23.9	**93.2**	**29.0**	**72.2**	**89.3%**	**95.0%**	
ND 06	CELL 6	NA	6"	723-01-02	63.8	38.2	**73.6**	**31.9**	**55.8**	**87.5%**	**95.0%**	
ND 07	CELL 6	NA	6"	723-01-02	63.8	38.2	**78.2**	**39.2**	**56.2**	**88.1%**	**95.0%**	
ND 08	CELL 6	NA	6"	723-01-02	63.8	38.2	**65.1**	**34.5**	**48.4**	**75.9%**	**95.0%**	
ND 09	CELL 6	NA	6"	723-01-02	63.8	38.2	**73.5**	**33.7**	**55.0**	**86.2%**	**95.0%**	
ND 10	CELL 6	NA	6"	723-01-02	63.8	38.2	**68.8**	**36.9**	**50.3**	**78.8%**	**95.0%**	Retest in area of ND-6
ND 11	CELL 6	NA	6"	723-01-02	63.8	38.2	**68.9**	**37.3**	**50.2**	**78.7%**	**95.0%**	Retest in area of ND-8
ND 12	CELL 6	NA	6"	723-01-02	63.8	38.2	**64.4**	**26.8**	**50.8**	**79.6%**	**95.0%**	Retest in area of ND-3
ND 13	CELL 6	NA	6"	723-01-02	63.8	38.2	**68.6**	**33.4**	**51.4**	**80.6%**	**95.0%**	Retest in area of ND-4

Gauge Number	Gauge Model
13957	3440

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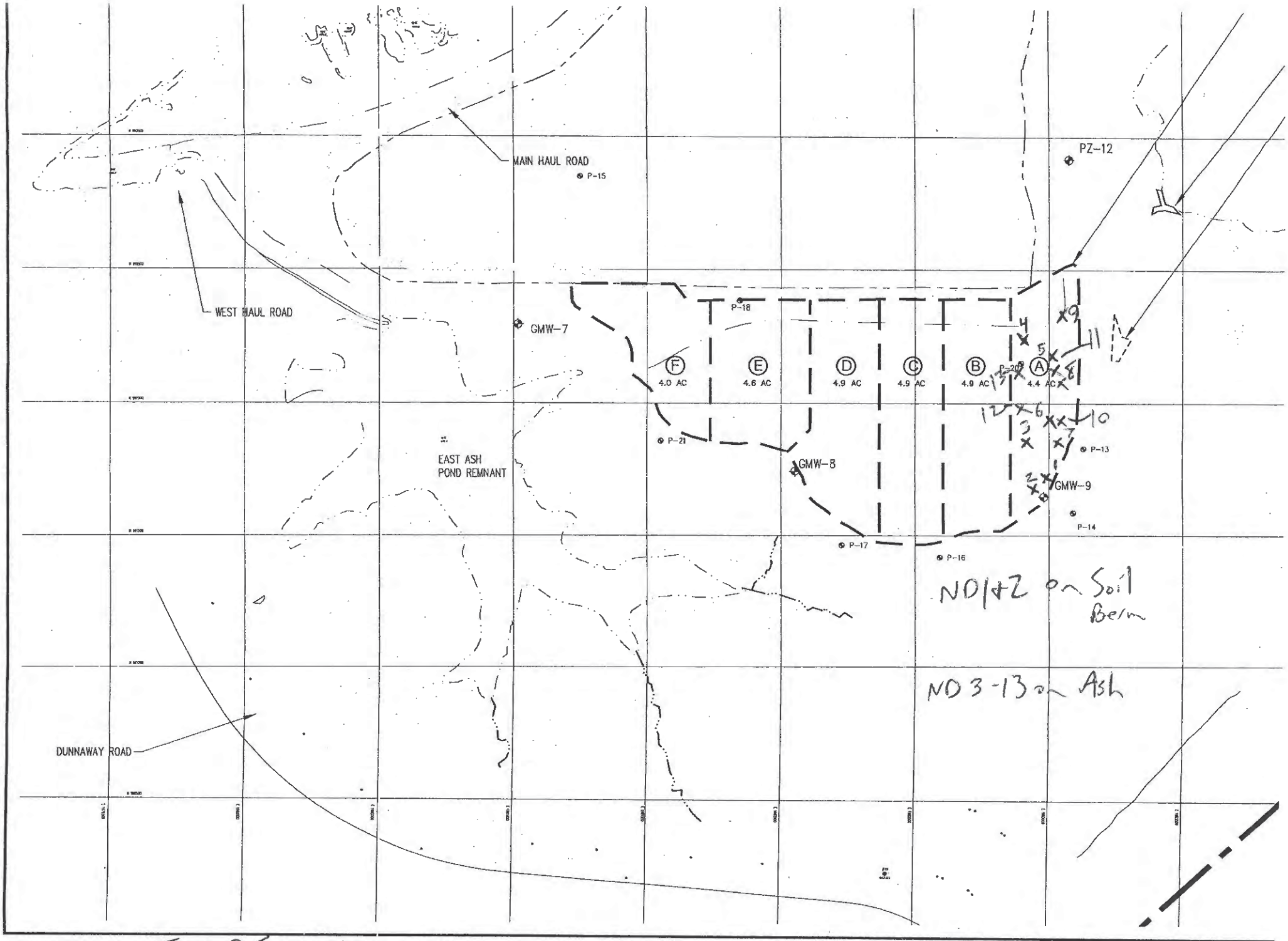

FDR-05 10.13.11 Sc

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO FLY ASH DAM SAFETY
Project No.	2011-845

Test Number:	MC-01	MC-02	MC-03	MC-04	MC-05
Nuclear Test Number:	ND-03	ND-04	ND-05	ND-06	ND-07
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	6"	6"	6"	6"	6"
Tare Number	309	300	314	305	303
Wt. of Tare & WS (gm)	179.80	263.96	305.82	238.58	293.21
Wt. of Tare & DS (gm)	163.57	226.51	256.10	201.42	242.06
Wt. of Tare (gm)	109.82	111.17	84.80	85.04	111.53
Wt. of Water (gm)	16.23	37.45	49.72	37.16	51.15
Wt. of DS (gm)	53.75	115.34	171.3	116.38	130.53
Water Content (%)	**30.2**	**32.5**	**29.0**	**31.9**	**39.2**

Test Number:	MC-06	MC-07	MC-08	MC-09	MC-10
Nuclear Test Number:	ND-08	ND-09	ND-10	ND-11	ND-12
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	6"	6"	6"	6"	6"
Tare Number	308	304	306	307	398
Wt. of Tare & WS (gm)	255.69	353.62	241.90	266.75	232.00
Wt. of Tare & DS (gm)	218.88	292.50	200.60	224.38	200.80
Wt. of Tare (gm)	112.18	111.00	88.53	110.88	84.38
Wt. of Water (gm)	36.81	61.12	41.3	42.37	31.2
Wt. of DS (gm)	106.7	181.5	112.07	113.5	116.42
Water Content (%)	**34.5**	**33.7**	**36.9**	**37.3**	**26.8**

Notes : *NA*

Tested By *SC* *Date* *10.13.11* *Checked By* *MPS* *Date* *10/19*

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO FLY ASH DAM SAFETY
Project No.	2011-845

Test Number:	MC-11
Nuclear Test Number:	ND-13
Location:	PHASE 6
Depth:	6"
Tare Number	318
Wt. of Tare & WS (gm)	263.85
Wt. of Tare & DS (gm)	219.51
Wt. of Tare (gm)	86.81
Wt. of Water (gm)	44.34
Wt. of DS (gm)	132.7
Water Content (%)	**33.4**

Notes : *NA*

Tested By *SC* *Date* *10.13.11* *Checked By* *MM* *Date* *10/14*

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO FLY ASH DAM SAFETY
Project Number :	2011-845

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-05**
Date (s) :	10.13.11

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : BLACK FLY ASH

Test Information

Test Number :	1PT-01
Location:	ND-03
Depth (ft):	0.5
Date :	10.13.11

Mold

Weight of Mold (lbs.)	9.4715
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.3296
Weight of Mold (lbs)	9.4715
Weight of WS (lbs)	2.8581
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	800
Wt. of Tare & WS (gm)	274.16
Wt. of Tare & DS (gm)	234.63
Wt. of Tare (gm)	103.83
Wt. of Water (gm)	39.53
Wt. of DS (gm)	130.80
Wet Density (pcf)	86.6
Moisture Content %	**30.2**
Dry Density (pcf)	**66.5**

Geotechnics Represenative : Stephen Crockett

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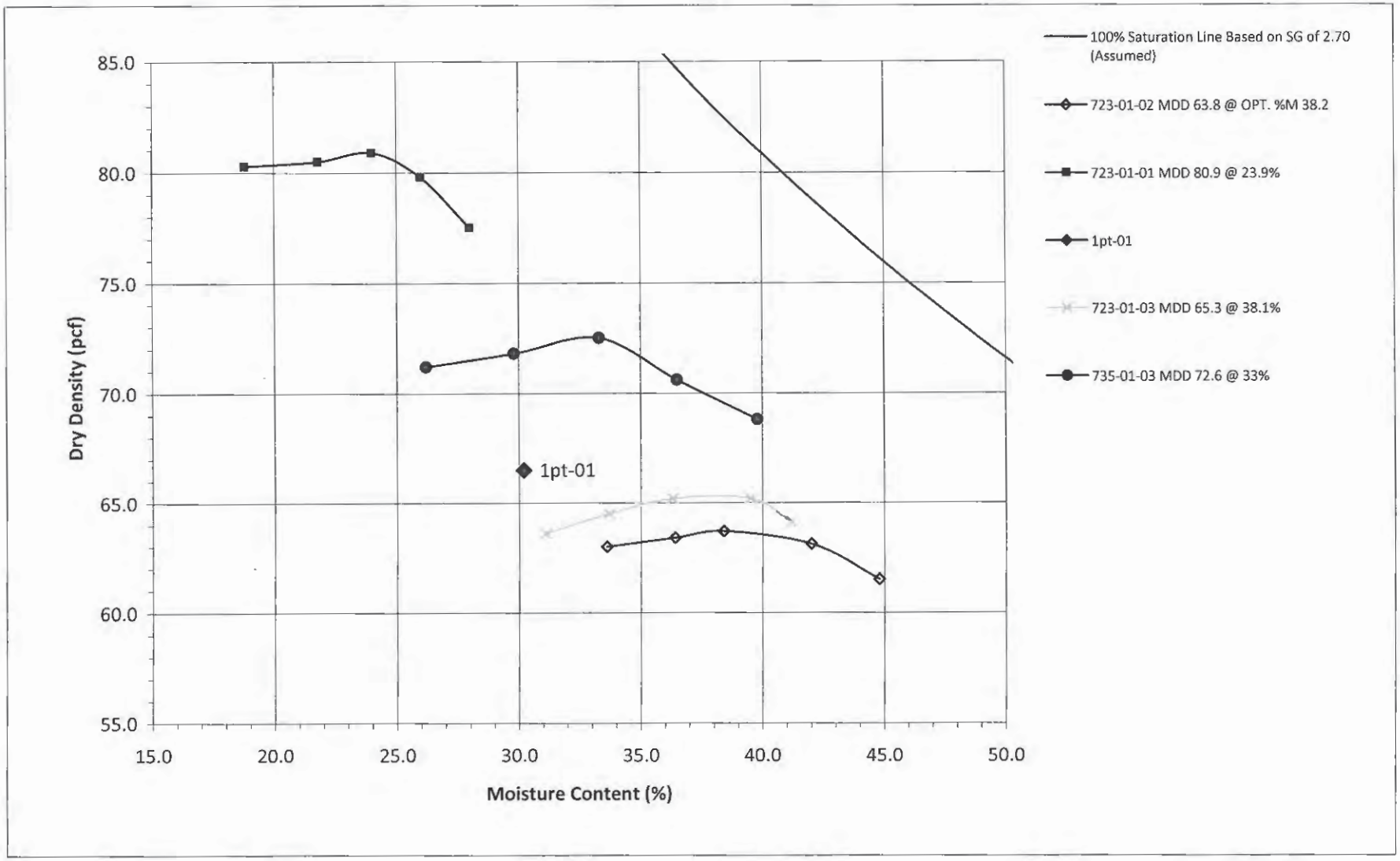
INTEGRITY IN TESTING

One Point Moisture / Density Relationships

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO FLY ASH DAM SAFETY
Project Number : 2011-845



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Day:	Tues.
Date:	10.7.11
Log No.:	4
Page:	1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Dam Safety	**Project No.:**	2011-845
Client Name:	Blackrock Engineers	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 8:15am **Departed:** 3:30pm
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Jon Giles

Weather Conditions:	Sunny	**Temperature:**	80
Contractor's Equipment:	Ingersand Smoothdrum Roller, Water Truck, Dozer		
Contractor's Personnel:	1		

Description of Daily Activities & Events

- Geotechnics representative Mark Blackley arrived on site and met with Blackrock representative Jon Giles
- Attended site safety training for Amonia by Progress Energy.
- Geotechnics Rep. performed moisture density testing with nuclear density gauge. Locations were selected by Blacrock rep.
- Moisture / Density test ND-1,2,3 performed on soil berm locations on attached map.
- Moisture / Density test ND-4,5,6,7 performed on fly ash in cell 6, locations attached.
- Moisture / Density test ND-8-17 performed on Phase 4 fly ash, locations attached.
- Geotechnics Rep. obtained two drive cylinder tests for comparison with Nuclear gauge results. See attached results.
- Geotechnics Rep. departed site.

Prepared By: MB **Date:** 10/7/2011 **Checked By:** [illegible] **Date:** 10/11

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO DAM SAFETY
Project Number : 2011-845

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number :	**FDR-04**	Geotechnics Representative :	Mark Blackley	Page :	1
Date (s) :	**10.7.11**	Reviewed By :	MPS	Date :	10/12

Contractor :	Charah, Inc.	Borrow Source :	Fly Ash Silo

Compaction Equipment :	Ingersand Smoothdrum Vibratory Roller

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	CELL 6		6"	845-01-02	111.0	15.4	**110.7**	**19.5**	**92.6**	**83.5%**	**95.0%**	Berm - soil
ND 2	CELL 6		6"	845-01-02	111.0	15.4	**117.1**	**18.1**	**99.2**	**89.3%**	**95.0%**	Berm - soil
ND 3	CELL 6		6"	845-01-02	111.0	15.4	**110.0**	**22.4**	**89.9**	**81.0%**	**95.0%**	Berm - soil
ND 4	CELL 6		6"	654-02-01	69.5	32.8	**78.7**	**30.0**	**60.5**	**87.1%**	**95.0%**	Fly Ash
ND 5	CELL 6		6"	654-02-01	69.5	32.8	**73.0**	**26.7**	**57.6**	**82.9%**	**95.0%**	Fly Ash
ND 6	CELL 6		6"	654-02-01	69.5	32.8	**82.2**	**27.7**	**64.4**	**92.6%**	**95.0%**	Fly Ash
ND 7	CELL 6		6"	654-02-01	69.5	32.8	**86.6**	**29.2**	**67.0**	**96.4%**	**95.0%**	Fly Ash
ND 8	CELL 4		6"	654-02-01	69.5	32.8	**84.2**	**23.2**	**68.3**	**98.3%**	**95.0%**	Fly Ash
ND 9	CELL 4		6"	654-02-01	69.5	32.8	**72.7**	**26.0**	**57.7**	**83.0%**	**95.0%**	Fly Ash
ND 10	CELL 4		6"	654-02-01	69.5	32.8	**84.9**	**23.9**	**68.5**	**98.6%**	**95.0%**	Fly Ash
DC 1	CELL 4		NA	654-02-01	69.5	32.8	***69.1***	***25.7***	***55.0***	***79.1%***	**95.0%**	Fly Ash
ND 11	CELL 4		6"	654-02-01	69.5	32.8	**71.0**	**26.4**	**56.2**	**80.8%**	**95.0%**	Fly Ash
ND 12	CELL 4		6"	654-02-01	69.5	32.8	**72.0**	**18.7**	**60.7**	**87.3%**	**95.0%**	Fly Ash
ND 13	CELL 4		6"	654-02-01	69.5	32.8	**86.0**	**26.5**	**68.0**	**97.8%**	**95.0%**	Fly Ash
ND 14	CELL 4		6"	723-01-01	80.9	23.9	**86.6**	**25.9**	**68.8**	**85.0%**	**95.0%**	Fly Ash
ND 15	CELL 4		6"	723-01-01	80.9	23.9	**82.7**	**18.1**	**70.0**	**86.6%**	**95.0%**	Fly Ash
ND 16	CELL 4		6"	723-01-01	80.9	23.9	**105.0**	**20.8**	**86.9**	**107.4%**	**95.0%**	Fly Ash
ND 17	CELL 4		6"	723-01-01	80.9	23.9	**96.7**	**22.4**	**79.0**	**97.7%**	**95.0%**	Fly Ash
DC 2	CELL 4		NA	723-01-01	80.9	23.9	***98.3***	***22.3***	***80.4***	***99.4%***	**95.0%**	Fly Ash

Gauge Number	Gauge Model
32387	3440

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C-2

4/SF1 TEMPORARY CULVERT
18"ø CPE-S

1/SF1 ROADWAY
TEMP 1

4/SF2 V-DITCH TC-6
UNDERCUT BASE

DROP INLET – 36"ø 2/SF1
RIM ELEV = 518.0'

4/SF1 DOWNPIPE DP-9
18" CPE-S

3/SF1 OUTLET PROTECTION

5/SF1 SEDIMENT TRAP
H = 2.5FT

6/SF2 SILT FENCE OUTLET
EVERY 300± LF

5/SF2 VEGETATED SOIL COVER
TOP OF EAST SLOPE
24" TOTAL THICKNESS

4/SF2 V-DITCH EAST

4/SF2 V-DITCH SOUTH

6/SF2 SILT FENCE OUTLET
EVERY 300± LF

2/SF2 PERIMETER BERM

5/SF2

5/SF2

N 992500

N 991500

E 1982000

E 1982500

E 1983000

E 1983500

A 4.4 AC

B 4.9 AC

C 4.9 AC

D 4.9 AC

E 4.6 AC

5%

520

530

540

550

560

80'(TYP)

1%(TYP)

TEST ND 1

TEST ND 2

TEST ND 3

ND 4

ND 5

ND 6

ND 7

FDR-04
10-7-11

P6
TEST 1-3 (SOIL)
4-7 (ASH)

08.08.11	0	NCDENR - DWM NOTIFICATION	
DATE	NO.	REVISION	

LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- PROPOSED CONSTRUCTION LIMITS
- EXISTING LIMITS OF LINER
- CELL LIMITS
- NON 404 – ISOLATED WETLANDS
- INTERMITTENT STREAMS
- JURISDICTIONAL WETLANDS
- EXISTING CHANNEL/POND
- EXISTING UNPAVED ROAD/PARKING
- PROPOSED ACCESS ROAD
- SILT FENCE
- SEDIMENT TRAP HEIGHT, H = 5FT (TYPICAL)

attachment #1

FLY ASH (DFA) TO ESTABLISH A BASE GRADE FOR FUTURE LINER

TO OPTIMUM WATER CONTENT AND COMPACTED TO A MINIMUM 95% PACTED PROMPTLY. PLANNED COMPACTION TESTING FREQUENCY IS IGNEER

5. INTERIM SLOPE COVER. AN 18-INCH VEGETATED SOIL COVER SHALL BE INSTALLED ON THE WEST AND SOUTH SLOPES, AND EMBNKMENT TOP (80' WIDTH). SOIL CEMENT MAY BE APPROVED BY THE OWNER FOR TEMPORARY DUST CONTROL PRIOR TO SOIL COVER APPLICATION.

6. ACTIVE TOP SURFACE. DURING OPERATIONS, THE WORKING TOP SURFACE SHALL BE GRADED TO 0.5%± AND SHALL BE MOISTURE CONDITIONED TO CONTROL DUST. SEDIMENT TRAPS SHALL BE POSITIONED TO CONTROL DISCHARGE OF RUN-OFF INTO CHANNELS OR INLETS.

REFERENCES

1. EXISTING TOPOGRAPHY SHOWN IS REPRESENTATIVE OF EXISTING CONDITIONS FOR THE P6 STRUCTURAL FILL CONSTRUCTION LIMITS AS COMPILED (2' CONTOURS) BY CAROLINA RESOURCE MAPPING, WILMINGTON, N.C., FROM AERIAL PHOTOGRAPHY DATED MARCH, 2007 (CONTOURS

Client:	BLACKROCK ENGINEERS
Project Name :	ROXBORO DAM SAFETY
Project Number :	2011-845

Report Number :	**FDR-04**
Date (s) :	10.7.11

Drive Cylinder - ASTM D 2937

Test Information		
Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-10	ND-17
Location:	CELL 4	CELL 4
Depth (ft):	NA	NA
Date :	10.7.11	10.7.11
Mold		
Cylinder ID	SC-01	SC-01
Weight of Cylinder (lbs.)	1.335	1.41
Volume of Cylinder (ft^3)	0.033	0.033
Specimen		
Wt. of Cylinder & WS (lbs.)	4.20	4.65
Wt. of Cylinder (lbs.)	1.34	1.41
Wt. of WS	2.87	3.24
Cylinder Volume (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	809	826
Wt. of Tare & WS (gm)	503.80	432.20
Wt. of Tare & DS (gm)	424.36	378.48
Wt. of Tare (gm)	114.90	137.10
Wt. of Water (gm)	79.44	53.72
Wt. of DS (gm)	309.46	241.38
Wet Density (pcf):	86.8	98.3
Moisture Content (%):	**25.7**	**22.3**
Dry Density (pcf):	**69.1**	**80.4**

Geotechnics Representative : M. BLACKLEY

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Day:	**THURS**
Date:	**11/10/2011**
Log No.:	**9**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Dam Safety	**Project No.:**	2011-845
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:45 **Departed:** 4:15
General Contractor:	Charah, Inc	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Jon Giles
Blackrock	Gary Ahlberg

Weather Conditions:	Cloudy	**Temperature:**	60

Contractor's Equipment: Smoothdrum Roller, Dozer, 3 Off-Road Terek trucks

Contractor's Personnel: ~3

Description of Daily Activities & Events

- Geotechnics representative Shannon Sisell arrived on site and met with Jon Giles (Blackrock).
- Charah was spreading and rolling ash as three Off-Road trucks were delivering in Phase 6.
- Geotechnics rep. performed 6 moisture/density test in locations selected by Jon Giles.
- Test performed near or at existing ash surface with probe at 8 inches.
- As requested by Jon Giles, 2 one-point-proctor test were collected for samples with a greater compaction than 100%. 4 oven moisture samples were also collected (see data).
- Site received a light mist/rain, preventing futher testing. Previous test were not affected.
- Geotechnics rep. and Jon Giles met with Gary Ahlberg (Blackrock) to review.
- Geotechnics rep. collected 1 bulk sample from borrow pit for standard proctor.
- Geotechnics rep. collected 3 bulk samples from west ash pond for gradation test. Samples were collect at 100' from south end, middle, 100' from north end of west finger.
- Geotechnics rep. departed the site at 4:15PM

Prepared By: S. Sisell **Date:** 11/10/2011 **Checked By:** MMB **Date:** 11/11

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO FLY ASH DAM SAFETY
Project Number : 2011-845

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-09**	Geotechnics Representative : Shannon Sisell	Page : 1
Date (s) : **11.10.11**	Reviewed By : MMS	Date : 11/11

Contractor : Charah, Inc.	Borrow Source : Fly Ash Silo

Compaction Equipment : Cat Smoothdrum Vibratory Roller

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	PHASE 6	-2"	8"	735-01-03	72.6	33.0	**67.8**	**23.9**	**52.6**	**72.4%**	**95.0%**	gray, firm, moist
ND 2	PHASE 6	-2"	8"	723-01-01	81.0	23.9	**89.0**	**13.4**	**78.5**	**96.9%**	**95.0%**	tan, firm, moist
ND 3	PHASE 6	-2"	8"	723-01-01	81.0	23.9	**91.6**	**18.2**	**77.5**	**95.7%**	**95.0%**	gray tan marbled, firm
ND 4	PHASE 6	-2"	8"	735-01-03	72.6	33.0	**76.8**	**24.7**	**61.6**	**84.8%**	**95.0%**	gray, firm, moist
ND 5	PHASE 6	-2"	8"	735-01-03	72.6	33.0	**69.8**	**22.9**	**54.7**	**75.4%**	**95.0%**	gray, firm, moist
ND 6	PHASE 6	-1"	8"	735-01-03	72.6	33.0	**84.8**	**21.4**	**61.1**	**84.2%**	**95.0%**	gray, firm, moist

Gauge Number	Gauge Model
17	3450

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO FLY ASH DAM SAFETY
Project No.	2011-845

Test Number:	.001	.002	.003	.004
Nuclear Test Number:	1	4	5	6
Location:	P6	P6	P6	P6
Depth:	-3"	-3"	-3"	-3"
Tare Number	397	211	820	840
Wt. of Tare & WS (gm)	797.98	593.63	746.18	650.21
Wt. of Tare & DS (gm)	684.07	510.08	645.88	581.88
Wt. of Tare (gm)	208.32	171.19	208.04	262.64
Wt. of Water (gm)	113.91	83.55	100.3	68.33
Wt. of DS (gm)	475.75	338.89	437.84	319.24
Water Content (%)	**23.9**	**24.7**	**22.9**	**21.4**

Notes : *NA*

Tested By *SFS* *Date* *11/10/2011* *Checked By* *Date* 11/21

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO FLY ASH DAM SAFETY
Project Number :	2011-845

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-09**
Date (s) :	**11.10.11**

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : P6 ASH

Test Information		
Test Number :	1	2
Location:	ND-2	ND-3
Depth (ft):	NA	NA
Date :	11/10	11/10
Mold		
Weight of Mold (lbs.)	9.465	9.32
Volume OF Mold (ft^3)	0.033	0.033
Specimen		
Weight of Mold & WS (lbs)	12.733	12.769
Weight of Mold (lbs)	9.465	9.32
Weight of WS (lbs)	3.268	3.449
Volume OF Mold (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	821	819
Wt. of Tare & WS (gm)	266.90	245.50
Wt. of Tare & DS (gm)	252.94	227.78
Wt. of Tare (gm)	135.80	135.50
Wt. of Water (gm)	13.96	17.72
Wt. of DS (gm)	117.14	92.28
Wet Density (pcf)	99.0	104.5
Moisture Content %	**11.9**	**19.2**
Dry Density (pcf)	**88.5**	**87.7**

Geotechnics Represenative : S. SISELL

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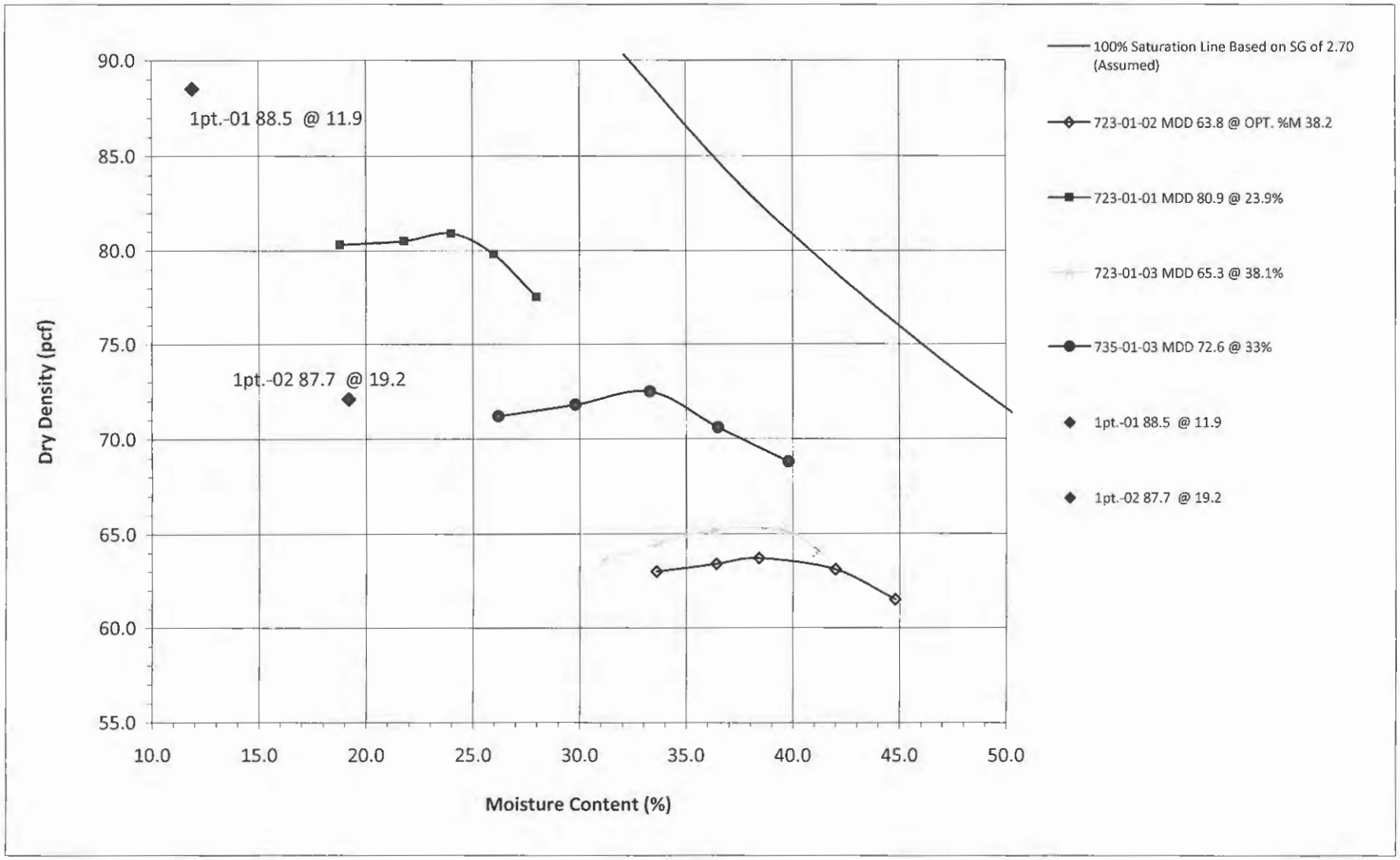
One Point Moisture / Density Relationships

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO FLY ASH DAM SAFETY
Project Number : 2011-845



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Day:	Wed.
Date:	1.18.12
Log No.:	01
Page:	1 of 1

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2011-768
Client Name:	Blackrock Eng.	**Client Contact:**	Hannu Kemppinen
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 1:45pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny, Windy	**Temperature:**	40's
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Blackrock representative John Giles.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	1.18.12	**Checked By:**	[illegible]	**Date**	1/23

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-01**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1
Date (s) : **1.18.12**	Reviewed By : MMS	Date : 1/23

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	A	1.18.12	6"	607-01-02	98.2	14.6	**114.0**	**17.3**	**97.2**	**99.0%**	**95.0%**	
DC - 01	A	1.18.12	6"	607-01-02	98.2	14.6	**114.8**	**17.3**	**97.9**	**99.7%**	**95.0%**	
ND - 02	A	1.18.12	6"	607-01-02	98.2	14.6	**112.6**	**19.5**	**94.2**	**96.0%**	**95.0%**	
ND - 03	A	1.18.12	6"	735-01-03	72.6	33.0	**91.4**	**26.0**	**72.5**	**99.9%**	**95.0%**	
ND - 04	A	1.18.12	6"	723-01-01	80.9	23.9	**97.5**	**25.3**	**77.8**	**96.2%**	**95.0%**	
ND - 05	B	1.18.12	6"	723-01-03	65.3	38.1	**81.4**	**25.6**	**64.8**	**99.2%**	**95.0%**	
ND - 06	B	1.18.12	6"	723-01-01	80.9	23.9	**95.4**	**18.1**	**80.8**	**99.9%**	**95.0%**	
DC - 02	B	1.18.12	6"	723-01-01	80.9	23.9	**94.2**	**18.1**	**79.8**	**98.6%**	**95.0%**	
ND - 07	B	1.18.12	6"	1PT.-07	51.5	37.0	**70.8**	**27.0**	**55.7**	**108.2%**	**95.0%**	
ND - 08	B	1.18.12	6"	723-01-03	65.3	38.1	**76.9**	**21.5**	**63.3**	**96.9%**	**95.0%**	
ND - 09	B	1.18.12	6"	723-01-03	65.3	38.1	**74.6**	**17.1**	**63.7**	**97.6%**	**95.0%**	
ND - 10	B	1.18.12	6"	1PT.-07	51.5	37.0	**73.6**	**32.7**	**55.5**	**107.7%**	**95.0%**	

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-01**
Date (s) :	1.18.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-01	ND-06
Location:	A	B
Depth (ft):	1.18.12	1.18.12
Date :	1.18.12	1.18.12

Mold

Cylinder ID	JB-01	JB-02
Weight of Cylinder (lbs.)	1.34	1.37
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.13	4.48
Wt. of Cylinder (lbs.)	1.34	1.37
Wt. of WS	3.79	3.11
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	812	805
Wt. of Tare & WS (gm)	528.30	366.20
Wt. of Tare & DS (gm)	466.16	326.31
Wt. of Tare (gm)	106.63	106.16
Wt. of Water (gm)	62.14	39.89
Wt. of DS (gm)	359.53	220.15
Wet Density (pcf):	114.8	94.2
Moisture Content (%):	**17.3**	**18.1**
Dry Density (pcf):	**97.9**	**79.8**

Geotechnics Representative : JACOB R. BUDA

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-01**
Date (s) : 1.18.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information				
Test Number :	1pt-01	1pt-02	1pt-01	1pt-01
Location:	A	A	A	B
Depth (ft):	1.18.12	1.18.12	1.18.12	1.18.12
Date :	1.18.12	1.18.12	1.18.12	1.18.12
Mold				
Weight of Mold (lbs.)	4.49	4.49	4.9	4.9
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Weight of Mold & WS (lbs)	8.08	7.09	7.49	7.86
Weight of Mold (lbs)	4.49	4.49	4.90	4.90
Weight of WS (lbs)	3.59	2.60	2.59	2.96
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	307	308	399	305
Wt. of Tare & WS (gm)	312.45	245.76	300.98	274.98
Wt. of Tare & DS (gm)	282.92	222.53	252.28	238.93
Wt. of Tare (gm)	110.85	111.77	86.70	84.72
Wt. of Water (gm)	29.53	23.23	48.70	36.05
Wt. of DS (gm)	172.07	110.76	165.58	154.21
Wet Density (pcf):	108.8	78.8	78.5	89.7
Moisture Content (%):	**17.2**	**21.0**	**29.4**	**23.4**
Dry Density (pcf):	**92.9**	**65.1**	**60.6**	**72.7**

Geotechnics Representative : Jacob R. Buda

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	A	A	A	A	B
Depth:	1.18.12	1.18.12	1.18.12	1.18.12	1.18.12
Tare Number	812	808	814	804	800
Wt. of Tare & WS (gm)	528.30	487.42	396.62	469.36	355.91
Wt. of Tare & DS (gm)	466.16	424.85	337.81	395.73	304.55
Wt. of Tare (gm)	106.53	104.48	111.65	105.10	103.78
Wt. of Water (gm)	62.14	62.57	58.81	73.63	51.36
Wt. of DS (gm)	359.63	320.37	226.16	290.63	200.77
Water Content (%)	**17.3**	**19.5**	**26.0**	**25.3**	**25.6**

Test Number:	WC-06	WC-07	WC-08
Nuclear Test Number:	ND-06	ND-07	ND-10
Location:	B	B	B
Depth:	1.18.12	1.18.12	1.18.12
Tare Number	805	811	801
Wt. of Tare & WS (gm)	366.2	383.96	415.68
Wt. of Tare & DS (gm)	326.31	324.91	339.43
Wt. of Tare (gm)	106.16	106.11	106.43
Wt. of Water (gm)	39.89	59.05	76.25
Wt. of DS (gm)	220.15	218.8	233
Water Content (%)	**18.1**	**27.0**	**32.7**

Notes : *NA*

Tested By *JRB* *Date* *1.20.12* *Checked By* MM *Date* 1/23

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-01**
Date (s) : 1.18.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-05	1pt-06	1pt-07
Location:	B	B	B
Depth (ft):	1.18.12	1.18.12	1.18.12
Date :	1.18.12	1.18.12	1.18.12

Mold

Weight of Mold (lbs.)	4.49	4.49	4.9
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	7.97	7.43	7.23
Weight of Mold (lbs)	4.49	4.49	4.90
Weight of WS (lbs)	3.48	2.94	2.33
Volume OF Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	305	399	308
Wt. of Tare & WS (gm)	214.53	235.76	239.83
Wt. of Tare & DS (gm)	193.60	196.43	205.26
Wt. of Tare (gm)	84.75	86.80	111.89
Wt. of Water (gm)	20.93	39.33	34.57
Wt. of DS (gm)	108.85	109.63	93.37
Wet Density (pcf):	105.5	89.1	70.6
Moisture Content (%):	**19.2**	**35.9**	**37.0**
Dry Density (pcf):	**88.4**	**65.6**	**51.5**

Geotechnics Representative : Jacob R. Buda

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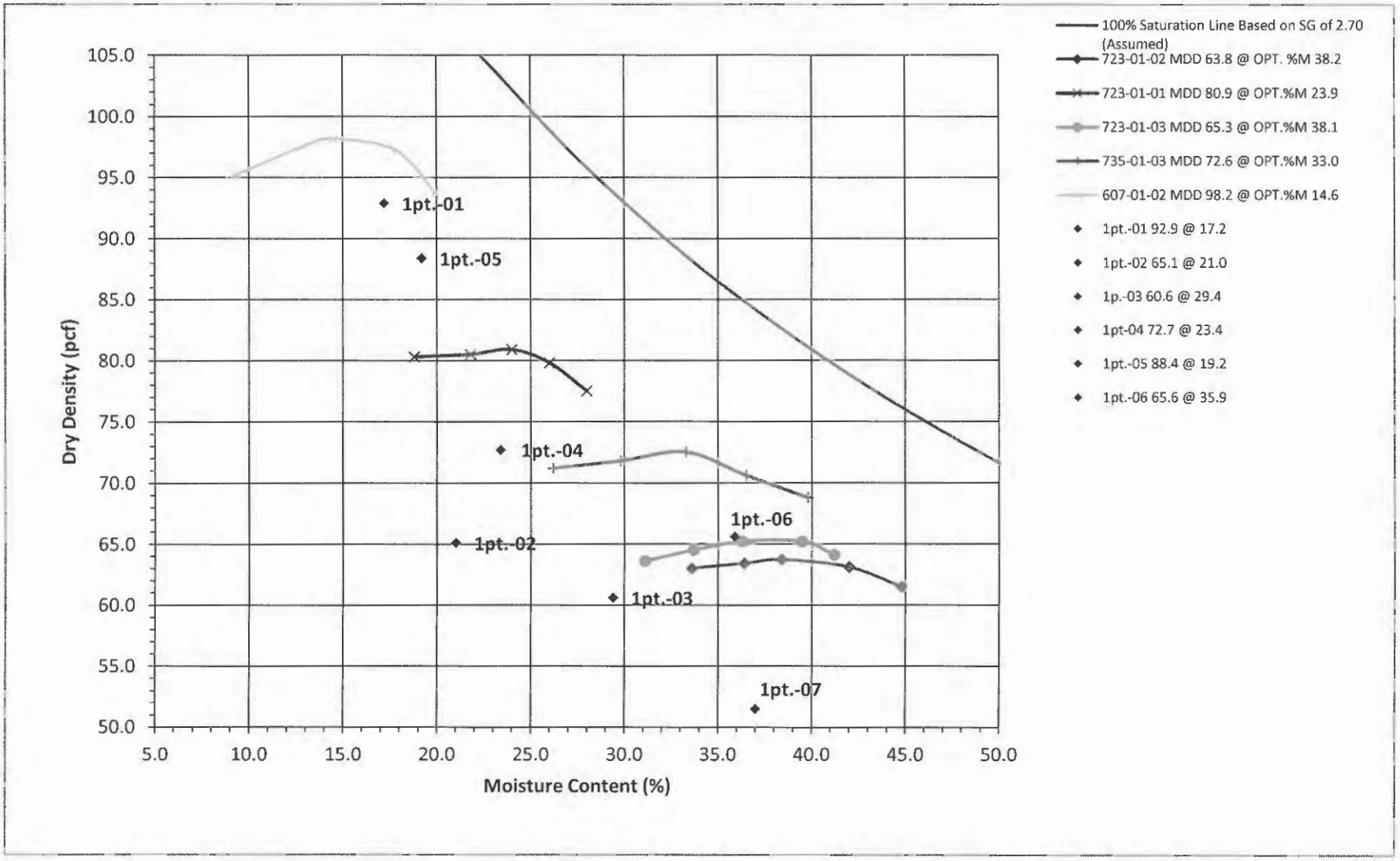
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607



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Day:	**Thurs.**
Date:	**2.2.12**
Log No.:	**03**
Page:	**1 of 1**

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-000
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 12:00pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny, Windy	**Temperature:**	60's
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Charah representative Justin Mize
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material (see FDR-03 for results).
- Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	2.2.12	**Checked By:**	MMS	**Date:**	2/3

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-000

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-03**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1
Date (s) : **2.2.12**	Reviewed By : MPS	Date : 2/3

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33577	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	B	2.2.12	6"	723-01-03	65.3	38.1	**83.8**	**25.9**	**66.6**	**101.9%**	**95.0%**	%M Corrected
ND - 02	B	2.2.12	6"	723-01-03	65.3	38.1	**82.3**	**29.7**	**63.5**	**97.2%**	**95.0%**	%M Corrected
ND - 03	B	2.2.12	6"	723-01-01	80.9	23.9	**93.4**	**17.2**	**79.7**	**98.5%**	**95.0%**	%M Corrected
ND - 04	B	2.2.12	6"	723-01-03	65.3	38.1	**74.4**	**19.7**	**62.2**	**95.2%**	**95.0%**	%M Corrected
ND - 05	B	2.2.12	6"	1pt.-02	54.3	36.3	**77.8**	**35.9**	**57.2**	**105.4%**	**95.0%**	%M Corrected
ND - 06	B	2.2.12	6"	723-01-03	65.3	38.1	**78.9**	**23.2**	**64.0**	**98.1%**	**95.0%**	%M Corrected
ND - 07	A	2.2.12	6"	723-01-03	65.3	38.1	**84.0**	**24.4**	**67.5**	**103.4%**	**95.0%**	%M Corrected
ND - 08	A	2.2.12	6"	723-01-01	80.9	23.9	**97.2**	**20.8**	**80.5**	**99.5%**	**95.0%**	%M Corrected

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Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-000

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INTEGRITY IN TESTING

Report Number :	**FDR-03**
Date (s) :	2.2.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	B	A
Depth (ft):	2.2.12	2.2.12
Date :	2.2.12	2.2.12

Mold

Weight of Mold (lbs.)	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.35	11.90
Weight of Mold (lbs)	9.46	9.46
Weight of WS (lbs)	2.89	2.44
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	307	304
Wt. of Tare & WS (gm)	277.32	303.68
Wt. of Tare & DS (gm)	233.96	252.37
Wt. of Tare (gm)	110.79	110.83
Wt. of Water (gm)	43.36	51.31
Wt. of DS (gm)	123.17	141.54
Wet Density (pcf):	87.6	73.9
Moisture Content (%):	**35.2**	**36.3**
Dry Density (pcf):	**64.8**	**54.3**

Geotechnics Representative : Jacob R. Buda

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INTEGRITY IN TESTING

MOISTURE CONTENT

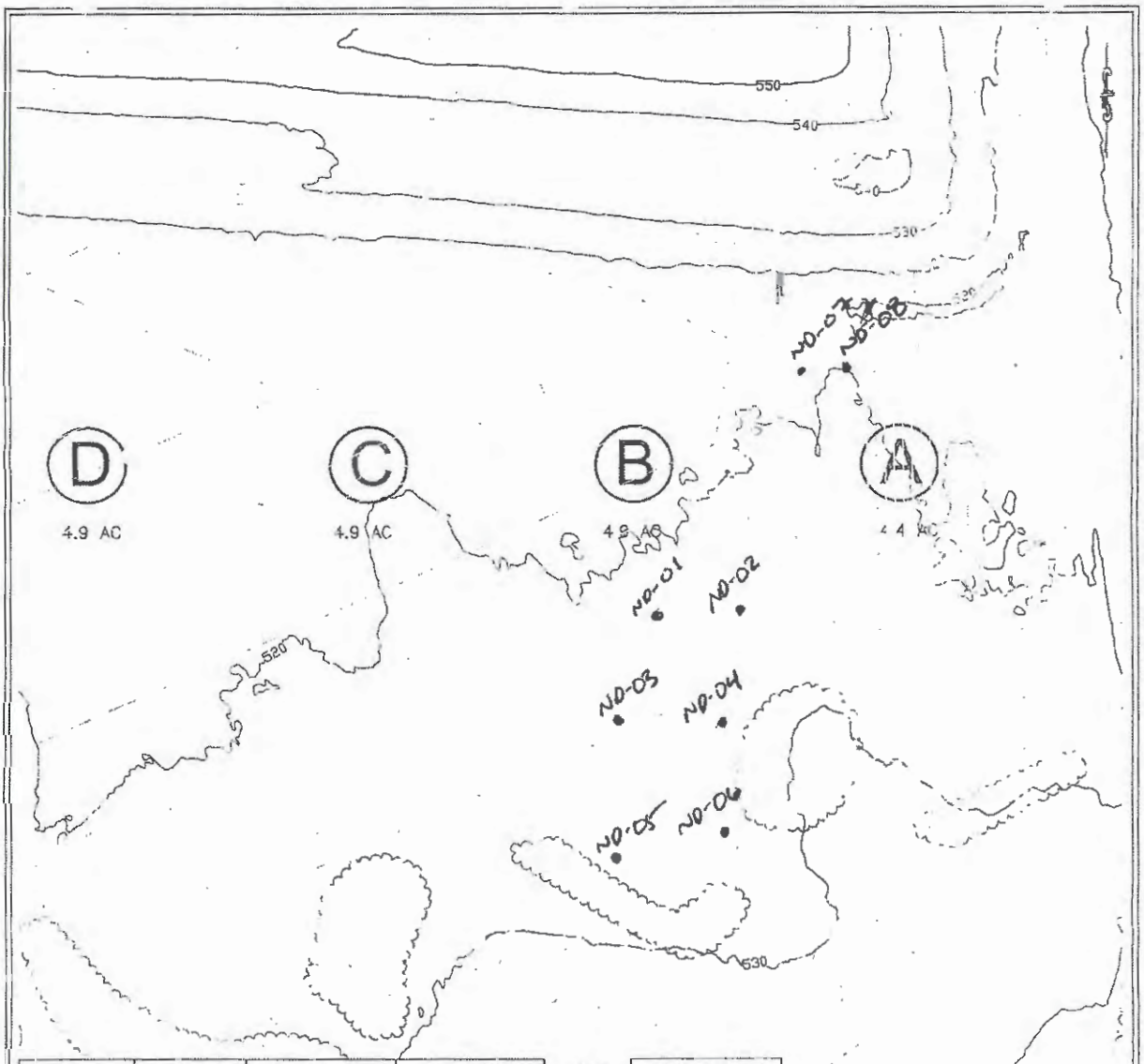
ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-000

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-05	ND-07
Location:	B	B	B	B	A
Depth:	2.2.12	2.2.12	2.2.12	2.2.12	2.2.12
Tare Number	802	805	808	810	814
Wt. of Tare & WS (gm)	422.07	279.55	465.39	324.08	373.23
Wt. of Tare & DS (gm)	357.93	239.83	412.48	268.76	321.96
Wt. of Tare (gm)	103.59	106.22	104.46	114.54	111.71
Wt. of Water (gm)	64.14	39.72	52.91	55.32	51.27
Wt. of DS (gm)	254.34	133.61	308.02	154.22	210.25
Water Content (%)	**25.2**	**29.7**	**17.2**	**35.9**	**24.4**

Notes : *NA*

Tested By *JRB* *Date* *1.20.12* *Checked By* *Date* 2/3



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

TITLE:

P6A
COMPACTION TESTS
GEOTECHNICS 2.2.12

APPROX. TEST LOCATIONS

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
JWG	GWA	1"=100'	CT-3

DATE:	PROJECT NO.	FILE NAME
11.14.11	ROXLF	P6-CT_BR

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107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
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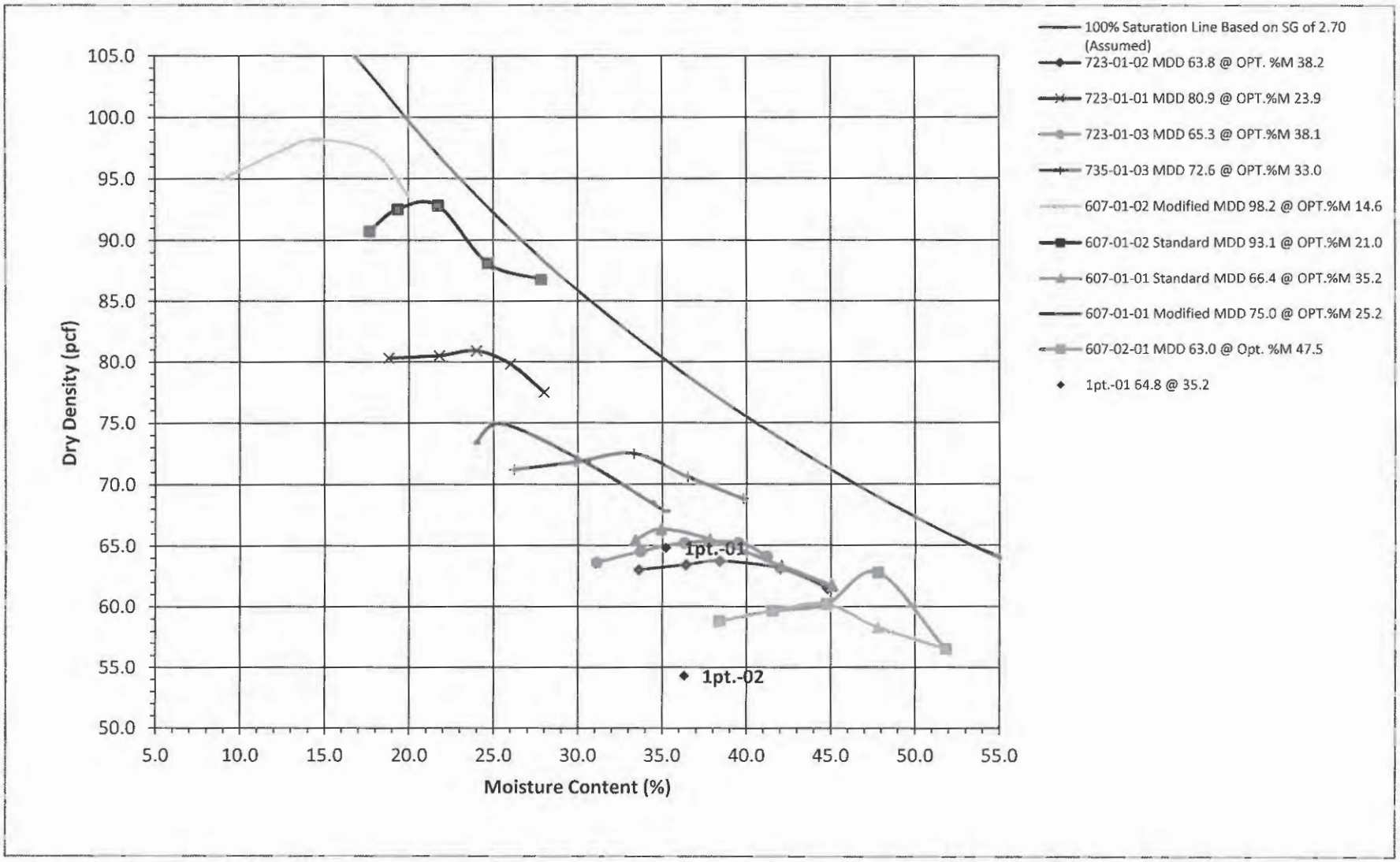
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-000



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Day:	**Thurs.**
Date:	**2.9.12**
Log No.:	**04**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00am **Departed:** 1:45pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny, Windy	**Temperature:**	50's

Contractor's Equipment: 1 CAT Smoothdrum Roller

Contractor's Personnel: NA

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Charah representative Matt Pugh
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Gypsum material in Phase 3A (see GFDR-01 for results).
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material (see FDR-04 for results).
- Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.

Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	2.9.12	**Checked By:**	MMS	**Date:**	2/13

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

Geotechnics
INTEGRITY IN TESTING

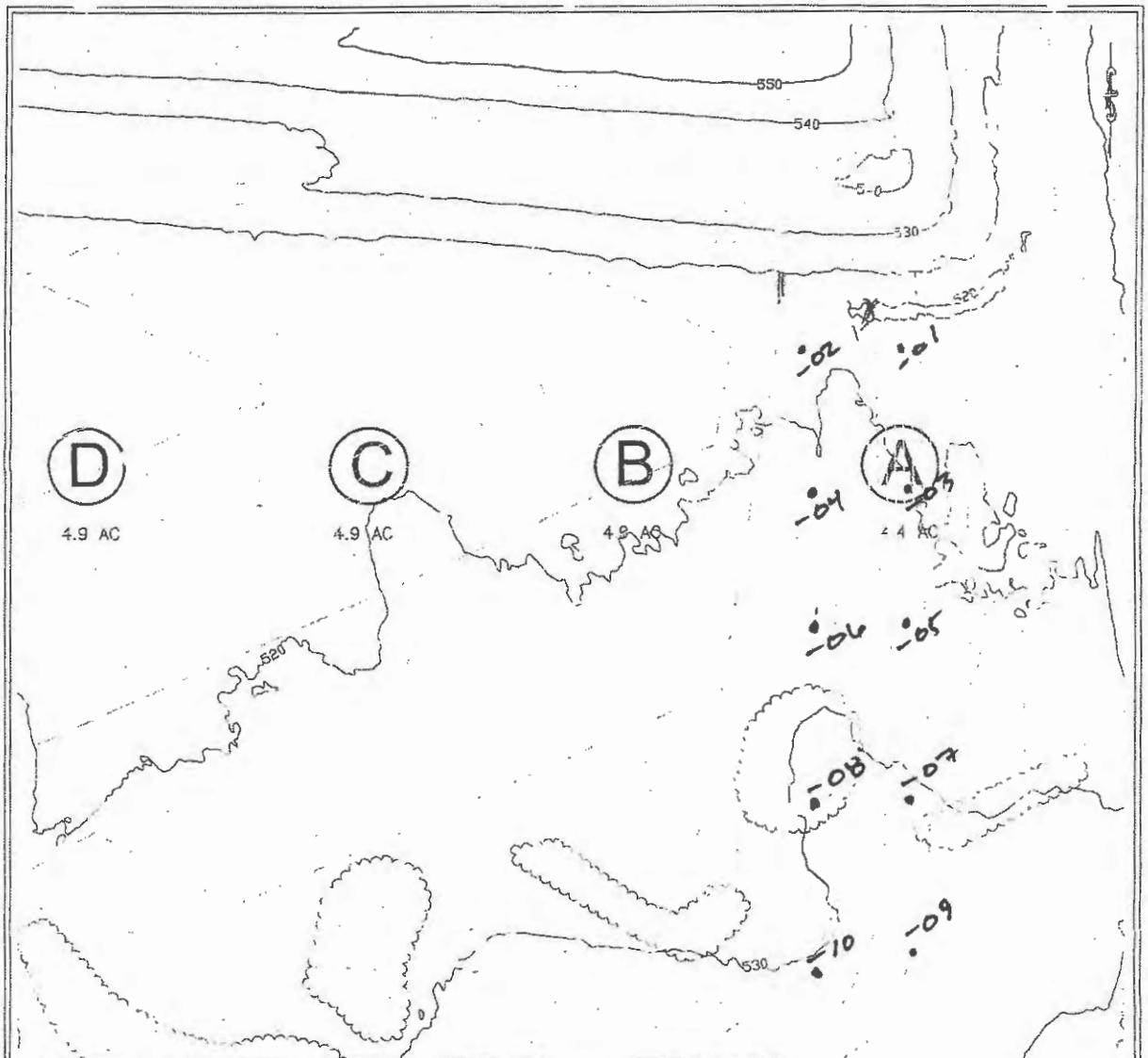
Field Density Report

Report Number : **FDR-04**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1
Date (s) : **2.9.12**	Reviewed By : [illegible]	Date : 2/13

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33577	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	A	542.3	6"	607-01-01	75.0	25.2	**82.8**	**9.8**	**75.4**	**100.5%**	**95.0%**	%M Corrected
ND - 02	A	542.7	6"	723-01-03	65.3	38.1	**82.6**	**29.3**	**63.9**	**97.8%**	**95.0%**	%M Corrected
ND - 03	A	544.5	6"	1pt.-03	56.9	35.2	**76.8**	**38.2**	**55.6**	**97.7%**	**95.0%**	%M Corrected
DC - 01	A	544.5	6"	1pt.-03	56.9	35.2	**76.1**	**38.2**	**55.1**	**96.8%**	**95.0%**	%M Corrected
ND - 04	A	543.4	6"	723-01-03	65.3	38.1	**77.0**	**22.2**	**63.0**	**96.5%**	**95.0%**	%M Corrected
ND - 05	A	543.5	6"	607-01-01	75.0	25.2	**80.6**	**9.2**	**73.8**	**98.4%**	**95.0%**	%M Corrected
ND - 06	A	543.5	6"	1pt.-03	56.9	35.2	**73.1**	**27.9**	**57.2**	**100.4%**	**95.0%**	%M Corrected
ND - 07	A	543.4	6"	1pt.-03	56.9	35.2	**75.7**	**28.2**	**59.0**	**103.8%**	**95.0%**	%M Corrected
ND - 08	A	543.4	6"	1pt.-03	56.9	35.2	**69.5**	**24.0**	**56.0**	**98.5%**	**95.0%**	%M Corrected
ND - 09	A	543.8	6"	1pt.-03	56.9	35.2	**72.3**	**25.9**	**57.4**	**100.9%**	**95.0%**	%M Corrected
ND - 10	A	543.8	6"	1pt.-03	56.9	35.2	**72.1**	**25.7**	**57.4**	**100.8%**	**95.0%**	%M Corrected



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6A COMPACTION TESTS GEOTECHNICS 2.9.12	JWG	GWA	1"=100'	CT-3
	DATE: 11.14.11	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-05	ND-07
Location:	A	A	A	A	A
Depth:	542.3	542.68	544.5	543.5	543.4
Tare Number	310	315	308	309	307
Wt. of Tare & WS (gm)	560.37	414.50	355.98	555.21	445.15
Wt. of Tare & DS (gm)	520.19	345.50	288.42	517.80	371.58
Wt. of Tare (gm)	110.27	110.30	111.79	109.63	110.8
Wt. of Water (gm)	40.18	69	67.56	37.41	73.57
Wt. of DS (gm)	409.92	235.2	176.63	408.17	260.78
Water Content (%)	**9.8**	**29.3**	**38.2**	**9.2**	**28.2**

Test Number:	WC-06
Nuclear Test Number:	ND-09
Location:	A
Depth:	543.8
Tare Number	314
Wt. of Tare & WS (gm)	320.93
Wt. of Tare & DS (gm)	272.36
Wt. of Tare (gm)	84.69
Wt. of Water (gm)	48.57
Wt. of DS (gm)	187.67
Water Content (%)	**25.9**

Notes : *NA*

Tested By JRB *Date* 2.9.12 *Checked By* MMS *Date* 2/13

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-624

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-04**
Date (s) :	2.9.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-03
Location:	A
Depth (ft):	544.5
Date :	2.9.12

Mold

Cylinder ID	JB-01
Weight of Cylinder (lbs.)	1.36
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.87
Wt. of Cylinder (lbs.)	1.36
Wt. of WS	2.51
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	308
Wt. of Tare & WS (gm)	355.98
Wt. of Tare & DS (gm)	288.42
Wt. of Tare (gm)	111.79
Wt. of Water (gm)	67.56
Wt. of DS (gm)	176.63
Wet Density (pcf):	76.1
Moisture Content (%):	**38.2**
Dry Density (pcf):	**55.0**

Geotechnics Representative : JACOB R. BUDA

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-000

Report Number : **FDR-04**
Date (s) : 2.9.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03
Location:	A	A	A
Depth (ft):	2.9.12	2.9.12	2.9.12
Date :	2.9.12	2.9.12	2.9.12

Mold

Weight of Mold (lbs.)	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.33	11.89	12.00
Weight of Mold (lbs)	9.46	9.46	9.46
Weight of WS (lbs)	2.87	2.43	2.54
Volume OF Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	310	308	308
Wt. of Tare & WS (gm)	283.92	355.98	355.98
Wt. of Tare & DS (gm)	239.92	288.42	292.42
Wt. of Tare (gm)	110.53	111.79	111.79
Wt. of Water (gm)	44.00	67.56	63.56
Wt. of DS (gm)	129.39	176.63	180.63
Wet Density (pcf):	87.0	73.6	77.0
Moisture Content (%):	**34.0**	**38.2**	**35.2**
Dry Density (pcf):	**64.9**	**53.3**	**56.9**

Geotechnics Representative : Jacob R. Buda

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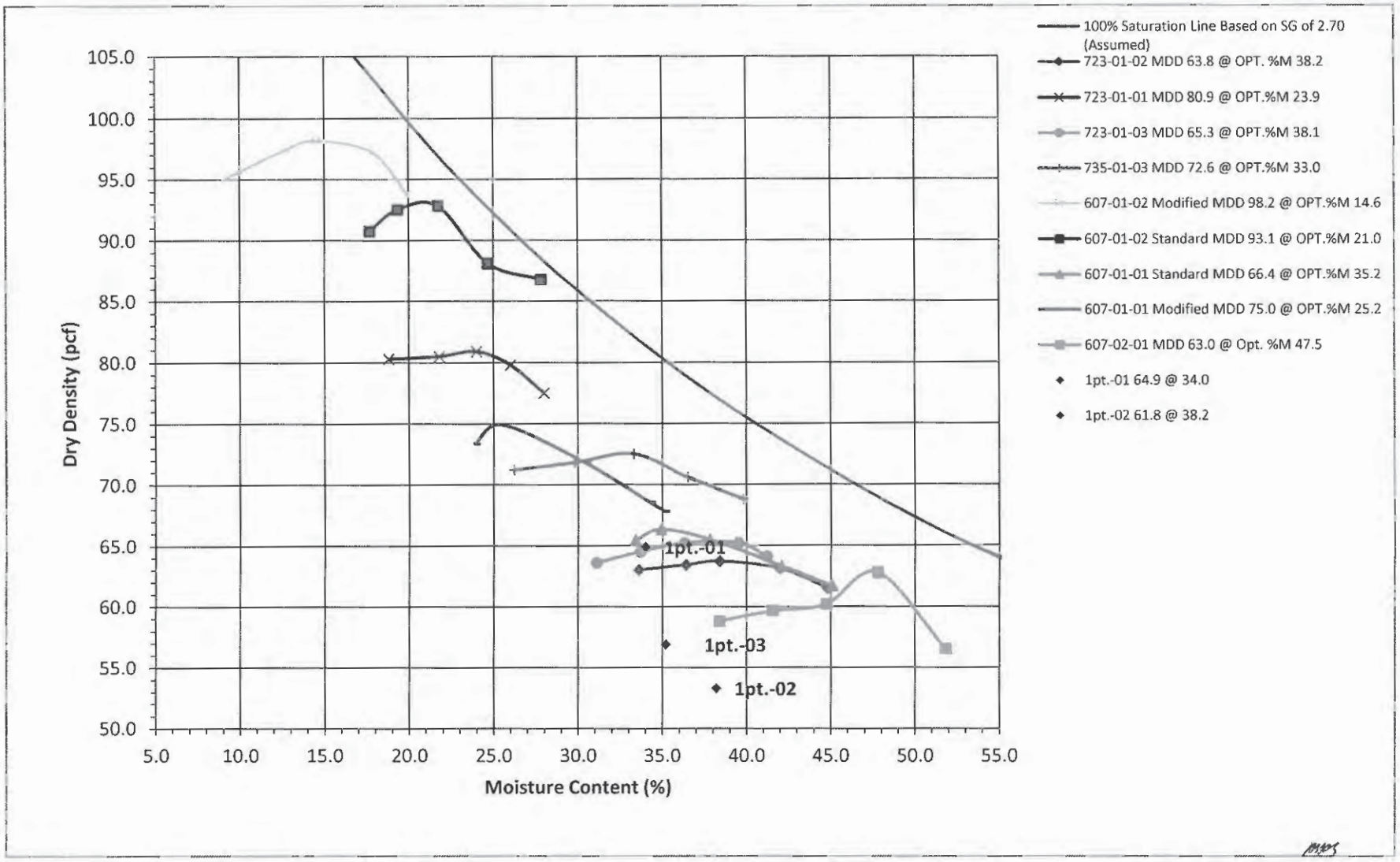
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-000



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Day:	**Thurs.**
Date:	**2.16.12**
Log No.:	**05**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 1:30pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Overcast, Light Rain	**Temperature:**	50's

Contractor's Equipment: 1 CAT Smoothdrum Roller

Contractor's Personnel: NA

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Charah representative Matt Pugh
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Gypsum material in Phase 3A (see GFDR-02 for results).
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material (see FDR-05 for results).
- Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	2.16.12	**Checked By:**	[illegible]	**Date:**	[illegible]

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

Geotechnics
INTEGRITY IN TESTING

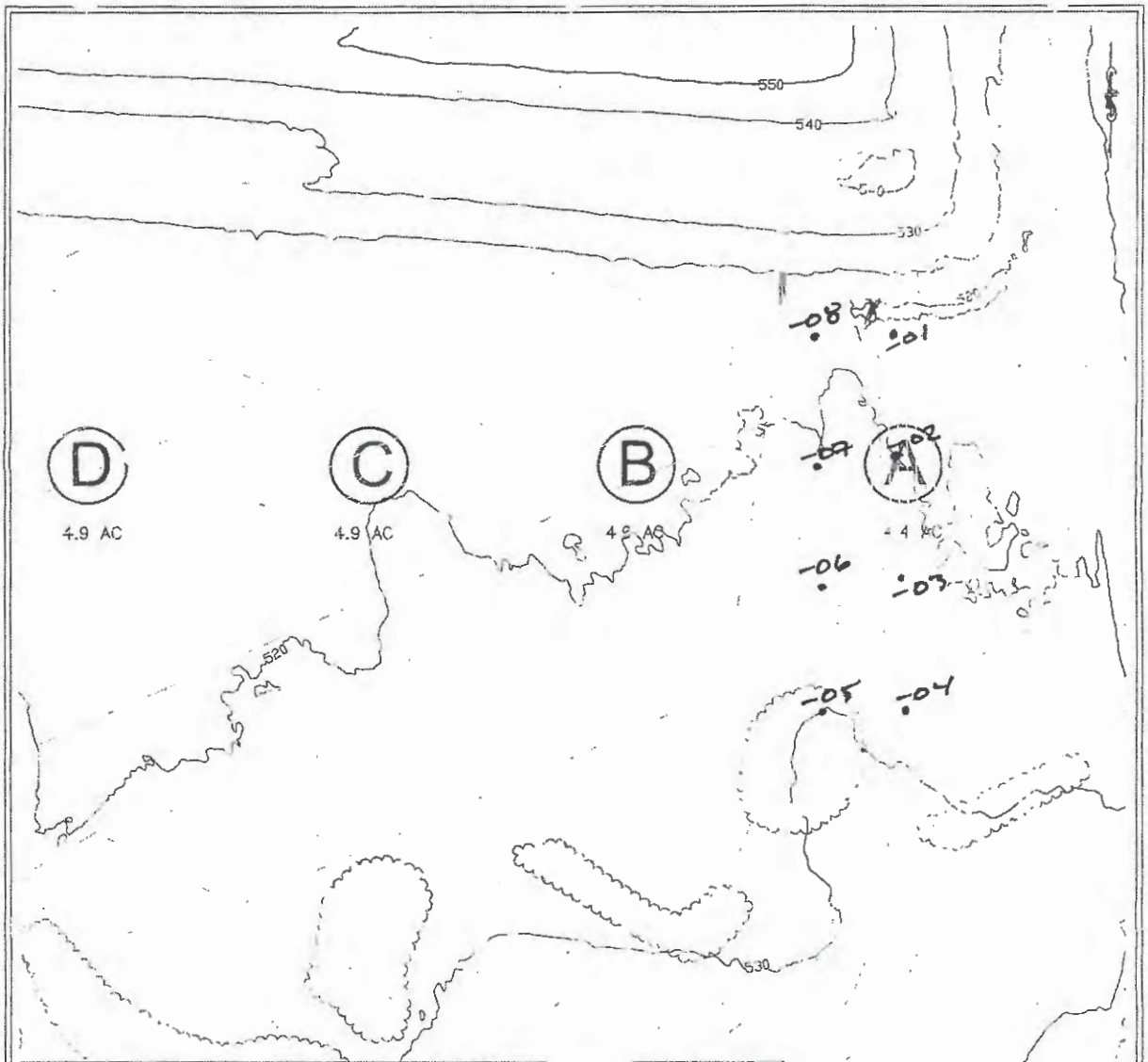
Field Density Report

Report Number : **FDR-05**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1
Date (s) : **2.16.12**	Reviewed By : MAPS	Date : 2/20

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33560	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	A	545.9	8"	607-01-01	66.4	35.2	**85.9**	**32.6**	**64.8**	**97.6%**	**95.0%**	%M Corrected
ND - 02	A	545.9	8"	607-01-01	66.4	35.2	**87.6**	**30.1**	**67.3**	**101.4%**	**95.0%**	%M Corrected
ND - 03	A	546.4	8"	723-01-01	80.9	23.9	**98.8**	**22.4**	**80.7**	**99.8%**	**95.0%**	%M Corrected
ND - 04	A	546.3	8"	1pt.-02	61.5	43.5	**80.1**	**35.3**	**59.2**	**96.3%**	**95.0%**	%M Corrected
ND - 05	A	546.2	8"	1pt.-02	61.5	43.5	**77.7**	**30.3**	**59.6**	**97.0%**	**95.0%**	%M Corrected
ND - 06	A	546.3	8"	723-01-01	80.9	23.9	**96.7**	**17.6**	**82.2**	**101.6%**	**95.0%**	%M Corrected
ND - 07	A	545.8	8"	723-01-01	80.9	23.9	**98.2**	**24.8**	**78.7**	**97.3%**	**95.0%**	%M Corrected
ND - 08	A	541.6	8"	735-01-03	72.6	33.0	**93.9**	**33.6**	**70.3**	**96.8%**	**95.0%**	%M Corrected



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

TITLE:

P6A
COMPACTION TESTS
GEOTECHNICS 2.14.12

APPROX. LOCATIONS

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
JWG	GWA	1"=100'	CT-3

DATE:	PROJECT NO.	FILE NAME
11.14.11	ROXLF	P6-CT_BR

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POST OFFICE BOX 58
WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6595

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-000

Report Number : **FDR-05**
Date (s) : 2.16.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt.02A	1pt.-02B	1pt.-02C
Location:	A	A	A	A
Depth (ft):	546.4	546.3	546.3	546.3
Date :	2.16.12	2.16.12	2.16.12	2.16.12

Mold

Weight of Mold (lbs.)	9.46	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.69	12.08	12.22	12.38
Weight of Mold (lbs)	9.46	9.46	9.46	9.46
Weight of WS (lbs)	3.23	2.62	2.76	2.92
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	317	304	831	838
Wt. of Tare & WS (gm)	343.95	340.79	478.25	445.12
Wt. of Tare & DS (gm)	299.49	280.68	417.84	389.50
Wt. of Tare (gm)	84.70	110.81	262.28	261.70
Wt. of Water (gm)	44.46	60.11	60.41	55.62
Wt. of DS (gm)	214.79	169.87	155.56	127.80
Wet Density (pcf):	97.9	79.4	83.6	88.3
Moisture Content (%):	**20.7**	**35.4**	**38.8**	**43.5**
Dry Density (pcf):	**81.1**	**58.6**	**60.2**	**61.5**

Geotechnics Representative : Jacob R. Buda

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Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-000

Report Number :	**FDR-05**
Date (s) :	2.16.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-02D
Location:	A
Depth (ft):	546.4
Date :	2.16.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.37
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.91
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	830
Wt. of Tare & WS (gm)	482.97
Wt. of Tare & DS (gm)	411.47
Wt. of Tare (gm)	258.40
Wt. of Water (gm)	71.50
Wt. of DS (gm)	153.07
Wet Density (pcf):	88.2
Moisture Content (%):	**46.7**
Dry Density (pcf):	**60.1**

Geotechnics Representative : Jacob R. Buda

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-08
Location:	A	A	A	A	A
Depth:	546.0	545.9	546.4	546.3	541.6
Tare Number	305	314	309	315	308
Wt. of Tare & WS (gm)	315.48	338.76	459.32	357.83	380.79
Wt. of Tare & DS (gm)	258.79	280.00	395.26	293.43	313.26
Wt. of Tare (gm)	84.76	84.99	109.75	110.88	112.12
Wt. of Water (gm)	56.69	58.76	64.06	64.4	67.53
Wt. of DS (gm)	174.03	195.01	285.51	182.55	201.14
Water Content (%)	**32.6**	**30.1**	**22.4**	**35.3**	**33.6**

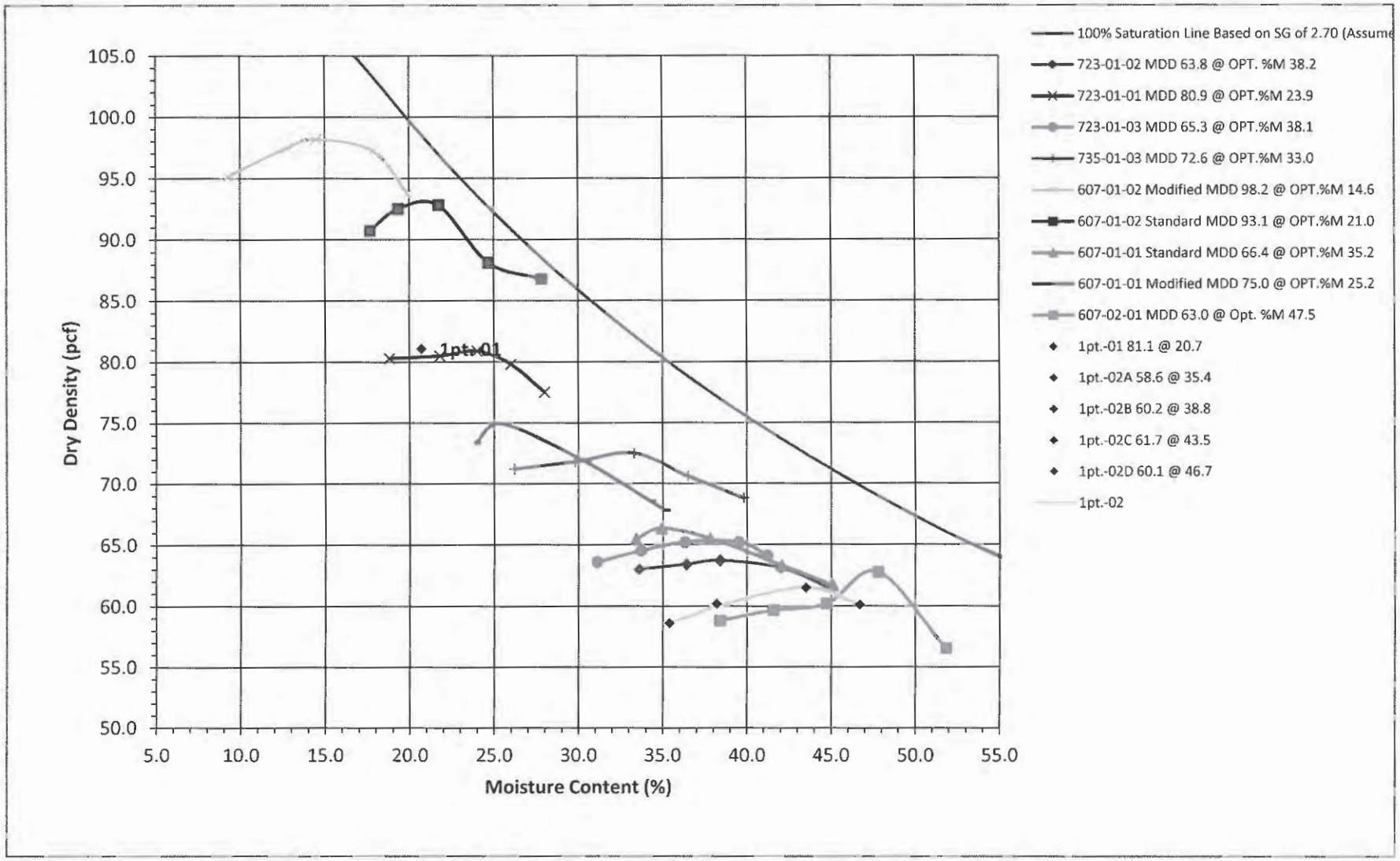
Notes : *NA*

Tested By *JRB* *Date* *2.16.12* *Checked By* *MMS* *Date* 2/20

geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	**Thursday**
Date:	**2.23.12**
Log No.:	**06**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah Inc.	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:00am **Departed:** 2:00pm
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	73
Contractor's Equipment:	CAT Smooth Drum Vibratory compactor		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Gotechnics Rep. David Wright arrived on site and made contact with Charah representative Matt Pugh.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Gypsum material in Phase 3A (see GFDR-03 for results).
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Fly ash material in Phase 6A (see FDR-06 for results).
- Water content and one point proctors were obtained for guage verification and proctor selection.
- Geotechnics Rep departed site.

Prepared By:	DAW	**Date:**	2.23.12	**Checked By:**	GEM	**Date:**	3-5-12

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Client: Charah
Project Name : Roxboro Ash LF Phase 6A
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FDR-06**	Geotechnics Representative : DAW	Page : 1 of 1
Date (s) : **2.23.12**	Reviewed By : SMOYER	Date : 3-5-12

Contractor : Charah	Borrow Source : Onsite Cylo

Compaction Equipment : CAT Smooth drum vibratory compactor

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND	1	A	541.4	8"	607-01-01	66.4	35.2	**84.2**	**24.3**	**67.7**	**102.0%**	**95.0%**	
ND	2	A	549.6	8"	607-01-01	66.4	35.2	**80.2**	**18.7**	**67.6**	**101.8%**	**95.0%**	
ND	3	A	549.5	8"	607-01-01	66.4	35.2	**82.7**	**27.8**	**64.7**	**97.5%**	**95.0%**	
ND	4	A	549.5	8"	607-01-01	66.4	35.2	**85.1**	**28.2**	**66.4**	**100.0%**	**95.0%**	
ND	5	A	547.5	8"	607-01-01	66.4	35.2	**84.5**	**23.9**	**68.2**	**102.7%**	**95.0%**	
ND	6	A	545.8	8"	607-01-01	66.4	35.2	**81.7**	**25.2**	**65.3**	**98.3%**	**95.0%**	

Gauge Number	Gauge Model	Density Count	Moisture Count
33577	3440	2391	626

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Client: Charah
Project Name : Roxboro Ash LF Phase 6A
Project Number : 2012-624

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INTEGRITY IN TESTING

Report Number : **GFDR-03**
Date (s) : 2.23.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4
Nuclear Test Number :	ND-01	ND-02	ND-03	ND-04
Location:	TOE OF PH3A	TOE OF PH3A	TOE OF PH3A	TOE OF PH3A
Depth (ft):	531.4	531.9	532.4	531.9
Tare Number	DW-01	1710	1710	1710
Wt. of Tare & WS (gm)	455.9	469.1	430.3	482.6
Wt. of Tare & DS (gm)	405.3	418.4	384.1	430.2
Wt. of Tare (gm)	111	111	111	111
Wt. of Water (gm)	50.6	50.7	46.2	52.4
Wt. of DS (gm)	294.3	307.4	273.1	319.2
Water Content (%)	**17.2**	**16.5**	**16.9**	**16.4**

Test Number :
Nuclear Test Number :
Location:
Depth (ft):

Tare Number
Wt. of Tare & WS (gm)
Wt. of Tare & DS (gm)
Wt. of Tare (gm)
Wt. of Water (gm)
Wt. of DS (gm)

Water Content (%)

Notes : NA

Tested By: DAW Date: 2.23.12

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Client:	Charah
Project Name :	Roxboro Ash LF Phase 6A
Project Number :	2012-624

Report Number :	**FDR-06**
Date (s) :	2.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-01
Location:	A
Depth (ft):	541.4
Date :	2.23.12

Mold

Weight of Mold (lbs.)	9.32
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.34
Weight of Mold (lbs)	9.32
Weight of WS (lbs)	3.02
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	DW-01
Wt. of Tare & WS (gm)	506.90
Wt. of Tare & DS (gm)	405.80
Wt. of Tare (gm)	111.00
Wt. of Water (gm)	101.10
Wt. of DS (gm)	294.80
Wet Density (pcf)	91.5
Moisture Content %	**34.3**
Dry Density (pcf)	**68.1**

Geotechnics Represenative : DAW

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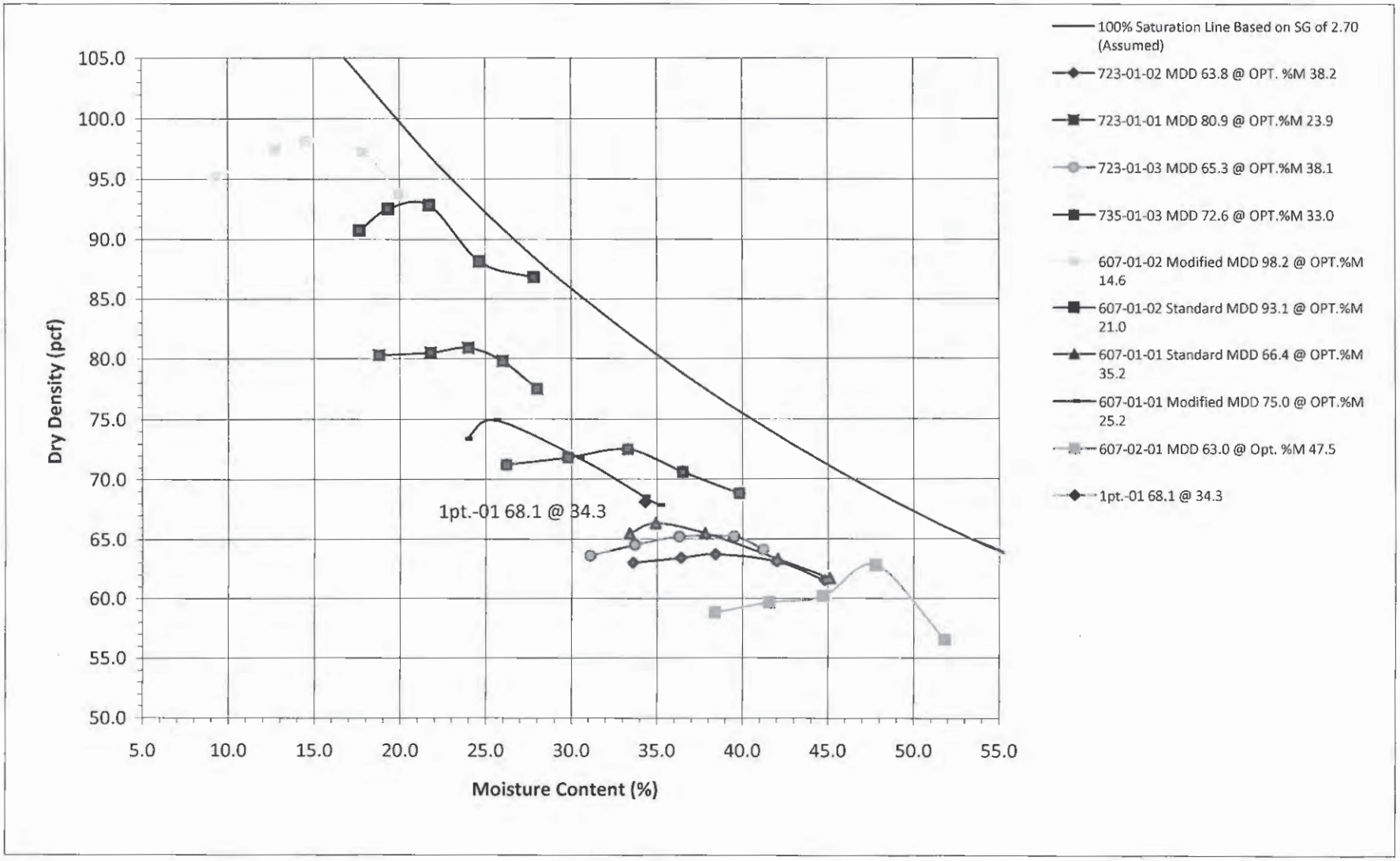
Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	Thurs.
Date:	3.1.12
Log No.:	07
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:15AM **Departed:** 11:30AM
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	75
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Stephen Crockett arrived on site and made contact with Charah representative
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Gypsum material in Phase 3A (see GFDR-04 for results).
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material in Phase 6A (see FDR-07 for results).
- Water Content were obtained for verification of Nuclear Density Gauge results.
- Geotechnics Rep. departed the site.

Prepared By:	SCC	**Date:**	3.1.12	**Checked By:**	GDM	**Date:**	3-5-12

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-07**	Geotechnics Representative : STEPHEN CROCKETT	Page : 1 of 1
Date (s) : **3.1.12**	Reviewed By : GMDUR	Date : 3-5-12

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33560	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 04	6A	NA	6"	723-01-01	80.9	23.9	**97.2**	**25.4**	**77.5**	**95.8%**	**95.0%**	%M Corrected
DC 01	6A	NA	NA	723-01-01	80.9	23.9	**99.4**	**25.4**	**79.3**	**98.0%**	**95.0%**	
ND - 05	6A	NA	6"	735-01-03	72.6	33.0	**91.4**	**27.5**	**71.7**	**98.7%**	**95.0%**	%M Corrected
ND - 06	6A	NA	6"	735-01-03	72.6	33.0	**94.1**	**29.8**	**72.5**	**99.9%**	**95.0%**	%M Corrected
ND - 07	6A	NA	6"	735-01-03	72.6	33.0	**91.1**	**31.8**	**69.1**	**95.2%**	**95.0%**	%M Corrected
ND - 08	6A	NA	6"	607-01-01	66.4	35.2	**82.3**	**30.8**	**62.9**	**94.8%**	**95.0%**	%M Corrected
ND - 09	6A	NA	6"	723-01-01	80.9	23.9	**98.1**	**18.4**	**82.9**	**102.4%**	**95.0%**	%M Corrected
ND - 10	6A	NA	6"	607-01-01	66.4	35.2	**86.4**	**32.2**	**65.4**	**98.4%**	**95.0%**	%M Corrected
ND - 11	6A	NA	6"	735-01-03	72.6	33.0	**90.4**	**29.9**	**69.6**	**95.9%**	**95.0%**	%M Corrected

Client: CHARAH
Project Name : ROXBORO ASH LF
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **GFDR-04**	Geotechnics Representative : Stephen Crockett	Page : 1 of 1
Date (s) : **3.1.12**	Reviewed By : GMOYER	Date : 3 5 12

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33260	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	TOE OF P3A	-	6"	624-01-01	89.6	19.5	**106.0**	**10.3**	**96.1**	**107.3%**	**95.0%**	%M Corrected
ND - 02	TOE OF P3A	-	6"	624-01-01	89.6	19.5	**101.4**	**11.9**	**90.6**	**101.1%**	**95.0%**	%M Corrected
ND - 03	TOE OF P3A	-	6"	624-01-01	89.6	19.5	**104.0**	**11.0**	**93.7**	**104.6%**	**95.0%**	%M Corrected

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-624

Report Number :	**FDR-07**
Date (s) :	3.1.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-04
Location:	6A
Depth (ft):	-
Date :	3.1.12

Mold

Cylinder ID	SC-01
Weight of Cylinder (lbs.)	1.37
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.65
Wt. of Cylinder (lbs.)	1.37
Wt. of WS	3.28
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	A-5
Wt. of Tare & WS (gm)	244.84
Wt. of Tare & DS (gm)	215.24
Wt. of Tare (gm)	98.81
Wt. of Water (gm)	29.60
Wt. of DS (gm)	116.43
Wet Density (pcf):	99.4
Moisture Content (%):	**25.4**
Dry Density (pcf):	**79.2**

Geotechnics Representative : Stephen Crockett

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-05	ND-06
Location:	3A	3A	3A	6A	6A
Depth:	-	-	-	-	-
Tare Number	G-5	SS-2	Z-14	SS-1	Y-3
Wt. of Tare & WS (gm)	427.28	321.65	343.79	319.25	304.26
Wt. of Tare & DS (gm)	401.08	298.06	319.65	270.81	256.93
Wt. of Tare (gm)	147.22	99.10	100.17	94.78	98.09
Wt. of Water (gm)	26.2	23.59	24.14	48.44	47.33
Wt. of DS (gm)	253.86	198.96	219.48	176.03	158.84
Water Content (%)	**10.3**	**11.9**	**11.0**	**27.5**	**29.8**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-07	ND-08	ND-09	ND-10	ND-11
Location:	6A	6A	6A	6A	6A
Depth:	-	-	-	-	-
Tare Number	SS-4	A-1	Y-11	B-4	Z-12
Wt. of Tare & WS (gm)	301.27	286.94	322.06	354.66	347.24
Wt. of Tare & DS (gm)	252.46	241.78	287.32	292.07	289.76
Wt. of Tare (gm)	98.97	95.26	98.33	97.66	97.60
Wt. of Water (gm)	48.81	45.16	34.74	62.59	57.48
Wt. of DS (gm)	153.49	146.52	188.99	194.41	192.16
Water Content (%)	**31.8**	**30.8**	**18.4**	**32.2**	**29.9**

Notes : *NA*

Tested By *SC* *Date* *3.1.12* *Checked By* *Date*

Day:	Thurs.
Date:	3.1.12
Log No.:	07
Page:	1

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:15AM **Departed:** 11:30AM
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	75
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Stephen Crockett arrived on site and made contact with Charah representative
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted Gypsum material in Phase 3A (see GFDR-04 for results).
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material in Phase 6A (see FDR-07 for results).
- Water Content were obtained for verification of Nuclear Density Gauge results.
- Geotechnics Rep. departed the site.

Prepared By:	SCC	**Date:**	3.1.12	**Checked By:**	**Date:**

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-07**	Geotechnics Representative : STEPHEN CROCKETT	Page : 1 of 1
Date (s) : **3.1.12**	Reviewed By :	Date :

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33560	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 04	6A	NA	6"	723-01-01	80.9	23.9	**97.2**	**25.4**	**77.5**	**95.8%**	**95.0%**	%M Corrected
DC 01	6A	NA	NA	723-01-01	80.9	23.9	**99.4**	**25.4**	**79.3**	**98.0%**	**95.0%**	
ND - 05	6A	NA	6"	735-01-03	72.6	33.0	**91.4**	**27.5**	**71.7**	**98.7%**	**95.0%**	%M Corrected
ND - 06	6A	NA	6"	735-01-03	72.6	33.0	**94.1**	**29.8**	**72.5**	**99.9%**	**95.0%**	%M Corrected
ND - 07	6A	NA	6"	735-01-03	72.6	33.0	**91.1**	**31.8**	**69.1**	**95.2%**	**95.0%**	%M Corrected
ND - 08	6A	NA	6"	607-01-01	66.4	35.2	**82.3**	**30.8**	**62.9**	**94.8%**	**95.0%**	%M Corrected
ND - 09	6A	NA	6"	723-01-01	80.9	23.9	**98.1**	**18.4**	**82.9**	**102.4%**	**95.0%**	%M Corrected
ND - 10	6A	NA	6"	607-01-01	66.4	35.2	**86.4**	**32.2**	**65.4**	**98.4%**	**95.0%**	%M Corrected
ND - 11	6A	NA	6"	735-01-03	72.6	33.0	**90.4**	**29.9**	**69.6**	**95.9%**	**95.0%**	%M Corrected

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-624

Report Number :	**FDR-07**
Date (s) :	3.1.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-04
Location:	6A
Depth (ft):	-
Date :	3.1.12

Mold

Cylinder ID	SC-01
Weight of Cylinder (lbs.)	1.37
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.65
Wt. of Cylinder (lbs.)	1.37
Wt. of WS	3.28
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	A-5
Wt. of Tare & WS (gm)	244.84
Wt. of Tare & DS (gm)	215.24
Wt. of Tare (gm)	98.81
Wt. of Water (gm)	29.60
Wt. of DS (gm)	116.43
Wet Density (pcf):	99.4
Moisture Content (%):	**25.4**
Dry Density (pcf):	**79.2**

Geotechnics Representative : Stephen Crockett

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-05	ND-06
Location:	3A	3A	3A	6A	6A
Depth:	-	-	-	-	-
Tare Number	G-5	SS-2	Z-14	SS-1	Y-3
Wt. of Tare & WS (gm)	427.28	321.65	343.79	319.25	304.26
Wt. of Tare & DS (gm)	401.08	298.06	319.65	270.81	256.93
Wt. of Tare (gm)	147.22	99.10	100.17	94.78	98.09
Wt. of Water (gm)	26.2	23.59	24.14	48.44	47.33
Wt. of DS (gm)	253.86	198.96	219.48	176.03	158.84
Water Content (%)	**10.3**	**11.9**	**11.0**	**27.5**	**29.8**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-07	ND-08	ND-09	ND-10	ND-11
Location:	6A	6A	6A	6A	6A
Depth:	-	-	-	-	-
Tare Number	SS-4	A-1	Y-11	B-4	Z-12
Wt. of Tare & WS (gm)	301.27	286.94	322.06	354.66	347.24
Wt. of Tare & DS (gm)	252.46	241.78	287.32	292.07	289.76
Wt. of Tare (gm)	98.97	95.26	98.33	97.66	97.60
Wt. of Water (gm)	48.81	45.16	34.74	62.59	57.48
Wt. of DS (gm)	153.49	146.52	188.99	194.41	192.16
Water Content (%)	**31.8**	**30.8**	**18.4**	**32.2**	**29.9**

Notes : *NA*

Tested By *SC* *Date* *3.1.12* *Checked By* *Date*

Day:	Thurs.
Date:	3.8.12
Log No.:	08
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00AM **Departed:** 11:30AM
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	70
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Stephen Crockett arrived on site and made contact with Charah representative Chris Robertson.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material in Phase 6 (see FDR-07 for results). GPS locations recorded by Chris.
- Water Content Tests were obtained for verification of Nuclear Density Gauge results.
- One-Point Proctor Sample was obtained for proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	SCC	**Date:**	3.8.12	**Checked By:**	MPS	**Date:**	3/9

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

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INTEGRITY IN TESTING

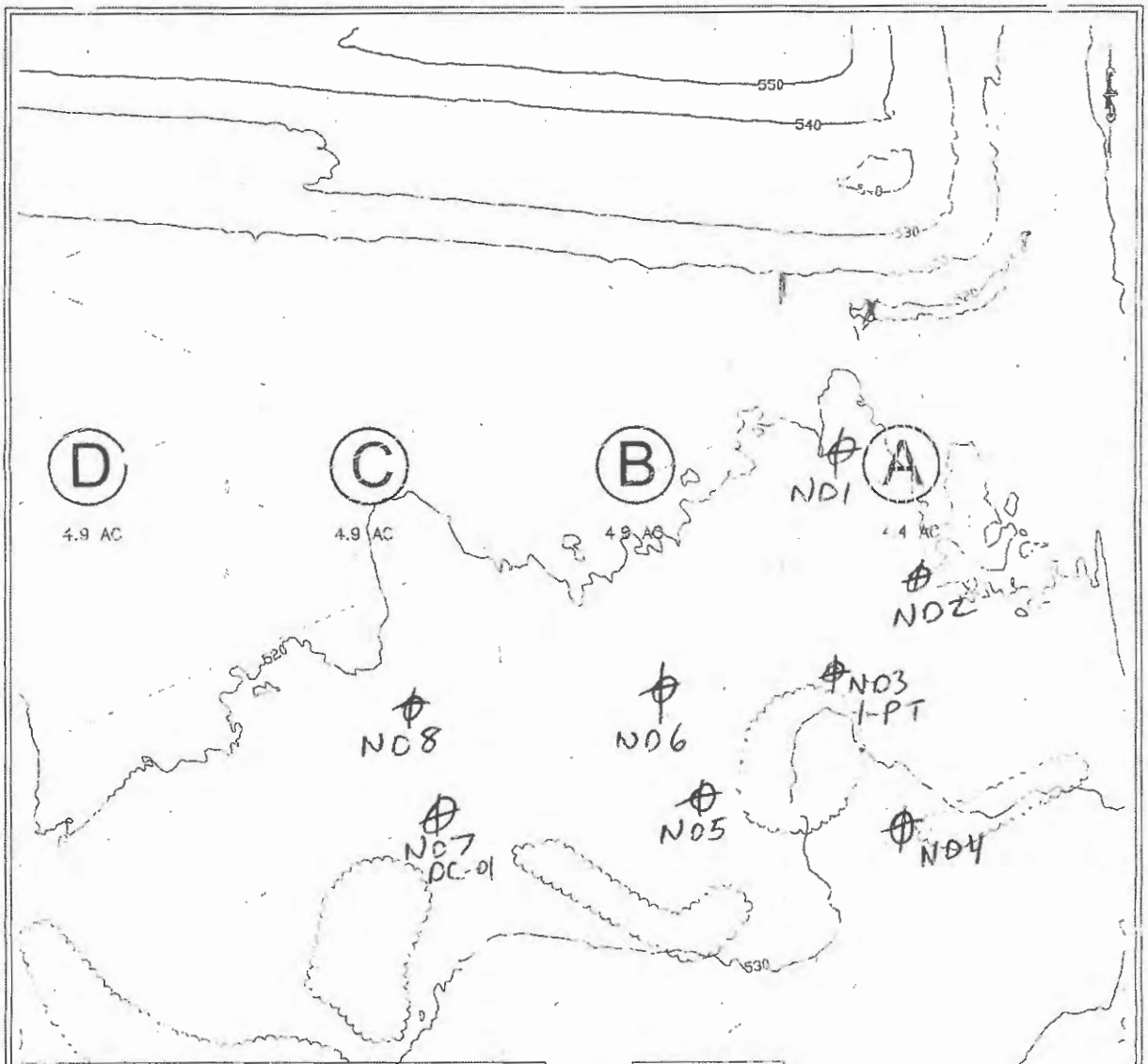
Field Density Report

Report Number : **FDR-08**	Geotechnics Representative : STEPHEN CROCKETT	Page : 1 of 1
Date (s) : **3.8.12**	Reviewed By : MAPS	Date : 3/9

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33560	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	6A	549.5	6"	607-01-01	66.4	23.9	**80.4**	**26.7**	**63.5**	**95.6%**	**95.0%**	%M Corrected
ND - 02	6A	545.1	6"	607-01-01	66.4	23.9	**85.0**	**27.2**	**66.8**	**100.6%**	**95.0%**	%M Corrected
ND - 03	6A	555.1	6"	607-01-01	66.4	33.0	**85.6**	**27.8**	**67.0**	**100.9%**	**95.0%**	%M Corrected
ND - 04	6A	558.3	6"	607-01-01	66.4	33.0	**86.4**	**28.8**	**67.1**	**101.0%**	**95.0%**	%M Corrected
ND - 05	6B	550.3	6"	735-01-03	72.6	33.0	**94.2**	**30.2**	**72.4**	**99.7%**	**95.0%**	%M Corrected
ND - 06	6B	545.5	6"	735-01-03	72.6	35.2	**99.1**	**37.3**	**72.2**	**99.4%**	**95.0%**	%M Corrected
ND - 07	6C	530.8	6"	607-01-01	66.4	23.9	**85.5**	**36.9**	**62.5**	**94.1%**	**95.0%**	%M Corrected
DC - 01	6C	530.8	NA	607-01-01	66.4	35.2	**89.4**	**36.9**	**65.3**	**98.3%**	**95.0%**	
ND - 08	6C	528.6	6"	607-01-01	66.4	33.0	**87.1**	**34.3**	**64.9**	**97.7%**	**95.0%**	%M Corrected



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6A COMPACTION TESTS GEOTECHNICS	JWG	GWA	1"=100'	CT-3
	DATE: 11.14.11	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

BLACKROCK ENGINEERS, INC.
POST OFFICE BOX 58
WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

Density Test Locations 3.8.12

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-624

Report Number :	**FDR-08**
Date (s) :	3.8.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-07
Location:	6C
Depth (ft):	-
Date :	3.8.12

Mold

Cylinder ID	SC-04
Weight of Cylinder (lbs.)	1.39
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.34
Wt. of Cylinder (lbs.)	1.39
Wt. of WS	2.95
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	Z-12
Wt. of Tare & WS (gm)	267.98
Wt. of Tare & DS (gm)	222.14
Wt. of Tare (gm)	97.85
Wt. of Water (gm)	45.84
Wt. of DS (gm)	124.29
Wet Density (pcf):	89.4
Moisture Content (%):	**36.9**
Dry Density (pcf):	**65.3**

Geotechnics Representative : Stephen Crockett

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	6A	6A	6A	6A	6B
Depth:	-	-	-	-	-
Tare Number	SS-1	Y-11	A-1	SS-4	B-4
Wt. of Tare & WS (gm)	268.90	286.62	320.07	318.06	327.43
Wt. of Tare & DS (gm)	232.34	246.50	271.26	269.11	274.35
Wt. of Tare (gm)	95.30	98.96	95.80	99.32	98.39
Wt. of Water (gm)	36.56	40.12	48.81	48.95	53.08
Wt. of DS (gm)	137.04	147.54	175.46	169.79	175.96
Water Content (%)	**26.7**	**27.2**	**27.8**	**28.8**	**30.2**

Test Number:	WC-06	WC-07
Nuclear Test Number:	ND-6	ND-08
Location:	6B	6C
Depth:	-	-
Tare Number	Y-3	Y-1
Wt. of Tare & WS (gm)	349.79	221.74
Wt. of Tare & DS (gm)	281.5	189.62
Wt. of Tare (gm)	98.37	95.94
Wt. of Water (gm)	68.29	32.12
Wt. of DS (gm)	183.13	93.68
Water Content (%)	**37.3**	**34.3**

Notes : *NA*

Tested By *SC* *Date* *3.8.12* *Checked By* *MM* *Date* *3/9*

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6
Project Number :	2012-624

Report Number :	**FDR-08**
Date (s) :	3.8.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-3
Depth (ft):	
Date :	3.8.12

Mold

Weight of Mold (lbs.)	9.458
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.38
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.92
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	A-5
Wt. of Tare & WS (gm)	329.88
Wt. of Tare & DS (gm)	271.21
Wt. of Tare (gm)	99.18
Wt. of Water (gm)	58.67
Wt. of DS (gm)	172.03
Wet Density (pcf):	88.6
Moisture Content (%):	**34.1**
Dry Density (pcf):	**66.0**

Geotechnics Representative : STEPHEN CROCKETT

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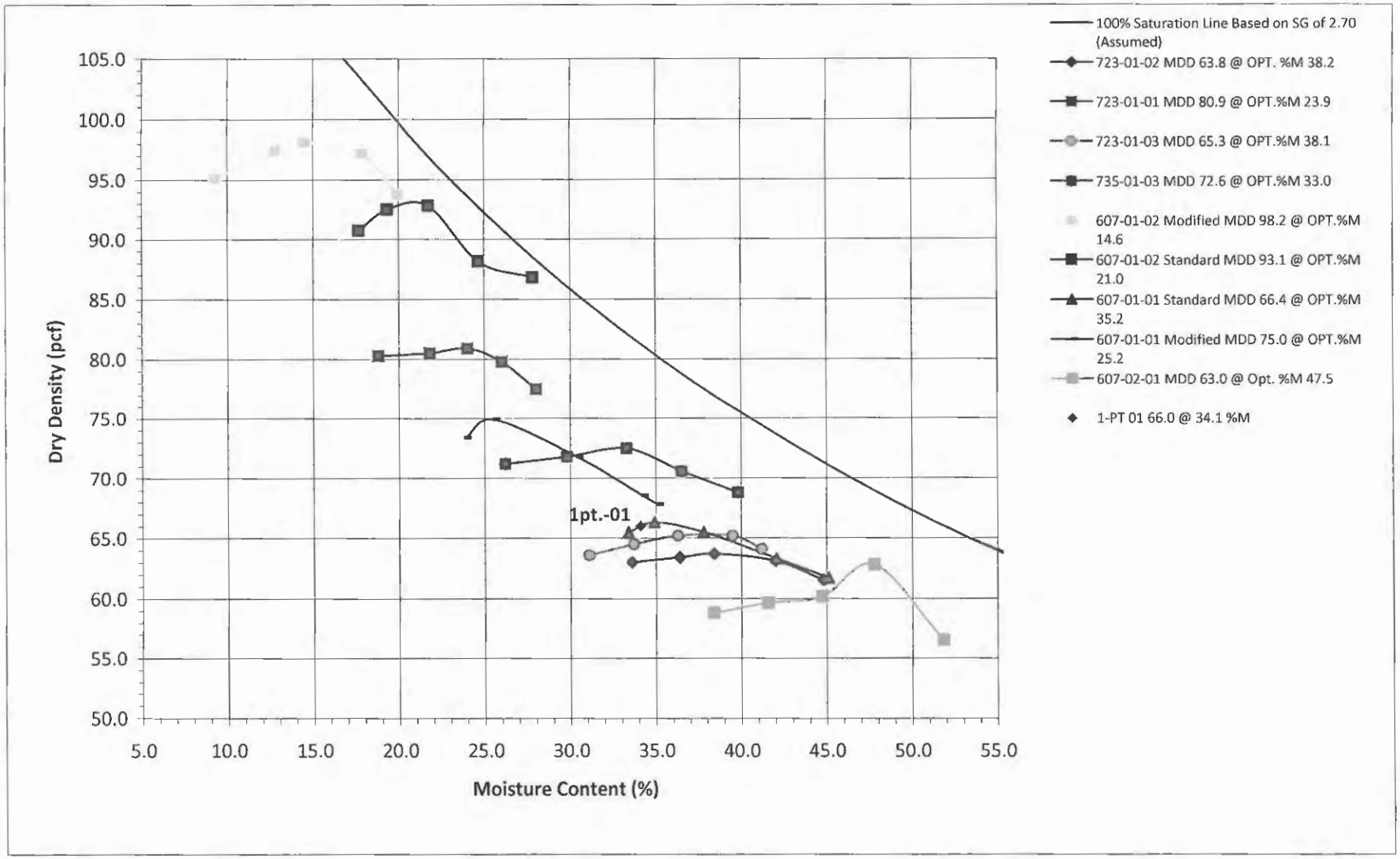
Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6
Project Number : 2012-624



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Day:	**Fri.**
Date:	**3.16.12**
Log No.:	**09**
Page:	**1**

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-624
Client Name:	Charah	**Client Contact:**	Justin Mize
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:15AM **Departed:** 11:30AM
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Cloudy	**Temperature:**	70
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Stephen Crockett arrived on site and made contact with Charah representative Chris Robertson.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material in Phase 6 (see FDR-09 for results). GPS locations recorded by Chris.
- Water Content Tests were obtained for verification of Nuclear Density Gauge results.
- One-Point Proctor Sample was obtained for proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	SCC	**Date:**	3.16.12	**Checked By:**	[illegible]	**Date:**	3/21

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

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INTEGRITY IN TESTING

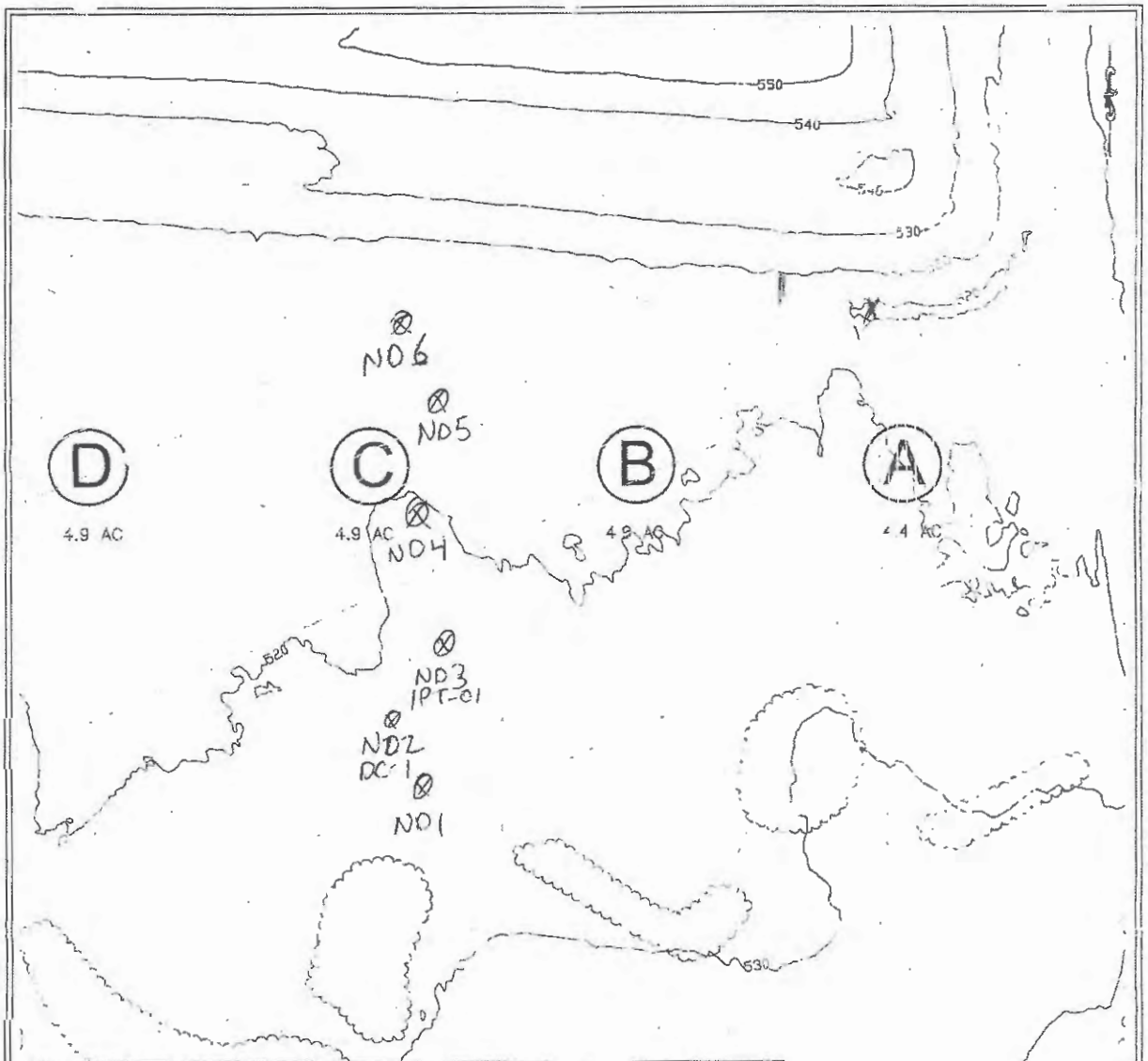
Field Density Report

Report Number : **FDR-09**	Geotechnics Representative : STEPHEN CROCKETT	Page : 1 of 1
Date (s) : **3.16.12**	Reviewed By : [illegible]	Date : 3/20

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
33560	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	6C	531.8	6"	723-01-03	65.3	38.1	**85.8**	**36.4**	**62.9**	**96.3%**	**95.0%**	%M Corrected
ND - 02	6C	529.3	6"	723-01-03	65.3	38.1	**84.4**	**29.5**	**65.2**	**99.8%**	**95.0%**	%M Corrected
DC - 01	6C	529.3	6"	723-01-03	65.3	38.1	**87.0**	**29.5**	**67.2**	**102.9%**	**95.0%**	
ND - 03	6C	526.9	6"	735-01-03	72.6	33.0	**95.1**	**36.9**	**69.5**	**95.7%**	**95.0%**	%M Corrected
ND - 04	6C	522.9	6"	723-01-03	65.3	38.1	**76.7**	**19.1**	**64.4**	**98.6%**	**95.0%**	%M Corrected
ND - 05	6C	521.7	6"	723-01-03	65.3	38.1	**79.7**	**38.0**	**57.8**	**88.4%**	**95.0%**	%M Corrected
ND - 06	6C	521.1	6"	723-01-03	65.3	38.1	**82.0**	**32.3**	**62.0**	**94.9%**	**95.0%**	%M Corrected



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

TITLE:

P6A
COMPACTION TESTS
GEOTECHNICS

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
JWG	GWA	1"=100'	CT-3
DATE:	PROJECT NO.	FILE NAME	
11.14.11	ROXLF	P6-CT_BR	

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WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-624

Report Number :	**FDR-09**
Date (s) :	3.16.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-02
Location:	6C
Depth (ft):	-
Date :	3.16.12

Mold

Cylinder ID	SC-04
Weight of Cylinder (lbs.)	1.39
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.26
Wt. of Cylinder (lbs.)	1.39
Wt. of WS	2.87
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	Z-12
Wt. of Tare & WS (gm)	334.02
Wt. of Tare & DS (gm)	280.23
Wt. of Tare (gm)	98.01
Wt. of Water (gm)	53.79
Wt. of DS (gm)	182.22
Wet Density (pcf):	87.0
Moisture Content (%):	**29.5**
Dry Density (pcf):	**67.2**

Geotechnics Representative : Stephen Crockett

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-03	ND-04	ND-05	ND-06
Location:	6C	6C	6C	6C	6C
Depth:	-	-	-	-	-
Tare Number	SS-4	SS-1	A-1	Y-11	A-5
Wt. of Tare & WS (gm)	294.34	274.45	265.49	242.13	253.85
Wt. of Tare & DS (gm)	242.28	226.19	238.25	201.40	216.14
Wt. of Tare (gm)	99.42	95.51	96.00	94.11	99.21
Wt. of Water (gm)	52.06	48.26	27.24	40.73	37.71
Wt. of DS (gm)	142.86	130.68	142.25	107.29	116.93
Water Content (%)	**36.4**	**36.9**	**19.1**	**38.0**	**32.3**

Test Number:
Nuclear Test Number:
Location:
Depth:

Tare Number
Wt. of Tare & WS (gm)
Wt. of Tare & DS (gm)
Wt. of Tare (gm)
Wt. of Water (gm)
Wt. of DS (gm)

Water Content (%)

Notes : *NA*

Tested By *SC* *Date* *3.8.12* *Checked By* *MMS* *Date* *3/20*

Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-09**
Date (s) :	3.16.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-3
Depth (ft):	
Date :	3.16.12

Mold

Weight of Mold (lbs.)	9.458
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.37
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.91
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	A-5
Wt. of Tare & WS (gm)	256.78
Wt. of Tare & DS (gm)	215.59
Wt. of Tare (gm)	99.21
Wt. of Water (gm)	41.19
Wt. of DS (gm)	116.38
Wet Density (pcf):	88.2
Moisture Content (%):	**35.4**
Dry Density (pcf):	**65.2**

Geotechnics Representative : STEPHEN CROCKETT

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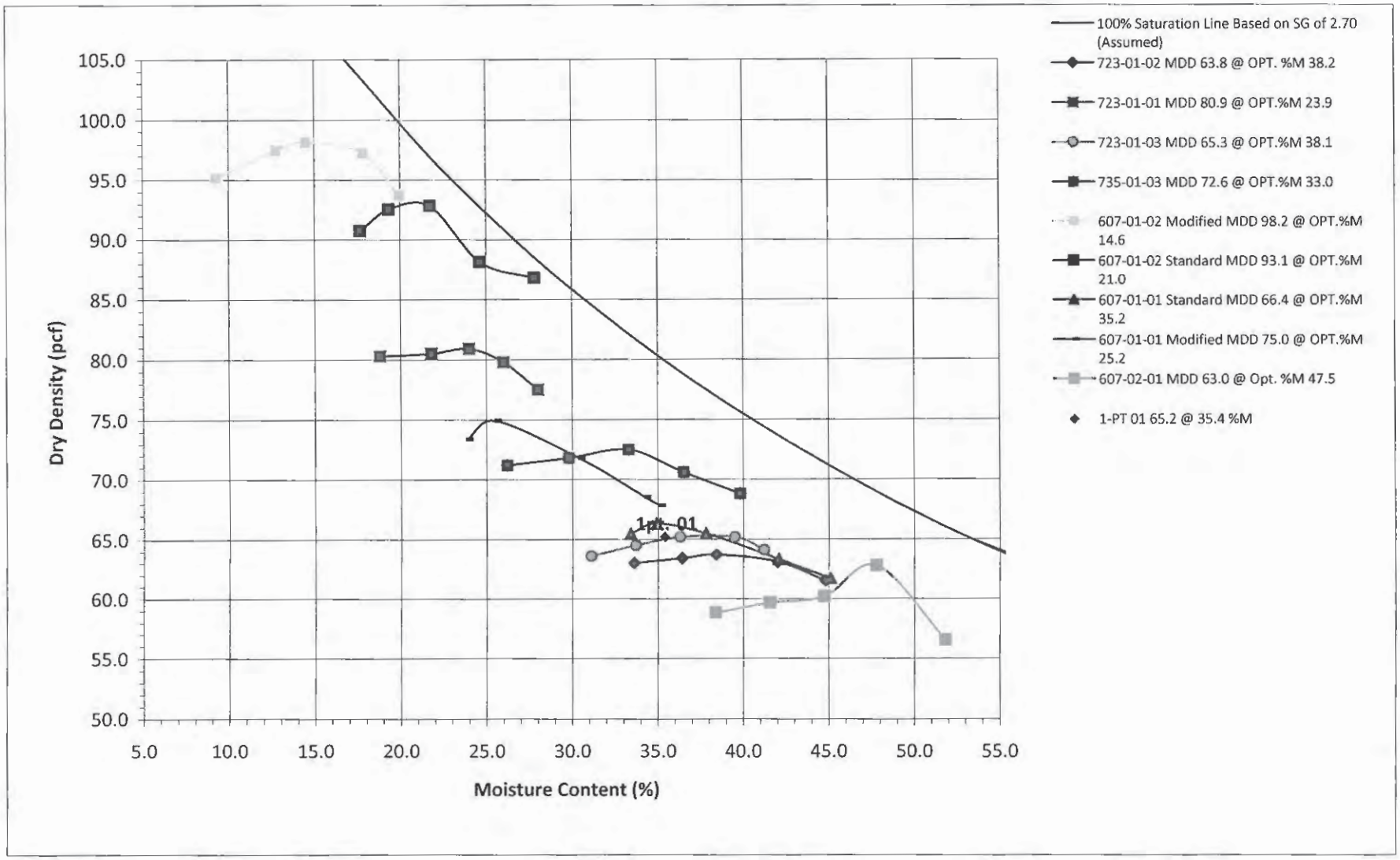
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6
Project Number : 2012-624



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Day:	**Thursday**
Date:	**3.23.12**
Log No.:	**10**
Page:	**1**

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INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash Landfill Phase 6	**Project No.:**	2010-624
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 12:00pm **Departed:** 3:00pm
General Contractor:	Charah Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
John Giles	Blackrock Engineering

Weather Conditions:	Sunny	**Temperature:**	82

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Contractor's Personnel:

Description of Daily Activities & Events

- Geotechnics Rep, David Wright arrived onsite and made contact with Jon Giles of Blackrock Emgineering
- Geotechnics rep performed nuclear density testing of previously placed, compacted fly ash. One point to be taken proctors, and moisture samples, were received to aid in proctor selection and test verification.
- Geotechnics rep left site.

Prepared By:	DAW	**Date:**	3.23.12	**Checked By:**	SFS	**Date:**	4-3-12

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

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INTEGRITY IN TESTING

Field Density Test Report

Report Number :	**FAND-10**	Geotechnics Representative :	David Wright	Page :	1 of 1
Date (s) :	**3.23.12**	Reviewed By :	SFS	Date :	4-2-12

Contractor :	Charah	Borrow Source :	Onsite Flyash cylo

Compaction Equipment :	1 CAT vibratory smoothdrum compactor

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
FAND 1	6C	533.8	6"	723-01-02	63.8	38.2	**82.4**	**40.0**	**58.9**	**92.3%**	**90.0%**	Moisture Correction
FAND 2	6C	526.1	6"	607-01-01	66.4	35.2	**91.9**	**38.1**	**66.5**	**100.2%**	**90.0%**	Moisture Correction
FAND 3	6C	525.1	6"	723-01-02	63.8	38.2	**76.7**	**27.0**	**60.4**	**94.7%**	**90.0%**	Moisture Correction
FAND 4	6C	524.6	6"	723-01-02	63.8	38.2	**74.5**	**27.6**	**58.4**	**91.5%**	**90.0%**	Moisture Correction
FAND 5	6C	525.9	6"	723-01-02	63.8	38.2	**82.2**	**37.9**	**59.6**	**93.4%**	**90.0%**	Moisture Correction
FAND 6	6C	529.6	6"	607-01-01	75.0	25.2	**83.2**	**30.6**	**63.7**	**84.9%**	**90.0%**	Moisture Correction
FAND 7	6C	526.8	6"	607-01-01	75.0	25.2	**84.5**	**29.5**	**65.3**	**87.0%**	**90.0%**	Moisture Correction
FAND 8	6C	525.6	6"	607-01-01	75.0	25.2	**85.6**	**31.0**	**65.3**	**87.1%**	**90.0%**	Moisture Correction
FAND 9	6C	524.5	6"	607-01-01	75.0	25.2	**93.3**	**36.2**	**68.5**	**91.3%**	**90.0%**	Moisture Correction
FAND 10	6C	524.5	6"	723-01-02	63.8	38.2	**73.1**	**37.2**	**53.3**	**83.5%**	**90.0%**	Moisture Correction
FAND 11	6C	525.6	6"	723-01-02	63.8	38.2	**73.4**	**33.5**	**55.0**	**86.2%**	**90.0%**	Moisture Correction
FAND 12	6C		6"	607-01-01	75.0	25.2	**85.7**	**29.5**	**66.2**	**88.2%**	**90.0%**	Moisture Correction

Gauge Number	Gauge Model	Density Count	Moisture Count
33577	3440	2315	648

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-01
Location:	Phase C
Depth (ft):	533.8
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.41
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.95
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	308
Wt. of Tare & WS (gm)	611.60
Wt. of Tare & DS (gm)	468.55
Wt. of Tare (gm)	110.80
Wt. of Water (gm)	143.05
Wt. of DS (gm)	357.75
Wet Density (pcf)	88.9
Moisture Content %	**40.0**
Dry Density (pcf)	**63.5**

Geotechnics Represenative : DAW SFS 4-3-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-02
Location:	Phase C
Depth (ft):	526.1
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.5
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.04
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	303
Wt. of Tare & WS (gm)	614.70
Wt. of Tare & DS (gm)	475.80
Wt. of Tare (gm)	111.40
Wt. of Water (gm)	138.90
Wt. of DS (gm)	364.40
Wet Density (pcf)	91.6
Moisture Content %	**38.1**
Dry Density (pcf)	**66.3**

Geotechnics Represenative : DAW SFS 4-3-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-03
Location:	Phase C
Depth (ft):	5.25.1
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.29
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.83
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	305
Wt. of Tare & WS (gm)	510.60
Wt. of Tare & DS (gm)	392.50
Wt. of Tare (gm)	84.90
Wt. of Water (gm)	118.10
Wt. of DS (gm)	307.60
Wet Density (pcf)	85.2
Moisture Content %	**38.4**
Dry Density (pcf)	**61.6**

Geotechnics Represenative : DAW SFS 4-5-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-04
Location:	Phase C
Depth (ft):	524.6
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.36
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.9
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	368
Wt. of Tare & WS (gm)	687.00
Wt. of Tare & DS (gm)	549.38
Wt. of Tare (gm)	111.80
Wt. of Water (gm)	137.62
Wt. of DS (gm)	437.58
Wet Density (pcf)	87.3
Moisture Content %	**31.5**
Dry Density (pcf)	**66.5**

Geotechnics Represenative : DAW SFS 4-3-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-05
Location:	Phase C
Depth (ft):	526.8
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.39
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.93
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	A-5
Wt. of Tare & WS (gm)	426.50
Wt. of Tare & DS (gm)	352.15
Wt. of Tare (gm)	99.70
Wt. of Water (gm)	74.35
Wt. of DS (gm)	252.45
Wet Density (pcf)	88.3
Moisture Content %	**29.5**
Dry Density (pcf)	**68.2**

Geotechnics Represenative : DAW SFS 4-3-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-06
Location:	Phase C
Depth (ft):	525.6
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.52
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.06
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	A-1
Wt. of Tare & WS (gm)	488.60
Wt. of Tare & DS (gm)	395.85
Wt. of Tare (gm)	96.20
Wt. of Water (gm)	92.75
Wt. of DS (gm)	299.65
Wet Density (pcf)	92.2
Moisture Content %	**31.0**
Dry Density (pcf)	**70.4**

Geotechnics Represenative : DAW SFS 4-3-12

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-10**
Date (s) :	3.23.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-07
Location:	Phase C
Depth (ft):	
Date :	3.23.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.49
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.03
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	Z-12
Wt. of Tare & WS (gm)	544.30
Wt. of Tare & DS (gm)	442.52
Wt. of Tare (gm)	98.00
Wt. of Water (gm)	101.78
Wt. of DS (gm)	344.52
Wet Density (pcf)	91.3
Moisture Content %	**29.5**
Dry Density (pcf)	**70.5**

Geotechnics Represenative : DAW SFS 4-3-12

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

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INTEGRITY IN TESTING

Report Number : **FDR-10**
Date (s) : 3.23.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4	5
Nuclear Test Number :	FAND-01	FAND-02	FAND-03	FAND-04	FAND-05
Location:	P6	P6	P6	P6	P6
Depth (ft):	533.8	526.1	525.1	524.6	525.9
Tare Number	308	303	398	305	309
Wt. of Tare & WS (gm)	611.6	614.7	352.5	510.6	436.2
Wt. of Tare & DS (gm)	468.55	475.8	295.55	392.5	346.45
Wt. of Tare (gm)	110.8	111.4	84.4	84.9	109.9
Wt. of Water (gm)	143.05	138.9	56.95	84.9	89.75
Wt. of DS (gm)	357.75	364.4	211.15	307.6	236.55
Water Content (%)	**40.0**	**38.1**	**27.0**	**27.6**	**37.9**

Test Number :	6	7	8	9	10
Nuclear Test Number :	FAND-06	FAND-07	FAND-08	FAND-09	FAND-10
Location:	P6	P6	P6	P6	P6
Depth (ft):	529.6	526.8	525.6	524.5	524.5
Tare Number	368	A-5	A-1	308	312
Wt. of Tare & WS (gm)	687	426.5	488.6	452	409
Wt. of Tare & DS (gm)	549.38	352.15	395.85	355.42	321.23
Wt. of Tare (gm)	99.7	99.7	96.2	88.5	85.2
Wt. of Water (gm)	137.62	74.35	92.75	96.58	87.77
Wt. of DS (gm)	449.68	252.45	299.65	266.92	236.03
Water Content (%)	**30.6**	**29.5**	**31.0**	**36.2**	**37.2**

Notes : *NA*

Tested By: DAW Date: 3/23/2012 SFS 4-3-12

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

Report Number : **FDR-10**
Date (s) : 3.23.12

geotechnics
INTEGRITY IN TESTING

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	11	12
Nuclear Test Number :	FAND-11	FAND-12
Location:	P6	P6
Depth (ft):	525.6	
Tare Number	399	Z-12
Wt. of Tare & WS (gm)	425	544.3
Wt. of Tare & DS (gm)	340.23	442.52
Wt. of Tare (gm)	87	98
Wt. of Water (gm)	84.77	101.78
Wt. of DS (gm)	253.23	344.52
Water Content (%)	**33.5**	**29.5**

Test Number :	
Nuclear Test Number :	
Location:	
Depth (ft):	
Tare Number	
Wt. of Tare & WS (gm)	
Wt. of Tare & DS (gm)	
Wt. of Tare (gm)	
Wt. of Water (gm)	
Wt. of DS (gm)	
Water Content (%)	

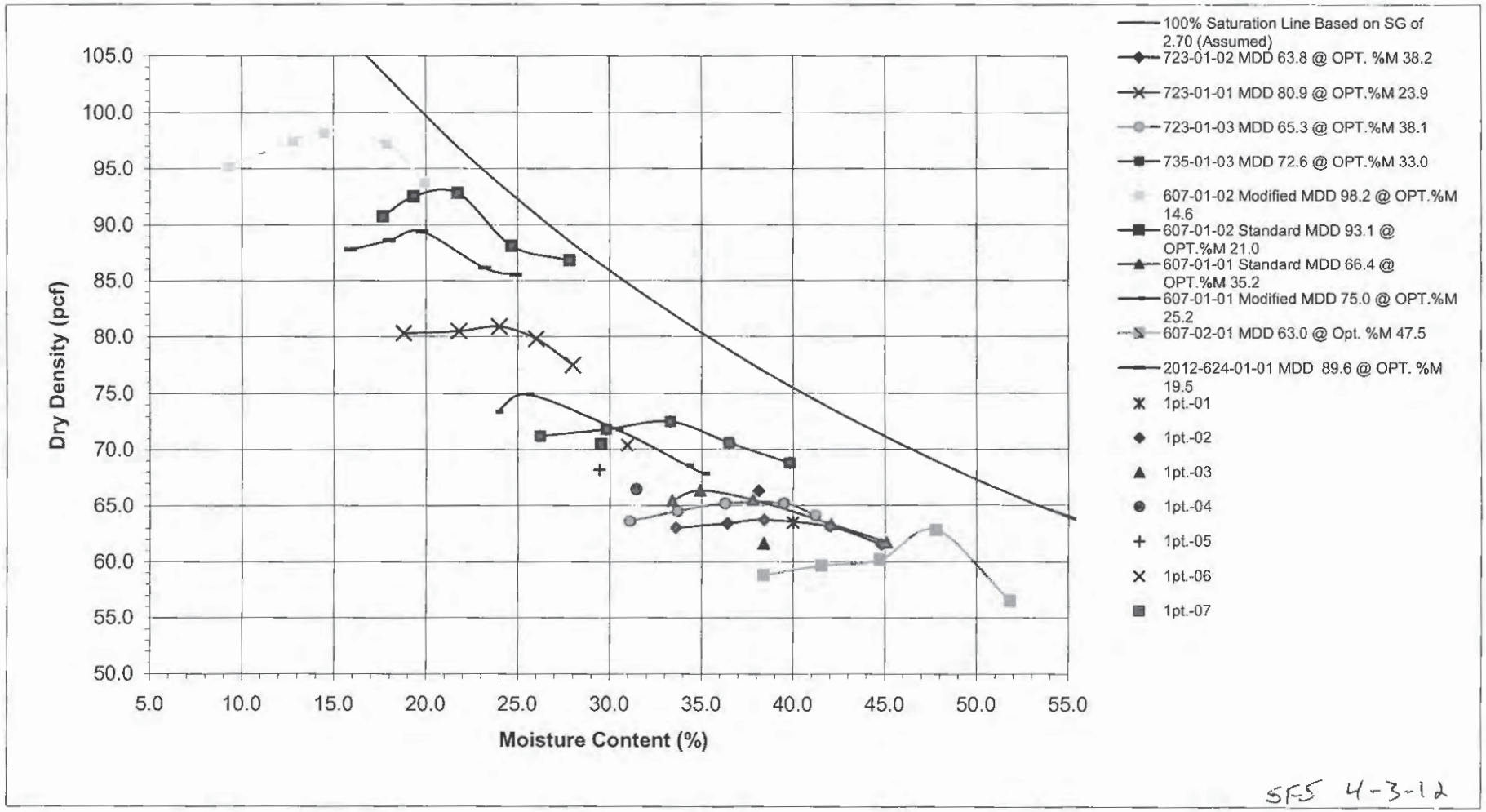
Notes : *NA*

Tested By: DAW Date: 3/23/2012 SFS 4-3-12

geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



SFS 4-3-12

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Day:	**Thursday**
Date:	**3.29.12**
Log No.:	**11**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash Landfill Phase 6	**Project No.:**	2010-624
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 12:00pm **Departed:** 3:00pm
General Contractor:	Charah Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
John Giles	Blackrock Engineering

Weather Conditions:	Sunny	**Temperature:**	70

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Contractor's Personnel: Enter number of laborers, operators, etc.

Description of Daily Activities & Events

- Geotechnics Rep, David Wright arrived onsite and made contact with Jon Giles of Blackrock Engineering
- Geotechnics rep performed nuclear density testing of previously placed, compacted fly ash. One point to proctors, and moisture samples, were received to aid in proctor selection and test verification.
- Geotechnics rep left site.

Prepared By: DAW **Date:** 3.29.12 **Checked By:** MAS **Date:** 4/17

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FAND-11**	Geotechnics Representative : David Wright	Page : 1 of 1
Date (s) : **3.29.12**	Reviewed By : MAM	Date : 4/17

Contractor : Charah	Borrow Source : Onsite Flyash cylo

Compaction Equipment : 1 CAT vibratory smoothdrum compactor

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
FAND 1	6C	533	6"	723-01-01	80.9	23.9	**103.6**	**26.7**	**81.8**	**101.1%**	**90.0%**	Moisture Correction
FAND 2	6C	528	6"	723-01-02	63.8	38.2	**78.2**	**24.7**	**62.7**	**98.3%**	**90.0%**	Moisture Correction
FAND 3	6C	527	6"	723-01-02	63.8	38.2	**73.2**	**25.1**	**58.5**	**91.7%**	**90.0%**	Moisture Correction
FAND 4	6C	528	6"	723-01-02	63.8	38.2	**73.0**	**26.4**	**57.8**	**90.5%**	**90.0%**	Moisture Correction
FAND 5	6C	529	6"	723-01-02	63.8	38.2	**79.6**	**31.0**	**60.8**	**95.2%**	**90.0%**	Moisture Correction
FAND 6	6C	528	6"	723-01-02	63.8	38.2	**85.5**	**29.9**	**65.8**	**103.2%**	**90.0%**	Moisture Correction
FAND 7	6C	528	6"	723-01-02	63.8	38.2	**69.4**	**21.1**	**57.3**	**89.8%**	**90.0%**	Moisture Correction

Gauge Number	Gauge Model	Density Count	Moisture Count
33577	3440	2308	653

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-11**
Date (s) :	3.29.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-01
Location:	Phase C
Depth (ft):	533
Date :	3.29.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.49
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.03
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	310
Wt. of Tare & WS (gm)	513.44
Wt. of Tare & DS (gm)	428.40
Wt. of Tare (gm)	109.90
Wt. of Water (gm)	85.04
Wt. of DS (gm)	318.50
Wet Density (pcf)	91.3
Moisture Content %	**26.7**
Dry Density (pcf)	**72.0**

Geotechnics Represenative : DAW

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-11**
Date (s) :	3.29.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-02
Location:	Phase C
Depth (ft):	527
Date :	3.29.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.42
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.96
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	K-7
Wt. of Tare & WS (gm)	474.82
Wt. of Tare & DS (gm)	401.70
Wt. of Tare (gm)	110.40
Wt. of Water (gm)	73.12
Wt. of DS (gm)	291.30
Wet Density (pcf)	89.2
Moisture Content %	**25.1**
Dry Density (pcf)	**71.3**

Geotechnics Represenative : DAW

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-11**
Date (s) :	3.29.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-03
Location:	Phase C
Depth (ft):	528
Date :	3.29.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.5
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.04
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	308
Wt. of Tare & WS (gm)	631.16
Wt. of Tare & DS (gm)	522.62
Wt. of Tare (gm)	111.50
Wt. of Water (gm)	108.54
Wt. of DS (gm)	411.12
Wet Density (pcf)	91.6
Moisture Content %	**26.4**
Dry Density (pcf)	**72.4**

Geotechnics Represenative : DAW MBS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-11**
Date (s) :	3.29.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-04
Location:	Phase C
Depth (ft):	528
Date :	3.29.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.29
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.83
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	304
Wt. of Tare & WS (gm)	560.79
Wt. of Tare & DS (gm)	482.40
Wt. of Tare (gm)	110.90
Wt. of Water (gm)	78.39
Wt. of DS (gm)	371.50
Wet Density (pcf)	85.2
Moisture Content %	**21.1**
Dry Density (pcf)	**70.4**

Geotechnics Represenative : DAW

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

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INTEGRITY IN TESTING

Report Number : **FDR-11**
Date (s) : 3.29.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4	5
Nuclear Test Number :	FAND-01	FAND-02	FAND-03	FAND-04	FAND-05
Location:	P6	P6	P6	P6	P6
Depth (ft):	533	528	527	528	529
Tare Number	310	307	K-7	308	303
Wt. of Tare & WS (gm)	513.44	476.97	474.82	631.16	567.04
Wt. of Tare & DS (gm)	428.4	404.3	401.7	522.62	459.1
Wt. of Tare (gm)	109.9	110.1	110.4	111.5	110.9
Wt. of Water (gm)	85.04	72.67	73.12	108.54	107.94
Wt. of DS (gm)	318.5	294.2	291.3	411.12	348.2
Water Content (%)	**26.7**	**24.7**	**25.1**	**26.4**	**31.0**

Test Number :	6	7
Nuclear Test Number :	FAND-06	FAND-07
Location:	P6	P6
Depth (ft):	528	528
Tare Number	312	304
Wt. of Tare & WS (gm)	439.55	560.79
Wt. of Tare & DS (gm)	357.8	482.4
Wt. of Tare (gm)	84.4	110.9
Wt. of Water (gm)	81.75	78.39
Wt. of DS (gm)	273.4	371.5
Water Content (%)	**29.9**	**21.1**

Notes : *NA*

Tested By: DAW Date: 3.29.12 MPS

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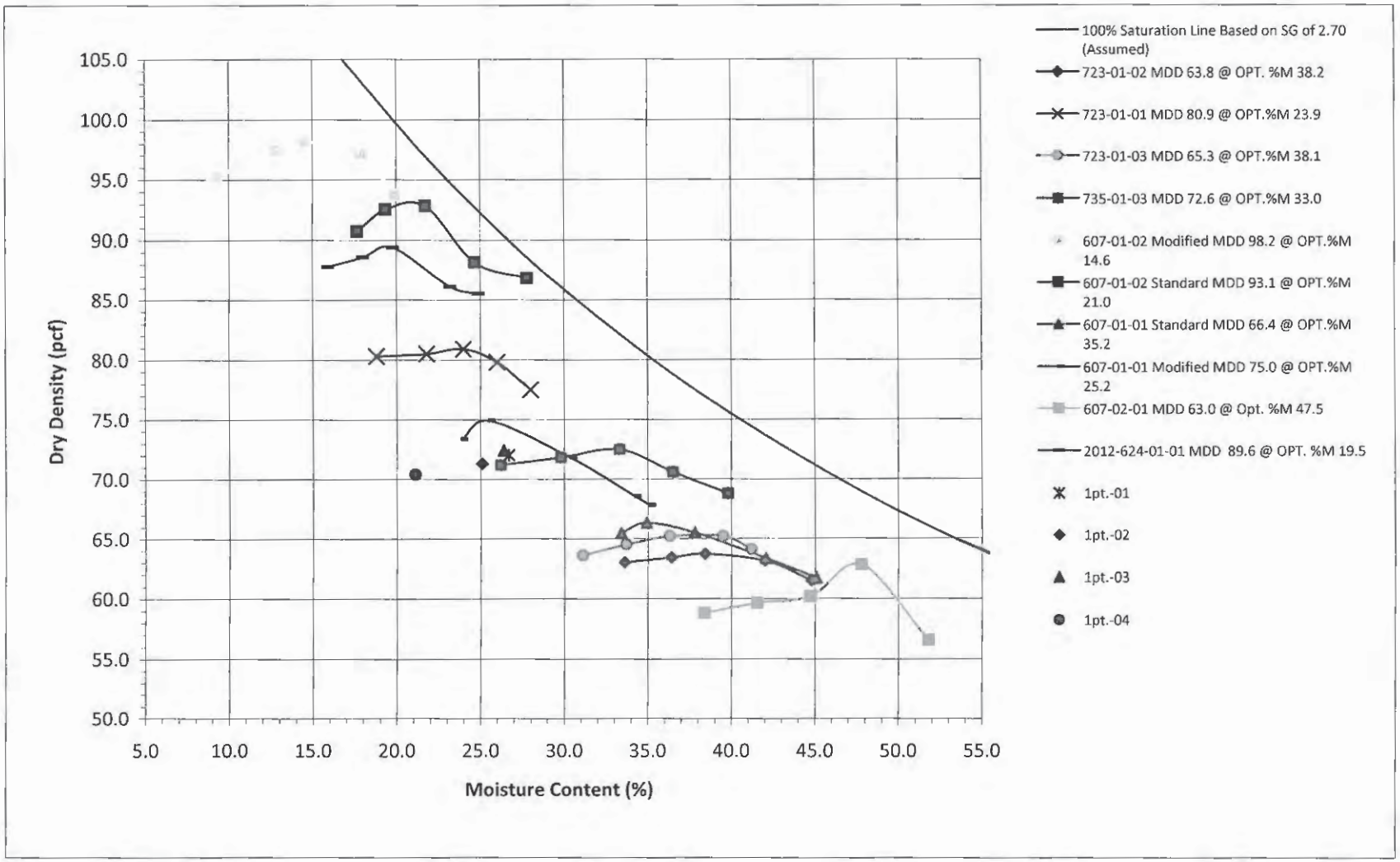
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	**Thursday**
Date:	**4.5.12**
Log No.:	**12**
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geotechnics
INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash Landfill Phase 6	**Project No.:**	2010-624
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 11:00am **Departed:** 12:30pm
General Contractor:	Charah Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
John Giles	Blackrock Engineering

Weather Conditions:	Sunny	**Temperature:**	70

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Contractor's Personnel: Enter number of laborers, operators, etc.

Description of Daily Activities & Events

- Geotechnics Rep, David Wright arrived onsite and made contact with Jon Giles of Blackrock Engineering
- Geotechnics rep performed nuclear density testing of previously placed, compacted fly ash. One point to proctors, and moisture samples, were received to aid in proctor selection and test verification.
- Geotechnics rep left site.

Prepared By:	DAW	**Date:**	4.5.12	**Checked By:**	[illegible]	**Date:**	4/17

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FAND-12**	Geotechnics Representative : David Wright	Page : 1 of 1
Date (s) : **4.5.12**	Reviewed By : [illegible]	Date : 4/17

Contractor : Charah	Borrow Source : Onsite Flyash cylo

Compaction Equipment : 1 CAT vibratory smoothdrum compactor

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
FAND 1	6C	531	6"	607-01-01	66.4	35.2	**96.2**	**34.5**	**71.5**	**107.7%**	**90.0%**	Moisture Correction
FAND 2	6C	529.6	6"	607-01-01	66.4	35.2	**93.0**	**29.6**	**71.8**	**108.1%**	**90.0%**	Moisture Correction
FAND 3	6C	528.7	6"	723-01-03	65.3	38.1	**75.7**	**18.1**	**64.1**	**98.2%**	**90.0%**	Moisture Correction
FAND 4	6C	528.5	6"	723-01-02	63.8	38.2	**75.8**	**15.8**	**65.5**	**102.6%**	**90.0%**	Moisture Correction
FAND 5	6C	528.2	6"	723-01-02	63.8	38.2	**73.4**	**19.2**	**61.6**	**96.5%**	**90.0%**	Moisture Correction
FAND 6	6C	529.1	6"	723-01-02	63.8	38.2	**69.3**	**23.8**	**56.0**	**87.7%**	**90.0%**	Moisture Correction
FAND 7	6C	529.5	6"	607-01-01	66.4	35.2	**82.5**	**21.5**	**67.9**	**102.3%**	**90.0%**	Moisture Correction
FAND 8	6C	529	6"	607-01-01	66.4	35.2	**65.8**	**18.6**	**55.5**	**83.6%**	**90.0%**	Moisture Correction
FAND 9	6C	528.9	6"	607-01-01	66.4	35.2	**66.2**	**19.1**	**55.6**	**83.7%**	**90.0%**	Moisture Correction
FAND 10	6C	528.2	6"	607-01-01	66.4	35.2	**74.5**	**23.2**	**60.5**	**91.1%**	**90.0%**	Moisture Correction

Gauge Number	Gauge Model	Density Count	Moisture Count
33577	3440	2315	648

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-01
Location:	Phase C
Depth (ft):	531
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.44
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.98
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	398
Wt. of Tare & WS (gm)	525.32
Wt. of Tare & DS (gm)	412.30
Wt. of Tare (gm)	84.70
Wt. of Water (gm)	113.02
Wt. of DS (gm)	327.60
Wet Density (pcf)	89.8
Moisture Content %	**34.5**
Dry Density (pcf)	**66.7**

Geotechnics Represenative : DAW

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-02
Location:	Phase C
Depth (ft):	528.7
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.5
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.04
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	311
Wt. of Tare & WS (gm)	534.52
Wt. of Tare & DS (gm)	465.50
Wt. of Tare (gm)	84.20
Wt. of Water (gm)	69.02
Wt. of DS (gm)	381.30
Wet Density (pcf)	91.6
Moisture Content %	**18.1**
Dry Density (pcf)	**77.5**

Geotechnics Represenative : DAW

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-03
Location:	Phase C
Depth (ft):	528.2
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.02
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.56
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	318
Wt. of Tare & WS (gm)	396.27
Wt. of Tare & DS (gm)	346.00
Wt. of Tare (gm)	84.20
Wt. of Water (gm)	50.27
Wt. of DS (gm)	261.80
Wet Density (pcf)	77.1
Moisture Content %	**19.2**
Dry Density (pcf)	**64.7**

Geotechnics Represenative : DAW MMS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-04
Location:	Phase C
Depth (ft):	529.1
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.19
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.73
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	300
Wt. of Tare & WS (gm)	601.08
Wt. of Tare & DS (gm)	506.90
Wt. of Tare (gm)	111.20
Wt. of Water (gm)	94.18
Wt. of DS (gm)	395.70
Wet Density (pcf)	82.2
Moisture Content %	**23.8**
Dry Density (pcf)	**66.4**

Geotechnics Represenative : DAW MAS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-05
Location:	Phase C
Depth (ft):	529
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.39
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	2.93
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	301
Wt. of Tare & WS (gm)	591.85
Wt. of Tare & DS (gm)	512.20
Wt. of Tare (gm)	84.00
Wt. of Water (gm)	79.65
Wt. of DS (gm)	428.20
Wet Density (pcf)	88.3
Moisture Content %	**18.6**
Dry Density (pcf)	**74.4**

Geotechnics Represenative : DAW MPS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-12**
Date (s) :	4.5.12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	1pt.-06
Location:	Phase C
Depth (ft):	528.2
Date :	4.5.12

Mold

Weight of Mold (lbs.)	9.46
Volume OF Mold (ft^3)	0.0332

Specimen

Weight of Mold & WS (lbs)	12.54
Weight of Mold (lbs)	9.46
Weight of WS (lbs)	3.08
Volume OF Mold (ft^3)	0.0332

Moisture / Density

Tare Number	399
Wt. of Tare & WS (gm)	533.54
Wt. of Tare & DS (gm)	449.60
Wt. of Tare (gm)	87.80
Wt. of Water (gm)	83.94
Wt. of DS (gm)	361.80
Wet Density (pcf)	92.8
Moisture Content %	**23.2**
Dry Density (pcf)	**75.3**

Geotechnics Represenative : DAW

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Report Number : **FDR-12**
Date (s) : 4.5.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4	5
Nuclear Test Number :	FAND-01	FAND-02	FAND-03	FAND-04	FAND-05
Location:	P6	P6	P6	P6	P6
Depth (ft):	531	529.6	528.7	528.5	528.2
Tare Number	398	312	311	303	318
Wt. of Tare & WS (gm)	525.32	426.16	534.52	514.15	396.27
Wt. of Tare & DS (gm)	412.3	348.1	465.5	459.13	346
Wt. of Tare (gm)	84.7	84.4	84.2	110.9	84.2
Wt. of Water (gm)	113.02	78.06	69.02	55.02	50.27
Wt. of DS (gm)	327.6	263.7	381.3	348.23	261.8
Water Content (%)	**34.5**	**29.6**	**18.1**	**15.8**	**19.2**

Test Number :	6	7	8	9	10
Nuclear Test Number :	FAND-06	FAND-07	FAND-08	FAND-09	FAND-10
Location:	P6	P6	P6	P6	P6
Depth (ft):	529.1	529.5	529	528.9	528.2
Tare Number	300	307	301	304	399
Wt. of Tare & WS (gm)	601.08	639.49	591.85	565.5	533.54
Wt. of Tare & DS (gm)	506.9	545.81	512.2	492.6	449.6
Wt. of Tare (gm)	111.2	110.1	84	110.9	87.8
Wt. of Water (gm)	94.18	93.68	79.65	72.9	83.94
Wt. of DS (gm)	395.7	435.71	428.2	381.7	361.8
Water Content (%)	**23.8**	**21.5**	**18.6**	**19.1**	**23.2**

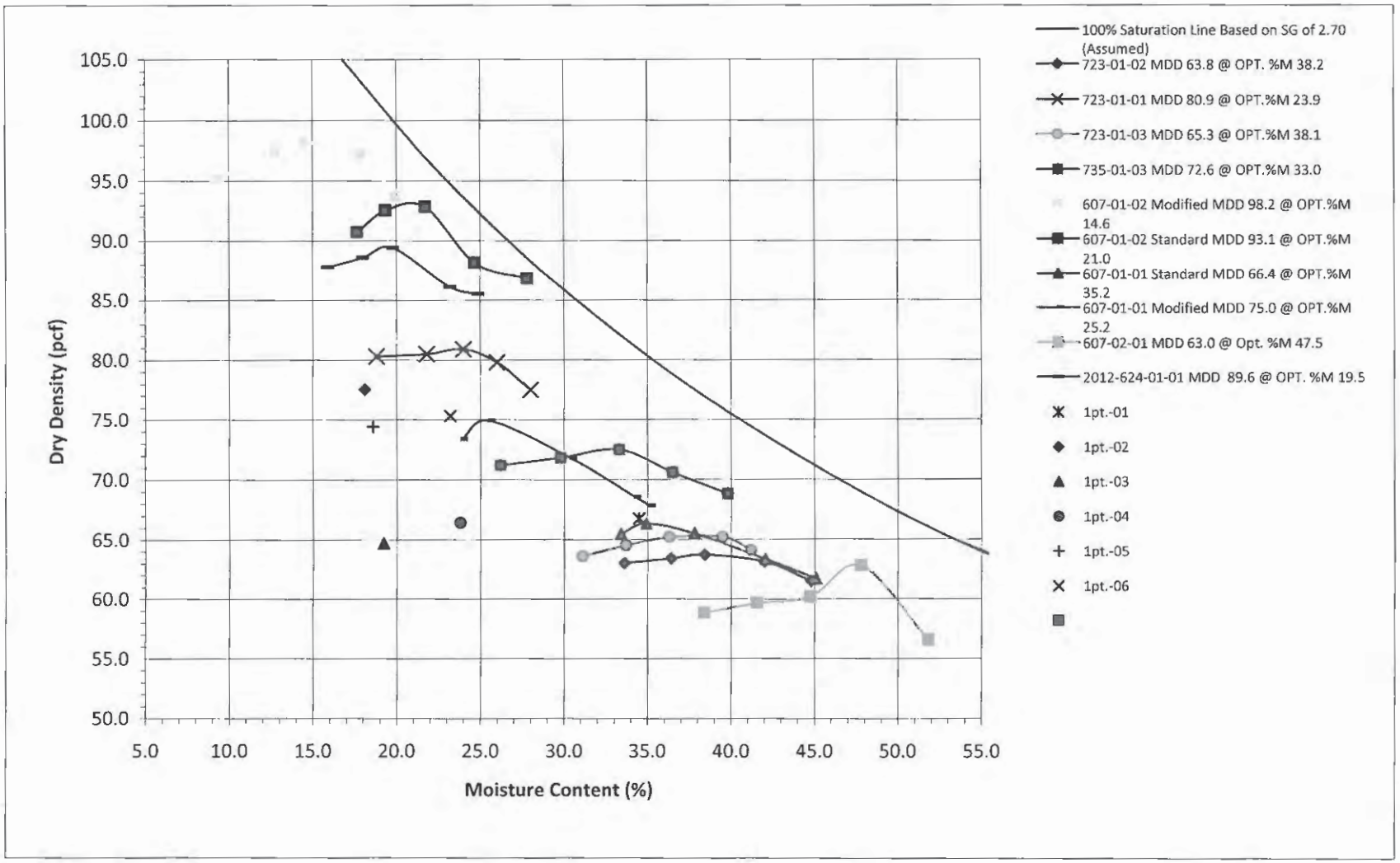
Notes : NA

Tested By: DAW Date: 4.5.12 MPS

geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	**Thursday**
Date:	**4/12/2012**
Log No.:	**13**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash Landfill Phase 6-C	**Project No.:**	2010-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 11:00am **Departed:** 2:30pm
General Contractor:	Charah Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
John Giles	Blackrock Engineering

Weather Conditions:	Sunny	**Temperature:**	~65

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Contractor's Personnel: ~5

Description of Daily Activities & Events

- Geotechnics Rep, Shannon Sisell arrived onsite and made contact with Jon Giles of Blackrock Engineering
- Geotechnics rep performed 11 nuclear density testing of previously placed, compacted fly ash.
- Collected 6 samples to perform one point proctors for proper curve selection.
- Collected 5 samples for moisture content.
- Geotechnics rep departed site.

Prepared By: SFS **Date:** 4/12/2012 **Checked By:** [illegible] **Date:** [illegible]

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FAND-13**	Geotechnics Representative : Shannon Sisell	Page : 1 of 1
Date (s) : **4/12/2012**	Reviewed By : [illegible]	Date : [illegible]

Contractor : Charah	Borrow Source : Onsite Flyash cylo

Compaction Equipment : 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	6C	530	6"	723-01-02	63.8	38.2	**71.4**	**35.5**	**52.7**	**82.6%**	**90.0%**	Moisture Correction
ND 2	6C	529.6	6"	723-01-02	63.8	38.2	**57.5**	**38.5**	**41.5**	**65.0%**	**90.0%**	Moisture Correction
ND 3	6C	529.8	6"	723-01-02	63.8	38.2	**61.1**	**35.0**	**45.3**	**70.9%**	**90.0%**	Moisture Correction
ND 4	6C	527.6	6"	723-01-02	63.8	38.2	**64.8**	**38.9**	**46.6**	**73.1%**	**90.0%**	Moisture Correction
ND 5	6C	527.9	6"	723-01-02	63.8	38.2	**81.9**	**35.5**	**60.5**	**94.8%**	**90.0%**	Moisture Correction
ND 6	6C	528.2	6"	723-01-02	63.8	38.2	**75.5**	**31.0**	**57.7**	**90.4%**	**90.0%**	Moisture Correction
ND 7	6C	527.4	8"	723-01-02	63.8	38.2	**76.3**	**34.2**	**56.9**	**89.1%**	**90.0%**	Moisture Correction
ND 8	6C	527.5	8"	723-01-02	63.8	38.2	**72.6**	**38.8**	**52.3**	**81.9%**	**90.0%**	Moisture Correction
ND 9	6C	530.1	8"	723-01-02	63.8	38.2	**72.4**	**30.8**	**55.3**	**86.8%**	**90.0%**	Moisture Correction
ND 10	6C	530.1	8"	723-01-02	63.8	38.2	**68.4**	**36.2**	**50.2**	**78.7%**	**90.0%**	Moisture Correction
ND 11	6C	529.9	8"	723-01-02	63.8	38.2	**75.7**	**30.0**	**58.2**	**91.2%**	**90.0%**	Moisture Correction

Gauge Number	Gauge Model	Density Count	Moisture Count
17	3450	6825	1165

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Report Number : **FDR-13**
Date (s) : 4.12.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4	5
Nuclear Test Number :	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	P6	P6	P6	P6	P6
Elevation (ft.):	530	529.6	529.8	527.6	527.9
Tare Number	A-1	SS-2	Y-3	Y-11	SS-1
Wt. of Tare & WS (gm)	204.1	216.2	210.14	219.6	313.34
Wt. of Tare & DS (gm)	175.62	183.67	181.1	185.64	256.03
Wt. of Tare (gm)	95.33	99.26	98.22	98.4	94.65
Wt. of Water (gm)	28.48	32.53	29.04	33.96	57.31
Wt. of DS (gm)	80.29	84.41	82.88	87.24	161.38
Water Content (%)	**35.5**	**38.5**	**35.0**	**38.9**	**35.5**

Test Number :	6	7	8	9	10
Nuclear Test Number :	ND-06	ND-07	ND-08	ND-09	ND-10
Location:	P6	P6	P6	P6	P6
Elevation (ft.):	528.2	527.4	527.5	530.1	530.1
Tare Number	Z-12	Z-14	B-4	Y-1	SS-5
Wt. of Tare & WS (gm)	327.85	233.15	224.64	278.5	255.19
Wt. of Tare & DS (gm)	273.44	199.27	189.14	235.54	213.38
Wt. of Tare (gm)	98.05	100.34	97.76	96	97.97
Wt. of Water (gm)	54.41	33.88	35.5	42.96	41.81
Wt. of DS (gm)	175.39	98.93	91.38	139.54	115.41
Water Content (%)	**31.0**	**34.2**	**38.8**	**30.8**	**36.2**

Notes : NA

Tested By: SFS Date: 4/12/2012

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-13**
Date (s) :	4.12.12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	11
Nuclear Test Number :	ND-11
Location:	P6
Elevation (ft.):	529.9
Tare Number	A-5
Wt. of Tare & WS (gm)	277.55
Wt. of Tare & DS (gm)	236.31
Wt. of Tare (gm)	98.92
Wt. of Water (gm)	41.24
Wt. of DS (gm)	137.39
Water Content (%)	**30.0**

Test Number :	
Nuclear Test Number :	
Location:	
Elevation (ft.):	
Tare Number	
Wt. of Tare & WS (gm)	
Wt. of Tare & DS (gm)	
Wt. of Tare (gm)	
Wt. of Water (gm)	
Wt. of DS (gm)	
Water Content (%)	

Notes : *NA*

Tested By: SFS Date: 4/12/2012

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-607

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-13**
Date (s) :	4/12/2012

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information			
Test Number :	ND.-01	ND.-02	ND.-03
Location:	Phase C	Phase C	Phase C
Elevation(ft.):	530	529.6	529.8
Date :	4/12/2012	4/12/2012	4/12/2012
Mold			
Weight of Mold (lbs.)	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033
Specimen			
Weight of Mold & WS (lbs)	12.3	11.77	11.81
Weight of Mold (lbs)	9.46	9.46	9.46
Weight of WS (lbs)	2.84	2.31	2.35
Volume OF Mold (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	A-5	SS-2	B-4
Wt. of Tare & WS (gm)	441.85	417.23	456.63
Wt. of Tare & DS (gm)	352.60	330.21	364.53
Wt. of Tare (gm)	99.10	99.37	98.08
Wt. of Water (gm)	89.25	87.02	92.10
Wt. of DS (gm)	253.50	230.84	266.45
Wet Density (pcf)	86.1	70.0	71.2
Moisture Content %	**35.2**	**37.7**	**34.6**
Dry Density (pcf)	**63.7**	**50.8**	**52.9**

Geotechnics Represenative : SFS

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

Report Number : **FDR-13**
Date (s) : 4/12/2012

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information			
Test Number :	ND.-04	ND.-07	ND.-08
Location:	Phase C	Phase C	Phase C
Elevation(ft.):	527.6	527.4	527.5
Date :	4/12/2012	4/12/2012	4/12/2012
Mold			
Weight of Mold (lbs.)	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033
Specimen			
Weight of Mold & WS (lbs)	12.13	12.31	12.185
Weight of Mold (lbs)	9.46	9.46	9.46
Weight of WS (lbs)	2.67	2.85	2.725
Volume OF Mold (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	SS-5	Z-14	Y-3
Wt. of Tare & WS (gm)	506.47	579.61	503.35
Wt. of Tare & DS (gm)	391.78	458.71	389.92
Wt. of Tare (gm)	98.12	100.72	98.32
Wt. of Water (gm)	114.69	120.90	113.43
Wt. of DS (gm)	293.66	357.99	291.60
Wet Density (pcf)	80.9	86.4	82.6
Moisture Content %	**39.1**	**33.8**	**38.9**
Dry Density (pcf)	**58.2**	**64.6**	**59.5**

Geotechnics Represenative : SFS

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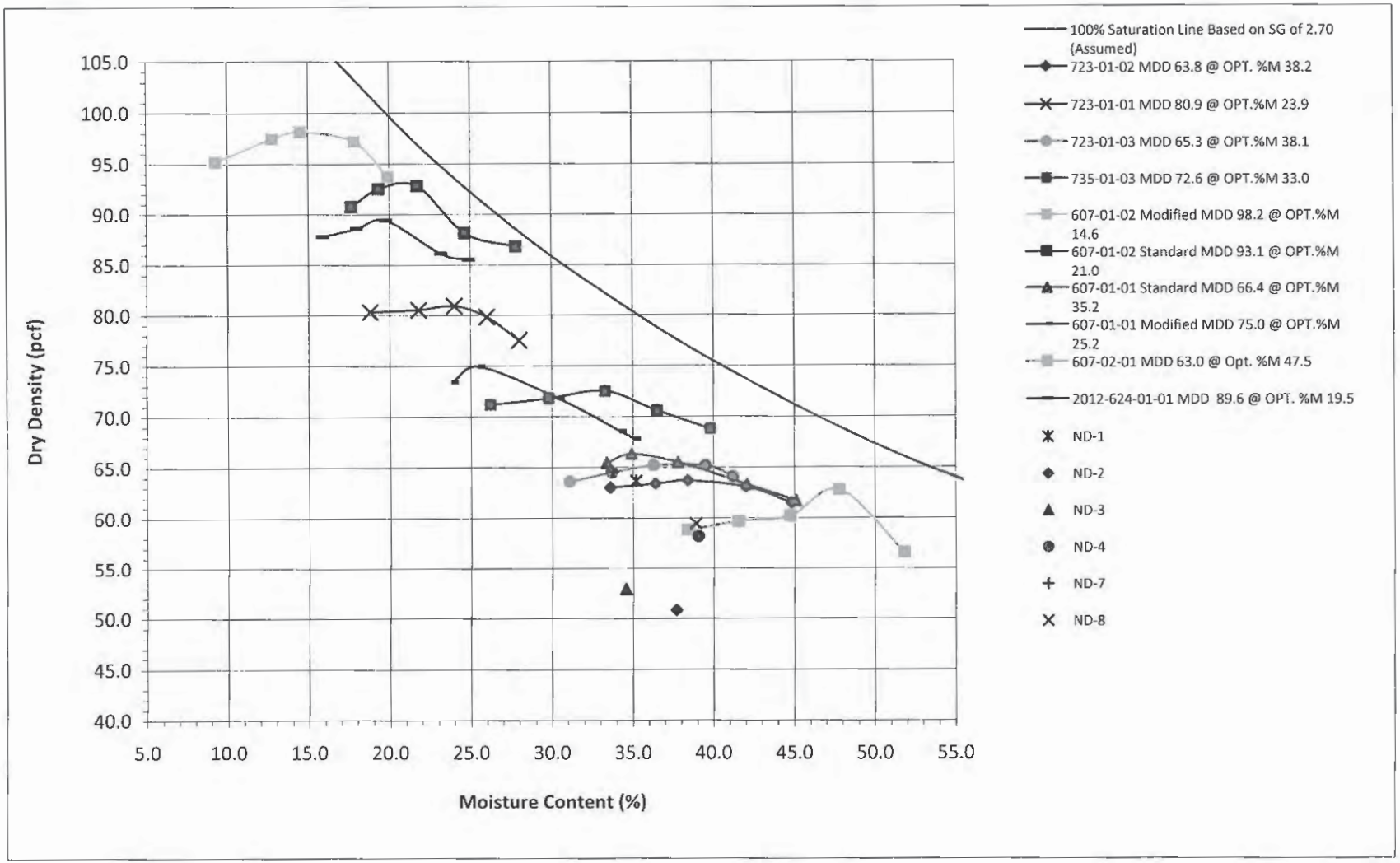
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	**Friday**
Date:	**4/20/2012**
Log No.:	**14**
Page:	**1**

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INTEGRITY IN TESTING

Daily Field Activity Log

Project Name:	Roxboro Ash Landfill Phase 6-C	**Project No.:**	2010-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 11:00am **Departed:** 1:45pm
General Contractor:	Charah Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
John Giles	Blackrock Engineering

Weather Conditions:	Overcast	**Temperature:**	~65

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Contractor's Personnel: ~5

Description of Daily Activities & Events

- Geotechnics Rep, Shannon Sisell and Jeffrey Ray arrived onsite and made contact with Jon Giles of Engineering
- Geotechnics rep performed 10 nuclear density testing of previously placed, compacted fly ash.
- Collected 5 samples to perform one point proctors for proper curve selection.
- Collected 4 samples for moisture content.
- Geotechnics rep departed site.

Prepared By: JBR **Date:** 4/20/2012 **Checked By:** MBS **Date:** 4/24

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FAND-14**	Geotechnics Representative : Jeffrey Ray	Page : 1 of 1
Date (s) : **4/20/2012**	Reviewed By : MDT	Date : 4/25

Contractor : Charah	Borrow Source : Onsite Flyash cylo

Compaction Equipment : 1 CAT D6 bulldozer, 1 CAT smoothdrum vibratory compactor, 1 OshKosh 4000 gallon water truck, 1 Volvo offroad water truck

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	6C	531.6	8"	607-02-01	63.0	47.5	**66.0**	**35.6**	**48.7**	**77.3%**	**90.0%**	Gray Fly Ash
ND 2	6C	529.9	8"	607-02-02	63.0	47.5	**77.5**	**39.3**	**55.7**	**88.3%**	**90.0%**	Gray Fly Ash
ND 3	6C	529.4	8"	607-02-03	63.0	47.5	**71.3**	**34.3**	**53.1**	**84.3%**	**90.0%**	Gray Fly Ash
ND 4	6C	529.6	8"	607-02-04	63.0	47.5	**73.0**	**31.9**	**55.4**	**87.9%**	**90.0%**	Gray Fly Ash
ND 5	6C	529	8"	607-02-05	63.0	47.5	**66.0**	**39.8**	**47.2**	**74.9%**	**90.0%**	Gray Fly Ash
ND 6	6C	529.1	8"	607-02-06	63.0	47.5	**67.9**	**33.3**	**50.9**	**80.8%**	**90.0%**	Gray Fly Ash
ND 7	6C	529	8"	607-02-07	63.0	47.5	**72.4**	**44.1**	**50.3**	**79.8%**	**90.0%**	Gray Fly Ash
ND 8	6C	529.5	8"	607-02-08	63.0	47.5	**78.9**	**36.5**	**57.8**	**91.7%**	**90.0%**	Gray Fly Ash
ND 9	6C	531.3	8"	607-02-09	63.0	47.5	**67.2**	**36.2**	**49.3**	**78.3%**	**90.0%**	Gray Fly Ash

Gauge Number	Gauge Model	Density Count	Moisture Count
17	3450	6842	1165

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-607

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FAND-14**
Date (s) :	4/20/2012

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information			
Test Number :	ND-01	ND-03	ND-05
Location:	Phase C	Phase C	Phase C
Elevation(ft.):	531.6	529.9	529.8
Date :	4/20/2012	4/20/2012	4/20/2012
Mold			
Weight of Mold (lbs.)	9.45547	9.45547	9.45547
Volume OF Mold (ft^3)	0.0332	0.0332	0.0332
Specimen			
Weight of Mold & WS (lbs)	11.9698	12.0602	11.849
Weight of Mold (lbs)	9.45547	9.45547	9.45547
Weight of WS (lbs)	2.51433	2.60473	2.39353
Volume OF Mold (ft^3)	0.0332	0.0332	0.0332
Moisture / Density			
Tare Number	311	307	312
Wt. of Tare & WS (gm)	366.27	415.61	366.22
Wt. of Tare & DS (gm)	292.27	337.66	285.91
Wt. of Tare (gm)	84.38	110.66	84.30
Wt. of Water (gm)	74.00	77.95	80.31
Wt. of DS (gm)	207.89	227.00	201.61
Wet Density (pcf)	75.7	78.5	72.1
Moisture Content %	**35.6**	**34.3**	**39.8**
Dry Density (pcf)	**55.9**	**58.4**	**51.6**

Geotechnics Represenative : JBR

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-607

Report Number :	**FAND-14**
Date (s) :	4/20/2012

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information		
Test Number :	ND-07	ND-09
Location:	Phase C	Phase C
Elevation(ft.):	529	531.3
Date :	4/20/2012	4/20/2012
Mold		
Weight of Mold (lbs.)	9.45547	9.45547
Volume OF Mold (ft^3)	0.0332	0.0332
Specimen		
Weight of Mold & WS (lbs)	12.0743	11.94
Weight of Mold (lbs)	9.45547	9.45547
Weight of WS (lbs)	2.61883	2.48453
Volume OF Mold (ft^3)	0.0332	0.0332
Moisture / Density		
Tare Number	300	314
Wt. of Tare & WS (gm)	334.12	332.52
Wt. of Tare & DS (gm)	265.80	266.67
Wt. of Tare (gm)	110.71	84.55
Wt. of Water (gm)	68.32	65.85
Wt. of DS (gm)	155.09	182.12
Wet Density (pcf)	78.9	74.8
Moisture Content %	**44.1**	**36.2**
Dry Density (pcf)	**54.8**	**55.0**

Geotechnics Represenative : JBR

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

geotechnics
INTEGRITY IN TESTING

Report Number : **FAND-14**
Date (s) : 4/20/2012

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4
Nuclear Test Number :	ND-02	ND-04	ND-06	ND-08
Location:	P6	P6	P6	P6
Elevation (ft.):	529.9	529.6	529.1	529.5
Tare Number	317	315	318	310
Wt. of Tare & WS (gm)	355.56	548.13	447.59	546.16
Wt. of Tare & DS (gm)	279.07	442.19	357.38	429.47
Wt. of Tare (gm)	84.38	110.38	86.63	110.2
Wt. of Water (gm)	76.49	105.94	90.21	116.69
Wt. of DS (gm)	194.69	331.81	270.75	319.27
Water Content (%)	**39.3**	**31.9**	**33.3**	**36.5**

Test Number :	
Nuclear Test Number :	
Location:	
Elevation (ft.):	
Tare Number	
Wt. of Tare & WS (gm)	
Wt. of Tare & DS (gm)	
Wt. of Tare (gm)	
Wt. of Water (gm)	
Wt. of DS (gm)	
Water Content (%)	

Notes : *NA*

Tested By: JBR Date: 4/20/2012

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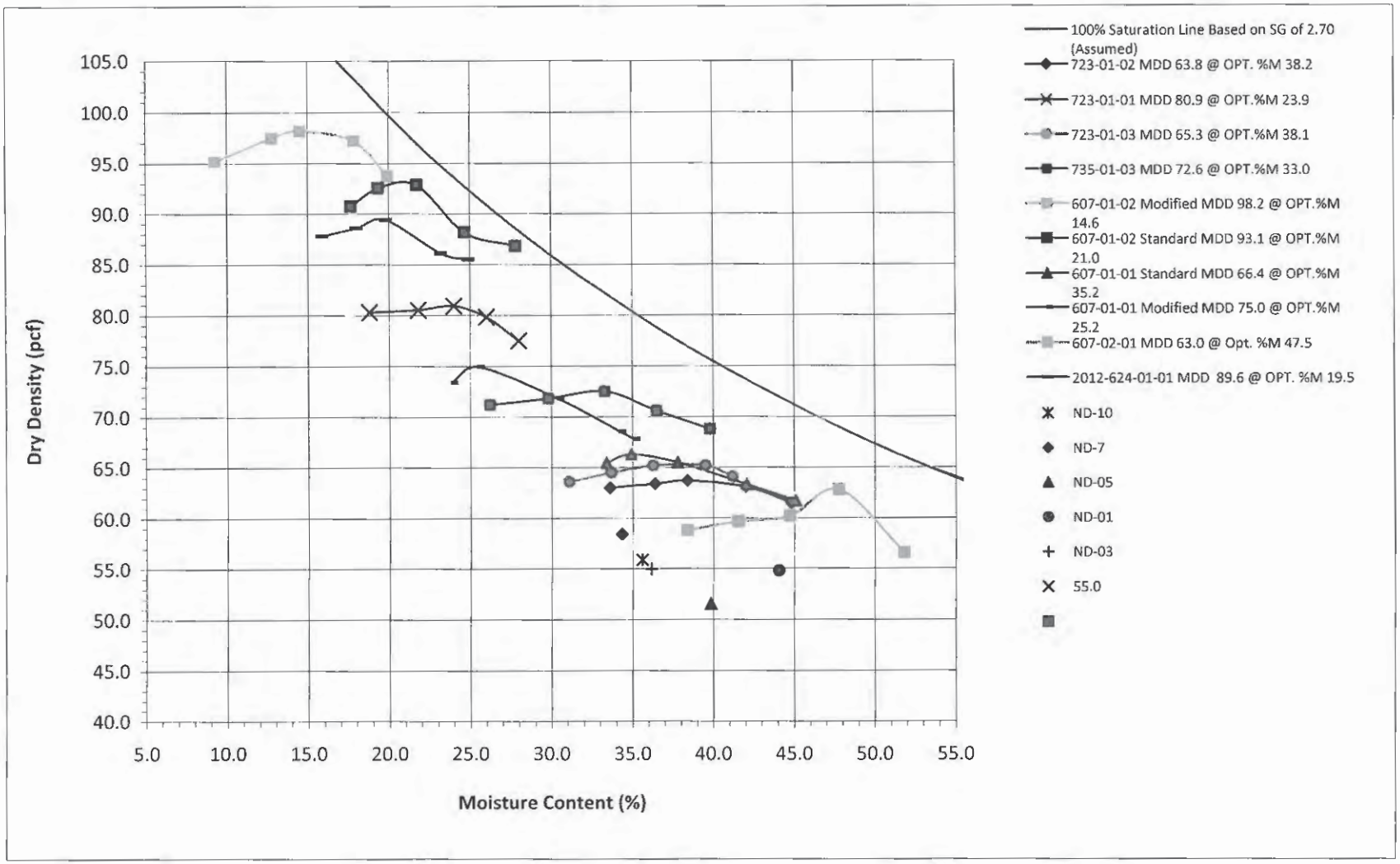
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	**Friday**
Date:	**5/4/2012**
Log No.:	**17**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Engineers	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00am **Departed:** 2:00pm
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Charah	Chris Robertson

Weather Conditions:	Clear	**Temperature:**	80

Contractor's Equipment: 1- CAT Smoothdrum Roller, 1- CAT D6 Dozer, 1- Water Truck, 2- On-Road Dump Trucks

Contractor's Personnel: ~4

Description of Daily Activities & Events

- Geotechnics Rep. Shannon Sisell arrived on site and made contact with Chris Robertson and Gary Ahlberg
- Geotechnics Rep. performed 6 Moisture / Density testing of previously placed and compacted Silo Ash material in Phase 6C (see FDR-16).
- Charah reps. added watered and Re-rolled to achieve required compaction.
- Geotechnics Rep. perfomed 6 additional Moisture / Density tests befor returning to the above mentioned reworked area (ND-1 to ND-6) and retested ND-3through ND-6 (see FDR-16).
- Geotechnics Rep. collected 6 Drive Cylinders.
- Geotechnics Rep. collected 7 Water Content.
- Geotechnics Rep. collected 1 one-point proctor.
- Geotechnics Rep. departed the site.

Prepared By: SFS **Date:** 5/4/2012 **Checked By:** [illegible] **Date:** 5/9

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6C
Project Number : 2012-624

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INTEGRITY IN TESTING

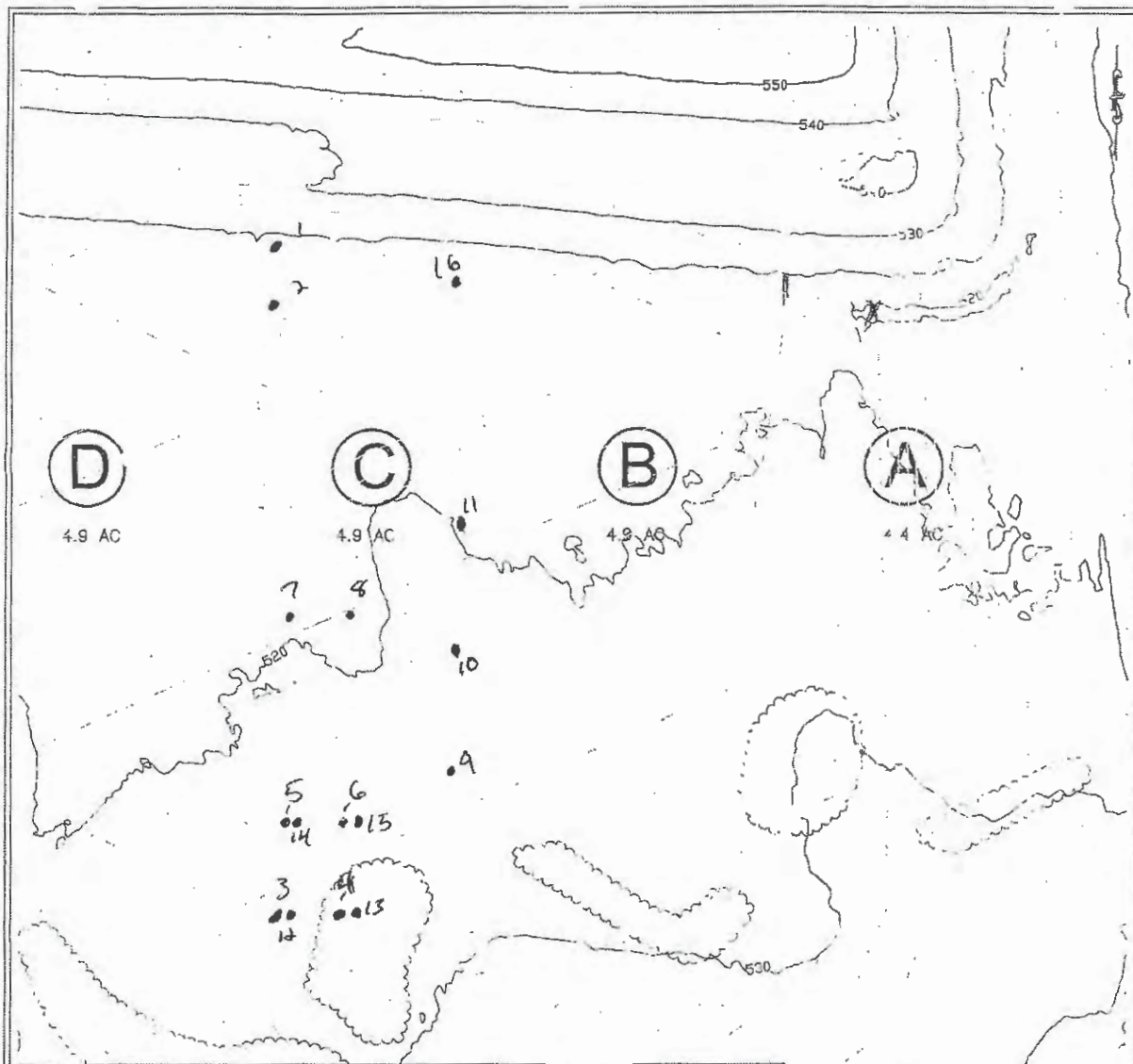
Field Density Report

Report Number : **FDR-17**	Geotechnics Representative : Shannon Sisell	Page : 1 of 1
Date (s) : **5/4/2012**	Reviewed By : MMS	Date : 5/9

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	1- CAT Smoothdrum Roller, 1- CAT D6 Dozer, 1- Water Truck, 2- On-Road Dump Truck
33260	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	Ph. 6C	530.1	8"	735-01-03	72.6	33.0	**86.3**	**29.6**	**66.6**	**91.7%**	**90%**	DC-01&02 - %M corrected
ND - 2	Ph. 6C	529.2	8"	723-01-03	65.3	38.1	**85.7**	**33.5**	**64.2**	**98.3%**	**90%**	%M corrected
ND - 3	Ph. 6C	534.4	8"	723-01-02	63.8	38.2	**82.8**	**32.2**	**62.6**	**98.2%**	**90%**	%M corrected
ND - 4	Ph. 6C	534.8	8"	723-01-02	63.8	38.2	**81.2**	**33.3**	**60.9**	**95.5%**	**90%**	%M corrected
ND - 5	Ph. 6C	534.8	8"	607-03-01	59.0	41.8	**69.4**	**30.2**	**53.3**	**90.3%**	**90%**	DC-03 - %M corrected
ND - 6	Ph. 6C	534.6	8"	607-03-01	59.0	41.8	**72.6**	**39.6**	**52.0**	**88.1%**	**90%**	%M corrected
ND - 7	Ph. 6C	534.6	8"	607-03-01	59.0	41.8	**68.4**	**32.0**	**51.8**	**87.8%**	**90%**	DC-04 - %M corrected
ND - 8	Ph. 6C	534.8	8"	723-01-02	63.8	38.2	**78.6**	**28.2**	**61.3**	**96.1%**	**90%**	DC-05 - %M corrected
ND - 9	Ph. 6C	534.9	8"	607-03-01	59.0	41.8	**75.1**	**33.3**	**56.3**	**95.5%**	**90%**	%M corrected
ND - 10	Ph. 6C	534.7	8"	607-01-01	75.0	25.2	**92.6**	**32.2**	**70.0**	**93.4%**	**90%**	DC-06 - %M corrected
ND - 11	Ph. 6C	534.9	8"	607-03-01	59.0	41.8	**78.4**	**37.4**	**57.1**	**96.7%**	**90%**	%M corrected
ND - 12	Ph. 6C	534.5	8"	723-01-02	63.8	38.2	**84.3**	**33.5**	**63.1**	**99.0%**	**90%**	ND-3R - %M corrected
ND - 13	Ph. 6C	534.7	8"	723-01-02	63.8	38.2	**83.7**	**33.7**	**62.6**	**98.1%**	**90%**	ND-4R - %M corrected
ND - 14	Ph. 6C	534.7	8"	607-03-01	59.0	41.8	**70.9**	**36.7**	**51.9**	**87.9%**	**90%**	ND-5R - %M corrected
ND - 15	Ph. 6C	534.5	8"	607-03-01	59.0	41.8	**70.5**	**36.6**	**51.6**	**87.5%**	**90%**	ND-6R - %M corrected
ND - 16	Ph. 6C	534.5	8"	735-01-03	72.6	33.0	**89.5**	**25.5**	**71.3**	**98.2%**	**90%**	DC-07 - %M corrected



TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

5-4-12

TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6A COMPACTION TESTS GEOTECHNICS	JWG	GWA	1"=100'	CT-3
	DATE: 11.14.11	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

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WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CHARAH
Client Reference	ROXBORO ASH LF PHASE 6C
Project No.	2012-624

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-2	ND-3	ND-4	ND-6	ND-9
Location:	Ph.6C	Ph.6C	Ph.6C	Ph.6C	Ph.6C
Depth:	529.2	534.4	534.8	534.6	534.9
Tare Number	803	807	800	805	804
Wt. of Tare & WS (gm)	299.2	330.72	381.97	293.79	291.57
Wt. of Tare & DS (gm)	250.14	275.66	312.49	240.55	244.98
Wt. of Tare (gm)	103.5	104.56	103.6	106.09	105.01
Wt. of Water (gm)	49.06	55.06	69.48	53.24	46.59
Wt. of DS (gm)	146.64	171.1	208.89	134.46	139.97
Water Content (%)	**33.5**	**32.2**	**33.3**	**39.6**	**33.3**

Test Number:	WC-06	WC-07	WC-08	WC-09
Nuclear Test Number:	ND-12	ND-13	ND-14	ND-15
Location:	Ph.6C	Ph.6C	Ph.6C	Ph.6C
Depth:	534.5	534.7	534.7	534.5
Tare Number	810	303	813	802
Wt. of Tare & WS (gm)	347.45	329.54	293.07	287.25
Wt. of Tare & DS (gm)	288.99	274.55	244.48	237.99
Wt. of Tare (gm)	114.44	111.37	112.06	103.57
Wt. of Water (gm)	58.46	54.99	48.59	49.26
Wt. of DS (gm)	174.55	163.18	132.42	134.42
Water Content (%)	**33.5**	**33.7**	**36.7**	**36.6**

Notes :

Tested By SFS *Date* 5/4/2012 *Checked By* [illegible] *Date* 5/9

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6C
Project Number : 2012-624

Report Number : **FDR-17**
Date (s) : 5/4/2012

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-01	DC-02	DC-03	DC-04
Nuclear Test Number :	ND-1	ND-1	ND-5	ND-7
Location:	Ph.6C	Ph.6C	Ph.6C	Ph.6C
Depth (ft):	530.1	530.1	534.8	534.6
Date :	5/4/2012	5/4/2012	5/4/2012	5/4/2012
Mold				
Cylinder ID	--	--	--	--
Weight of Cylinder (lbs.)	1.325	1.3225	1.242	1.2415
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Wt. of Cylinder & WS (lbs.)	4.20	4.19	3.56	3.52
Wt. of Cylinder (lbs.)	1.33	1.32	1.24	1.24
Wt. of WS	2.88	2.86	2.32	2.28
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	829	310	315	305
Wt. of Tare & WS (gm)	669.05	439.74	356.36	371.33
Wt. of Tare & DS (gm)	576.06	364.43	299.31	301.86
Wt. of Tare (gm)	260.82	110.29	110.42	84.66
Wt. of Water (gm)	92.99	75.31	57.05	69.47
Wt. of DS (gm)	315.24	254.14	188.89	217.20
Wet Density (pcf):	87.1	86.8	70.3	69.2
Moisture Content (%):	**29.5**	**29.6**	**30.2**	**32.0**
Dry Density (pcf):	**67.3**	**67.0**	**54.0**	**52.4**
Proctor:	72.6	72.6	59.0	59.0
% Compaction:	**92.7%**	**92.2%**	**91.6%**	**88.8%**

Geotechnics Representative : Shannon Sisell

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Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6C
Project Number : 2012-624

Report Number : **FDR-17**
Date (s) : 5/4/2012

Drive Cylinder - ASTM D 2937

Test Information			
Test Number :	DC-05	DC-06	DC-07
Nuclear Test Number :	ND-8	ND-10	ND-16
Location:	Ph.6C	Ph.6C	Ph.6C
Depth (ft):	534.8	534.7	534.5
Date :	5/4/2012	5/4/2012	5/4/2012
Mold			
Cylinder ID	--	--	--
Weight of Cylinder (lbs.)	1.3805	1.3915	1.3135
Volume of Cylinder (ft^3)	0.033	0.033	0.033
Specimen			
Wt. of Cylinder & WS (lbs.)	4.04	4.54	4.21
Wt. of Cylinder (lbs.)	1.38	1.39	1.31
Wt. of WS	2.66	3.14	2.89
Cylinder Volume (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	314	300	398
Wt. of Tare & WS (gm)	428.71	490.28	485.51
Wt. of Tare & DS (gm)	353.04	397.91	404.07
Wt. of Tare (gm)	84.57	110.74	84.34
Wt. of Water (gm)	75.67	92.37	81.44
Wt. of DS (gm)	268.47	287.17	319.73
Wet Density (pcf):	80.7	95.3	87.7
Moisture Content (%):	**28.2**	**32.2**	**25.5**
Dry Density (pcf):	**63.0**	**72.1**	**69.9**
Proctor:	65.3	72.6	72.6
% Compaction:	**96.4%**	**99.3%**	**96.3%**

Geotechnics Representative : Shannon Sisell

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Client:	CHARAH
Project Name :	ROXBORO ASH LF PHASE 6C
Project Number :	2012-624

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INTEGRITY IN TESTING

Report Number :	**FDR-17**
Date (s) :	5/4/2012

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : GRAY SILO ASH

Test Information

Test Number :	1pt.-01
Location:	ND-13
Depth (ft):	534.7
Date :	5/4/2012

Mold

Weight of Mold (lbs.)	9.4535
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.502
Weight of Mold (lbs)	9.4535
Weight of WS (lbs)	3.0485
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	311
Wt. of Tare & WS (gm)	508.90
Wt. of Tare & DS (gm)	404.68
Wt. of Tare (gm)	84.39
Wt. of Water (gm)	104.22
Wt. of DS (gm)	320.29
Wet Density (pcf)	92.4
Moisture Content %	**32.5**
Dry Density (pcf)	**69.7**

Geotechnics Represenative : Shannon Sisell

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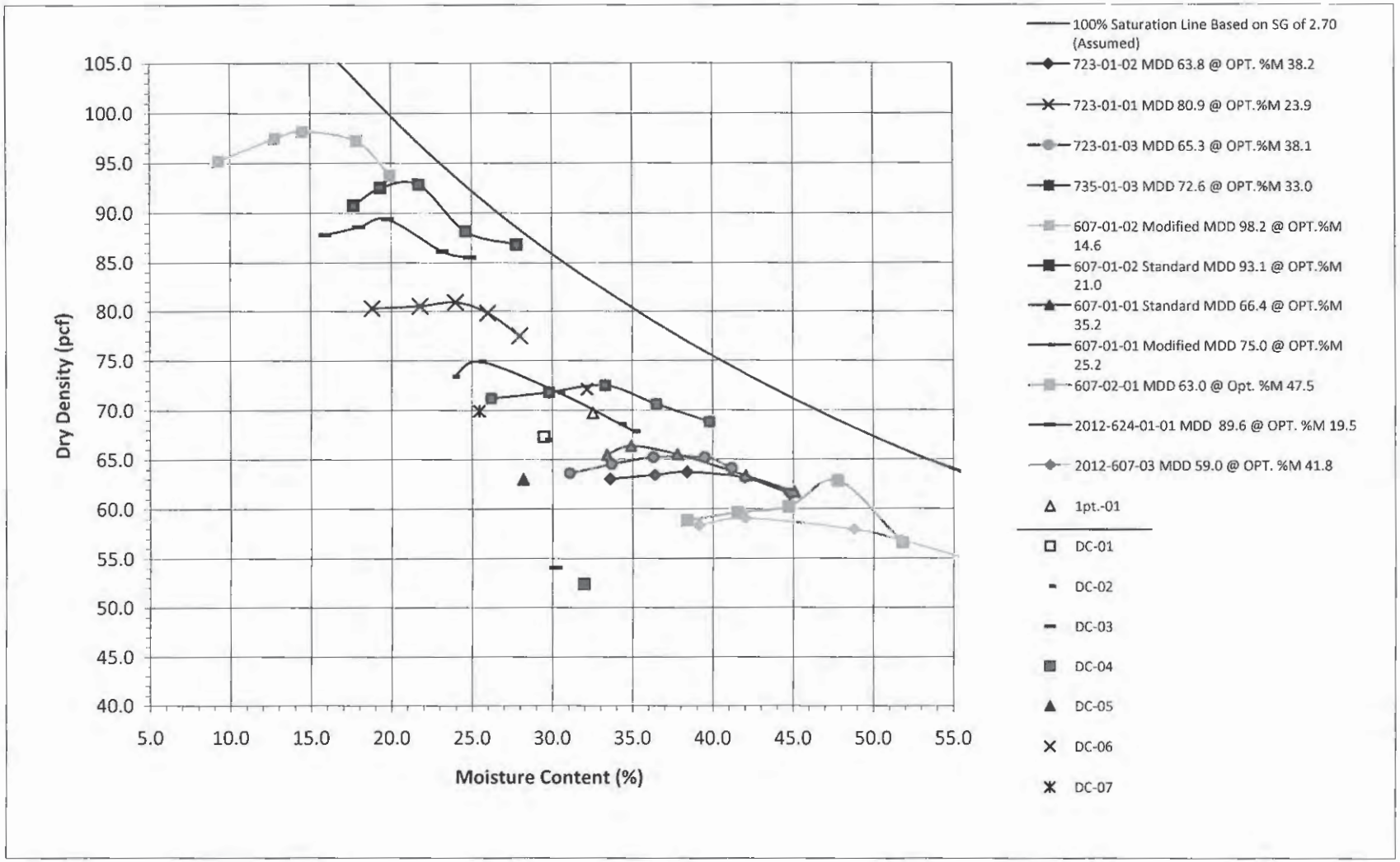
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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Day:	Thurs.
Date:	5.10.12
Log No.:	01
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 2:00pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy, Windy	**Temperature:**	60's

Contractor's Equipment: 1 CAT Smoothdrum Roller

Contractor's Personnel: NA

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	5.10.12	**Checked By:**	JRB	**Date:**	5.11.12

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-018**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1
Date (s) : **5.10.12**	Reviewed By : JRB	Date : 5.11.12

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	536.5	12"	607-03-01	59.0	41.8	**81.4**	**37.4**	**59.2**	**100.4%**	**90.0%**	
ND - 02	C	536.5	12"	607-03-01	59.0	41.8	**73.6**	**31.6**	**55.9**	**94.8%**	**90.0%**	
DC - 01	C	536.5	12"	607-03-01	59.0	41.8	**73.6**	**31.9**	**55.8**	**94.6%**	**90.0%**	
ND - 03	C	536.3	12"	607-03-01	59.0	41.8	**75.4**	**36.2**	**55.4**	**93.8%**	**90.0%**	
ND - 04	C	536.4	12"	607-03-01	59.0	41.8	**76.9**	**39.7**	**55.0**	**93.3%**	**90.0%**	
ND - 05	C	536.3	12"	607-01-01	66.4	35.2	**86.0**	**33.7**	**64.3**	**96.9%**	**90.0%**	
DC - 02	C	536.3	NA	607-01-01	66.4	35.2	**88.8**	**34.0**	**66.3**	**99.8%**	**90.0%**	
ND - 06	C	536.2	12"	607-03-01	59.0	41.8	**81.2**	**40.3**	**57.9**	**98.1%**	**90.0%**	
ND - 07	C	536.3	12"	607-03-01	59.0	41.8	**80.0**	**35.1**	**59.2**	**100.4%**	**90.0%**	
ND - 08	C	536.2	12"	607-03-01	59.0	41.8	**81.3**	**36.8**	**59.4**	**100.7%**	**90.0%**	
ND - 09	C	535.8	12"	607-03-01	59.0	41.8	**73.8**	**29.0**	**57.2**	**97.0%**	**90.0%**	
ND - 10	C	532.1	12"	607-01-01	66.4	35.2	**82.3**	**36.7**	**60.2**	**90.7%**	**90.0%**	

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Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-18**
Date (s) :	5.10.12

Drive Cylinder - ASTM D 2937

Test Information			
Test Number :	DC-01	DC-02	DC-03
Nuclear Test Number :	ND-02	ND-05	ND-10
Location:	C	C	C
Depth (ft):	536.5	536.3	532.1
Date :	5.10.12	5.10.12	5.10.12
Mold			
Cylinder ID	JB-01	JB-02	JB-02
Weight of Cylinder (lbs.)	1.37	1.33	1.32
Volume of Cylinder (ft^3)	0.033	0.033	0.033
Specimen			
Wt. of Cylinder & WS (lbs.)	3.80	4.26	4.20
Wt. of Cylinder (lbs.)	1.37	1.33	1.32
Wt. of WS	2.43	2.93	2.88
Cylinder Volume (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	314	311	300
Wt. of Tare & WS (gm)	345.04	478.68	477.41
Wt. of Tare & DS (gm)	282.04	378.76	377.83
Wt. of Tare (gm)	84.63	84.61	111.03
Wt. of Water (gm)	63.00	99.92	99.58
Wt. of DS (gm)	197.41	294.15	266.80
Wet Density (pcf):	73.6	88.8	87.3
Moisture Content (%):	**31.9**	**34.0**	**37.3**
Dry Density (pcf):	**55.8**	**66.3**	**63.6**

Geotechnics Representative : JACOB R. BUDA

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04
Nuclear Test Number:	ND-01	ND-03	ND-06	ND-08
Location:	C	C	C	C
Depth:	536.5	536.3	536.2	536.2
Tare Number	305	308	312	318
Wt. of Tare & WS (gm)	431.80	486.94	469.92	488.62
Wt. of Tare & DS (gm)	334.73	377.63	358.29	376.49
Wt. of Tare (gm)	84.81	88.41	84.37	86.74
Wt. of Water (gm)	97.07	109.31	111.63	112.13
Wt. of DS (gm)	249.92	289.22	273.92	289.75
Water Content (%)	**38.8**	**37.8**	**40.8**	**38.7**

Notes : *NA*

Tested By *JRB* *Date* *5.10.12* *Checked By* JRB *Date* 5.11.12

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

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INTEGRITY IN TESTING

Report Number :	**FDR-18**
Date (s) :	5.10.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03
Location:	ND-02	ND-05	ND-12
Depth (ft):	536.5	536.3	532.5
Date :	5.10.12	5.10.12	5.10.12

Mold

Weight of Mold (lbs.)	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.25	12.47	12.47
Weight of Mold (lbs)	9.46	9.46	9.46
Weight of WS (lbs)	2.79	3.01	3.01
Volume OF Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	314	310	303
Wt. of Tare & WS (gm)	239.52	333.56	260.88
Wt. of Tare & DS (gm)	193.99	274.06	213.91
Wt. of Tare (gm)	84.70	110.47	84.34
Wt. of Water (gm)	45.53	59.50	46.97
Wt. of DS (gm)	109.29	163.59	129.57
Wet Density (pcf):	84.5	91.2	91.2
Moisture Content (%):	**41.7**	**36.4**	**36.3**
Dry Density (pcf):	**59.7**	**66.9**	**66.9**

Geotechnics Representative : Jacob R. Buda

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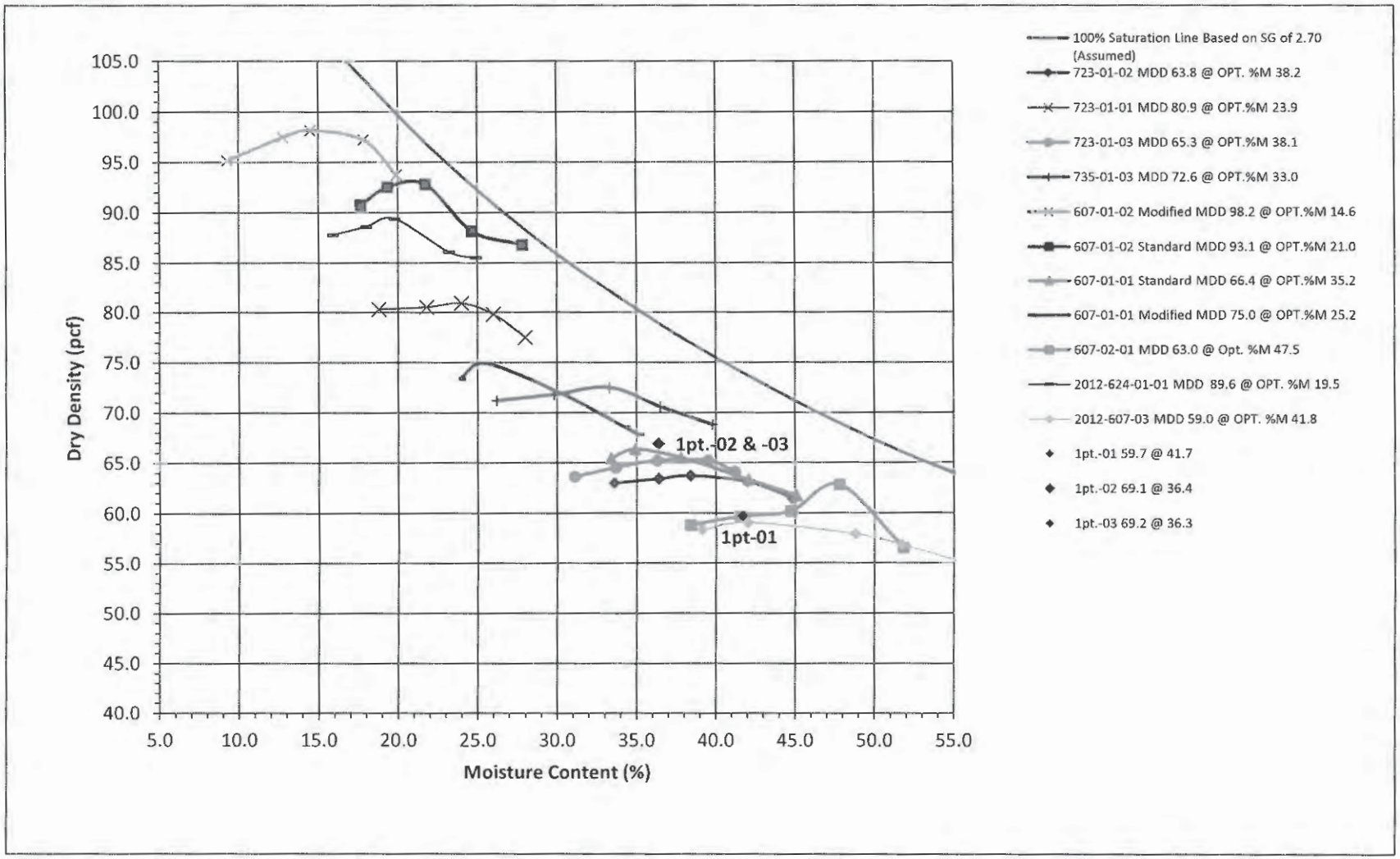
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607



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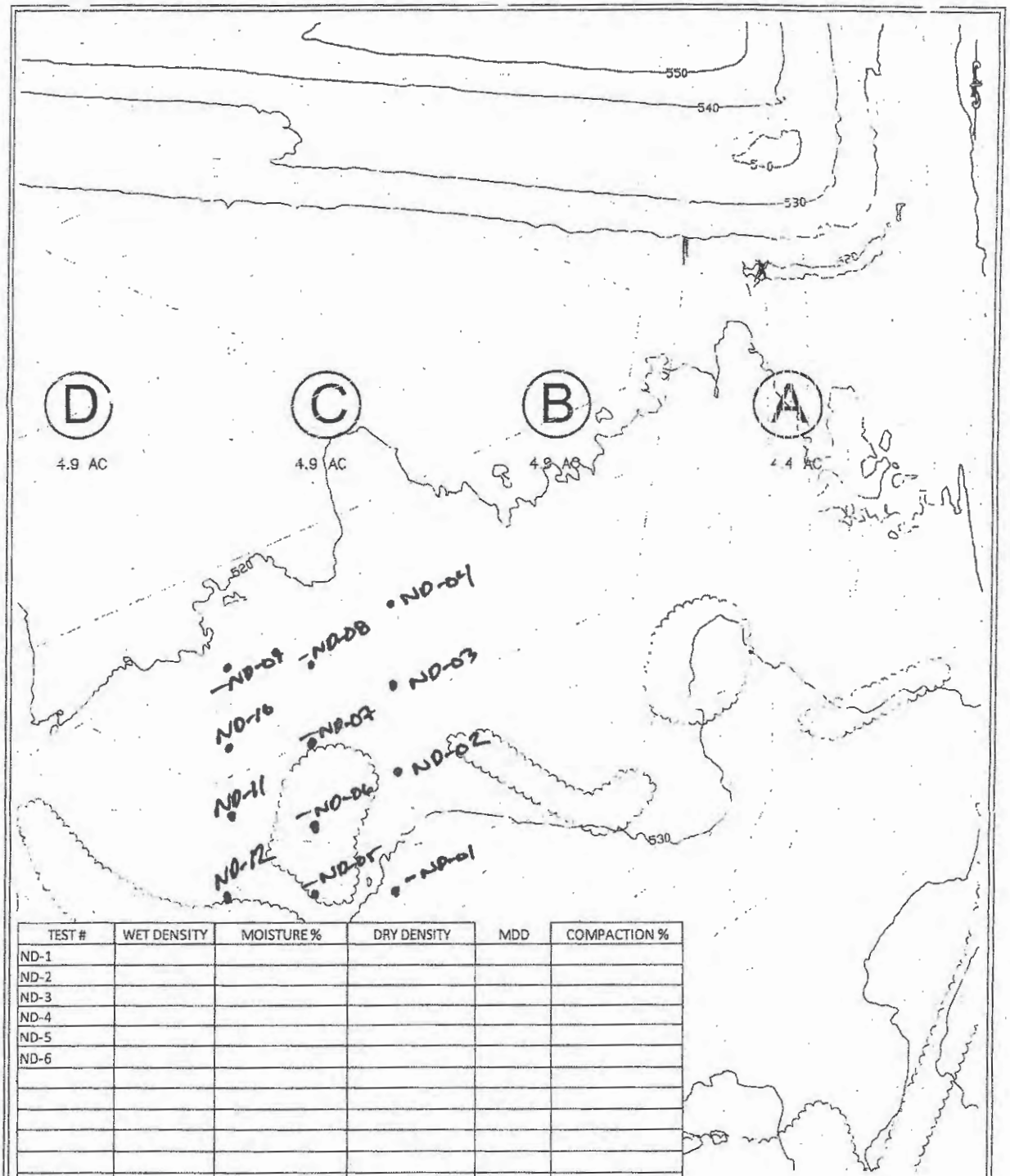

TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

APPROX. TEST LOCATIONS
5.10.12

TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6A COMPACTION TESTS GEOTECHNICS	JWG	GWA	1"=100'	CT-3
	DATE: 11.14.11	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

BLACKROCK ENGINEERS, INC.
POST OFFICE BOX 58
WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

Day:	**Thurs.**
Date:	**5.17.12**
Log No.:	**19**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:30pm **Departed:** 3:30pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy, Windy	**Temperature:**	70's

Contractor's Equipment: 1 CAT Smoothdrum Roller

Contractor's Personnel: NA

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	5.17.12	**Checked By:**	JRB	**Date:**	5.21.12

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-19**	Geotechnics Representative : JACOB R. BUDA	Page : 1 of 1	
Date (s) : **5.17.12**	Reviewed By : JRB	Date : 5.21.12	

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	530.78	12"	735-01-03	72.6	33.0	**87.5**	**21.9**	**71.8**	**98.9%**	**90.0%**	
ND - 02	C	531.00	12"	735-01-03	72.6	33.0	**80.9**	**20.7**	**67.0**	**92.3%**	**90.0%**	
ND - 03	C	531.56	12"	607-03-01	59.0	41.8	**79.8**	**34.7**	**59.2**	**100.4%**	**90.0%**	
ND - 04	C	530.66	12"	607-03-01	59.0	41.8	**76.8**	**29.9**	**59.1**	**100.2%**	**90.0%**	
DC - 01	C	530.66	NA	607-03-01	59.0	41.8	**77.0**	**33.3**	**57.8**	**97.9%**	**90.0%**	
ND - 05	C	539.90	12"	735-01-03	72.6	33.0	**88.8**	**32.3**	**67.1**	**92.5%**	**90.0%**	
DC - 02	C	539.90	NA	735-01-03	72.6	33.0	**94.2**	**34.5**	**70.0**	**96.5%**	**90.0%**	
ND - 06	C	539.96	12"	607-03-01	59.0	41.8	**69.0**	**30.1**	**53.0**	**89.9%**	**90.0%**	
DC - 03	C	539.60	NA	607-03-01	59.0	41.8	**69.7**	**32.0**	**52.8**	**89.5%**	**90.0%**	
ND - 07	C	540.42	12"	728-01-02	63.8	38.2	**84.2**	**33.8**	**62.9**	**98.6%**	**90.0%**	

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-19**
Date (s) : 5.17.12

Drive Cylinder - ASTM D 2937

Test Information			
Test Number :	DC-01	DC-02	DC-03
Nuclear Test Number :	ND-04	ND-05	ND-06
Location:	C	C	C
Depth (ft):	530.66	539.9	540.42
Date :	5.17.12	5.17.12	5.17.12
Mold			
Cylinder ID	JB-02	JB-03	JB-01
Weight of Cylinder (lbs.)	1.33	1.32	1.37
Volume of Cylinder (ft^3)	0.033	0.033	0.033
Specimen			
Wt. of Cylinder & WS (lbs.)	3.87	4.43	3.67
Wt. of Cylinder (lbs.)	1.33	1.32	1.37
Wt. of WS	2.54	3.11	2.30
Cylinder Volume (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	314	300	305
Wt. of Tare & WS (gm)	491.77	545.09	497.40
Wt. of Tare & DS (gm)	390.01	433.81	397.39
Wt. of Tare (gm)	84.69	110.87	84.79
Wt. of Water (gm)	101.76	111.28	100.01
Wt. of DS (gm)	305.32	322.94	312.60
Wet Density (pcf):	77.0	94.2	69.7
Moisture Content (%):	**33.3**	**34.5**	**32.0**
Dry Density (pcf):	**57.7**	**70.1**	**52.8**

Geotechnics Representative : JACOB R. BUDA

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01
Nuclear Test Number:	ND-02
Location:	C
Depth:	531.0
Tare Number	318
Wt. of Tare & WS (gm)	477.61
Wt. of Tare & DS (gm)	401.50
Wt. of Tare (gm)	86.74
Wt. of Water (gm)	76.11
Wt. of DS (gm)	314.76
Water Content (%)	**24.2**

Notes : *NA*

Tested By	*JRB*	*Date*	*5.17.12*	*Checked By*	*JRB*	***Date***	*5.21.12*

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-19**
Date (s) : 5.17.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03	1pt-01
Location:	ND-01	ND-04	ND-06	ND-07
Depth (ft):	530.78	530.66	539.96	540.42
Date :	5.17.12	5.17.12	5.17.12	5.17.12

Mold

Weight of Mold (lbs.)	9.46	9.46	9.46	9.46
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.41	12.16	12.09	12.17
Weight of Mold (lbs)	9.46	9.46	9.46	9.46
Weight of WS (lbs)	2.95	2.70	2.63	2.71
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	305	303	305	303
Wt. of Tare & WS (gm)	301.55	296.30	324.91	302.69
Wt. of Tare & DS (gm)	255.23	234.80	252.41	245.93
Wt. of Tare (gm)	84.72	84.34	84.72	84.34
Wt. of Water (gm)	46.32	61.50	72.50	56.76
Wt. of DS (gm)	170.51	150.46	167.69	161.59
Wet Density (pcf):	89.4	81.8	79.7	82.1
Moisture Content (%):	**27.2**	**40.9**	**43.2**	**35.1**
Dry Density (pcf):	**70.3**	**58.1**	**55.6**	**60.8**

Geotechnics Representative : Jacob R. Buda

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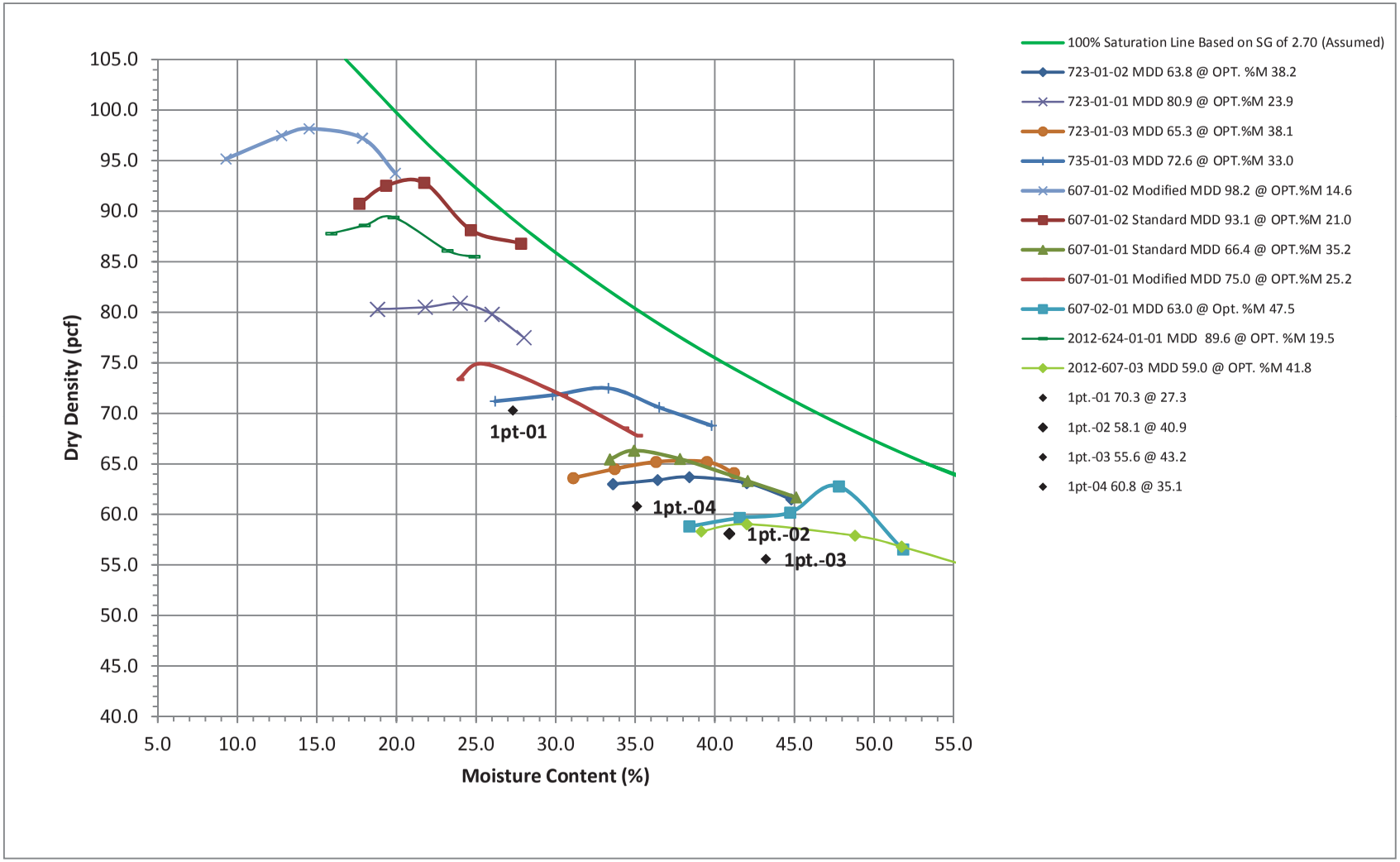
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607



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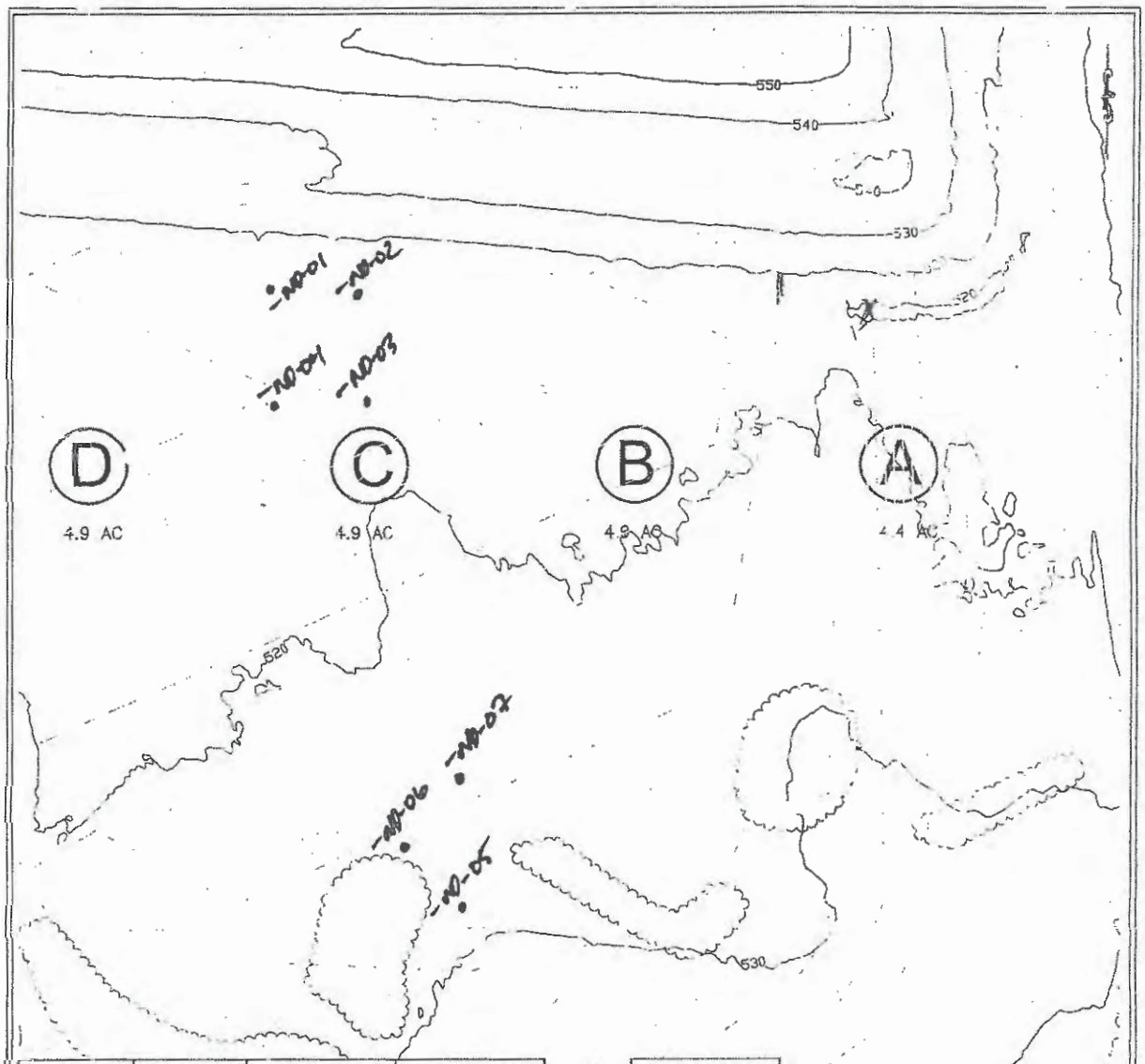

TEST #	WET DENSITY	MOISTURE %	DRY DENSITY	MDD	COMPACTION %
ND-1					
ND-2					
ND-3					
ND-4					
ND-5					
ND-6					

APPROXIMATE TEST LOCATIONS 5.17.12

TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6A COMPACTION TESTS GEOTECHNICS	JWG	GWA	1"=100'	CT-3
	DATE: 11.14.11	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

BLACKROCK ENGINEERS, INC.
POST OFFICE BOX 58
WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

Day:	Thurs.
Date:	5.24.12
Log No.:	20
Page:	1 of 1

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Gary Ahlberg
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 1:30pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy, Windy	**Temperature:**	70's
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	AG	**Date:**	5.24.12	**Checked By:**	[illegible]	**Date:**	5/30

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-020**	Geotechnics Representative : ABE GAETA	Page : 1 of 1
Date (s) : **5.24.12**	Reviewed By : RWS	Date : 5/30

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
32387	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	541.9	12"	624-01-01	89.6	19.5	**77.5**	**17.8**	**65.8**	**73.4%**	**90.0%**	
DC - 01	C	542	NA	624-01-01	89.6	19.5	**74.8**	**17.8**	**63.5**	**70.9%**	**90.0%**	
ND - 02	C	542	12"	624-01-01	89.6	19.5	**98.1**	**14.2**	**85.9**	**95.9%**	**90.0%**	
ND - 03	C	541.8	12"	735-01-03	72.6	33.0	**69.4**	**22.8**	**56.5**	**77.8%**	**90.0%**	
ND - 04	C	540	12"	624-01-01	89.6	19.5	**86.7**	**19.0**	**72.9**	**81.3%**	**90.0%**	
ND - 05	C	540.5	12"	624-01-01	89.6	19.5	**104.4**	**17.0**	**89.2**	**99.6%**	**90.0%**	
DC - 02	C	540.5	NA	624-01-01	89.6	19.5	**105.5**	**17.0**	**90.2**	**100.6%**	**90.0%**	
ND - 06	C	541.1	12"	735-01-03	72.6	33.0	**88.8**	**28.0**	**69.4**	**95.6%**	**90.0%**	
ND - 07	C	541.6	12"	624-01-01	89.6	19.5	**94.3**	**8.6**	**86.8**	**96.9%**	**90.0%**	
ND - 08	C	541.6	12"	735-01-03	72.6	33.0	**88.6**	**17.9**	**75.1**	**103.5%**	**90.0%**	
ND - 09	C	541.9	12"	735-01-03	72.6	33.0	**89.6**	**17.5**	**76.3**	**105.0%**	**90.0%**	

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-18**
Date (s) : 5.10.12

Drive Cylinder - ASTM D 2937

Test Information		
Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-1	ND-05
Location:	C	C
Depth (ft):	541.9	540.5
Date :	5.24.12	5.24.12
Mold		
Cylinder ID	#6	#4
Weight of Cylinder (lbs.)	1.23	1.24
Volume of Cylinder (ft^3)	0.033	0.033
Specimen		
Wt. of Cylinder & WS (lbs.)	3.70	4.71
Wt. of Cylinder (lbs.)	1.23	1.23
Wt. of WS	2.47	3.48
Cylinder Volume (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	Y-1	807
Wt. of Tare & WS (gm)	349.50	365.50
Wt. of Tare & DS (gm)	311.04	327.70
Wt. of Tare (gm)	95.50	104.70
Wt. of Water (gm)	38.46	37.80
Wt. of DS (gm)	215.54	223.00
Wet Density (pcf):	74.8	105.5
Moisture Content (%):	**17.8**	**17.0**
Dry Density (pcf):	**63.5**	**90.2**

Geotechnics Representative : ABE GAETA

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	C	C	C	C	B
Depth:	541.9	542	541.8	540	540.5
Tare Number	Y-1	810	820	813	807
Wt. of Tare & WS (gm)	349.50	368.30	352.00	354.60	365.5
Wt. of Tare & DS (gm)	311.04	336.70	311.90	315.80	327.7
Wt. of Tare (gm)	95.50	114.30	135.80	112.00	104.7
Wt. of Water (gm)	38.46	31.6	40.1	38.8	37.8
Wt. of DS (gm)	215.54	222.4	176.1	203.8	223
Water Content (%)	**17.8**	**14.2**	**22.8**	**19.0**	**17.0**

Test Number:	WC-06	WC-07	WC-08	WC-09
Nuclear Test Number:	ND-06	ND-07	ND-10	NA
Location:	C	C	C	C
Depth:	541.1	541.6	541.6	541.9
Tare Number	809	801	811	1710
Wt. of Tare & WS (gm)	347	351.9	354.4	349.4
Wt. of Tare & DS (gm)	296.2	332.4	316.7	312.7
Wt. of Tare (gm)	115	106.8	106.6	103.5
Wt. of Water (gm)	50.8	19.5	37.7	36.7
Wt. of DS (gm)	181.2	225.6	210.1	209.2
Water Content (%)	**28.0**	**8.6**	**17.9**	**17.5**

Notes : *NA*

Tested By *AG* *Date* *5/24/2012* *Checked By* *MWS* **Date** *5/30*

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-20**
Date (s) : 5.24.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	ND-02	ND-06
Depth (ft):	541.1	536.3
Date :	5.24.12	5.24.12

Mold

Weight of Mold (lbs.)	9.45	9.45
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.83	12.48
Weight of Mold (lbs)	9.45	9.45
Weight of WS (lbs)	3.38	3.03
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	810	809
Wt. of Tare & WS (gm)	368.30	347.00
Wt. of Tare & DS (gm)	336.70	296.21
Wt. of Tare (gm)	114.30	115.00
Wt. of Water (gm)	31.60	50.79
Wt. of DS (gm)	222.40	181.21
Wet Density (pcf):	102.4	91.8
Moisture Content (%):	**14.2**	**28.0**
Dry Density (pcf):	**89.7**	**71.7**

Geotechnics Representative : Abe Gaeta

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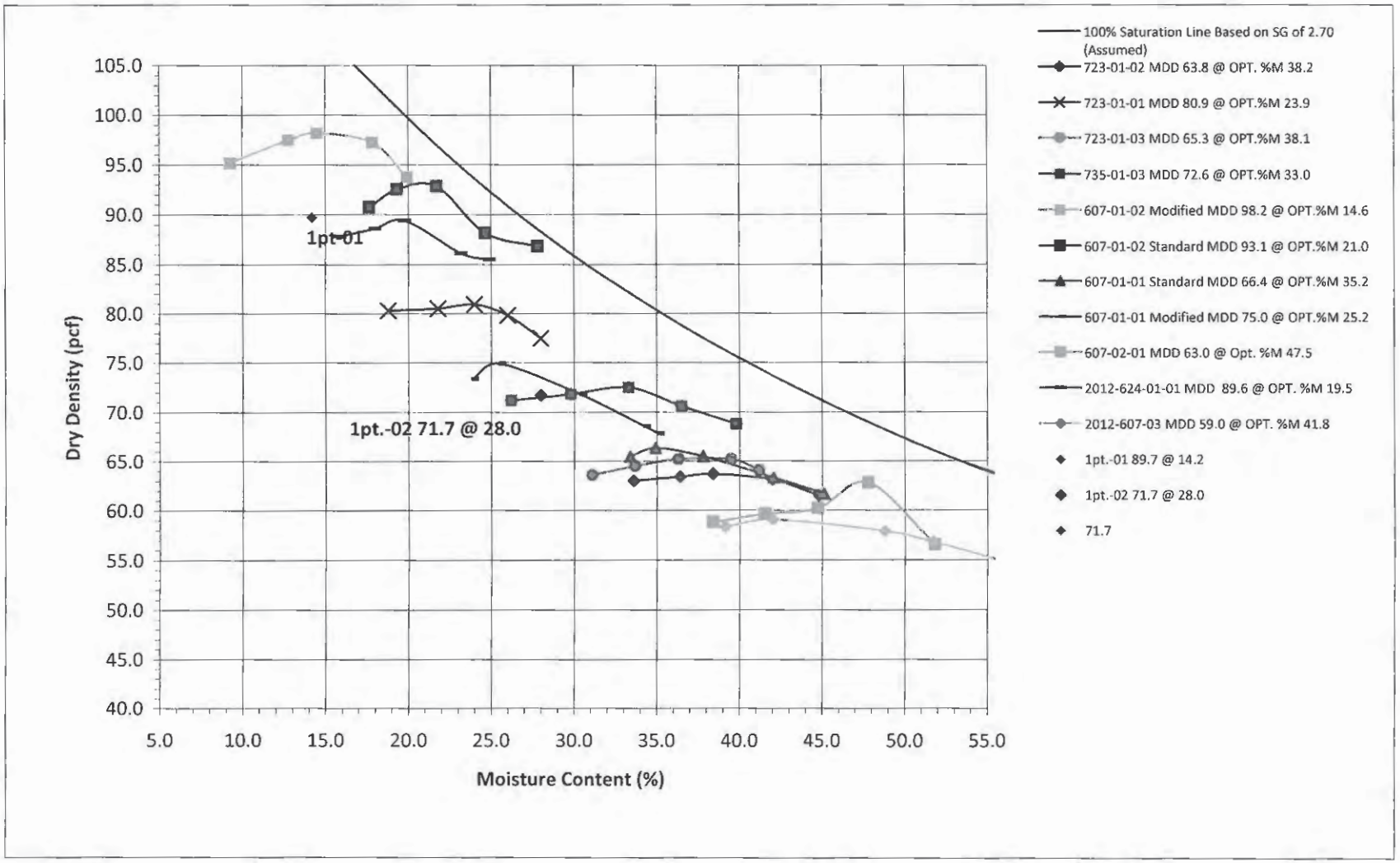
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607



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Day:	**Thurs.**
Date:	**5.31.12**
Log No.:	**21**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00am **Departed:** 12:30pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy, Windy	**Temperature:**	76
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	AG	**Date:**	5.31.12	**Checked By:**	MWS	**Date:**	6/4

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-21**	Geotechnics Representative : ABE GAETA	Page : 1 of 1
Date (s) : **5.31.12**	Reviewed By : [illegible]	Date : 6/4

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
32387	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	544.8	12"	607-01-01	75.0	25.2	**81.1**	**11.6**	**72.7**	**96.9%**	**90.0%**	moist. corrected
ND - 02	C	544.7	12"	607-01-01	75.0	25.2	**78.3**	**14.7**	**68.3**	**91.0%**	**90.0%**	moist. corrected
DC - 01	C	544.7	NA	607-01-01	75.0	25.2	**83.0**	**14.7**	**72.4**	**96.5%**	**90.0%**	moist. corrected
ND - 03	C	544.8	12"	607-01-01	75.0	25.2	**79.6**	**12.0**	**71.1**	**94.8%**	**90.0%**	moist. corrected
ND - 04	C	543.9	12"	624-01-01	89.6	19.5	**94.8**	**9.8**	**86.3**	**96.4%**	**90.0%**	moist. corrected
ND - 05	C	544.4	12"	624-01-01	89.6	19.5	**86.7**	**13.0**	**76.7**	**85.6%**	**90.0%**	moist. corrected
ND - 06	C	540.6	12"	624-01-01	89.6	19.5	**96.9**	**14.1**	**84.9**	**94.8%**	**90.0%**	moist. corrected
ND - 07	C	537.6	12"	624-01-01	89.6	19.5	**101.1**	**15.7**	**87.4**	**97.5%**	**90.0%**	moist. corrected

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	C	C	C	C	B
Depth:	544.8	544.7	544.8	543.9	544.4
Tare Number	807	826	810	801	817
Wt. of Tare & WS (gm)	357.00	343.80	353.20	351.40	349.1
Wt. of Tare & DS (gm)	330.80	317.30	327.70	329.60	324.5
Wt. of Tare (gm)	104.80	137.20	114.50	107.30	135.6
Wt. of Water (gm)	26.2	26.5	25.5	21.8	24.6
Wt. of DS (gm)	226	180.1	213.2	222.3	188.9
Water Content (%)	**11.6**	**14.7**	**12.0**	**9.8**	**13.0**

Test Number:	WC-06	WC-07
Nuclear Test Number:	ND-06	ND-07
Location:	C	C
Depth:	540.6	537.6
Tare Number	818	809
Wt. of Tare & WS (gm)	354.4	355.8
Wt. of Tare & DS (gm)	327.5	326
Wt. of Tare (gm)	137.2	136.1
Wt. of Water (gm)	26.9	29.8
Wt. of DS (gm)	190.3	189.9
Water Content (%)	**14.1**	**15.7**

Notes : *NA*

Tested By *AG* *Date* *5/31/2012* *Checked By* *MPS* **Date** *6/4*

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-21**
Date (s) :	5.31.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-2
Location:	C
Depth (ft):	544.7
Date :	5.31.12

Mold

Cylinder ID	#5
Weight of Cylinder (lbs.)	1.36
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.10
Wt. of Cylinder (lbs.)	1.36
Wt. of WS	2.74
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	826
Wt. of Tare & WS (gm)	343.80
Wt. of Tare & DS (gm)	317.30
Wt. of Tare (gm)	137.20
Wt. of Water (gm)	26.50
Wt. of DS (gm)	180.10
Wet Density (pcf):	83.0
Moisture Content (%):	**14.7**
Dry Density (pcf):	**72.4**

Geotechnics Representative : ABE GAETA

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-21**
Date (s) : 5.31.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03
Location:	ND-02	ND-04	ND-07
Depth (ft):	544.7	543.9	537.6
Date :	5.31.12	5.31.12	5.31.12

Mold

Weight of Mold (lbs.)	9.5	9.5	9.5
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.30	12.70	12.80
Weight of Mold (lbs)	9.50	9.50	9.50
Weight of WS (lbs)	2.80	3.20	3.30
Volume OF Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	826	801	809
Wt. of Tare & WS (gm)	343.80	351.40	355.80
Wt. of Tare & DS (gm)	317.30	329.60	326.00
Wt. of Tare (gm)	137.20	107.30	136.10
Wt. of Water (gm)	26.50	21.80	29.80
Wt. of DS (gm)	180.10	222.30	189.90
Wet Density (pcf):	84.8	97.0	100.0
Moisture Content (%):	**14.7**	**9.8**	**15.7**
Dry Density (pcf):	**74.0**	**88.3**	**86.4**

Geotechnics Representative : Abe Gaeta

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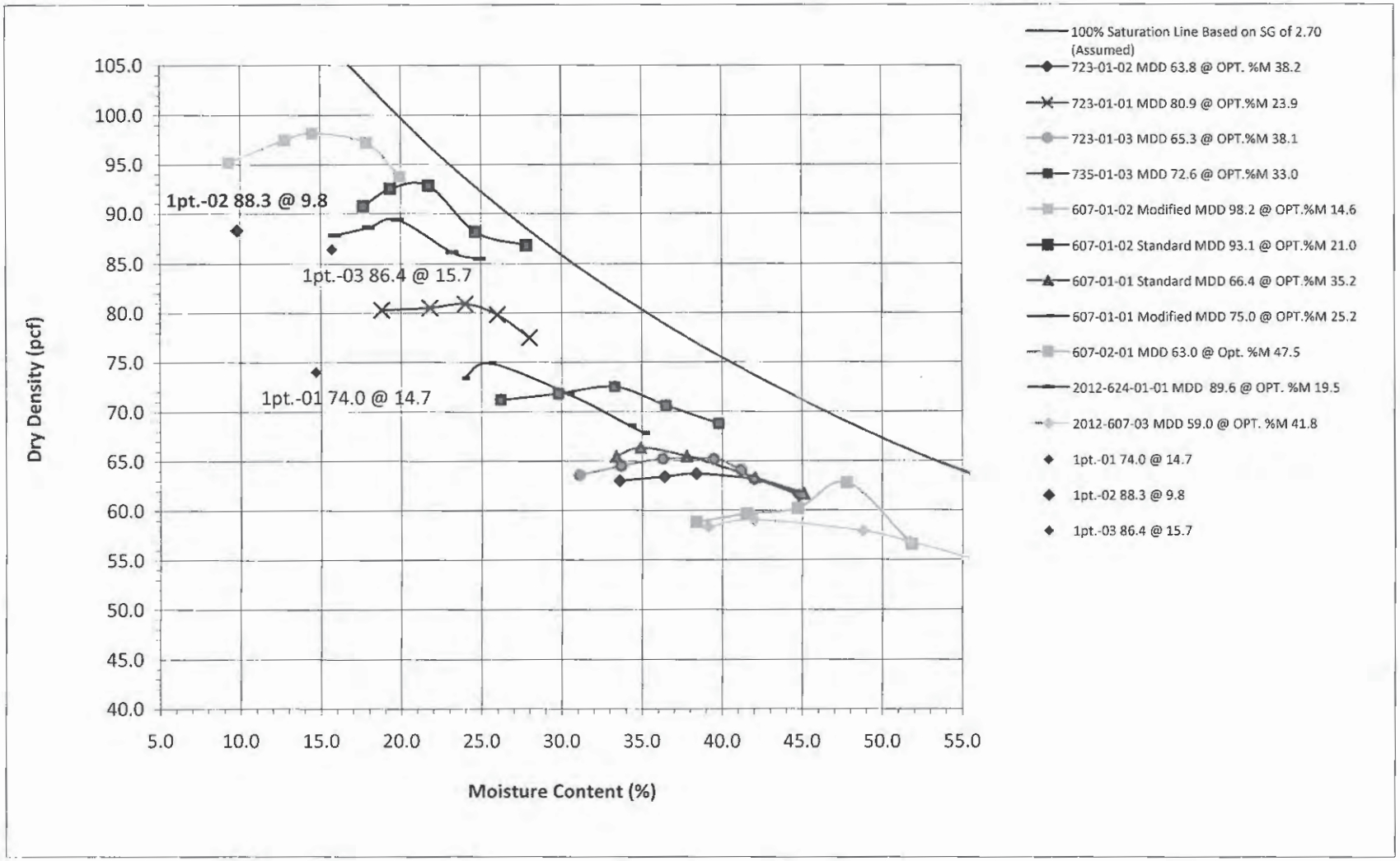
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-21



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Day:	**Thurs.**
Date:	**6.07.12**
Log No.:	**22**
Page:	**1 of 1**

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 1:00pm **Departed:** 4:00pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	80
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	AG	**Date:**	6.07.12	**Checked By:**	[illegible]	**Date:**	6/11

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-22**	Geotechnics Representative : ABE GAETA	Page : 1 of 1
Date (s) : **6.07.12**	Reviewed By :	Date :

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
32387	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	550.8	12"	624-01-01	89.6	19.5	**95.1**	**11.7**	**85.1**	**95.0%**	**90.0%**	moist. corrected
ND - 02	C	550.4	12"	607-01-02	93.1	21.0	**99.6**	**10.1**	**90.5**	**97.2%**	**90.0%**	moist. corrected
DC - 01	C	550.4	NA	607-01-02	93.1	21.0	**98.2**	**10.1**	**89.2**	**95.8%**	**90.0%**	moist. corrected
ND - 03	C	54503	12"	624-01-01	89.6	19.2	**94.5**	**11.4**	**84.8**	**94.7%**	**90.0%**	moist. corrected
ND - 04	C	552.3	12"	624-01-01	89.6	19.5	**94.0**	**9.8**	**85.6**	**95.5%**	**90.0%**	moist. corrected
ND - 05	C	552.5	12"	723-01-01	80.9	23.9	**85.1**	**10.2**	**77.2**	**95.5%**	**90.0%**	moist. corrected
ND - 06	C	547.9	12"	624-01-01	89.6	19.5	**93.3**	**11.0**	**84.1**	**93.8%**	**90.0%**	moist. corrected

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-22**
Date (s) :	6.07.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-2
Location:	C
Depth (ft):	550.4
Date :	6.07.12

Mold

Cylinder ID	#5
Weight of Cylinder (lbs.)	1.36
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.60
Wt. of Cylinder (lbs.)	1.36
Wt. of WS	3.24
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	813
Wt. of Tare & WS (gm)	347.30
Wt. of Tare & DS (gm)	325.70
Wt. of Tare (gm)	112.10
Wt. of Water (gm)	21.60
Wt. of DS (gm)	213.60
Wet Density (pcf):	98.2
Moisture Content (%):	**10.1**
Dry Density (pcf):	**89.2**

Geotechnics Representative : ABE GAETA

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	C	C	C	C	B
Depth:	550.8	550.4	545.3	552.3	552.5
Tare Number	ss-1	813	810	801	811
Wt. of Tare & WS (gm)	362.00	347.30	354.00	347.40	349.2
Wt. of Tare & DS (gm)	333.80	325.70	329.50	326.00	326.8
Wt. of Tare (gm)	93.10	112.10	114.60	106.90	106.4
Wt. of Water (gm)	28.2	21.6	24.5	21.4	22.4
Wt. of DS (gm)	240.7	213.6	214.9	219.1	220.4
Water Content (%)	**11.7**	**10.1**	**11.4**	**9.8**	**10.2**

Test Number:	WC-06
Nuclear Test Number:	ND-06
Location:	C
Depth:	547.9
Tare Number	806
Wt. of Tare & WS (gm)	359.9
Wt. of Tare & DS (gm)	334.4
Wt. of Tare (gm)	102.2
Wt. of Water (gm)	25.5
Wt. of DS (gm)	232.2
Water Content (%)	**11.0**

Notes : *NA*

Tested By *AG* *Date* *6/7/2012* *Checked By* MMS **Date** 6/11

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-22**
Date (s) :	6.07.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-06
Depth (ft):	547.9
Date :	6.07.12

Mold

Weight of Mold (lbs.)	9.5
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.50
Weight of Mold (lbs)	9.50
Weight of WS (lbs)	3.00
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	806
Wt. of Tare & WS (gm)	359.90
Wt. of Tare & DS (gm)	334.40
Wt. of Tare (gm)	102.20
Wt. of Water (gm)	25.50
Wt. of DS (gm)	232.20
Wet Density (pcf):	90.9
Moisture Content (%):	**11.0**
Dry Density (pcf):	**81.9**

Geotechnics Representative : Abe Gaeta

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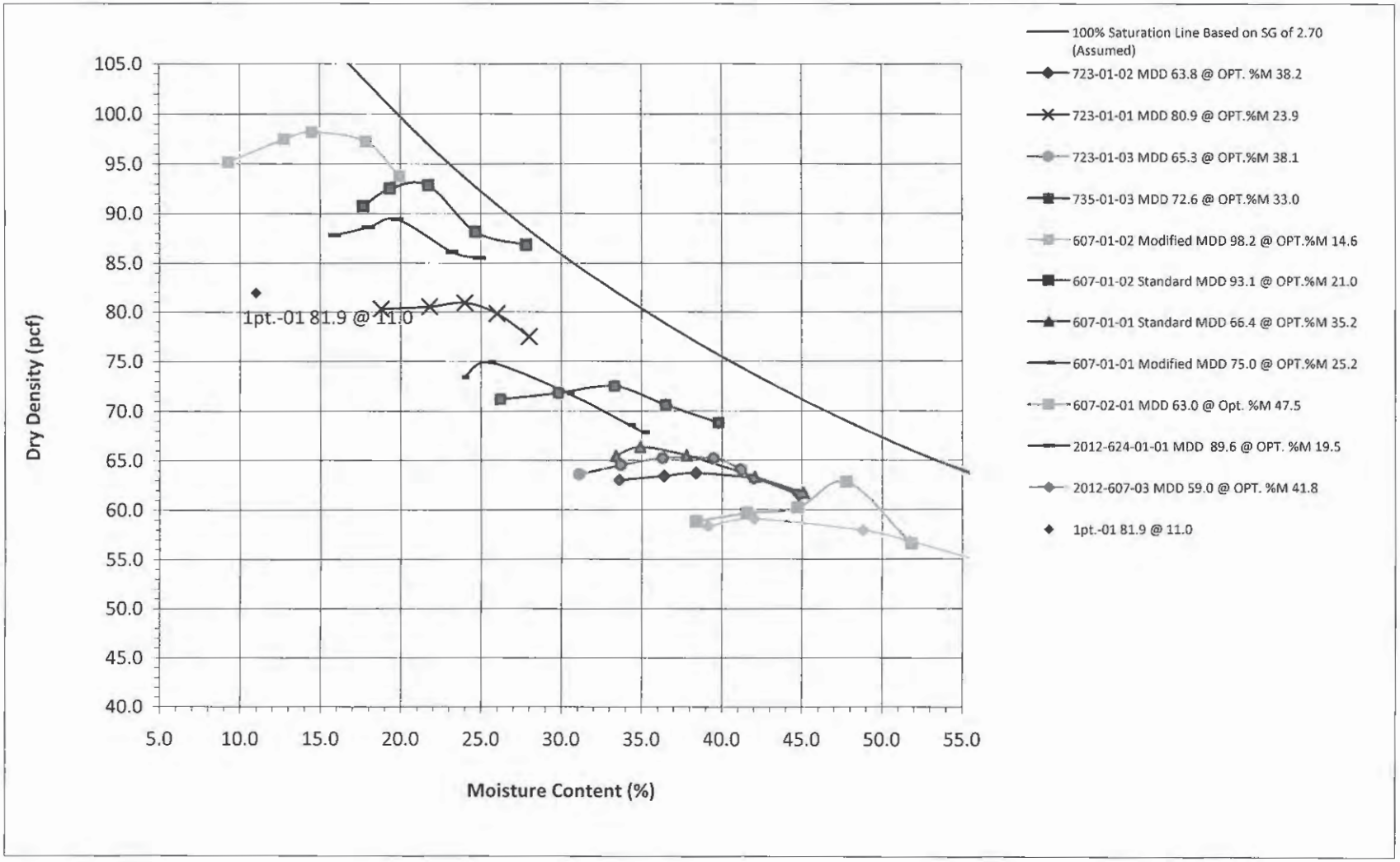
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-22



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Day:	Thurs.
Date:	6.14.12
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30am **Departed:** 1:30pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	80
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained for gauge verification and proctor selection.
- Geotechnics Rep. departed the site.

Prepared By:	AG	**Date:**	6.14.12	**Checked By:**	MWS	**Date:**	6/21

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

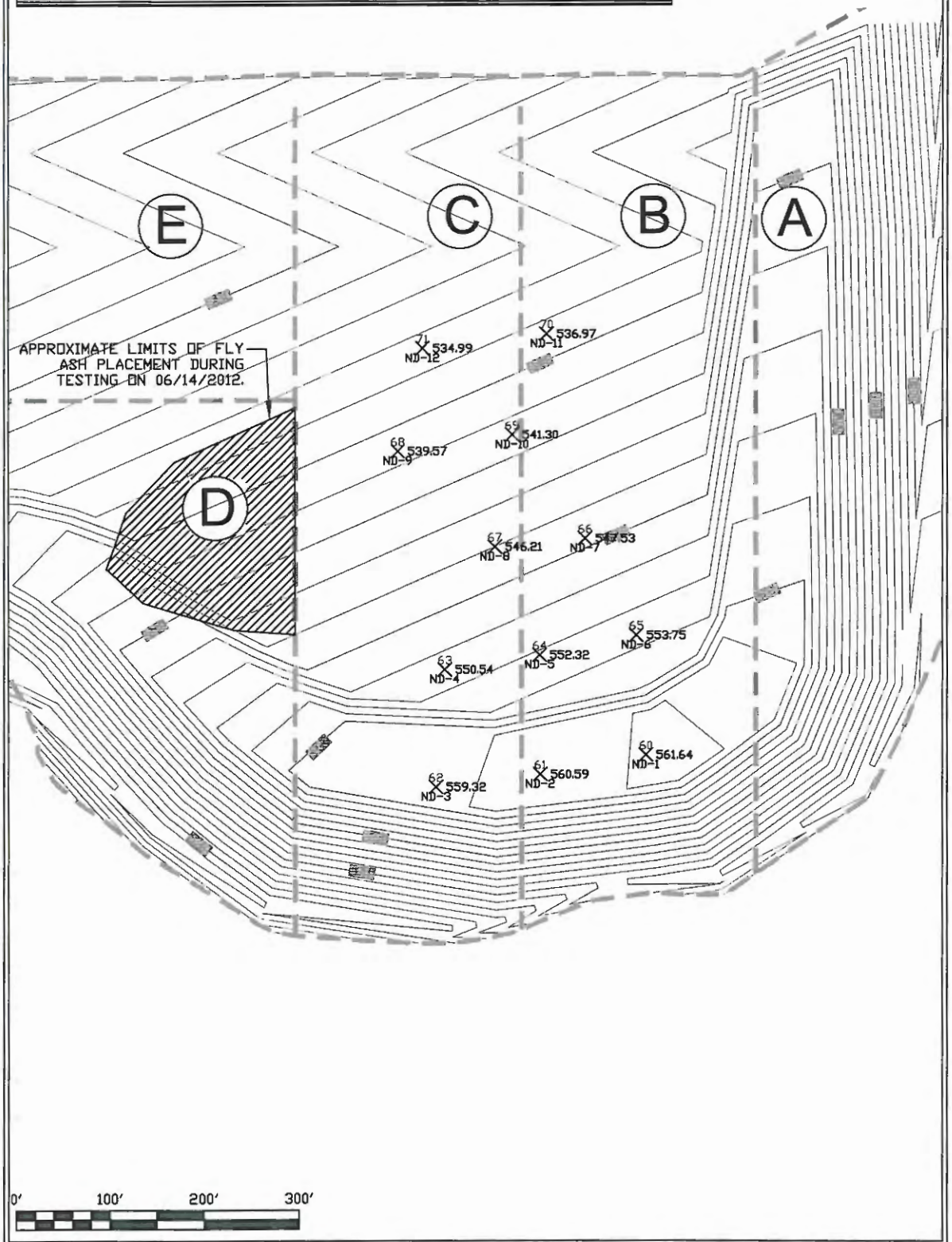
Report Number : **FDR-23**	Geotechnics Representative : ABE GAETA	Page : 1 of 1
Date (s) : **6.14.12**	Reviewed By : MWS	Date : 6/21

Contractor : CHARAH	Borrow Source : NA

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
32387	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	C	561.6	12"	624-01-01	89.6	19.5	**101.8**	**22.4**	**83.2**	**92.8%**	**90.0%**	moist. corrected
ND - 02	C	560.6	12"	723-01-02	63.8	38.2	**74.6**	**35.8**	**54.9**	**86.1%**	**90.0%**	moist. corrected
DC - 01	C	560.6	NA	723-01-02	63.8	38.2	**71.5**	**36.0**	**52.6**	**82.4%**	**90.0%**	moist. corrected
ND - 03	C	559.3	12"	723-01-02	63.8	38.2	**81.8**	**28.1**	**63.9**	**100.1%**	**90.0%**	moist. corrected
ND - 04	C	550.5	12"	607-01-02	93.1	21.0	**110.1**	**25.7**	**87.6**	**94.1%**	**90.0%**	moist. corrected
ND - 05	C	552.3	12"	723-01-01	80.9	23.9	**93.2**	**29.4**	**72.0**	**89.0%**	**90.0%**	moist. corrected
ND - 06	C	553.8	12"	607-01-01	75.0	25.2	**88.5**	**21.0**	**73.1**	**97.5%**	**90.0%**	moist. corrected
ND - 07	C	547.5	12"	723-01-01	80.9	23.9	**93.0**	**24.2**	**74.9**	**92.6%**	**90.0%**	moist. corrected
ND - 08	C	546.2	12"	723-01-01	80.9	23.9	**101.2**	**24.5**	**81.3**	**100.5%**	**90.0%**	moist. corrected
ND - 09	C	539.5	12"	723-01-01	80.9	23.9	**91.6**	**25.7**	**72.9**	**90.1%**	**90.0%**	moist. corrected
ND - 10	C	541.3	12"	723-01-01	80.9	23.9	**90.6**	**18.4**	**76.5**	**94.6%**	**90.0%**	moist. corrected
ND - 11	C	537	12"	723-01-01	80.9	23.9	**98.9**	**22.9**	**80.5**	**99.5%**	**90.0%**	moist. corrected
ND - 12	C	535	12"	735-01-01	72.6	33.0	**87.0**	**27.3**	**68.3**	**94.1%**	**90.0%**	moist. corrected

NOTES:
1) TESTING OF MOST OF THE SAMPLES WERE PERFORMED ON MIXED ROXBORO AND MAYO FLY ASH WITHIN THE DEPTH AND ACROSS THE WORKING FILL PLACEMENT.
2) THE SUMMARY TABLE PROVIDED IN PLACE MOISTURE DENSITY TEST RESULTS.
3) DRIVE CYLINDER, 1-POINT PROCTOR AND LAB MOISTURE SAMPLES WERE COLLECTED FOR ANALYSIS AND DRY DENSITY CALCULATION FOR FINAL COMPACTION RESULTS AS REPORTED BY GEOTECHNICS.



TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
P6 C COMPACTION TESTS GEOTECHNICS 06.14.12	WML	GWA	1"=100'	CT-17
	DATE: 06.12.12	PROJECT NO. ROXLF	FILE NAME P6-CT_BR	

BLACKROCK ENGINEERS, INC.
POST OFFICE BOX 58
WILMINGTON, NORTH CAROLINA 28401
107 PLUMTREE LANE
CASTLE HAYNE, NORTH CAROLINA 28429
PHONE: 910.232.6696

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-23**
Date (s) :	6.14.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-2
Location:	C
Depth (ft):	560.5
Date :	6.14.12

Mold

Cylinder ID	#5
Weight of Cylinder (lbs.)	1.24
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.60
Wt. of Cylinder (lbs.)	1.24
Wt. of WS	2.36
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	Y-1
Wt. of Tare & WS (gm)	345.70
Wt. of Tare & DS (gm)	279.40
Wt. of Tare (gm)	95.10
Wt. of Water (gm)	66.30
Wt. of DS (gm)	184.30
Wet Density (pcf):	71.5
Moisture Content (%):	**36.0**
Dry Density (pcf):	**52.6**

Geotechnics Representative : ABE GAETA

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	C	C	C	C	B
Depth:	561.6	560.5	559.3	550.5	552.3
Tare Number	826	822	818	803	810
Wt. of Tare & WS (gm)	355.70	355.00	341.50	356.60	355.5
Wt. of Tare & DS (gm)	315.70	297.50	296.70	304.90	300.7
Wt. of Tare (gm)	136.90	136.90	137.20	104.10	114.5
Wt. of Water (gm)	40	57.5	44.8	51.7	54.8
Wt. of DS (gm)	178.8	160.6	159.5	200.8	186.2
Water Content (%)	**22.4**	**35.8**	**28.1**	**25.7**	**29.4**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-06	ND-07	ND-08	ND-09	ND-10
Location:	C	C	C	C	C
Depth:	553.7	547.5	546.2	539.5	541.3
Tare Number	805	804	809	304	309
Wt. of Tare & WS (gm)	361.3	360.2	354.6	344.6	363.8
Wt. of Tare & DS (gm)	317.1	310.5	307.4	296.8	324.3
Wt. of Tare (gm)	106.2	105.1	115	110.7	109.5
Wt. of Water (gm)	44.2	49.7	47.2	47.8	39.5
Wt. of DS (gm)	210.9	205.4	192.4	186.1	214.8
Water Content (%)	**21.0**	**24.2**	**24.5**	**25.7**	**18.4**

Notes : *NA*

Tested By *AG* *Date* *6/14/2012* *Checked By* MMS **Date** 6/21

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENG.
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	WC-11	WC-12
Nuclear Test Number:	ND-11	ND-12
Location:	C	C
Depth:	536.9	534.9
Tare Number	312	300
Wt. of Tare & WS (gm)	345.4	353.8
Wt. of Tare & DS (gm)	296.8	301.7
Wt. of Tare (gm)	84.4	111.1
Wt. of Water (gm)	48.6	52.1
Wt. of DS (gm)	212.4	190.6
Water Content (%)	**22.9**	**27.3**

Notes : *NA*

Tested By *AG* *Date* *6/14/2012* *Checked By* MM **Date** 6/21

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-23**
Date (s) :	6.14.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	ND-02	ND-06
Depth (ft):	560.5	553.7
Date :	6.14.12	6.14.12

Mold

Weight of Mold (lbs.)	9.5	9.5
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.30	12.40
Weight of Mold (lbs)	9.50	9.50
Weight of WS (lbs)	2.80	2.90
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	822	805
Wt. of Tare & WS (gm)	355.00	361.30
Wt. of Tare & DS (gm)	297.50	317.10
Wt. of Tare (gm)	136.90	106.20
Wt. of Water (gm)	57.50	44.20
Wt. of DS (gm)	160.60	210.90
Wet Density (pcf):	84.8	87.9
Moisture Content (%):	**35.8**	**21.0**
Dry Density (pcf):	**62.5**	**72.7**

Geotechnics Representative : Abe Gaeta

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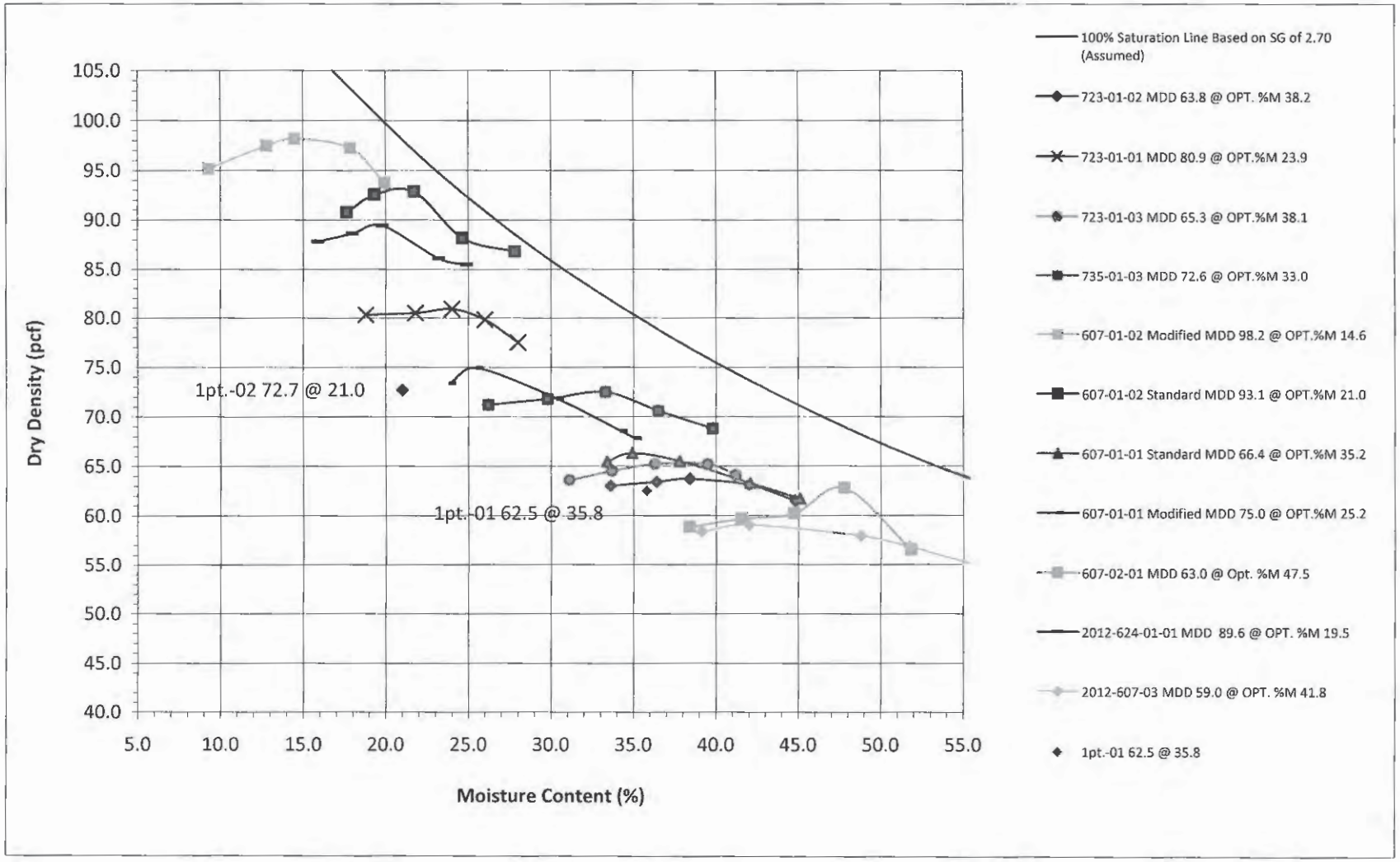
Geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-23



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Day:	Thursday
Date:	6.21.12
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Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semara, NC	**Time on Site:**	**Arrived:** 1:00 PM **Departed:** 3:00 PM
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny and Hot	**Temperature:**	90+

Contractor's Equipment: None Working

Contractor's Personnel:

Description of Daily Activities & Events

Geotechnics Rep. James Schiff arrived on site and made contact with Mr. Bill Lupi of Blackrock and proceeded out to the site to test the existing coal ash that had been placed

Geotechics Rep. performed a total of 5 tests (moisture/density) of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative. Locations and elevations were also collected by Blackrock representative.

Drive cylinder, water content and one-point proctor samples were obtained for gauge verification and proctor selection.

Geotecnics representative departed the site.

Prepared By:	JAS	**Date:**	6.21.12	**Checked By:**	MKS	**Date:**	6/27

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Test Report

Report Number : **FDR-24**	Geotechnics Representative : J SCHIFF	Page : 1 of 1
Date (s) : **6.21.12**	Reviewed By : RMS	Date : 6/27

Contractor : Charah	Borrow Source : Onsite Fly Ash Cylo

Compaction Equipment : 1 CAT vibratory smoothdrum compactor

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND	01	D	523.6	8"	723-01-02	63.8	38.2	**74.8**	**20.2**	**62.2**	**97.5%**	**95.0%**	moist. corrected
ND	02	D	525.3	8"	723-01-02	63.8	38.2	**75.4**	**30.6**	**57.7**	**90.4%**	**90.0%**	moist. corrected
ND	03	D	524.0	8"	723-01-02	63.8	38.2	**82.7**	**25.4**	**66.0**	**103.4%**	**90.0%**	moist. corrected
ND	04	D	523.8	8"	723-01-02	63.8	38.2	**70.6**	**26.1**	**56.0**	**87.8%**	**90.0%**	moist. corrected
ND	05	D	520.7	8"	723-01-01	80.9	23.9	**90.5**	**13.5**	**79.7**	**98.5%**	**90.0%**	moist. corrected

Gauge Number	Gauge Model	Density Count	Moisture Count
33577	3440	2315	648

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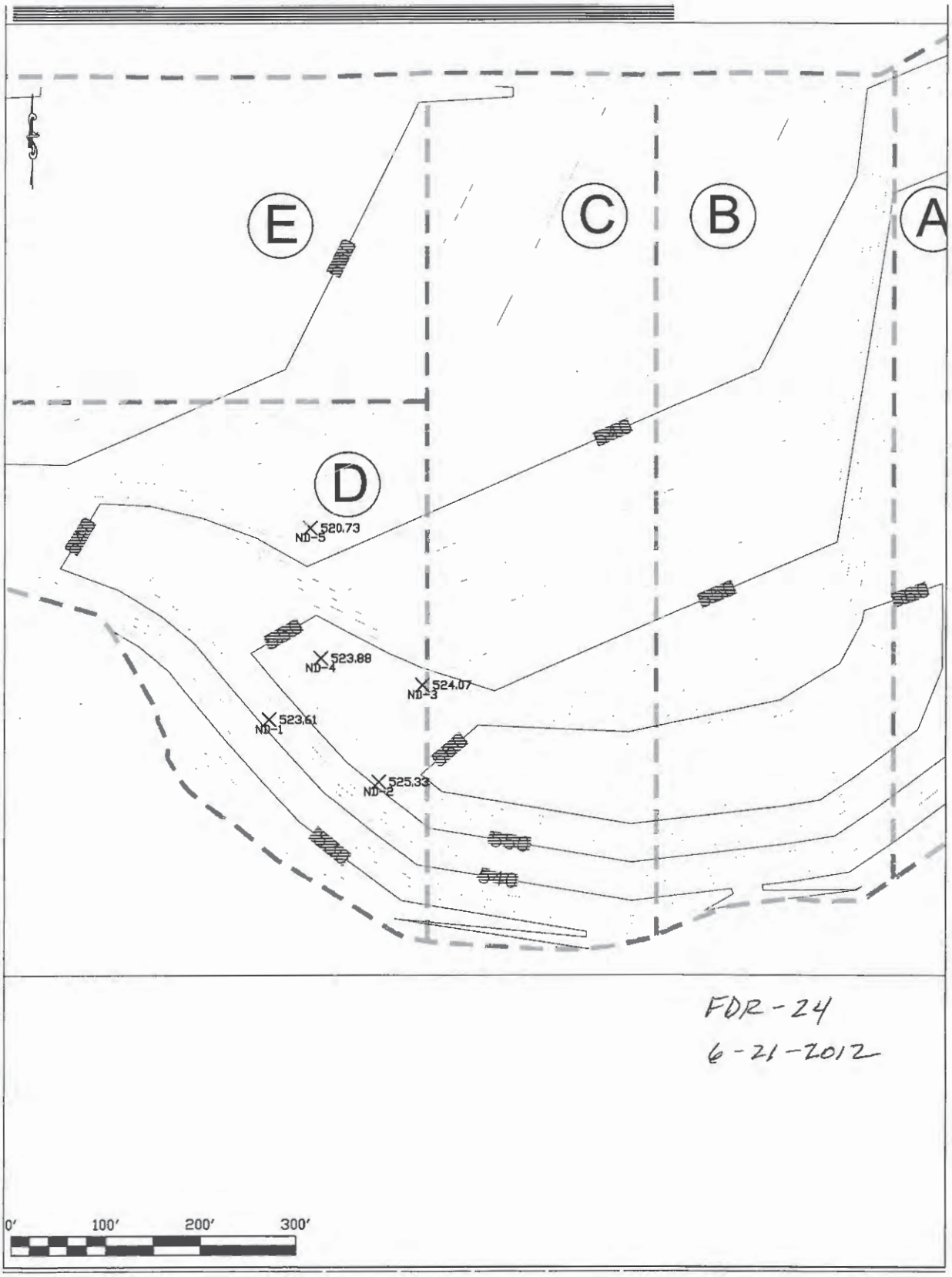

FDR-24
6-21-2012

Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-624

Report Number : **FDR-24**
Date (s) : 6.21.12

geotechnics
INTEGRITY IN TESTING

Water Content - ASTM D 4959 and ASTM D 2216

PRELIMINARY

Test Number :	1	2	3	4	5
Nuclear Test Number :	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	P6 D	P6 D	P6 D	P6 D	P6 D
Depth (ft):	523.6	525.3	524.0	523.8	520.7
Tare Number	813	SS-1	826	818	827
Wt. of Tare & WS (gm)	272.4	398.6	362.6	320.4	397.9
Wt. of Tare & DS (gm)	230.9	304.3	301.6	270.1	347.7
Wt. of Tare (gm)	112	93.5	137.3	137.2	136.2
Wt. of Water (gm)	41.5	94.3	61	84.9	50.2
Wt. of DS (gm)	118.9	210.8	164.3	132.9	211.5
Water Content (%)	**34.9**	**44.7**	**37.1**	**63.9**	**23.7**

Test Number :
Nuclear Test Number :
Location:
Depth (ft):

Tare Number
Wt. of Tare & WS (gm)
Wt. of Tare & DS (gm)
Wt. of Tare (gm)
Wt. of Water (gm)
Wt. of DS (gm)

Water Content (%)

Notes : *NA*

Tested By: JS Date: 6/21/2012

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR**
Date (s) :	6/21/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	ONE PT 02
Location:	ND-05
Depth (ft):	
Date :	21-Jun

Mold

Weight of Mold (lbs.)	9.45
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.79
Weight of Mold (lbs)	9.45
Weight of WS (lbs)	3.34
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	801
Wt. of Tare & WS (gm)	636.44
Wt. of Tare & DS (gm)	523.80
Wt. of Tare (gm)	106.98
Wt. of Water (gm)	112.64
Wt. of DS (gm)	416.82
Wet Density (pcf)	101.2
Moisture Content %	**27.0**
Dry Density (pcf)	**79.7**

Geotechnics Represenative : JS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-24**
Date (s) :	6/21/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information

Test Number :	ONE PT 01
Location:	ND-3
Depth (ft):	
Date :	21-Jun

Mold

Weight of Mold (lbs.)	9.45
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.472
Weight of Mold (lbs)	9.45
Weight of WS (lbs)	3.022
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	824
Wt. of Tare & WS (gm)	523.24
Wt. of Tare & DS (gm)	414.90
Wt. of Tare (gm)	135.48
Wt. of Water (gm)	108.34
Wt. of DS (gm)	279.42
Wet Density (pcf)	91.6
Moisture Content %	**38.8**
Dry Density (pcf)	**66.0**

Geotechnics Represenative : JS

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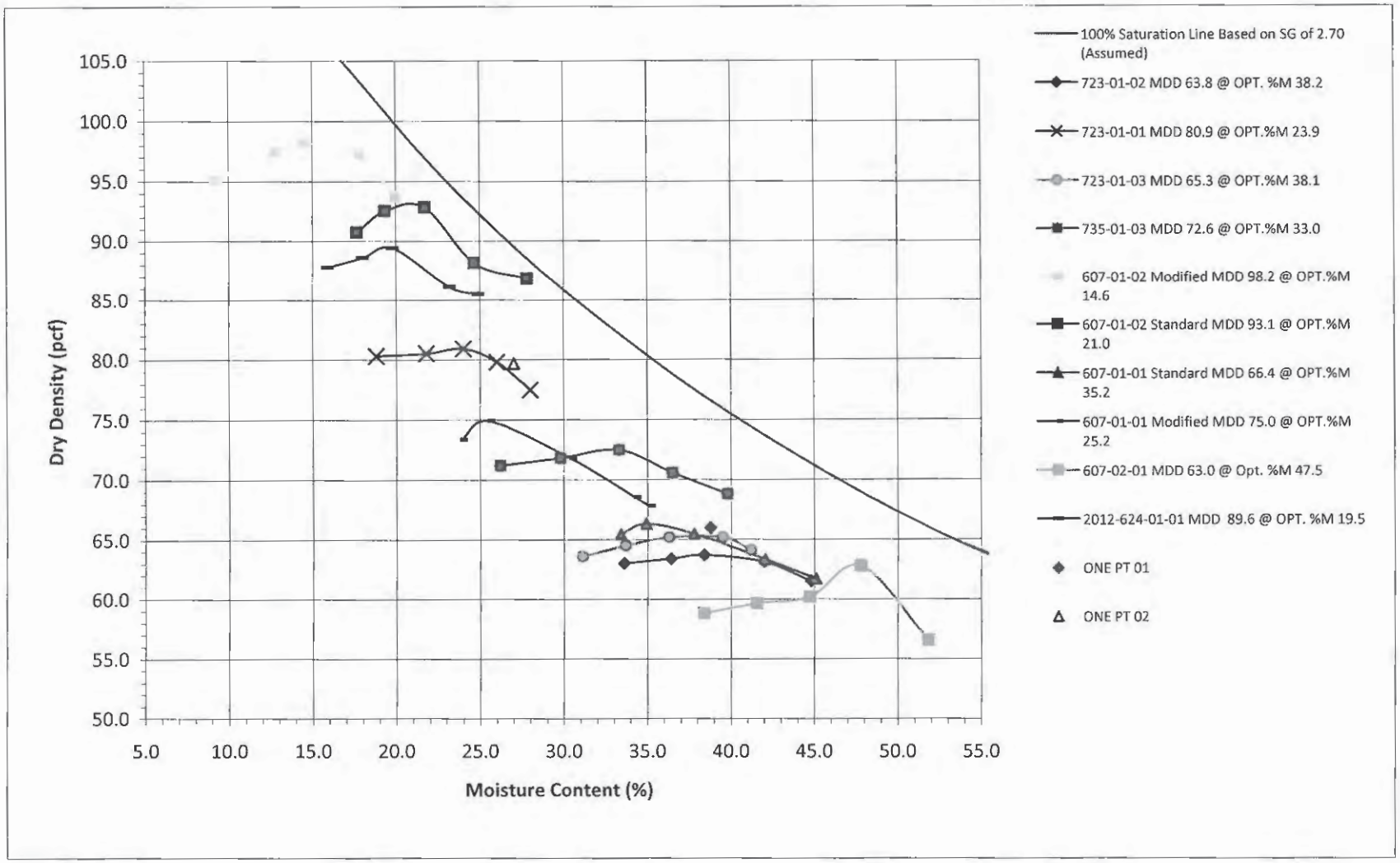
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624

FDR-24



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Day:	**Thursday**
Date:	**6.28.12**
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash Landfill-Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, North Carolina	**Time on Site:**	**Arrived:** 1015 **Departed:** 1435
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny and Hot	**Temperature:**	90

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smooth drum vibratory roller, 2-4,000 gallon water trucks, 3 on-site Ash hauling trucks

Contractor's Personnel: Larry-bulldozer operator

Description of Daily Activities & Events

- Geotechnics representative James Schiff arrived on-site and made contact with Mr. Bill Lupi of Blackrock and proceeded to the site to test existing coal ash that had been placed.
- Geotechnics representative performed a total of 6 tests of previously placed and compacted fly ash. Two tests (ND-1, ND-2) were performed in the upper ash fill placed in cell D, and four (including a re-test) was performed in the lower portions of Cell D. Testing was performed at the direction of Blackrock representative. Locations and elevations were also collected by Blackrock representitive.
- ND-3 initial test was low and Blackrock representative Bill Lupi asked the contractor to re-roll and compact the this lift. The area was re-rolled and compacted with 4 additional passes using the vibratory drum roller and the area was retested. The test results after re-rolling met the job specifications.
- Drive cylinders and water contact were obtained for gauge verification and proctor selection.
- Geotechnics representative departed the site.

Prepared By: JAS **Date:** 6/30/2012 **Checked By:** [illegible] **Date:** 7/2

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-25**	Geotechnics Representative : JAMES SCHIFF	Page : 1 OF 1
Date (s) : **6.28.12**	Reviewed By :	Date :

Contractor : CHARAH	Borrow Source : On site Fly Ash Cylo

Compaction Equipment : 1 CAT vibratory smooth drum compactor

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 01	D	538.5	8"	723-01-02	63.8	38.2	**74.5**	**36.1**	**54.7**	**85.8%**	**90.0%**	moist. corrected
ND 02	D	534.7	8"	723-01-02	63.8	38.2	**73.1**	**26.6**	**57.7**	**90.5%**	**90.0%**	moist. corrected
ND 03	D	521.0	8"	723-01-02	63.8	38.2	**74.0**	**33.4**	**55.5**	**86.9%**	**90.0%**	moist. corrected
ND 03	D	521.0	8"	723-01-02	63.8	38.2	**75.9**	**39.0**	**54.6**	**85.6%**	**90.0%**	Re-test
ND 04	D	524.9	8"	723-01-02	63.8	38.2	**76.2**	**28.3**	**59.4**	**93.1%**	**90.0%**	moist. corrected
ND 05	D	525.5	8"	723-01-01	63.8	38.2	**81.3**	**25.9**	**64.6**	**101.2%**	**95.0%**	moist. corrected

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3440	2222	566

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

Report Number : **FDR-24**
Date (s) : 6.21.12

geotechnics
INTEGRITY IN TESTING

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3
Nuclear Test Number :	ND-01	ND-03rt	ND-04
Location:	P6 D	P6 D	P6 D
Depth (ft):	538.5	521.0	524.9
Tare Number	823	825	820
Wt. of Tare & WS (gm)	327.8	320.3	320.4
Wt. of Tare & DS (gm)	277.06	268.97	279.74
Wt. of Tare (gm)	136.7	137.2	136.2
Wt. of Water (gm)	50.74	51.33	40.66
Wt. of DS (gm)	140.36	131.77	143.54
Water Content (%)	**36.1**	**39.0**	**28.3**

Test Number :	
Nuclear Test Number :	
Location:	
Depth (ft):	
Tare Number	
Wt. of Tare & WS (gm)	
Wt. of Tare & DS (gm)	
Wt. of Tare (gm)	
Wt. of Water (gm)	
Wt. of DS (gm)	
Water Content (%)	

Notes : *NA*

Tested By: JS Date: 6/21/2012 MPS

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-25**
Date (s) :	6/28/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-04
Location:	D
Depth (ft):	524.9
Date :	28-Jun

Mold

Cylinder ID	2
Weight of Cylinder (lbs.)	0.426
Volume of Cylinder (ft^3)	0.01

Specimen

Wt. of Cylinder & WS (lbs.)	1.25
Wt. of Cylinder (lbs.)	0.43
Wt. of WS	0.83
Cylinder Volume (ft^3)	0.010

Moisture / Density

Tare Number	827
Wt. of Tare & WS (gm)	371.40
Wt. of Tare & DS (gm)	318.94
Wt. of Tare (gm)	136.20
Wt. of Water (gm)	52.46
Wt. of DS (gm)	182.74
Wet Density (pcf):	82.6
Moisture Content (%):	**28.7**
Dry Density (pcf):	**64.2**

Geotechnics Representative : J SCHIFF

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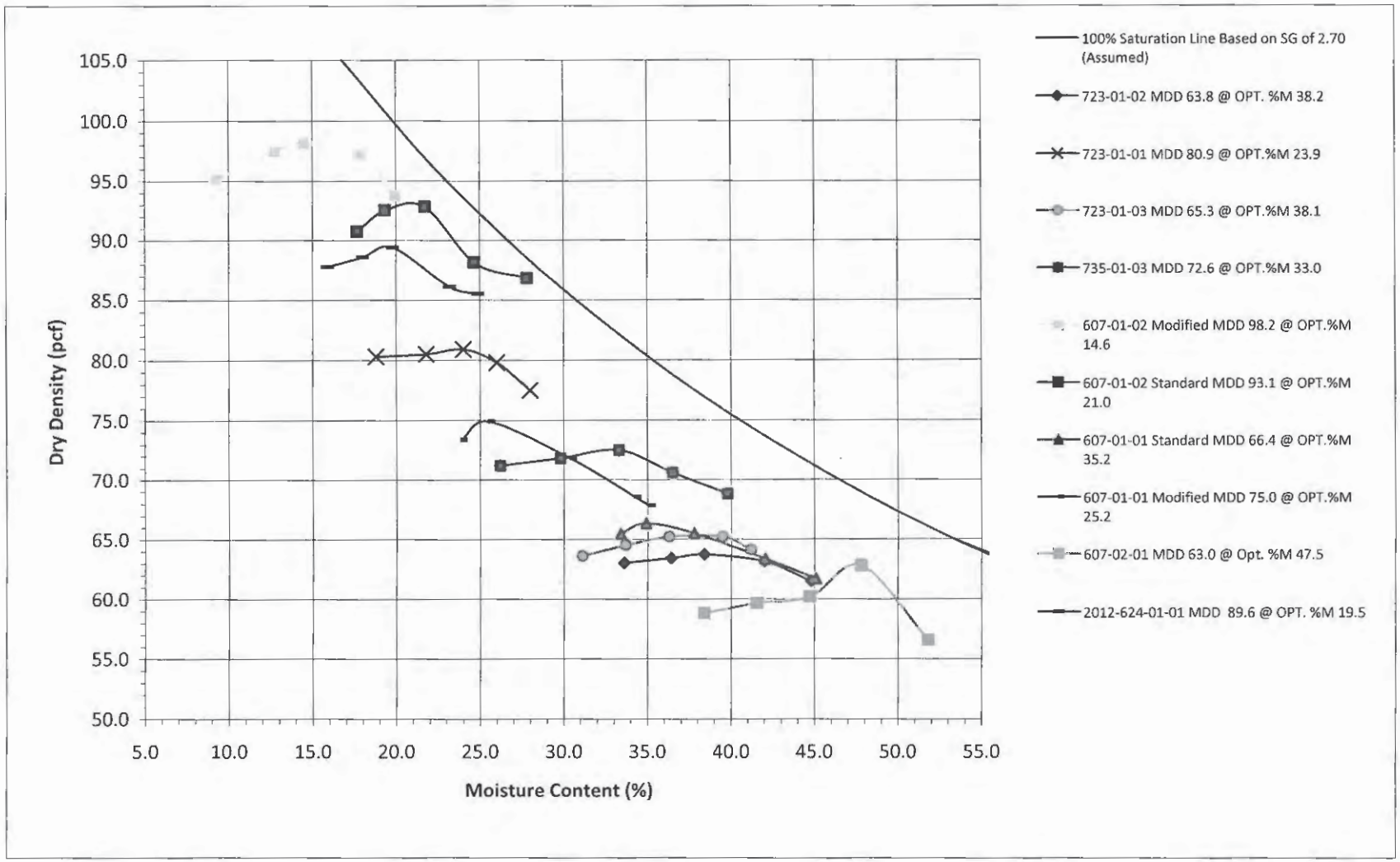
geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: CHARAH
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-624



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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash Landfill-Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semera, North Carolina	**Time on Site:**	**Arrived:** 1040 **Departed:** 1410
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny and Hot	**Temperature:**	95+ degrees

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smooth drum vibratory roller, 2-4,000 gallon water trucks, 3 on-site Ash hauling trucks

Contractor's Personnel: Larry-bulldozer operator

Description of Daily Activities & Events

- Geotechnics representative James Schiff arrived on-site and made contact with Mr. Bill Lupi of Blackrock and proceeded to the site to test existing coal ash that had been placed.
- Geotechnics representative performed a total of 6 tests of previously placed and compacted fly ash. in the lower portions of Cell D. Testing was performed at the direction of Blackrock representative Location and elevations were collected by Charah Inc. representative.
- 1 pt. proctor samples and water conents were obtained for gauge verification and proctor selection.
- Geotechnics representative departed the site and returned to office.

Prepared By: JAS **Date:** 7/5/2012 **Checked By:** [illegible] **Date:** 7/9

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Day:	**Thursday**
Date:	**7.5.12**
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash Landfill-Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semera, North Carolina	**Time on Site:**	**Arrived:** 1040 **Departed:** 1410
General Contractor:	Charah Inc.	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny and Hot	**Temperature:**	95+ degrees

Contractor's Equipment: 1 CAT D6 bulldozer, 1 CAT smooth drum vibratory roller, 2-4,000 gallon water trucks, 3 on-site Ash hauling trucks

Contractor's Personnel: Larry-bulldozer operator

Description of Daily Activities & Events

- Geotechnics representative James Schiff arrived on-site and made contact with Mr. Bill Lupi of Blackrock and proceeded to the site to test existing coal ash that had been placed.
- Geotechnics representative performed a total of 6 tests of previously placed and compacted fly ash. in the lower portions of Cell D. Testing was performed at the direction of Blackrock representative Location and elevations were collected by Charah Inc. representative.
- 1 pt. proctor samples and water conents were obtained for gauge verification and proctor selection.
- Geotechnics representative departed the site and returned to office.

Prepared By: JAS **Date:** 7/5/2012 **Checked By:** [illegible] **Date:** 7/9

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-26**	Geotechnics Representative : JAMES SCHIFF	Page : 1 OF 1
Date (s) : **7.5.12**	Reviewed By : NDS	Date : 7/9

Contractor : CHARAH	Borrow Source : On site Fly Ash Cylo

Compaction Equipment : 1 CAT vibratory smooth drum compactor, 3 dump trucks, 1 bull dozer

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 01	D	524.7	8"	607-01-02	93.1	21.0	**96.6**	**13.0**	**85.5**	**91.8%**	**90.0%**	
ND 02	D	525.1	8"	723-01-01	80.9	23.9	**84.5**	**15.5**	**73.2**	**90.4%**	**90.0%**	
ND 03	D	528.7	8"	723-01-02	63.8	38.1	**75.6**	**33.8**	**56.5**	**88.6%**	**90.0%**	
ND 04	D	529.0	8"	723-01-01	80.9	23.9	**89.4**	**19.7**	**74.7**	**92.3%**	**95.0%**	
ND 05	D	526.8	8"	735-01-03	72.6	33.0	**85.3**	**28.7**	**66.3**	**91.3%**	**90.0%**	
ND 06	D	527.5	8"	723-01-02	63.8	38.1	**73.1**	**28.3**	**57.0**	**89.3%**	**90.0%**	

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3401-B	2213	560

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF PHASE 6A
Project No.	2012-607

Test Number:	.001	.002	.003	.004	.005
Nuclear Test Number:	01	02	03	04	05
Location:	D	D	D	D	D
Depth:	524.7	525.1	528.7	529.0	526.8
Tare Number	809	805	813	814	804
Wt. of Tare & WS (gm)	374.20	418.50	406.40	446.30	369.3
Wt. of Tare & DS (gm)	344.45	376.52	332.10	391.28	310.46
Wt. of Tare (gm)	114.90	106.40	112.40	112.00	105.3
Wt. of Water (gm)	29.75	41.98	74.3	55.02	58.84
Wt. of DS (gm)	229.55	270.12	219.7	279.28	205.16
Water Content (%)	**13.0**	**15.5**	**33.8**	**19.7**	**28.7**

Test Number:	.006
Nuclear Test Number:	06
Location:	D
Depth:	527.5
Tare Number	810
Wt. of Tare & WS (gm)	393.8
Wt. of Tare & DS (gm)	332.2
Wt. of Tare (gm)	114.5
Wt. of Water (gm)	61.6
Wt. of DS (gm)	217.7
Water Content (%)	**28.3**

Notes : *NA*

Tested By *JS* *Date* *7/5/2012* *Checked By* *MPS* *Date* *7/9*

Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-26**
Date (s) :	7/5/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-01
Location:	D
Depth (ft):	524.7
Date :	5-Jul

Mold

Cylinder ID	3
Weight of Cylinder (lbs.)	0.412
Volume of Cylinder (ft^3)	0.01

Specimen

Wt. of Cylinder & WS (lbs.)	1.41
Wt. of Cylinder (lbs.)	0.41
Wt. of WS	1.00
Cylinder Volume (ft^3)	0.010

Moisture / Density

Tare Number	820
Wt. of Tare & WS (gm)	563.90
Wt. of Tare & DS (gm)	523.48
Wt. of Tare (gm)	136.15
Wt. of Water (gm)	40.42
Wt. of DS (gm)	387.33
Wet Density (pcf):	99.8
Moisture Content (%):	**10.4**
Dry Density (pcf):	**90.4**

Geotechnics Representative : J SCHIFF

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Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-26**
Date (s) :	7.5.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	ND--2	ND-3
Depth (ft):	525.1	528.7
Date :	7.5.12	7.5.12

Mold

Weight of Mold (lbs.)	9.45	9.45
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.73	12.26
Weight of Mold (lbs)	9.45	9.45
Weight of WS (lbs)	3.28	2.81
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	305	314
Wt. of Tare & WS (gm)	355.37	262.69
Wt. of Tare & DS (gm)	318.59	216.87
Wt. of Tare (gm)	84.72	84.81
Wt. of Water (gm)	36.78	45.82
Wt. of DS (gm)	233.87	132.06
Wet Density (pcf):	99.4	85.2
Moisture Content (%):	**15.7**	**34.7**
Dry Density (pcf):	**85.9**	**63.2**

Geotechnics Representative : J Schiff

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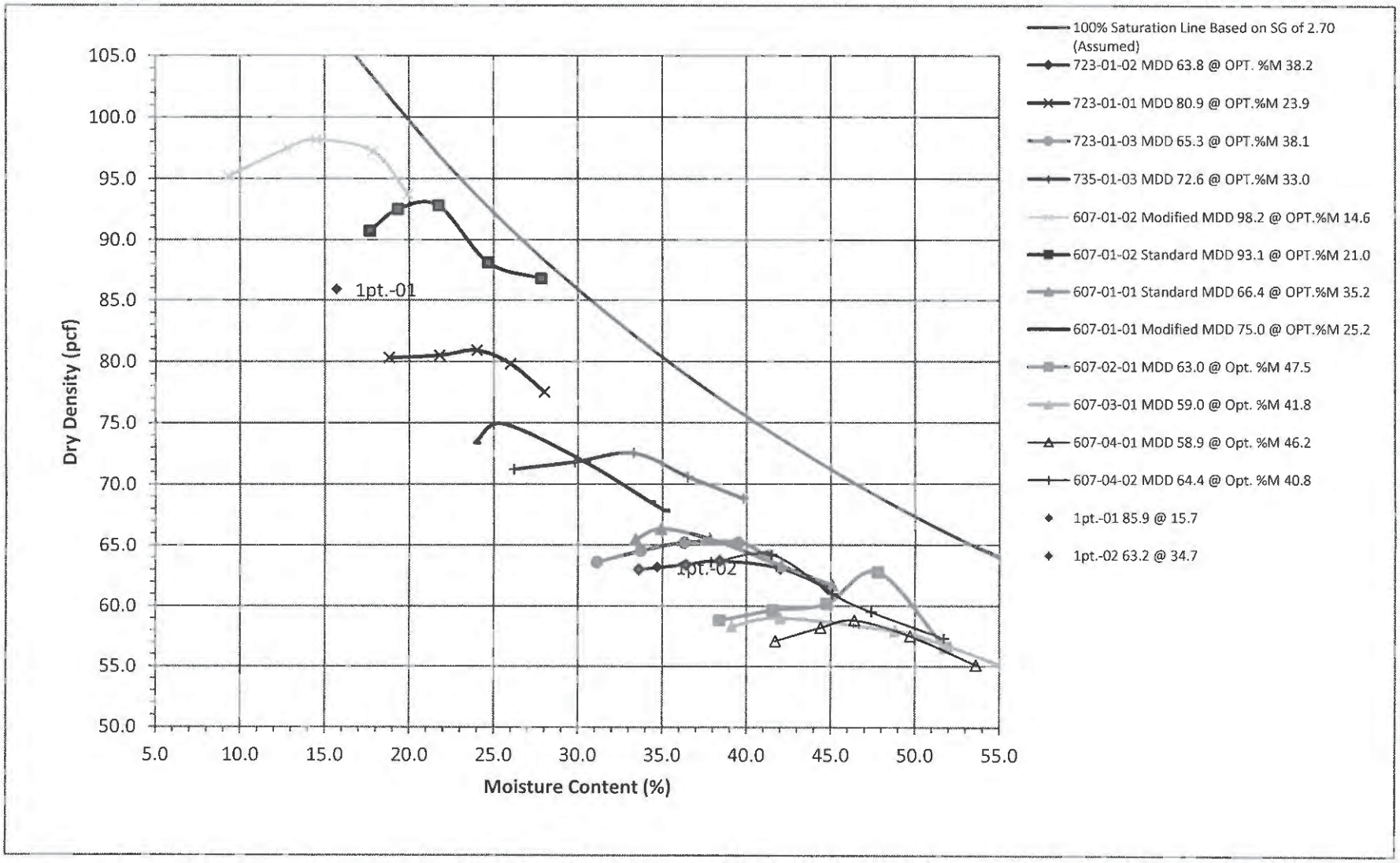
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607



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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash Landfill-Phase 6A	**Project No.:**	2012-607	
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi	
Site Location:	Semera, North Carolina	**Time on Site:**	**Arrived:**	9:45
			Departed:	1:15
General Contractor:	Charah Inc.	**Superintendent:**	NA	

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions: P. Cloudy **Temperature:** 80+ degrees

Contractor's Equipment: 2 CAT D6 bulldozer, 1 CAT smooth drum vibratory roller, 1-4,000 gallon water trucks, 8 on-site Ash hauling trucks

Contractor's Personnel: Larry-bulldozer operator, Chris - Charah's surveyor

Description of Daily Activities & Events

- Geotechnics representative James Schiff arrived on-site and made contact with Mr. Bill Lupi of Blackrock and proceeded to the site to test existing coal ash that had been placed.
- Geotechnics representative performed a total of 8 nuclear density tests of previously placed and compacted fly ash. Six of the tests were performed in Cell D between elevation 531 to 534.5 feet. Two re-tests (ND-7 and ND-8) were performed at elevation 560.5 to 561.5 in Cell C. Locations and elevations were collected by Charah Inc. representative (Chris).
- Drive cylinders and water contact were obtained for gauge verification and proctor selection.
- Geotechnics representative departed the site and returned to office.

Prepared By: JAS **Date:** 7/12/2012 **Checked By:** RBS **Date:** 7/16

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-27**	Geotechnics Representative : JAMES SCHIFF	Page : 1 OF 1
Date (s) : **7.12.12**	Reviewed By : [illegible]	Date : 7/16

Contractor : CHARAH	Borrow Source : On site Fly Ash Cylo

Compaction Equipment : 1 CAT vibratory smooth drum compactor, 8 dump trucks, 2 bull dozer

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 01	D	534.5	8"	723-01-03	65.3	38.1	**79.3**	**24.7**	**63.2**	**96.8%**	**95.0%**	moist corr. K=96.0
ND 02	D	533.4	8"	607-01-01	66.4	35.2	**83.1**	**26.6**	**66.6**	**100.3%**	**95.0%**	
ND 03	D	532.3	8"	607-02-01	63.0	47.5	**82.3**	**36.0**	**58.8**	**93.3%**	**90.0%**	
ND 04	D	531.7	8"	607-01-01	66.4	35.2	**82.7**	**32.3**	**61.9**	**93.2%**	**90.0%**	
ND 05	D	531.4	8"	723-01-02	63.8	38.2	**76.1**	**30.5**	**57.5**	**90.1%**	**90.0%**	
ND 06	D	531.8	8"	723-01-02	63.8	38.2	**78.2**	**27.7**	**60.3**	**94.5%**	**90.0%**	
ND 07	C	561.6	8"	624-01-01	89.6	19.5	**92.8**	**14.2**	**81.3**	**90.7%**	**95.0%**	Re-Test of ND-01 (6/14/12)
ND 08	C	560.5	8"	607-04-01	58.9	46.2	**62.8**	**21.4**	**51.7**	**87.8%**	**95.0%**	Re-Test of ND-02 (6/14/12)

Note: All test added a K value moisture correction

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3401-B	2247	570

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Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-624

Report Number :	**FDR-27**
Date (s) :	7/12/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-01	ND-04
Location:	D	D
Depth (ft):	534.5	531.7
Date :	12-Jul	12-Jul

Mold

Cylinder ID	1	2
Weight of Cylinder (lbs.)	0.522	0.425
Volume of Cylinder (ft^3)	0.01	0.01

Specimen

Wt. of Cylinder & WS (lbs.)	1.36	1.31
Wt. of Cylinder (lbs.)	0.52	0.43
Wt. of WS	0.84	0.89
Cylinder Volume (ft^3)	0.010	0.010

Moisture / Density

Tare Number	828	817
Wt. of Tare & WS (gm)	291.59	324.49
Wt. of Tare & DS (gm)	260.81	278.32
Wt. of Tare (gm)	136.10	135.52
Wt. of Water (gm)	30.78	46.17
Wt. of DS (gm)	124.71	142.80
Wet Density (pcf):	84.0	88.9
Moisture Content (%):	**24.7**	**32.3**
Dry Density (pcf):	**67.4**	**67.2**

Geotechnics Representative : J SCHIFF

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Client: Blackrock Engineering
Project Name : Roxboro Ash Landfill Phase 6
Project Number : 2012-607

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INTEGRITY IN TESTING

Report Number : **FDR-27**
Date (s) : 7/12/12

Water Content - ASTM D 4959 and ASTM D 2216

Test Number :	1	2	3	4	5
Nuclear Test Number :	ND-02	ND-03	ND-05	ND-06	ND-07
Location:	D	D	D	D	C
Depth (ft):	533.4	532.3	531.4	531.8	561.6
Tare Number	824	826	818	827	8010
Wt. of Tare & WS (gm)	312.77	284.15	278.62	286.72	261.14
Wt. of Tare & DS (gm)	275.51	245.25	245.6	254.1	245.54
Wt. of Tare (gm)	135.41	137.11	137.22	136.23	135.81
Wt. of Water (gm)	37.26	38.9	33.02	32.62	15.6
Wt. of DS (gm)	140.1	108.14	108.38	117.87	109.73
Water Content (%)	**26.6**	**36.0**	**30.5**	**27.7**	**14.2**

Test Number :
Nuclear Test Number :
Location:
Depth (ft):

Tare Number
Wt. of Tare & WS (gm)
Wt. of Tare & DS (gm)
Wt. of Tare (gm)
Wt. of Water (gm)
Wt. of DS (gm)

Water Content (%)

Notes : *NA*

Tested By: JS Date: 7/12/2012

Client:	Blackrock Engineering
Project Name :	Roxboro Ash Landfill Phase 6
Project Number :	2012-607

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INTEGRITY IN TESTING

Report Number :	**FDR-27**
Date (s) :	7/12/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : Black Fly Ash

Test Information		
Test Number :	ONE PT 01	ONE PT 02
Location:	ND-04	ND-08
Depth (ft):	531.7	560.5
Date :	12-Jul	12-Jul
Mold		
Weight of Mold (lbs.)	9.45	9.45
Volume OF Mold (ft^3)	0.033	0.033
Specimen		
Weight of Mold & WS (lbs)	12.33	11.62
Weight of Mold (lbs)	9.45	9.45
Weight of WS (lbs)	2.88	2.17
Volume OF Mold (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	822	803
Wt. of Tare & WS (gm)	304.09	223.1
Wt. of Tare & DS (gm)	264.24	202.08
Wt. of Tare (gm)	136.97	103.71
Wt. of Water (gm)	39.85	21.02
Wt. of DS (gm)	127.27	98.37
Wet Density (pcf)	87.3	65.8
Moisture Content %	**31.3**	**21.4**
Dry Density (pcf)	**66.5**	**54.2**

Geotechnics Represenative : JS

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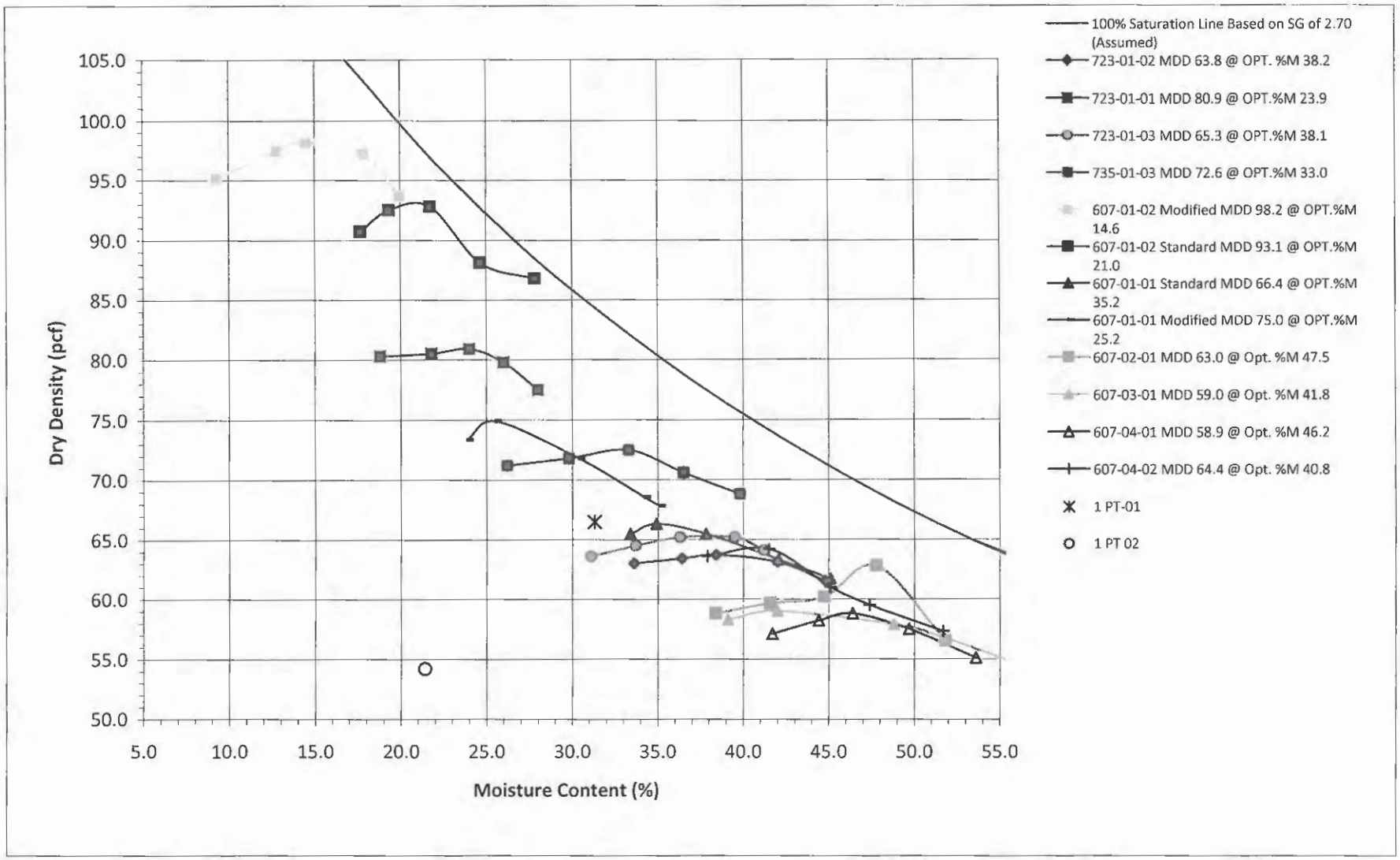
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-27



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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Progress Energy - Roxboro Ash Silo LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 11:30 AM **Departed:** 2:30 PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	William Lupi

Weather Conditions: Cloudy **Temperature:** 85

Contractor's Equipment: 1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Contractor's Personnel: ~9

Description of Daily Activities & Events

- Geotechnics representative, Shannon Sisell, arrived onsite.
- Performed 10 nuclear moisture/density test at location Phase 6-D (see FDR-28 for results).
- Performed 2 drive cylinder test to verify gauge readings (see DC-28 for results).
- Collected 1 One Point Proctor Sample for verification of material (see One-Point for results).
- Geotechnics rep. departed site

Prepared By: SFS **Date:** 7/19/2012 **Checked By:** MMS **Date:** 7/23

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Client: BLACKROCK ENGINEERING
Project Name : PROGRESS ENERGY - ROXBORO ASH SILO
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number :	**FDR-28**	Geotechnics Representative :	Shannon F. Sisell	Page :	1 of 1
Date (s) :	**Thursday, 7/19/12**	Reviewed By :	[illegible]	Date :	7/23

Contractor :	Charah, Inc.	Borrow Source :	Coal Ash Silo

Compaction Equipment :	1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Test Number	Test Location	Elevation / Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	Ph. 6-D	537.9	8"	607-03-01	59.0	41.8	**70.8**	**22.4**	**57.8**	**98.0%**	**95%**	
ND 2	Ph. 6-D	536.9	8"	607-03-01	59.0	41.8	**68.3**	**22.3**	**55.8**	**94.7%**	**95%**	
ND 3	Ph. 6-D	535.7	8"	735-01-03	72.6	33.0	**86.7**	**25.7**	**69.0**	**95.0%**	**95%**	DC-01
ND 4	Ph. 6-D	534.5	8"	723-01-01	80.9	23.9	**87.5**	**19.0**	**73.5**	**90.9%**	**95%**	
ND 5	Ph. 6-D	535.5	8"	607-01-01	66.4	35.2	**79.9**	**25.5**	**63.7**	**95.9%**	**90%**	ONE-POINT
ND 4R	Ph. 6-D	534.5	8"	723-01-01	80.9	23.9	**88.9**	**10.9**	**80.2**	**99.1%**	**95%**	
ND 6	Ph. 6-D	535.2	8"	607-02-01	63.0	47.5	**73.7**	**28.1**	**57.5**	**91.3%**	**90%**	
ND 7	Ph. 6-D	536.1	8"	723-01-01	89.6	19.5	**98.3**	**17.5**	**83.7**	**93.4%**	**90%**	
ND 2R	Ph. 6-D	536.7	8"	607-03-01	59.0	41.8	**79.3**	**33.3**	**59.5**	**100.8%**	**95%**	DC-02
ND 8	Ph. 6-D	534.5	8"	723-01-02	63.8	38.2	**76.4**	**26.5**	**60.4**	**94.7%**	**90%**	

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3411	2226	566

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	PROGRESS ENERGY - ROXBORO ASH SILO
Project No.	**2012-607**

Test Number:	.001	.002	.003	.004	.005
Nuclear Test Number:	ND-1	ND-2	ND-4	ND-4R	ND-6
Location:	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D
Depth:		536.9	534.5	534.5	535.2
Tare Number	821	816	826	824	827
Wt. of Tare & WS (gm)	215.16	227.54	239.24	259.89	247.72
Wt. of Tare & DS (gm)	200.68	210.84	222.92	247.67	223.29
Wt. of Tare (gm)	135.97	135.90	137.12	135.44	136.25
Wt. of Water (gm)	14.48	16.7	16.32	12.22	24.43
Wt. of DS (gm)	64.71	74.94	85.8	112.23	87.04
Water Content (%)	**22.4**	**22.3**	**19.0**	**10.9**	**28.1**

Test Number:	.006	.007
Nuclear Test Number:	ND-7	ND-8
Location:	Ph. 6-D	Ph. 6-D
Depth:	536.1	534.5
Tare Number	8010	818
Wt. of Tare & WS (gm)	282.13	257.31
Wt. of Tare & DS (gm)	260.33	232.19
Wt. of Tare (gm)	135.82	137.25
Wt. of Water (gm)	21.8	25.12
Wt. of DS (gm)	124.51	94.94
Water Content (%)	**17.5**	**26.5**

Notes : *NA*

Tested By *SFS* *Date* *7/19/2012* *Checked By* MMS *Date* 7/23

Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-28**
Date (s) :	Thursday, 7/19/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-3	ND-2R
Location:	Ph. 6-D	Ph. 6-D
Depth (ft):	535.7	536.7
Date :	7/19/2012	7/19/2012

Mold

Cylinder ID	1	2
Weight of Cylinder (lbs.)	1.389	1.313
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.19	4.05
Wt. of Cylinder (lbs.)	1.39	1.31
Wt. of WS	2.80	2.74
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	828	820
Wt. of Tare & WS (gm)	307.99	353.63
Wt. of Tare & DS (gm)	272.83	299.25
Wt. of Tare (gm)	136.08	136.18
Wt. of Water (gm)	35.16	54.38
Wt. of DS (gm)	136.75	163.07
Wet Density (pcf):	84.7	82.9
Moisture Content (%):	**25.7**	**33.3**
Dry Density (pcf):	**67.4**	**62.2**

Geotechnics Representative : Shannon F. Sisell

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Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-28**
Date (s) :	Thursday, 7/19/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : BLACK SILO ASH

Test Information

Test Number :	1pt.-01
Location:	Ph. -D
Elevation (ft):	535.5
Date :	7/19/2012

Mold

Weight of Mold (lbs.)	9.449
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.275
Weight of Mold (lbs)	9.449
Weight of WS (lbs)	2.826
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	823
Wt. of Tare & WS (gm)	318.21
Wt. of Tare & DS (gm)	280.62
Wt. of Tare (gm)	136.77
Wt. of Water (gm)	37.59
Wt. of DS (gm)	143.85
Wet Density (pcf)	85.6
Moisture Content %	**26.1**
Dry Density (pcf)	**67.9**

Geotechnics Represenative : Shannon F. Sisell

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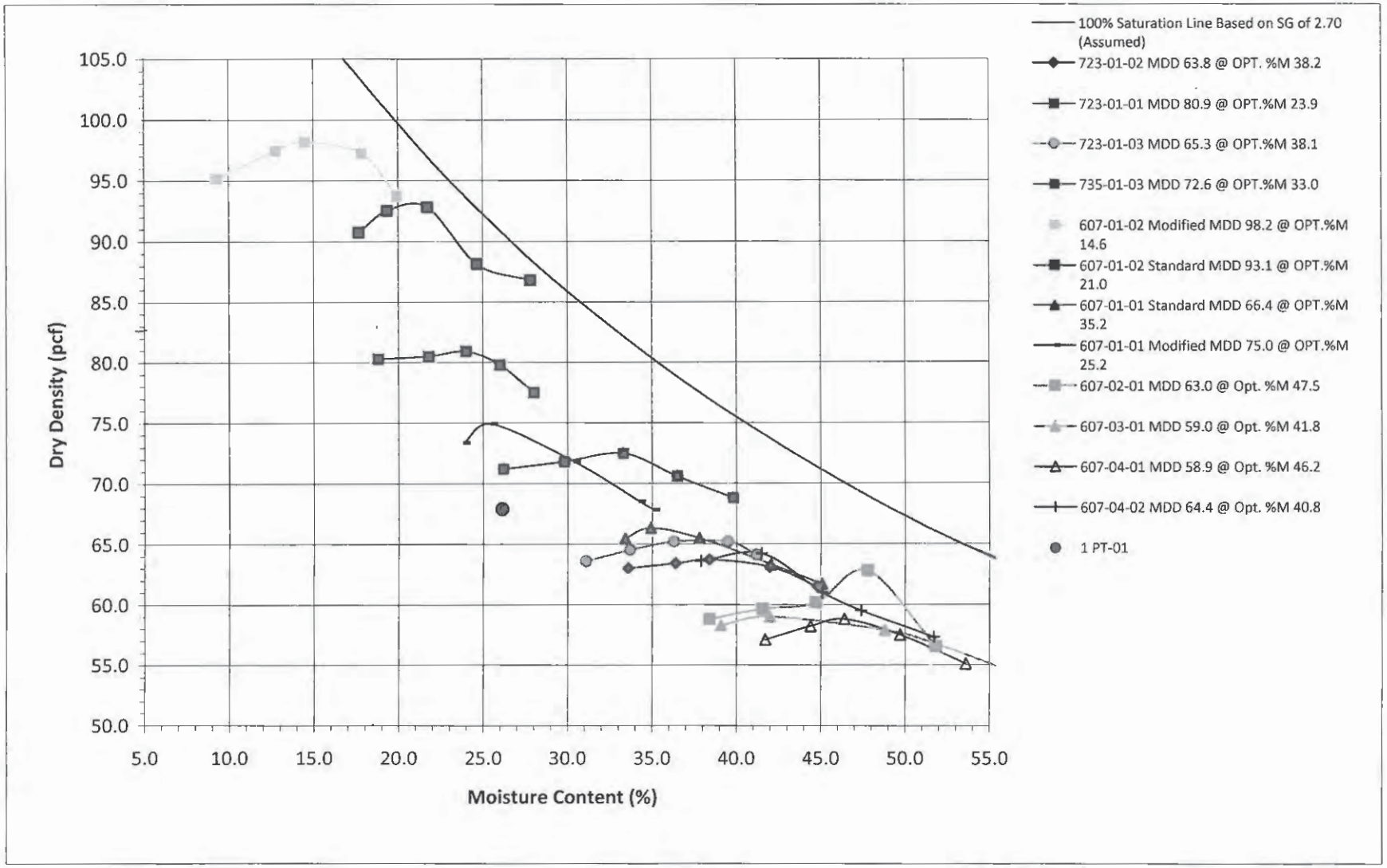
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-28



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Day:	**Thursday**
Date:	**7/26/2012**
Log No.:	**29**
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Progress Energy - Roxboro Ash Silo LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 10:10 AM **Departed:** 12:30 PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	William Lupi

Weather Conditions:	Clear	**Temperature:**	90

Contractor's Equipment: 1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Contractor's Personnel: ~9

Description of Daily Activities & Events

- Geotechnics representative, Shannon Sisell, arrived onsite.
- Standardized Nuclear Density Gauge and set Moisture Correction to K=+95
- Performed 7 nuclear moisture/density test at location Phase 6-D (see FDR-29 for results).
- Performed 2 drive cylinder test to verify gauge readings (see DC-29 for results).
- Collected 1 One Point Proctor Sample for verification of material (see One-Point for results).
- Collected 6 Moisture Content Samples for verification. No sample was collected for ND-5
- Geotechnics rep. departed site

Prepared By:	SFS	**Date:**	7/26/2012	**Checked By:**	MPS	**Date:**	7/27

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Client: BLACKROCK ENGINEERING
Project Name : PROGRESS ENERGY - ROXBORO ASH SILO LF
Project Number : 2012-607

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number :	**FDR-29**	Geotechnics Representative :	Shannon F. Sisell	Page :	1 of 1
Date (s) :	**Thursday, 7/26/12**	Reviewed By :	MPS	Date :	7/27

Contractor :	Charah, Inc.	Borrow Source :	Coal Ash Silo

Compaction Equipment :	1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Test Number	Test Location	Elevation / Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND 1	Ph. 6-D	541.9	8"	607-01-01	66.4	35.2	**84.4**	**31.6**	**64.1**	**96.6%**	**95%**	
ND 2	Ph. 6-D	541.4	8"	607-03-01	59.0	41.8	**81.2**	**34.9**	**60.2**	**102.0%**	**95%**	DC-01
ND 3	Ph. 6-D	540.2	8"	735-01-03	72.6	33.0	**83.7**	**22.7**	**68.2**	**95.0%**	**95%**	1-PT.
ND 4	Ph. 6-D	539.7	8"	607-01-01	66.4	35.2	**81.7**	**32.2**	**61.8**	**93.1%**	**90%**	
ND 5	Ph. 6-D	538.1	8"	723-01-02	63.8	38.2	**77.5**	**30.6**	**59.3**	**93.0%**	**90%**	
ND 6	Ph. 6-D	540.9	8"	607-01-01	66.4	35.2	**86.0**	**30.4**	**66.0**	**99.3%**	**95%**	DC-02
ND 7	Ph. 6-D	539.7	8"	607-03-01	59.0	41.8	**79.9**	**37.9**	**57.9**	**98.2%**	**95%**	

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3411	2216	567

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Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-29**
Date (s) :	Thursday, 7/26/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-2	ND-6
Location:	Ph. 6-D	Ph. 6-D
Depth (ft):	541.4	540.9
Date :	7/26/2012	7/26/2012

Mold

Cylinder ID	1	2
Weight of Cylinder (lbs.)	1.389	1.313
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.20	4.23
Wt. of Cylinder (lbs.)	1.39	1.31
Wt. of WS	2.81	2.92
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	801	809
Wt. of Tare & WS (gm)	360.60	395.75
Wt. of Tare & DS (gm)	293.93	339.19
Wt. of Tare (gm)	107.14	115.10
Wt. of Water (gm)	66.67	56.56
Wt. of DS (gm)	186.79	224.09
Wet Density (pcf):	85.2	88.4
Moisture Content (%):	**35.7**	**25.2**
Dry Density (pcf):	**62.8**	**70.6**

Geotechnics Representative : Shannon F. Sisell

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	PROGRESS ENERGY - ROXBORO ASH SILO
Project No.	**2012-607**

Test Number:	.001	.002	.003	.004	.005
Nuclear Test Number:	ND-1	ND-2	ND-3	ND-4	ND-6
Location:	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D
Depth:	541.9	541.4	540.2	539.7	540.9
Tare Number	805	811	Y-11	Y-1	814
Wt. of Tare & WS (gm)	291.61	259.29	252.97	263.20	307.34
Wt. of Tare & DS (gm)	247.24	219.69	223.96	222.08	261.76
Wt. of Tare (gm)	106.97	106.20	96.31	94.27	111.7
Wt. of Water (gm)	44.37	39.6	29.01	41.12	45.58
Wt. of DS (gm)	140.27	113.49	127.65	127.81	150.06
Water Content (%)	**31.6**	**34.9**	**22.7**	**32.2**	**30.4**

Test Number:	.006
Nuclear Test Number:	ND-7
Location:	Ph. 6-D
Depth:	539.7
Tare Number	SS-1
Wt. of Tare & WS (gm)	283.6
Wt. of Tare & DS (gm)	231.3
Wt. of Tare (gm)	93.45
Wt. of Water (gm)	52.3
Wt. of DS (gm)	137.85
Water Content (%)	**37.9**

Notes : *NA*

Tested By *SFS* *Date* *7/26/2012* *Checked By* *MB* *Date* *7/27*

Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

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INTEGRITY IN TESTING

Report Number :	**FDR-29**
Date (s) :	Thursday, 7/26/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : BLACK SILO ASH

Test Information

Test Number :	1pt.-01
Nuclear Test Number:	ND-3
Location:	Ph. 6-D
Elevation (ft):	540.2
Date :	7/26/2012

Mold

Weight of Mold (lbs.)	9.449
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.399
Weight of Mold (lbs)	9.449
Weight of WS (lbs)	2.95
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	802
Wt. of Tare & WS (gm)	417.27
Wt. of Tare & DS (gm)	359.38
Wt. of Tare (gm)	103.72
Wt. of Water (gm)	57.89
Wt. of DS (gm)	255.66
Wet Density (pcf)	89.4
Moisture Content %	**22.6**
Dry Density (pcf)	**72.9**

Geotechnics Represenative : Shannon F. Sisell

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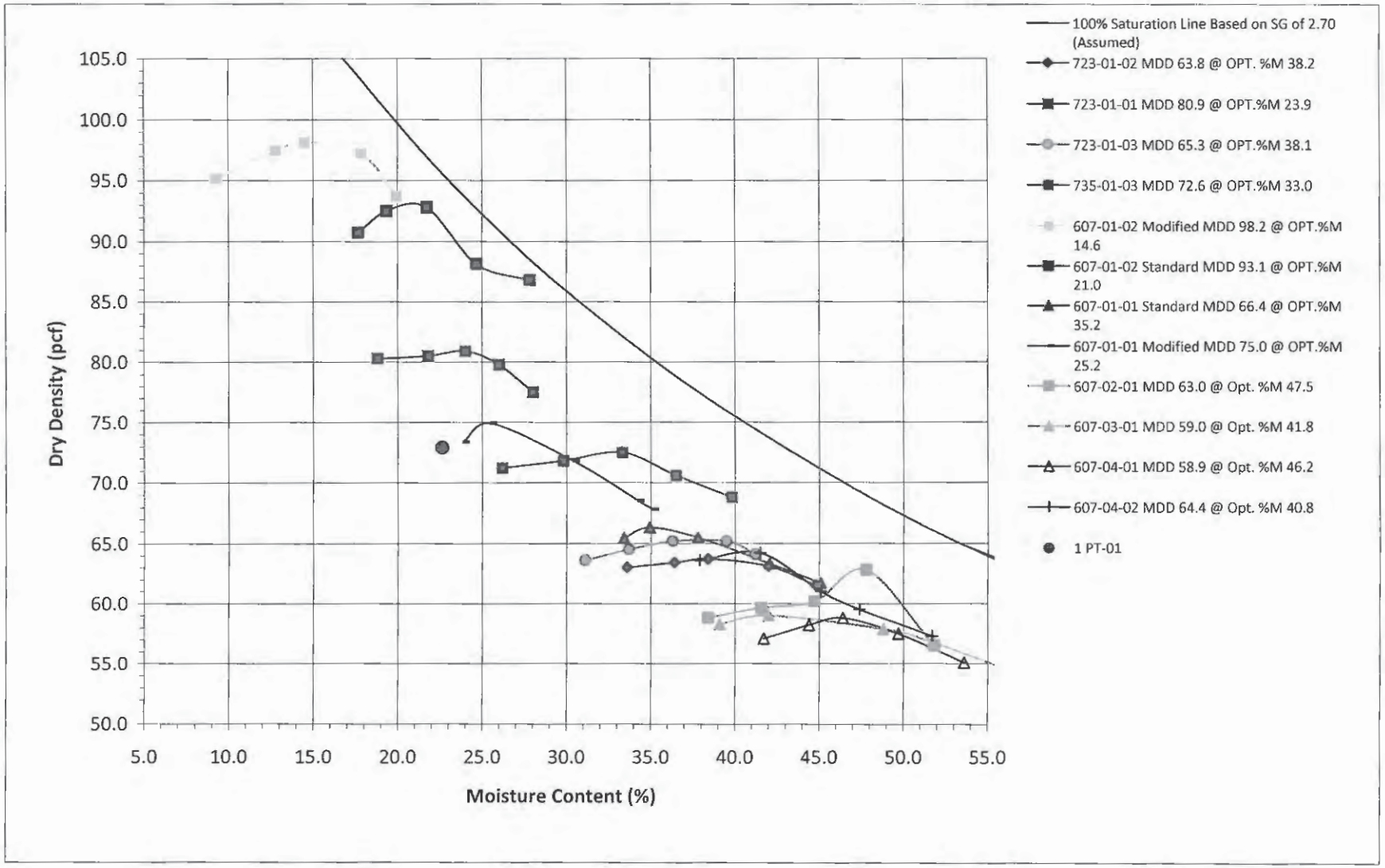
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-29



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Day:	**Thurs.**
Date:	**8.6.12**
Log No.:	**30**
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 10:15am **Departed:** 1:30pm
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Bill Lupi

Weather Conditions:	Sunny	**Temperature:**	80's - 90's

Contractor's Equipment: 1 Cat D6 Dozer, 1 CAT Smoothdrum Roller, 1 Water Truck

Contractor's Personnel: 3

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site.
- Geotechnics Rep. performed Moisture / Density testing at the direction of Blackrock Rep. (see FDR-30 for results).
- Geotechnics Rep. obtained bulk samples of Fly Ash for laboratory testing.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	8.6.12	**Checked By:**	JRB	**Date:**	**8.4.12**

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number :	**FDR-30**	Geotechnics Representative :	JACOB R. BUDA
Date (s) :	**8.2.12**	Reviewed By :	Date: **8.4.12**

Contractor :	CHARAH	Borrow Source :	ROXBORO AND MAYO PLANTS

Gauge Number	Gauge Model	Compaction Equipment :
13957	3401-B	

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 01	D	541.4	6"	607-04-02	64.4	40.8	**86.4**	**40.5**	**61.5**	**95.5%**	**95.0%**	
DC - 01	D	541.4	NA	607-04-02	64.4	40.8	**85.5**	**36.1**	**62.8**	**97.5%**	**95.0%**	
ND - 02	D	542.4	6"	607-04-02	64.4	40.8	**80.9**	**31.0**	**61.8**	**95.9%**	**95.0%**	
ND - 03	D	539.1	6"	607-04-02	64.4	40.8	**81.2**	**29.4**	**62.8**	**97.4%**	**95.0%**	
ND - 04	D	544.4	6"	607-03-01	59.0	41.8	**78.7**	**36.4**	**57.7**	**97.8%**	**95.0%**	
ND - 05	D	547.3	6"	607-03-01	59.0	41.8	**77.8**	**31.5**	**59.2**	**100.3%**	**95.0%**	
ND - 06	D	548.8	6"	607-04-02	64.4	40.8	**79.9**	**28.7**	**62.1**	**96.4%**	**95.0%**	
ND - 07	C	549.8	6"	607-02-01	63.0	47.5	**75.4**	**24.5**	**60.6**	**96.1%**	**95.0%**	
ND - 08	C	543.5	6"	723-01-01	80.9	23.9	**95.1**	**21.5**	**78.3**	**96.8%**	**95.0%**	

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

Report Number :	**FDR-30**
Date (s) :	8.2.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-01
Location:	D
Depth (ft):	541.4
Date :	8.2.12

Mold

Cylinder ID	JB-01
Weight of Cylinder (lbs.)	1.37
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.19
Wt. of Cylinder (lbs.)	1.37
Wt. of WS	2.82
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	310
Wt. of Tare & WS (gm)	511.25
Wt. of Tare & DS (gm)	404.89
Wt. of Tare (gm)	110.27
Wt. of Water (gm)	106.36
Wt. of DS (gm)	294.62
Wet Density (pcf):	85.5
Moisture Content (%):	**36.1**
Dry Density (pcf):	**62.8**

Geotechnics Representative : JACOB R. BUDA

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MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-676

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-02	ND-03	ND-04	ND-05	ND-06
Location:	D	D	D	D	D
Depth:	542.4	539.1	544.4	547.3	548.8
Tare Number	304	398	309	318	303
Wt. of Tare & WS (gm)	397.55	457.85	374.44	465.49	475.27
Wt. of Tare & DS (gm)	328.85	379.08	308.24	377.05	394.62
Wt. of Tare (gm)	110.60	84.50	109.61	86.60	111.45
Wt. of Water (gm)	68.7	78.77	66.2	88.44	80.65
Wt. of DS (gm)	218.25	294.58	198.63	290.45	283.17
Water Content (%)	**31.5**	**26.7**	**33.3**	**30.4**	**28.5**

Test Number:	WC-06	WC-07
Nuclear Test Number:	ND-07	ND-08
Location:	D	D
Depth:	549.8	543.5
Tare Number	311	317
Wt. of Tare & WS (gm)	507.6	428.91
Wt. of Tare & DS (gm)	426.95	372.22
Wt. of Tare (gm)	84.52	84.31
Wt. of Water (gm)	80.65	56.69
Wt. of DS (gm)	342.43	287.91
Water Content (%)	**23.6**	**19.7**

Notes : *NA*

Tested By *JRB* *Date* *8.6.12* *Checked By* *Date* ***8.4.12***

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

Report Number :	**FDR-30**
Date (s) :	8.2.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-04
Depth (ft):	544.4
Date :	5.16.11

Mold

Weight of Mold (lbs.)	9.45
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.10
Weight of Mold (lbs)	9.45
Weight of WS (lbs)	2.65
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	310
Wt. of Tare & WS (gm)	511.25
Wt. of Tare & DS (gm)	395.89
Wt. of Tare (gm)	110.27
Wt. of Water (gm)	115.36
Wt. of DS (gm)	285.62
Wet Density (pcf):	80.3
Moisture Content (%):	**40.4**
Dry Density (pcf):	**57.2**

Geotechnics Representative : JACOB R. BUDA

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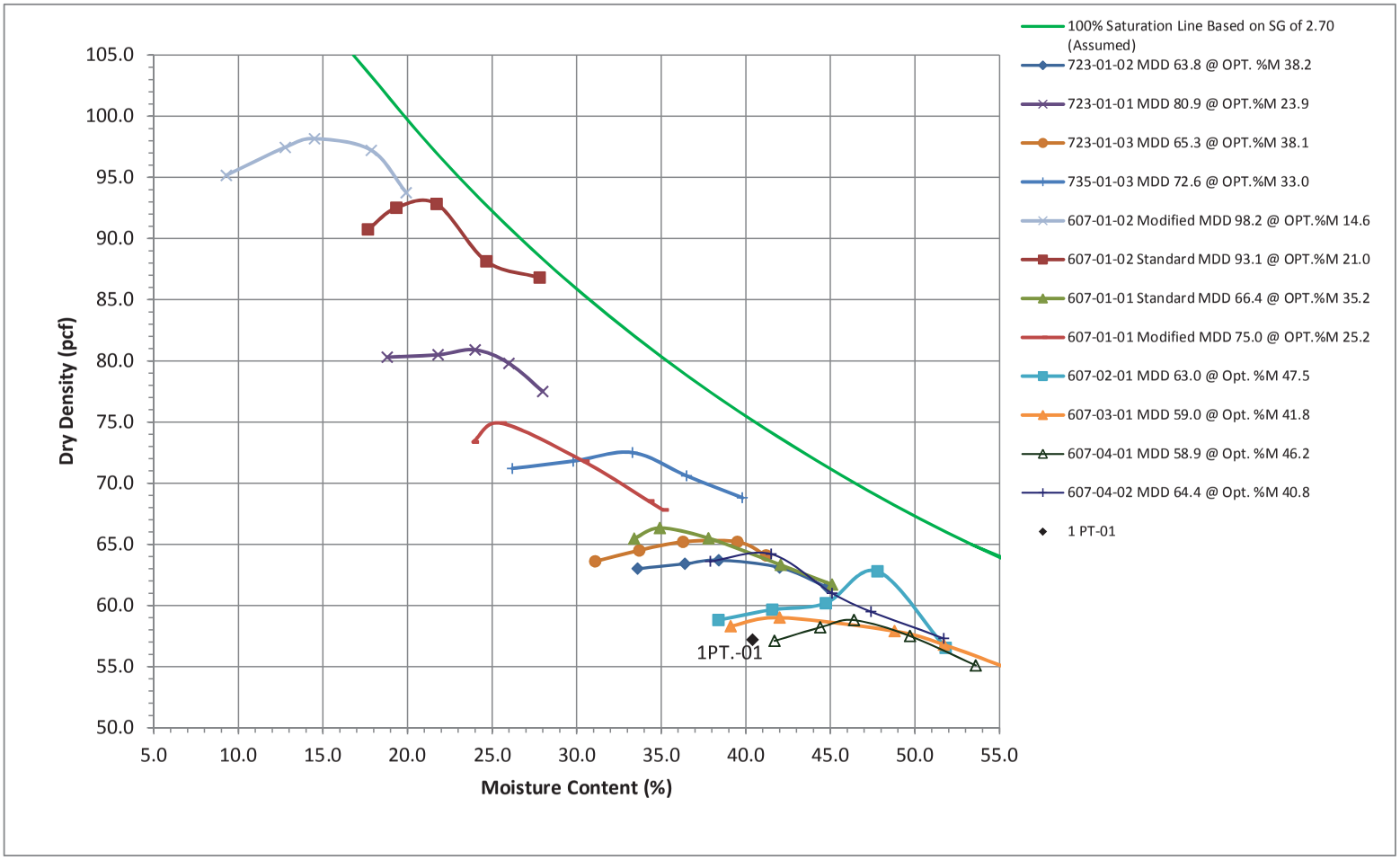
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607



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Day:	Thurs.
Date:	8/9/2012
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 10:09am **Departed:** 3:20 PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	William Lupi
Blackrock Engineering	Billy Bradford
Charah	Marvin Braddsher

Weather Conditions: Sunny **Temperature:** 80's - 90's

Contractor's Equipment: 1 Cat D6 Dozer, 1 CAT Smoothdrum Roller, 1 Water Truck, 4 On-Road Dump Trucks (MAYO), 4 On-Road Dump Truck (ROXBORO)

Contractor's Personnel: 3

Description of Daily Activities & Events

- Geotechnics Rep. Shannon F. Sisell arrived on site.
- Geotechnics Rep. performed Moisture / Density testing at the direction of Blackrock Rep. (see FDR-31 for results).
- Geotechnics Rep. obtained 2 One-Point-Proctor Samples for material verification.
- Geotechnics Rep. performed 1 Drive Cylinder Test for gauge verification
- Geotechnics Rep. obtained bulk samples of Fly Ash for laboratory testing.
- Geotechnics Rep. departed the site.

Prepared By: SFS **Date:** 8/9/2012 **Checked By:** JRB **Date:** 8.13.12

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-31**	Geotechnics Representative : Shannon F. Sisell
Date (s) : **8/9/2012**	Reviewed By : JZB Date: 8.13.12

Contractor : CHARAH	Borrow Source : ROXBORO AND MAYO PLANTS

Gauge Number	Gauge Model	Compaction Equipment :
13957	3401-B	1 Cat D6 Dozer, 1 CAT Smoothdrum Roller, 1 Water Truck, 4 On-Road Dump Truck (MAYO), 4 On-Road Dump Truck (ROXBORO)

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6D	540.2	8"	607-04-02	64.4	40.8	**78.1**	**30.3**	**59.9**	**93.1%**	**90%**	%M Corrected
ND - 2	PHASE 6D	538.8	8"	735-01-03	72.6	33.0	**83.0**	**26.3**	**65.7**	**90.5%**	**90%**	%M Corrected
ND - 3	PHASE 6D	542.9	8"	607-04-02	64.4	40.8	**78.5**	**28.5**	**61.1**	**94.9%**	**95%**	%M Corrected
ND - 3R	PHASE 6D	541.9	8"	607-04-02	64.4	40.8	**81.7**	**29.5**	**63.1**	**98.0%**	**95%**	%M Corrected
ND - 4	PHASE 6D	547.2	8"	607-02-01	63.0	47.5	**74.3**	**24.3**	**59.8**	**94.9%**	**90%**	%M Corrected
DC - 4	PHASE 6D	547.2	NA	607-02-01	63.0	47.5	**74.6**	**24.3**	**60.0**	**95.3%**	**90%**	
ND - 5	PHASE 6D	549.7	8"	607-02-01	63.0	47.5	**76.7**	**28.7**	**59.6**	**94.6%**	**95%**	%M Corrected
ND - 5R	PHASE 6D	549.7	8"	607-02-01	63.0	47.5	**83.0**	**34.5**	**61.7**	**98.0%**	**95%**	%M Corrected
ND - 6	PHASE 6D	545.5	8"	723-01-02	63.8	38.2	**77.2**	**27.2**	**60.7**	**95.1%**	**95%**	%M Corrected
ND - 6R	PHASE 6D	545.5	8"	723-01-02	63.8	38.2	**79.8**	**31.5**	**60.7**	**95.1%**	**95%**	%M Corrected
ND - 7	PHASE 6D	552.1	8"	607-04-01	58.9	46.2	**69.9**	**29.5**	**54.0**	**91.6%**	**95%**	%M Corrected
ND - 7R	PHASE 6D	552.1	8"	607-04-01	58.9	46.2	**68.6**	**29.5**	**53.0**	**90.0%**	**95%**	%M Corrected
ND - 8	PHASE 6D	519.4	8"	723-01-03	65.3	38.1	**82.3**	**29.2**	**63.7**	**97.5%**	**95%**	%M Corrected

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-31**
Date (s) :	8/9/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-04
Location:	Phase 6D
Depth (ft):	547.2
Date :	8/9/2012

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.32
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.78
Wt. of Cylinder (lbs.)	1.32
Wt. of WS	2.46
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	800
Wt. of Tare & WS (gm)	332.38
Wt. of Tare & DS (gm)	287.66
Wt. of Tare (gm)	103.89
Wt. of Water (gm)	44.72
Wt. of DS (gm)	183.77
Wet Density (pcf):	74.6
Moisture Content (%):	**24.3**
Dry Density (pcf):	**60.0**

Geotechnics Representative : SHANNON F. SISELL

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-31**
Date (s) :	8/9/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	ND-4	ND-7R
Depth (ft):	547.2	552.1
Date :	8/9/2012	8/9/2012

Mold

Weight of Mold (lbs.)	9.45	9.45
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.47	12.16
Weight of Mold (lbs)	9.45	9.45
Weight of WS (lbs)	3.02	2.71
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	828	821
Wt. of Tare & WS (gm)	363.10	306.30
Wt. of Tare & DS (gm)	302.24	258.25
Wt. of Tare (gm)	135.93	135.89
Wt. of Water (gm)	60.86	48.05
Wt. of DS (gm)	166.31	122.36
Wet Density (pcf):	91.4	82.0
Moisture Content (%):	**36.6**	**39.3**
Dry Density (pcf):	**66.9**	**58.9**

Geotechnics Representative : SHANNON F. SISELL

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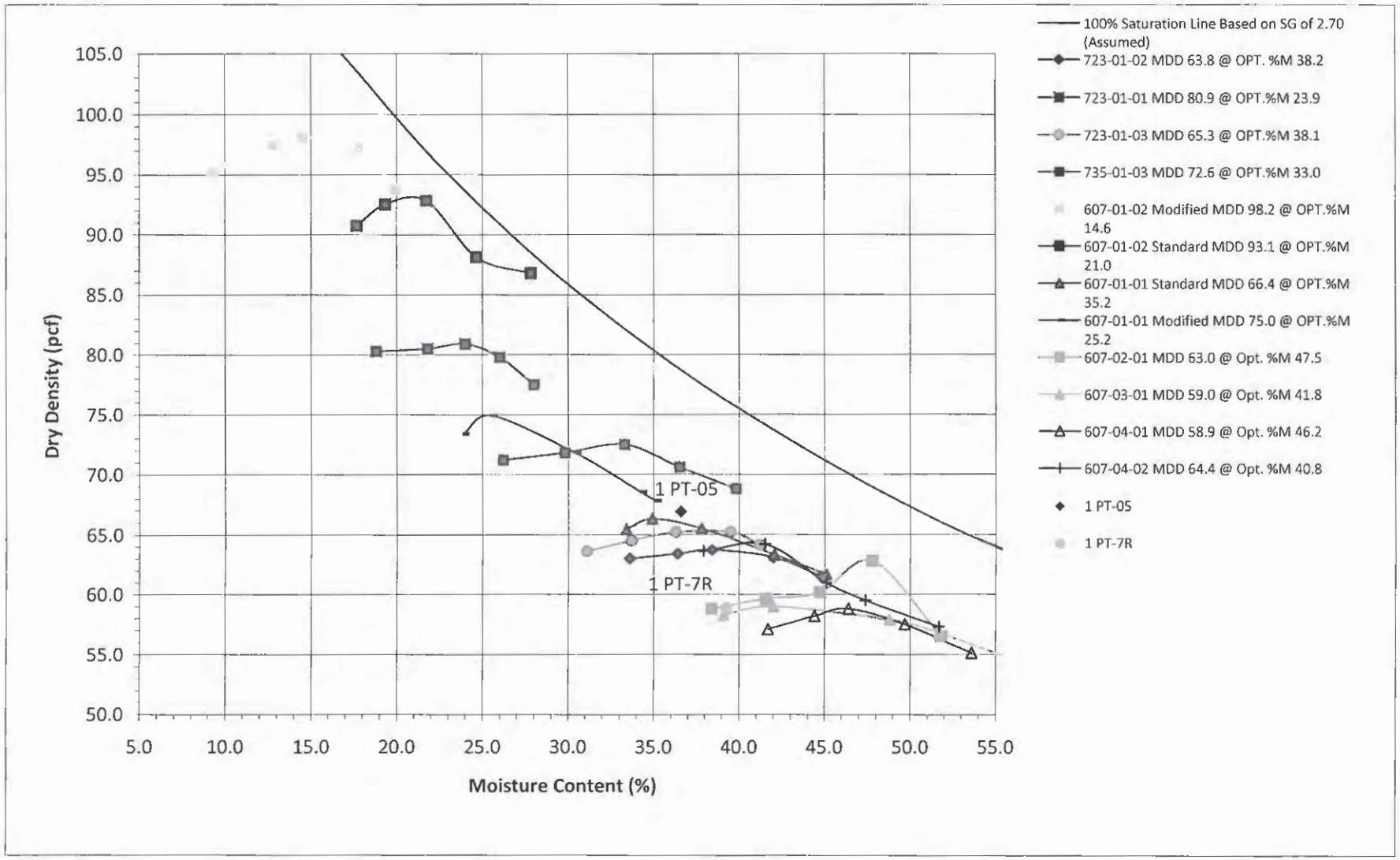
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-31



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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-1	ND-2	ND-3	ND-3R	ND-5
Location:	Phase 6D	Phase 6D	Phase 6D	Phase 6D	Phase 6D
Depth:	540.2	538.8	542.9	541.9	549.7
Tare Number	805	811	802	804	814
Wt. of Tare & WS (gm)	264.67	286.46	311.09	284.45	268.71
Wt. of Tare & DS (gm)	227.91	248.87	265.05	243.59	233.66
Wt. of Tare (gm)	106.50	106.13	103.62	105.09	111.67
Wt. of Water (gm)	36.76	37.59	46.04	40.86	35.05
Wt. of DS (gm)	121.41	142.74	161.43	138.5	121.99
Water Content (%)	**30.3**	**26.3**	**28.5**	**29.5**	**28.7**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-5R	ND-6	ND-6R	ND-7	ND-7R
Location:	Phase 6D	Phase 6D	Phase 6D	Phase 6D	Phase 6D
Depth:	549.7	545.5	545.5	552.1	552.1
Tare Number	801	807	809	806	813
Wt. of Tare & WS (gm)	321.56	257.09	332.97	249.68	298.53
Wt. of Tare & DS (gm)	266.55	224.49	280.78	216.05	256.02
Wt. of Tare (gm)	107.13	104.67	115.23	102.08	111.9
Wt. of Water (gm)	55.01	32.6	52.19	33.63	42.51
Wt. of DS (gm)	159.42	119.82	165.55	113.97	144.12
Water Content (%)	**34.5**	**27.2**	**31.5**	**29.5**	**29.5**

Notes : ND-4 refer to DC-01

Tested By SFS *Date* 8/9/2012 *Checked By* JRB *Date* 8.13.12

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-11
Nuclear Test Number:	ND-8
Location:	Phase 6D
Depth:	519.4
Tare Number	810
Wt. of Tare & WS (gm)	305.96
Wt. of Tare & DS (gm)	262.73
Wt. of Tare (gm)	114.52
Wt. of Water (gm)	43.23
Wt. of DS (gm)	148.21
Water Content (%)	**29.2**

Notes : *NA*

Tested By *SFS* *Date* *8/9/2012* *Checked By* JRB *Date* 8/13/12

Day:	**Thursday**
Date:	**8/16/2012**
Log No.:	**32**
Page:	**1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Progress Energy - Roxboro Ash Silo LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 10:20 AM **Departed:** 2:15 PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	William Lupi
Blackrock Engineering	Billy Bradford

Weather Conditions:	Clear	**Temperature:**	85

Contractor's Equipment: 1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Contractor's Personnel: ~9

Description of Daily Activities & Events

- Geotechnics representative, Shannon Sisell, arrived onsite.
- Standardized Nuclear Density Gauge and set Moisture Correction to K=+95
- Performed 13 nuclear moisture/density test at location Phase 6-D (see FDR-32 for results).
- Performed 2 drive cylinder test to verify gauge readings (see DC-29 for results).
- Collected 2 One Point Proctor Sample for verification of material (see One-Point for results).
- Collected 13 Moisture Content Samples for verification (see Moisture Content for results).
- Geotechnics rep. departed site

Prepared By:	SFS	**Date:**	8/16/2012	**Checked By:**	MWS	**Date:**	8/20

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Client: BLACKROCK ENGINEERING
Project Name : PROGRESS ENERGY - ROXBORO ASH SILO
Project Number : 2012-607

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number :	FDR-32	Geotechnics Representative :	Shannon F. Sisell	Page :	1 of 1
Date (s) :	Thursday, 8/16/12	Reviewed By :	RMS	Date :	8/20

Contractor :	Charah, Inc.	Borrow Source :	Coal Ash Silo

Compaction Equipment :	1- CAT Viberating Smooth Drum Roller, 1- Water Truck, 1- CAT D6 Dozer, 3- On-Road Dump Trucks

Test Number		Test Location	Elevation / Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND	1	Ph. 6-D	558.00	8"	607-02-01	63.0	47.5	**77.3**	**27.7**	**60.5**	**96.1%**	**95%**	1PT-01 - %M Corrected
ND	1R	Ph. 6-D	557.98	8"	607-02-01	63.0	47.5	**79.1**	**31.7**	**60.1**	**95.3%**	**95%**	%M Corrected
ND	2	Ph. 6-D	556.31	8"	607-03-01	59.0	41.8	**76.2**	**32.6**	**57.5**	**97.4%**	**95%**	%M Corrected
DC	2	Ph. 6-D	556.31	8"	607-03-01	59.0	41.8	**75.7**	**28.5**	**58.9**	**99.8%**	**95%**	%M Corrected
ND	3	Ph. 6-D	552.08	8"	607-03-01	59.0	41.8	**74.8**	**33.7**	**55.9**	**95.0%**	**95%**	%M Corrected
ND	4	Ph. 6-D	547.00	8"	723-01-03	65.3	38.1	**83.4**	**24.7**	**66.9**	**102.4%**	**95%**	%M Corrected
ND	5	Ph. 6-D	542.67	8"	723-01-03	65.3	38.1	**82.2**	**29.0**	**63.7**	**97.6%**	**95%**	%M Corrected
ND	6	Ph. 6-D	518.98	8"	607-03-01	59.0	41.8	**80.5**	**37.1**	**58.7**	**99.5%**	**90%**	%M Corrected
ND	7	Ph. 6-D	518.54	8"	723-01-02	63.8	38.2	**76.1**	**30.7**	**58.2**	**91.3%**	**90%**	1PT-02 - %M Corrected
ND	8	Ph. 6-D	519.48	8"	607-01-01	66.4	35.2	**88.1**	**37.5**	**64.1**	**96.5%**	**90%**	%M Corrected
ND	9	Ph. 6-D	520.84	8"	607-02-01	63.0	47.5	**77.0**	**32.4**	**58.2**	**92.3%**	**90%**	%M Corrected
ND	10	Ph. 6-D	519.51	8"	723-01-01	80.9	23.9	**87.2**	**10.4**	**79.0**	**97.6%**	**90%**	%M Corrected
DC	10	Ph. 6-D	519.51	8"	723-01-01	80.9	23.9	**88.6**	**10.4**	**80.3**	**99.2%**	**90%**	%M Corrected
ND	11	Ph. 6-D	519.17	8"	607-01-01	66.4	35.2	**80.0**	**30.4**	**61.3**	**92.4%**	**90%**	%M Corrected
ND	12	Ph. 6-D	540.02	8"	607-02-01	63.0	47.5	**81.5**	**36.5**	**59.7**	**94.8%**	**90%**	%M Corrected

Gauge Number	Gauge Model	Density Count	Moisture Count
13957	3411	2237	548

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Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

Report Number :	**FDR-32**
Date (s) :	Thursday, 8/16/12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-2	ND-10
Location:	Ph. 6-D	Ph. 6-D
Depth (ft):	556.31	519.51
Date :	8/16/2012	8/16/2012

Mold

Cylinder ID	1	2
Weight of Cylinder (lbs.)	1.31	1.32
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.81	4.24
Wt. of Cylinder (lbs.)	1.31	1.32
Wt. of WS	2.50	2.92
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	314	368
Wt. of Tare & WS (gm)	371.17	413.72
Wt. of Tare & DS (gm)	307.65	385.21
Wt. of Tare (gm)	84.84	111.34
Wt. of Water (gm)	63.52	28.51
Wt. of DS (gm)	222.81	273.87
Wet Density (pcf):	75.7	88.6
Moisture Content (%):	**28.5**	**10.4**
Dry Density (pcf):	**58.9**	**80.3**

Geotechnics Representative : Shannon F. Sisell

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	PROGRESS ENERGY - ROXBORO ASH SILO
Project No.	**2012-607**

Test Number:	.001	.002	.003	.004	.005
Nuclear Test Number:	ND-1	ND-1R	ND-2	ND-3	ND-4
Location:	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D
Depth:	558.00	557.98	556.31	552.08	547.00
Tare Number	825	817	SS-1	SS-2	B-1
Wt. of Tare & WS (gm)	323.04	336.04	237.52	272.90	307.2
Wt. of Tare & DS (gm)	282.63	287.77	202.18	229.14	265.89
Wt. of Tare (gm)	136.91	135.52	93.61	99.15	98.76
Wt. of Water (gm)	40.41	48.27	35.34	43.76	41.31
Wt. of DS (gm)	145.72	152.25	108.57	129.99	167.13
Water Content (%)	**27.7**	**31.7**	**32.6**	**33.7**	**24.7**

Test Number:	.006	.007	.008	.009	.010
Nuclear Test Number:	ND-5	ND-6	ND-7	ND-8	ND-9
Location:	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D	Ph. 6-D
Depth:	542.67	518.98	518.54	519.48	520.84
Tare Number	Y-11	311	307	312	308
Wt. of Tare & WS (gm)	329.11	317.06	374.97	351.08	330.02
Wt. of Tare & DS (gm)	276.81	254.06	312.76	278.35	270.97
Wt. of Tare (gm)	96.18	84.44	110.28	84.31	88.49
Wt. of Water (gm)	52.3	63	62.21	72.73	59.05
Wt. of DS (gm)	180.63	169.62	202.48	194.04	182.48
Water Content (%)	**29.0**	**37.1**	**30.7**	**37.5**	**32.4**

Notes : *NA*

Tested By *SFS* *Date* *8/16/2012* *Checked By* MDS *Date* 8/20

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	PROGRESS ENERGY - ROXBORO ASH SILO
Project No.	**2012-607**

Test Number:	.001	.002
Nuclear Test Number:	ND-11	ND-12
Location:	Ph. 6-D	Ph. 6-D
Depth:	519.17	540.02
Tare Number	309	398
Wt. of Tare & WS (gm)	386.26	304.43
Wt. of Tare & DS (gm)	321.79	245.60
Wt. of Tare (gm)	109.63	84.54
Wt. of Water (gm)	64.47	58.83
Wt. of DS (gm)	212.16	161.06
Water Content (%)	**30.4**	**36.5**

Notes : *NA*

Tested By *SFS* *Date* *8/16/2012* *Checked By* *MMS* *Date* *8/20*

Client:	BLACKROCK ENGINEERING
Project Name :	PROGRESS ENERGY - ROXBORO ASH SILO
Project Number :	**2012-607**

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INTEGRITY IN TESTING

Report Number :	**FDR-32**
Date (s) :	Thursday, 8/16/12

ONE POINT PROCTOR - Method for Soil Identification

Visual Descrpiton : BLACK SILO ASH

Test Information		
Test Number :	1pt.-01	1pt.-02
Nuclear Test Number:	ND-01	ND-07
Location:	Ph. 6-D	Ph. 6-D
Elevation (ft):	558.00	518.54
Date :	8/16/2012	8/16/2012
Mold		
Weight of Mold (lbs.)	9.446	9.446
Volume OF Mold (ft^3)	0.033	0.033
Specimen		
Weight of Mold & WS (lbs)	12.451	12.391
Weight of Mold (lbs)	9.446	9.446
Weight of WS (lbs)	3.005	2.945
Volume OF Mold (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	303	317
Wt. of Tare & WS (gm)	593.51	481.55
Wt. of Tare & DS (gm)	451.28	352.42
Wt. of Tare (gm)	111.49	84.34
Wt. of Water (gm)	142.23	129.13
Wt. of DS (gm)	339.79	268.08
Wet Density (pcf)	91.1	89.2
Moisture Content %	**41.9**	**48.2**
Dry Density (pcf)	**64.2**	**60.2**

Geotechnics Represenative : Shannon F. Sisell

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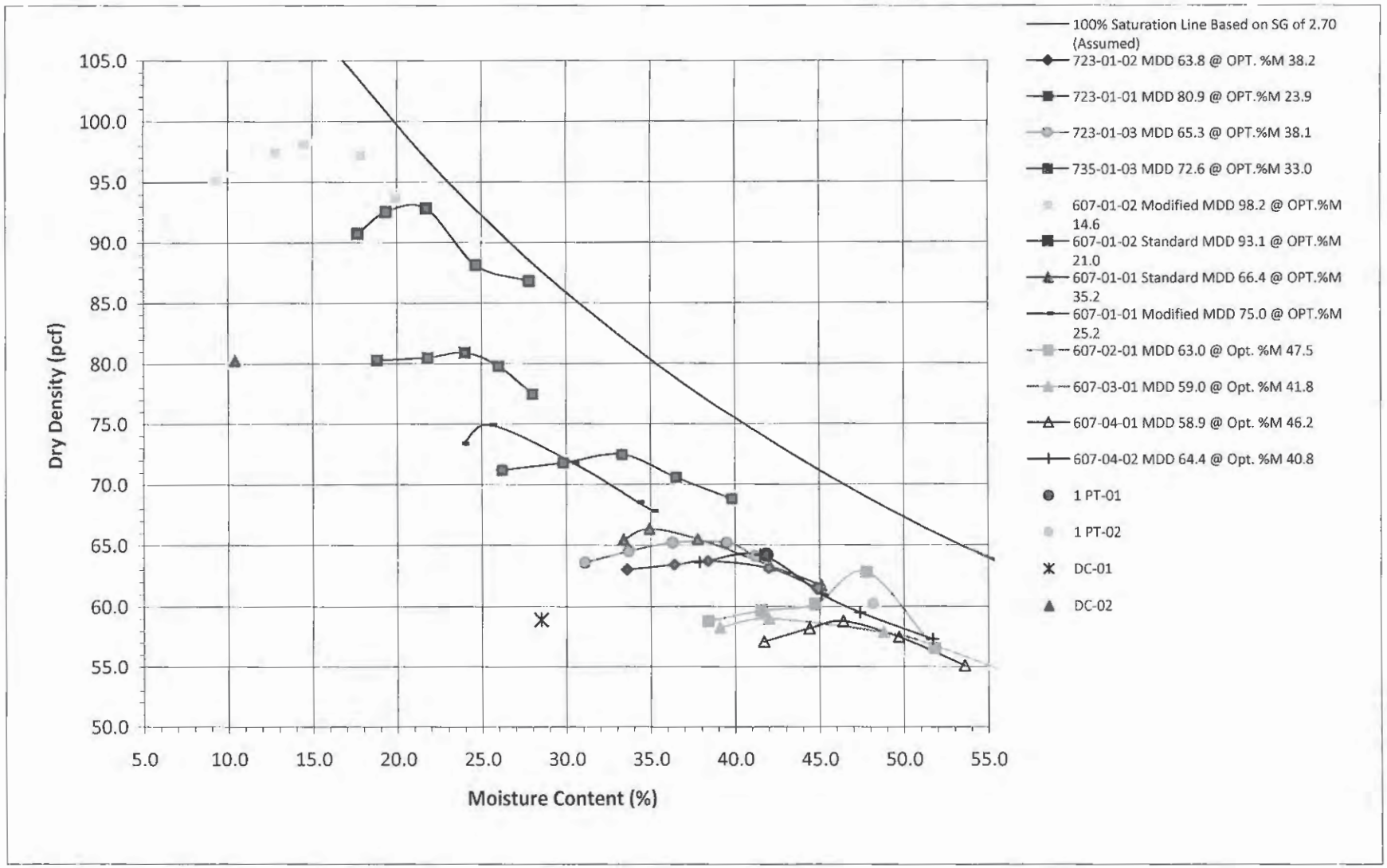
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

FDR-32



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Day:	Thurs.
Date:	8/23/2012
Log No.:	33
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF	**Project No.:**	2012-607
Client Name:	Blackrock Engineering	**Client Contact:**	Gary Ahlberg
Site Location:	Roxboro, NC	**Time on Site:**	**Arrived:** 10:30 AM **Departed:** 2:30 PM
General Contractor:	Charah, Inc.	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	William Lupi

Weather Conditions: Sunny **Temperature:** 80's - 90's

Contractor's Equipment: 1 Cat D6 Dozer, 1 CAT Smoothdrum Roller, 1 Water Truck, 4 On-Road Dump Trucks (MAYO), 4 On-Road Dump Truck (ROXBORO)

Contractor's Personnel: 3

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site.
- Geotechnics Rep. performed 7 Moisture / Density tests at the direction of Blackrock Rep.
- Geotechnics Rep. obtained 3 One-Point-Proctor Samples for material verification.
- Geotechnics Rep. performed 1 Drive Cylinder Test for gauge verification
- Geotechnics Rep. departed the site.

Prepared By: MB **Date:** 8/23/2012 **Checked By:** MMS **Date:** 8/27

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-33**	Geotechnics Representative : M. BLACKLEY
Date (s) : **8/23/2012**	Reviewed By : [illegible] Date: 8/27

Contractor : CHARAH	Borrow Source : ROXBORO AND MAYO PLANTS

Gauge Number	Gauge Model	Compaction Equipment :
13957	3401-B	1 Cat D6 Dozer, 1 CAT Smoothdrum Roller, 1 Water Truck, 4 On-Road Dump Truck (MAYO), 4 On-Road Dump Truck (ROXBORO)

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	522.1	8"	607-03-01	59.0	41.8	**78.3**	**32.0**	**59.3**	**100.5%**	**90%**	%M Corrected
ND - 2	PHASE 6E	522.2	8"	607-06-01	62.4	41.0	**76.4**	**30.9**	**58.4**	**93.5%**	**90%**	%M Corrected
ND - 3	PHASE 6E	522.9	8"	607-03-01	59.0	41.8	**77.5**	**38.3**	**56.0**	**95.0%**	**90%**	%M Corrected
ND - 4	PHASE 6E	521.2	8"	723-01-01	80.9	23.9	**97.1**	**22.6**	**79.2**	**97.9%**	**90%**	%M Corrected
ND - 5	PHASE 6E	522.6	8"	607-03-01	59.0	41.8	**71.6**	**35.4**	**52.9**	**89.6%**	**90%**	%M Corrected
ND - 6	PHASE 6E	522.8	8"	624-01-01	89.6	19.5	**96.0**	**16.6**	**82.3**	**91.9%**	**90%**	%M Corrected
ND - 7	PHASE 6E	523.5	8"	607-03-01	59.0	41.8	**74.2**	**36.2**	**54.5**	**92.3%**	**90%**	%M Corrected
ND - 5R	PHASE 6E	522.6	8"	607-03-01	59.0	41.8	**69.9**	**31.5**	**53.2**	**90.1%**	**90%**	%M Corrected

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-1	ND-2	ND-3	ND-4	ND-5
Location:	Phase 6E	Phase 6E	Phase 6E	Phase 6E	Phase 6E
Depth:	522.1	522.2	522.9	521.2	522.6
Tare Number	303	304	309	398	314
Wt. of Tare & WS (gm)	338.11	379.04	368.79	374.33	314.05
Wt. of Tare & DS (gm)	283.19	315.66	297.06	320.85	254.05
Wt. of Tare (gm)	111.51	110.59	109.58	84.44	84.75
Wt. of Water (gm)	54.92	63.38	71.73	53.48	60
Wt. of DS (gm)	171.68	205.07	187.48	236.41	169.3
Water Content (%)	**32.0**	**30.9**	**38.3**	**22.6**	**35.4**

Test Number:	WC-06	WC-07	WC-08
Nuclear Test Number:	ND-6	ND-7	ND-5R
Location:	Phase 6E	Phase 6E	Phase 6E
Depth:	522.8	523.5	522.6
Tare Number	312	318	809
Wt. of Tare & WS (gm)	381.88	333.42	332.97
Wt. of Tare & DS (gm)	339.52	267.75	280.78
Wt. of Tare (gm)	84.36	86.59	115.23
Wt. of Water (gm)	42.36	65.67	52.19
Wt. of DS (gm)	255.16	181.16	165.55
Water Content (%)	**16.6**	**36.2**	**31.5**

Notes :

Tested By MB *Date* 8/23/2012 *Checked By* MMS *Date* 8/27

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-33**
Date (s) :	8/23/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-1
Location:	Phase 6E
Depth (ft):	547.2
Date :	8/16/2012

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.31
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.81
Wt. of Cylinder (lbs.)	1.31
Wt. of WS	2.50
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	303
Wt. of Tare & WS (gm)	338.11
Wt. of Tare & DS (gm)	283.19
Wt. of Tare (gm)	111.50
Wt. of Water (gm)	54.92
Wt. of DS (gm)	171.69
Wet Density (pcf):	75.8
Moisture Content (%):	**32.0**
Dry Density (pcf):	**57.4**

Geotechnics Representative : M. BLACKLEY MB

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Day:	Thurs.
Date:	8.30.12
Log No.:	23
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:15am **Departed:** 3:45pm
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	85
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained
- Geotechnics Rep. departed the site.

Prepared By:	MB	**Date:**	8.30.12	**Checked By:**	[illegible]	**Date:**	9/4

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-34**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **8.30.12**	Reviewed By : MMS	Date : 9/4

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
32387	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
DC - 1	E	526.9	NA	723-01-02	63.8	38.2	**84.9**	**34.1**	**63.3**	**99.2%**	**90.0%**	
DC - 2	E	525.9	NA	723-01-02	63.8	38.2	**85.2**	**28.5**	**66.3**	**103.9%**	**90.0%**	
DC - 3	E	525.8	NA	723-01-02	63.8	38.2	**79.4**	**30.5**	**60.8**	**95.4%**	**90.0%**	
DC - 4	E	526.2	NA	723-01-02	63.8	38.2	**81.5**	**31.8**	**61.8**	**96.9%**	**90.0%**	
DC - 5	E	526.6	NA	723-01-02	63.8	38.2	**77.3**	**33.4**	**57.9**	**90.8%**	**90.0%**	
DC - 6	E	527.3	NA	723-01-02	63.8	38.2	**86.1**	**33.3**	**64.6**	**101.2%**	**90.0%**	
DC - 7	E	527.2	NA	723-01-02	63.8	38.2	**74.3**	**30.8**	**56.8**	**89.0%**	**90.0%**	
DC - 8	E	526.3	NA	723-01-02	63.8	38.2	**77.4**	**30.7**	**59.2**	**92.8%**	**90.0%**	
DC - 9	E	526.1	NA	723-01-02	63.8	38.2	**76.7**	**31.1**	**58.5**	**91.7%**	**90.0%**	
DC - 10	E	527.1	NA	723-01-02	63.8	38.2	**89.7**	**35.3**	**66.3**	**103.9%**	**90.0%**	

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-34**
Date (s) : 8.30.12

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-01	DC-02	DC-03	DC-06
Nuclear Test Number :	NA	NA	NA	NA
Location:	E	E	E	E
Depth (ft):	526.9	525.9	525.8	526.2
Date :	30-Aug	30-Aug	30-Aug	30-Aug
Mold				
Cylinder ID	1	2	3	4
Weight of Cylinder (lbs.)	1.39	1.39	1.39	1.39
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Wt. of Cylinder & WS (lbs.)	4.19	4.04	4.01	4.08
Wt. of Cylinder (lbs.)	1.39	1.23	1.39	1.39
Wt. of WS	2.80	2.81	2.62	2.69
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	820	827	819	822
Wt. of Tare & WS (gm)	456.64	451.29	375.97	398.08
Wt. of Tare & DS (gm)	375.15	381.39	319.81	335.11
Wt. of Tare (gm)	136.14	136.27	135.44	136.90
Wt. of Water (gm)	81.49	69.90	56.16	62.97
Wt. of DS (gm)	239.01	245.12	184.37	198.21
Wet Density (pcf):	84.9	85.2	79.4	81.5
Moisture Content (%):	**34.1**	**28.5**	**30.5**	**31.8**
Dry Density (pcf):	**63.3**	**66.3**	**60.9**	**61.9**

Geotechnics Representative : M. BLACKLEY

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-34**
Date (s) : 8.30.12

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-05	DC-06	DC-07	DC-08
Nuclear Test Number :	NA	NA	NA	NA
Location:	E	E	E	E
Depth (ft):	526.6	527.3	527.2	526.3
Date :	30-Aug	30-Aug	30-Aug	30-Aug
Mold				
Cylinder ID	5	6	7	4
Weight of Cylinder (lbs.)	1.39	1.39	1.39	1.39
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Wt. of Cylinder & WS (lbs.)	3.94	4.07	3.84	3.94
Wt. of Cylinder (lbs.)	1.39	1.23	1.39	1.39
Wt. of WS	2.55	2.84	2.45	2.56
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	8010	826	818	824
Wt. of Tare & WS (gm)	410.97	449.50	443.58	409.83
Wt. of Tare & DS (gm)	342.09	371.55	371.45	345.35
Wt. of Tare (gm)	135.80	137.14	137.20	135.44
Wt. of Water (gm)	68.88	77.95	72.13	64.48
Wt. of DS (gm)	206.29	234.41	234.25	209.91
Wet Density (pcf):	77.3	86.1	74.3	77.4
Moisture Content (%):	**33.4**	**33.3**	**30.8**	**30.7**
Dry Density (pcf):	**58.0**	**64.6**	**56.8**	**59.2**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-34**
Date (s) :	8.30.12

Drive Cylinder - ASTM D 2937

Test Information		
Test Number :	DC-09	DC-10
Nuclear Test Number :	NA	NA
Location:	E	E
Depth (ft):	526.1	527.1
Date :	30-Aug	30-Aug
Mold		
Cylinder ID	1	2
Weight of Cylinder (lbs.)	1.39	1.39
Volume of Cylinder (ft^3)	0.033	0.033
Specimen		
Wt. of Cylinder & WS (lbs.)	3.92	4.19
Wt. of Cylinder (lbs.)	1.39	1.23
Wt. of WS	2.53	2.96
Cylinder Volume (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	816	823
Wt. of Tare & WS (gm)	408.05	448.37
Wt. of Tare & DS (gm)	343.56	367.12
Wt. of Tare (gm)	135.91	136.78
Wt. of Water (gm)	64.49	81.25
Wt. of DS (gm)	207.65	230.34
Wet Density (pcf):	76.7	89.7
Moisture Content (%):	**31.1**	**35.3**
Dry Density (pcf):	**58.5**	**66.3**

Geotechnics Representative : M. BLACKLEY MWB

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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INTEGRITY IN TESTING

Report Number :	**FDR-34**
Date (s) :	8.30.12

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	DC-01	DC-07
Depth (ft):	526.9	527.2
Date :	8.30.12	8.30.12

Mold

Weight of Mold (lbs.)	9.45	9.45
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.31	12.23
Weight of Mold (lbs)	9.45	9.45
Weight of WS (lbs)	2.86	2.78
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	368	312
Wt. of Tare & WS (gm)	576.50	631.28
Wt. of Tare & DS (gm)	469.79	508.12
Wt. of Tare (gm)	111.30	84.45
Wt. of Water (gm)	106.71	123.16
Wt. of DS (gm)	358.49	423.67
Wet Density (pcf):	86.7	84.2
Moisture Content (%):	**29.8**	**29.1**
Dry Density (pcf):	**66.8**	**65.3**

Geotechnics Representative : MARK BLACKLEY MBS

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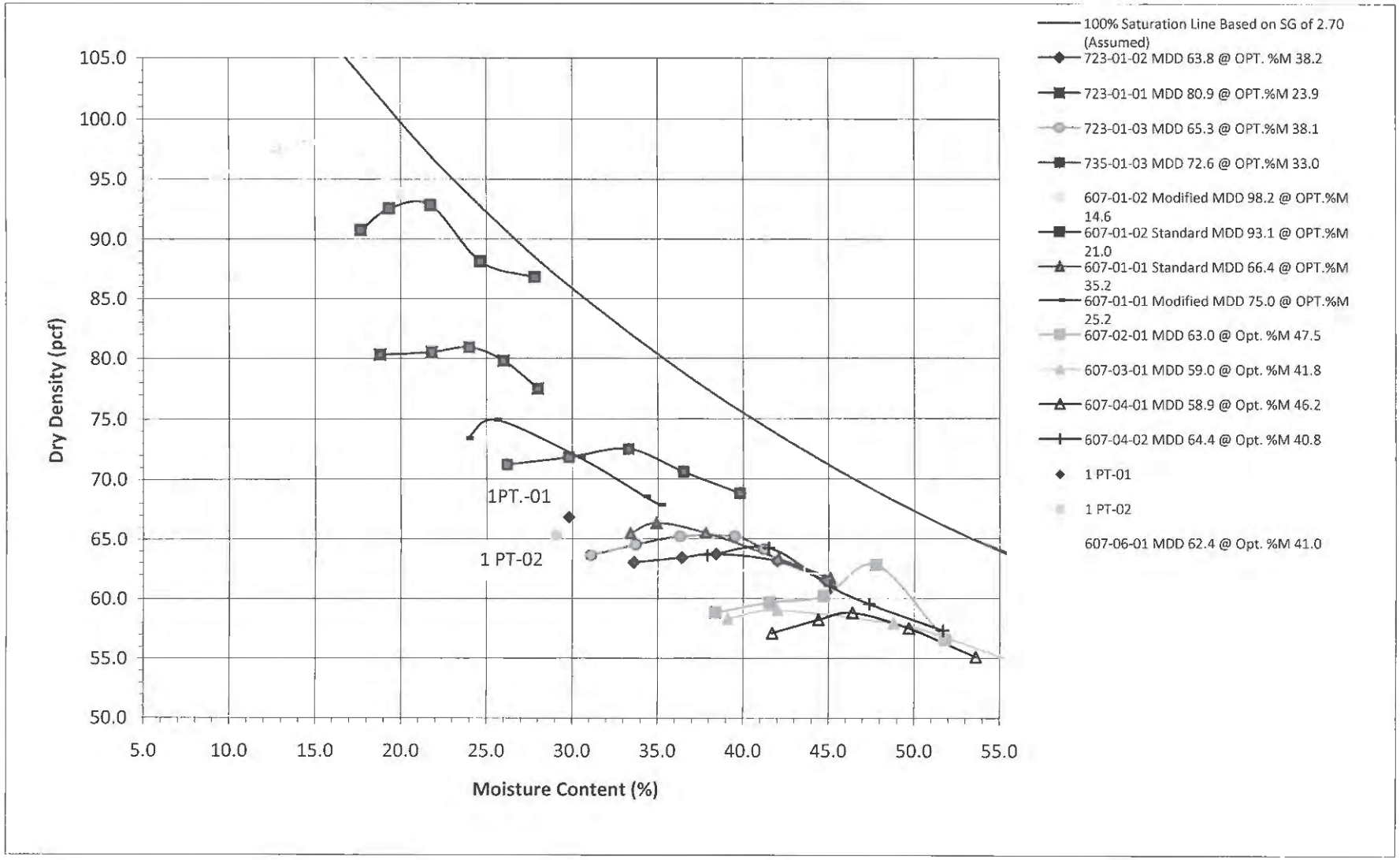
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607



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Day:	Thurs.
Date:	9/6/2012
Log No.:	35
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Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 12:00 PM
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy	**Temperature:**	85
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained
- Geotechnics Rep. departed the site.

Prepared By:	MLB	**Date:**	9/6/2012	**Checked By:**	MDS	**Date:**	9/10

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-35**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 9/6/12**	Reviewed By : MMS	Date : 9/10

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	531.2	8"	607-03-01	59.0	41.8	**68.7**	**25.4**	**54.8**	**92.9%**	**90.0%**	
ND - 2	PHASE 6E	529.9	8"	607-03-01	59.0	41.8	**72.6**	**28.3**	**56.6**	**95.9%**	**90.0%**	
ND - 3	PHASE 6E	528.9	8"	607-03-01	59.0	41.8	**74.0**	**28.8**	**57.5**	**97.4%**	**90.0%**	
DC - 1	PHASE 6E	528.9	NA	607-03-02	59.0	41.8	**72.4**	**28.8**	**56.2**	**95.3%**	**90.0%**	
ND - 4	PHASE 6E	528.4	8"	607-04-02	64.4	40.8	**80.2**	**28.3**	**62.5**	**97.1%**	**90.0%**	
ND - 5	PHASE 6E	526.8	8"	735-01-03	72.6	33.0	**93.3**	**34.0**	**69.6**	**95.9%**	**90.0%**	
ND - 6	PHASE 6E	527.1	8"	607-04-02	64.4	40.8	**83.2**	**40.0**	**59.4**	**92.3%**	**90.0%**	
ND - 7	PHASE 6E	527.9	8"	607-06-01	62.4	41.0	**79.4**	**39.8**	**56.8**	**91.0%**	**90.0%**	
ND - 8	PHASE 6E	529.3	8"	607-04-02	64.4	40.8	**78.3**	**36.2**	**57.5**	**89.3%**	**90.0%**	
ND - 9	PHASE 6E	526.1	8"	607-01-01	66.4	35.2	**88.4**	**40.3**	**63.0**	**94.9%**	**90.0%**	
ND - 10	PHASE 6E	529.5	8"	607-04-02	64.4	40.8	**84.1**	**34.4**	**62.6**	**97.2%**	**90.0%**	
DC - 2	PHASE 6E	529.5	NA	607-04-02	64.4	40.8	**86.7**	**34.4**	**64.5**	**100.2%**	**90.0%**	
ND - 11	PHASE 6E	529.3	8"	607-04-02	64.4	40.8	**81.9**	**32.8**	**61.7**	**95.8%**	**90.0%**	
ND - 12	PHASE 6E	529.2	8"	607-04-02	64.4	40.8	**75.4**	**25.4**	**60.1**	**93.4%**	**90.0%**	

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-10	ND-02	ND-03	ND-04
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	531.2	529.5	529.9	528.9	528.4
Tare Number	398	310	303	311	300
Wt. of Tare & WS (gm)	374.67	486.03	394.77	396.28	430.05
Wt. of Tare & DS (gm)	315.96	389.85	332.23	326.61	359.67
Wt. of Tare (gm)	84.41	110.25	111.50	84.74	110.76
Wt. of Water (gm)	58.71	96.18	62.54	69.67	70.38
Wt. of DS (gm)	231.55	279.6	220.73	241.87	248.91
Water Content (%)	**25.4**	**34.4**	**28.3**	**28.8**	**28.3**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-05	ND-06	ND-07	ND-08	ND-09
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	526.8	527.1	527.9	529.3	526.1
Tare Number	308	318	307	304	317
Wt. of Tare & WS (gm)	533.94	467.47	450.59	413.61	430.19
Wt. of Tare & DS (gm)	420.92	358.63	353.76	333.06	330.8
Wt. of Tare (gm)	88.48	86.59	110.4	110.61	84.39
Wt. of Water (gm)	113.02	108.84	96.83	80.55	99.39
Wt. of DS (gm)	332.44	272.04	243.36	222.45	246.41
Water Content (%)	**34.0**	**40.0**	**39.8**	**36.2**	**40.3**

Notes : *NA*

Tested By *MLB* *Date* *9/6/2012* *Checked By* *Date* 9/10

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-11	WC-12
Nuclear Test Number:	ND-11	ND-12
Location:	PHASE 6E	PHASE 6E
Depth:	529.3	529.2
Tare Number	368	312
Wt. of Tare & WS (gm)	438.69	482.38
Wt. of Tare & DS (gm)	351.19	401.73
Wt. of Tare (gm)	84.41	84.42
Wt. of Water (gm)	87.5	80.65
Wt. of DS (gm)	266.78	317.31
Water Content (%)	**32.8**	**25.4**

Notes : *NA*

Tested By *MLB* *Date* *9/6/2012* *Checked By* *MMS* *Date* *9/10*

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-35**
Date (s) :	9/6/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-03	ND-10
Location:	Phase 6E	Phase 6E
Depth (ft):	528.9	529.5
Date :	9/6/2012	9/6/2012

Mold

Cylinder ID	1	2
Weight of Cylinder (lbs.)	1.29	1.29
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.68	4.09
Wt. of Cylinder (lbs.)	1.29	1.23
Wt. of WS	2.39	2.86
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	311	310
Wt. of Tare & WS (gm)	396.28	486.03
Wt. of Tare & DS (gm)	326.61	389.85
Wt. of Tare (gm)	84.74	110.25
Wt. of Water (gm)	69.67	96.18
Wt. of DS (gm)	241.87	279.60
Wet Density (pcf):	72.4	86.7
Moisture Content (%):	**28.8**	**34.4**
Dry Density (pcf):	**56.2**	**64.5**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

Report Number :	**FDR-35**
Date (s) :	9/6/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-05
Depth (ft):	526.8
Date :	9/6/2012

Mold

Weight of Mold (lbs.)	9.44
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.63
Weight of Mold (lbs)	9.44
Weight of WS (lbs)	3.19
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	305
Wt. of Tare & WS (gm)	803.50
Wt. of Tare & DS (gm)	627.44
Wt. of Tare (gm)	84.74
Wt. of Water (gm)	176.06
Wt. of DS (gm)	542.70
Wet Density (pcf):	96.7
Moisture Content (%):	**32.4**
Dry Density (pcf):	**73.0**

Geotechnics Representative : MARK BLACKLEY

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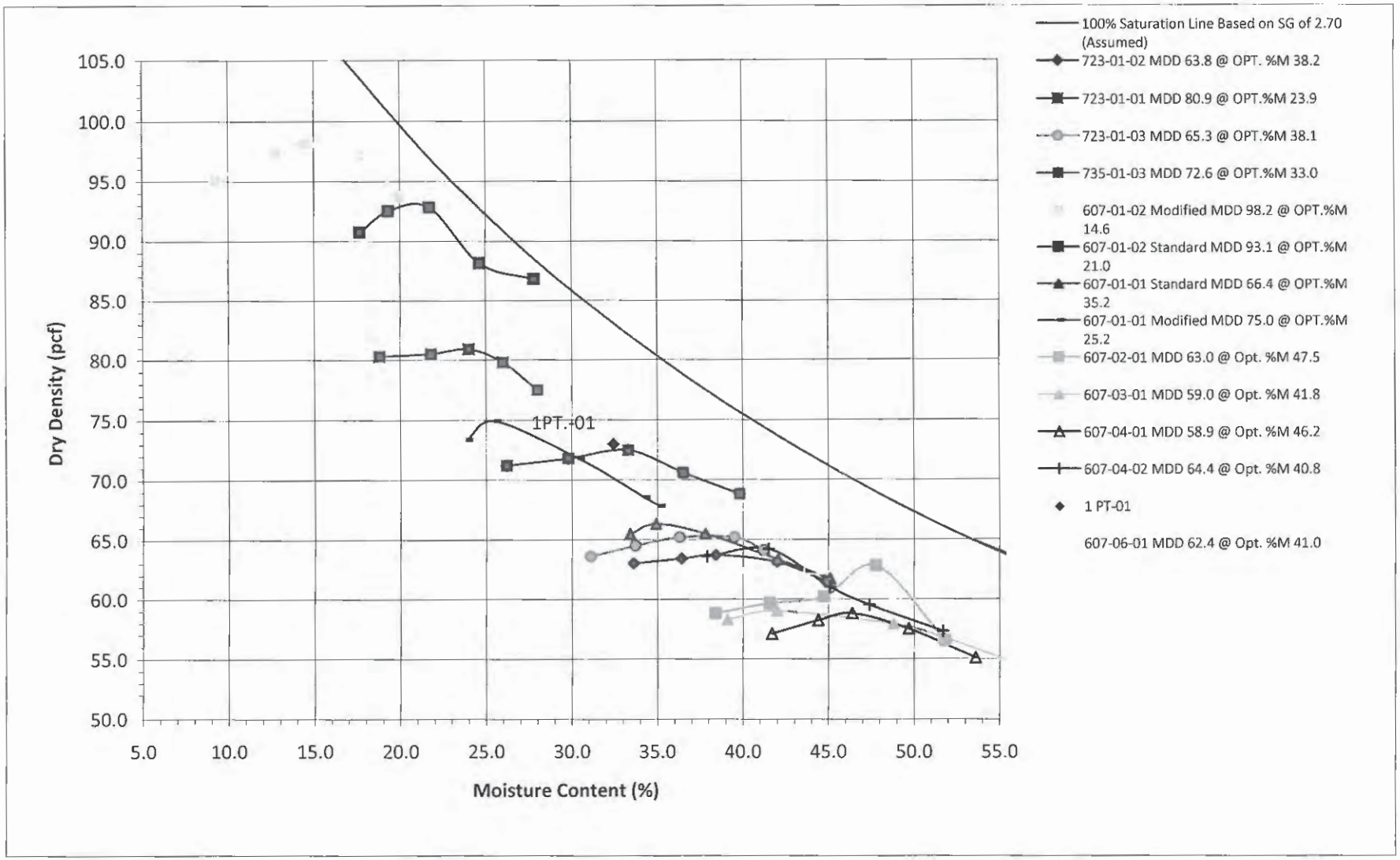
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-35



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Day:	Thurs.
Date:	9/13/2012
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Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 12:46 PM
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy	**Temperature:**	85
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed 9 Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained
- Geotechnics Rep. departed the site.

Prepared By: MLB **Date:** 9/13/2012 **Checked By:** [illegible] **Date:** 9/18

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-36**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 9/13/12**	Reviewed By : MMT	Date : 9/14

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	534.2	8"	607-06-01	62.4	75.5	**75.5**	**31.8**	**57.3**	**91.8%**	**90.0%**	
ND - 2	PHASE 6E	532.1	8"	723-01-02	63.8	38.2	**76.5**	**27.9**	**59.8**	**93.7%**	**90.0%**	
ND - 3	PHASE 6E	537.6	8"	607-06-01	62.4	41.0	**75.6**	**33.8**	**56.5**	**90.5%**	**90.0%**	
ND - 4	PHASE 6E	520	8"	735-01-03	72.6	33.0	**88.4**	**25.9**	**70.2**	**96.7%**	**90.0%**	
DC 1	PHASE 6E	520	NA	735-01-03	72.6	33.0	**91.2**	**25.9**	**72.4**	**99.8%**	**90.0%**	
ND - 5	PHASE 6E	515.4	8"	721-01-01	80.9	23.9	**95.0**	**24.5**	**76.3**	**94.3%**	**90.0%**	
ND - 6	PHASE 6E	515.4	8"	723-01-02	63.8	38.2	**83.0**	**32.4**	**62.7**	**98.3%**	**90.0%**	
ND - 7	PHASE 6E	516.8	8"	702-01-02	66.5	35.7	**88.4**	**34.8**	**65.6**	**98.6%**	**90.0%**	
ND - 8	PHASE 6E	517.4	8"	723-01-02	63.8	38.2	**77.3**	**29.9**	**59.5**	**93.3%**	**90.0%**	
ND - 9	PHASE 6E	516.5	8"	723-01-02	63.8	38.2	**80.4**	**35.2**	**59.5**	**93.2%**	**90.0%**	

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-10	ND-02	ND-03	ND-04
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	534.2	532.9	537.6	520.0	515.4
Tare Number	318	308	317	311	310
Wt. of Tare & WS (gm)	380.95	417.37	387.35	422.38	554.88
Wt. of Tare & DS (gm)	309.87	345.70	310.75	352.94	467.34
Wt. of Tare (gm)	86.60	88.46	84.36	84.64	110.25
Wt. of Water (gm)	71.08	71.67	76.6	69.44	87.54
Wt. of DS (gm)	223.27	257.24	226.39	268.3	357.09
Water Content (%)	**31.8**	**27.9**	**33.8**	**25.9**	**24.5**

Test Number:	WC-06	WC-07	WC-08	WC-09
Nuclear Test Number:	ND-05	ND-06	ND-07	ND-08
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	515.4	516.8	517.4	516.5
Tare Number	398	300	305	304
Wt. of Tare & WS (gm)	511.3	504.35	450.02	529.9
Wt. of Tare & DS (gm)	406.86	402.76	365.89	420.69
Wt. of Tare (gm)	84.4	110.75	84.73	110.56
Wt. of Water (gm)	104.44	101.59	84.13	109.21
Wt. of DS (gm)	322.46	292.01	281.16	310.13
Water Content (%)	**32.4**	**34.8**	**29.9**	**35.2**

Notes : *NA*

Tested By *MLB* *Date* *9/13/2012* *Checked By* *Date* 9/18

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-36**
Date (s) :	9/13/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-04
Location:	Phase 6E
Depth (ft):	520
Date :	9/13/2012

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.32
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.33
Wt. of Cylinder (lbs.)	1.32
Wt. of WS	3.01
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	311
Wt. of Tare & WS (gm)	422.38
Wt. of Tare & DS (gm)	352.94
Wt. of Tare (gm)	84.64
Wt. of Water (gm)	69.44
Wt. of DS (gm)	268.30
Wet Density (pcf):	91.2
Moisture Content (%):	**25.9**
Dry Density (pcf):	**72.5**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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INTEGRITY IN TESTING

Report Number :	**FDR-36**
Date (s) :	9/13/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-05
Depth (ft):	515.4
Date :	9/13/2012

Mold

Weight of Mold (lbs.)	9.52
Volume OF Mold (ft^3)	0.033

Specimen

	R 172
Weight of Mold & WS (lbs)	12.77
Weight of Mold (lbs)	9.52
Weight of WS (lbs)	3.25
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	303
Wt. of Tare & WS (gm)	633.39
Wt. of Tare & DS (gm)	536.71
Wt. of Tare (gm)	111.55
Wt. of Water (gm)	96.68
Wt. of DS (gm)	425.16
Wet Density (pcf):	98.5
Moisture Content (%):	**22.7**
Dry Density (pcf):	**80.2**

Geotechnics Representative : MARK BLACKLEY

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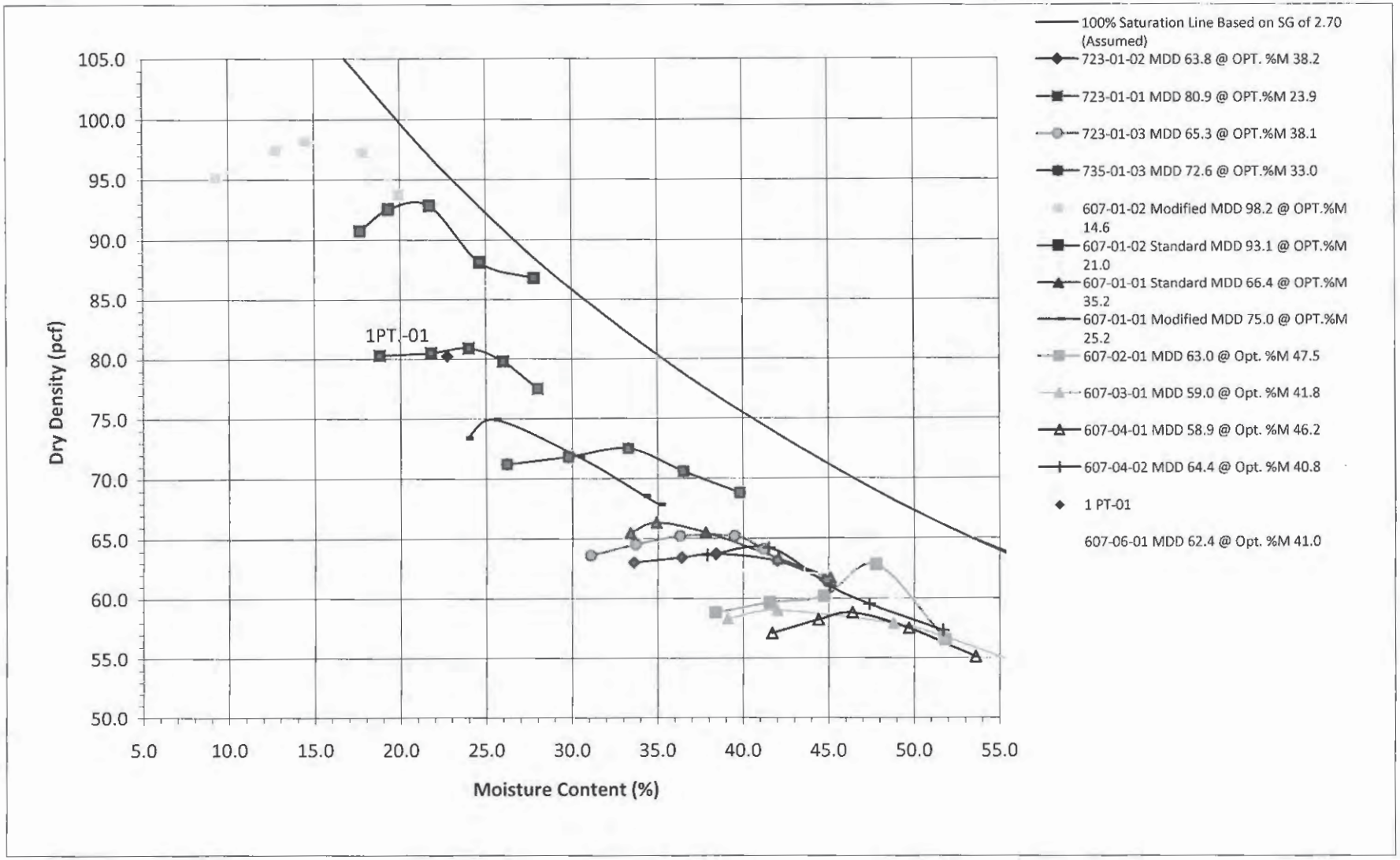
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-36



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Day:	Thurs.
Date:	9/20/2012
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:10 AM **Departed:** 2:10 PM
General Contractor:	Charah	**Superintendent:**	NA

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Partly Cloudy	**Temperature:**	80
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	NA		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed 10 Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Mr. Lupi chose the proctor value used based on site experience.
- Drive Cylinder, Water Content and One-point proctor samples were obtained
- Geotechnics Rep. departed the site.

Prepared By: MLB **Date:** 9/20/2012 **Checked By:** RWS **Date:** 9/24

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-37**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 9/20/12**	Reviewed By : [illegible]	Date : 9/24

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	520.1	8"	607-03-01	59.0	41.8	**73.4**	**35.3**	**54.2**	**91.9%**	**90.0%**	
ND - 2	PHASE 6E	520.2	8"	720-01-02	66.5	35.7	**79.0**	**22.0**	**64.8**	**97.4%**	**90.0%**	
DC 1	PHASE 6E	520.2	NA	720-01-02	66.5	35.7	**83.3**	**22.0**	**68.3**	**102.7%**	**90.0%**	
ND - 3	PHASE 6E	519.7	8"	607-04-02	64.4	40.8	**85.9**	**38.8**	**61.9**	**96.1%**	**90.0%**	
ND - 4	PHASE 6E	519.7	8"	607-06-01	62.4	41.0	**80.4**	**36.7**	**58.8**	**94.3%**	**90.0%**	
ND - 5	PHASE 6E	518.3	8"	607-06-01	62.4	41.0	**76.6**	**34.4**	**57.0**	**91.3%**	**90.0%**	
ND - 6	PHASE 6E	519.4	8"	607-03-01	59.0	41.8	**75.2**	**34.3**	**56.0**	**94.9%**	**90.0%**	
ND - 7	PHASE 6E	520.8	8"	607-04-02	64.4	40.8	**80.5**	**31.6**	**61.2**	**95.0%**	**90.0%**	
ND - 8	PHASE 6E	518.8	8"	607-03-01	59.0	41.8	**72.6**	**34.3**	**54.1**	**91.6%**	**90.0%**	
ND - 9	PHASE 6E	525.5	8"	607-04-02	64.4	40.8	**79.1**	**22.8**	**64.4**	**100.0%**	**90.0%**	
ND - 10	PHASE 6E	523	8"	607-04-02	64.4	40.8	**87.8**	**38.1**	**63.6**	**98.7%**	**90.0%**	

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	520.1	520.2	519.7	519.7	518.3
Tare Number	317	300	305	303	398
Wt. of Tare & WS (gm)	381.93	468.67	440.53	425.34	394.61
Wt. of Tare & DS (gm)	304.24	404.11	341.06	341.13	315.14
Wt. of Tare (gm)	84.42	110.78	84.76	111.52	84.4
Wt. of Water (gm)	77.69	64.56	99.47	84.21	79.47
Wt. of DS (gm)	219.82	293.33	256.3	229.61	230.74
Water Content (%)	**35.3**	**22.0**	**38.8**	**36.7**	**34.4**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-06	ND-07	ND-08	ND-09	ND-10
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	519.4	520.8	518.8	525.5	523.0
Tare Number	318	304	310	308	311
Wt. of Tare & WS (gm)	371.34	442.17	359.39	379.67	456.47
Wt. of Tare & DS (gm)	298.63	362.54	295.78	325.6	353.92
Wt. of Tare (gm)	86.64	110.62	110.35	88.53	84.68
Wt. of Water (gm)	72.71	79.63	63.61	54.07	102.55
Wt. of DS (gm)	211.99	251.92	185.43	237.07	269.24
Water Content (%)	**34.3**	**31.6**	**34.3**	**22.8**	**38.1**

Notes : *NA*

Tested By *MLB* *Date* *9/20/2012* *Checked By* *MDS* *Date* *9/24*

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-37**
Date (s) :	9/20/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-02
Location:	Phase 6E
Depth (ft):	520.2
Date :	9/20/2012

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.31
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.06
Wt. of Cylinder (lbs.)	1.31
Wt. of WS	2.75
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	300
Wt. of Tare & WS (gm)	468.67
Wt. of Tare & DS (gm)	404.11
Wt. of Tare (gm)	110.78
Wt. of Water (gm)	64.56
Wt. of DS (gm)	293.33
Wet Density (pcf):	83.3
Moisture Content (%):	**22.0**
Dry Density (pcf):	**68.3**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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INTEGRITY IN TESTING

Report Number :	**FDR-37**
Date (s) :	9/20/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-05
Depth (ft):	518.3
Date :	9/20/2012

Mold

Weight of Mold (lbs.)	4.52
Volume OF Mold (ft^3)	0.033

Specimen

	R 172
Weight of Mold & WS (lbs)	7.24
Weight of Mold (lbs)	4.52
Weight of WS (lbs)	2.72
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	312
Wt. of Tare & WS (gm)	589.86
Wt. of Tare & DS (gm)	461.30
Wt. of Tare (gm)	84.39
Wt. of Water (gm)	128.56
Wt. of DS (gm)	376.91
Wet Density (pcf):	82.4
Moisture Content (%):	**34.1**
Dry Density (pcf):	**61.5**

Geotechnics Representative : MARK BLACKLEY MPS

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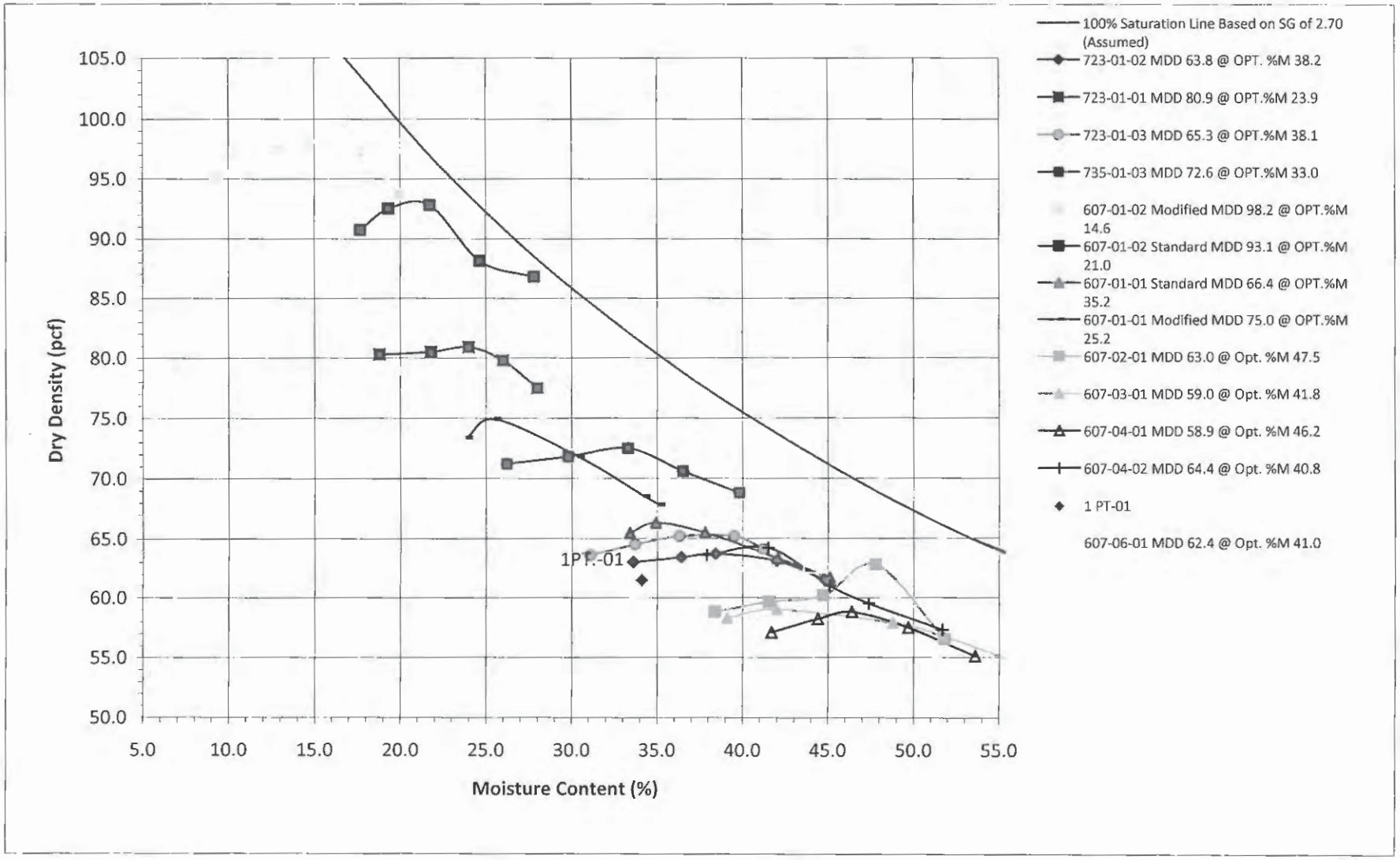
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-37



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Day:	Thurs.
Date:	9/27/2012
Log No.:	38
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:25 AM **Departed:** 1:00 PM
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions:	Sunny	**Temperature:**	80
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	~5		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed 8 Moisture / Density testing of previously placed and compacted fly ash material. Testing was performed at the direction of Blackrock representative.
- Mr. Lupi chose the proctor value used based on site experience.
- Drive Cylinder, Water Content and One-point proctor samples were obtained.
- Geotechnics Rep. departed the site.

Prepared By: MLB **Date:** 9/27/2012 **Checked By:** SFS **Date:** 10-1-12

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-38**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 9/27/12**	Reviewed By : SFS	Date : 10-1-12

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	529.2	8"	723-01-02	63.8	38.2	**79.4**	**30.8**	**60.7**	**95.1%**	**95.0%**	%M Corrected
ND - 2	PHASE 6E	527.7	8"	720-01-02	66.5	35.7	**87.9**	**30.6**	**67.3**	**101.2%**	**95.0%**	%M Corrected
DC 1	PHASE 6E	527.7	N/A	720-01-02	66.5	35.7	**89.1**	**30.6**	**68.2**	**102.6%**	**95.0%**	@ ND-02
ND - 3	PHASE 6E	523.4	8"	720-01-01	85.9	22.6	**103.8**	**22.6**	**84.7**	**98.6%**	**90.0%**	%M Corrected
ND - 4	PHASE 6E	522.2	8"	720-01-01	85.9	22.6	**103.8**	**22.8**	**84.5**	**98.4%**	**90.0%**	%M Corrected
ND - 5	PHASE 6E	522.1	8"	720-01-02	63.8	38.2	**86.2**	**38.2**	**62.4**	**97.8%**	**90.0%**	%M Corrected
ND - 6	PHASE 6E	523.1	8"	720-01-02	63.8	38.2	**83.0**	**32.1**	**62.8**	**98.5%**	**90.0%**	%M Corrected
ND - 7	PHASE 6E	524	8"	735-01-03	72.6	33.0	**92.2**	**34.7**	**68.4**	**94.3%**	**90.0%**	%M Corrected
ND - 8	PHASE 6E	526.1	8"	723-01-01	80.9	23.9	**93.1**	**25.3**	**74.3**	**91.8%**	**90.0%**	%M Corrected

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	529.2	527.7	523.4	522.2	522.1
Tare Number	368	310	308	307	398
Wt. of Tare & WS (gm)	379.94	497.32	488.19	479.31	378.47
Wt. of Tare & DS (gm)	316.67	406.67	414.47	410.84	297.14
Wt. of Tare (gm)	111.40	110.33	88.52	110.40	84.41
Wt. of Water (gm)	63.27	90.65	73.72	68.47	81.33
Wt. of DS (gm)	205.27	296.34	325.95	300.44	212.73
Water Content (%)	**30.8**	**30.6**	**22.6**	**22.8**	**38.2**

Test Number:	WC-06	WC-07	WC-08
Nuclear Test Number:	ND-06	ND-07	ND-08
Location:	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	523.1	524	526.1
Tare Number	318	311	314
Wt. of Tare & WS (gm)	456.7	531.75	555.21
Wt. of Tare & DS (gm)	366.74	416.49	460.22
Wt. of Tare (gm)	86.62	84.64	84.76
Wt. of Water (gm)	89.96	115.26	94.99
Wt. of DS (gm)	280.12	331.85	375.46
Water Content (%)	**32.1**	**34.7**	**25.3**

Notes : *NA*

Tested By *MLB* *Date* *9/27/2012* *Checked By* SFS *Date* 10-1-12

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-38**
Date (s) :	9/27/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-02
Location:	Phase 6E
Depth (ft):	527.7
Date :	9/27/2012

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.31
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.25
Wt. of Cylinder (lbs.)	1.31
Wt. of WS	2.94
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	310
Wt. of Tare & WS (gm)	497.32
Wt. of Tare & DS (gm)	406.67
Wt. of Tare (gm)	110.33
Wt. of Water (gm)	90.65
Wt. of DS (gm)	296.34
Wet Density (pcf):	89.1
Moisture Content (%):	**30.6**
Dry Density (pcf):	**68.2**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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INTEGRITY IN TESTING

Report Number :	**FDR-38**
Date (s) :	9/27/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-05
Depth (ft):	522.1
Date :	9/27/2012

Mold

Weight of Mold (lbs.)	4.51
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	7.46
Weight of Mold (lbs)	4.51
Weight of WS (lbs)	2.95
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	303
Wt. of Tare & WS (gm)	650.86
Wt. of Tare & DS (gm)	583.97
Wt. of Tare (gm)	111.50
Wt. of Water (gm)	66.89
Wt. of DS (gm)	472.47
Wet Density (pcf):	89.4
Moisture Content (%):	**14.2**
Dry Density (pcf):	**78.3**

Geotechnics Representative : MARK BLACKLEY

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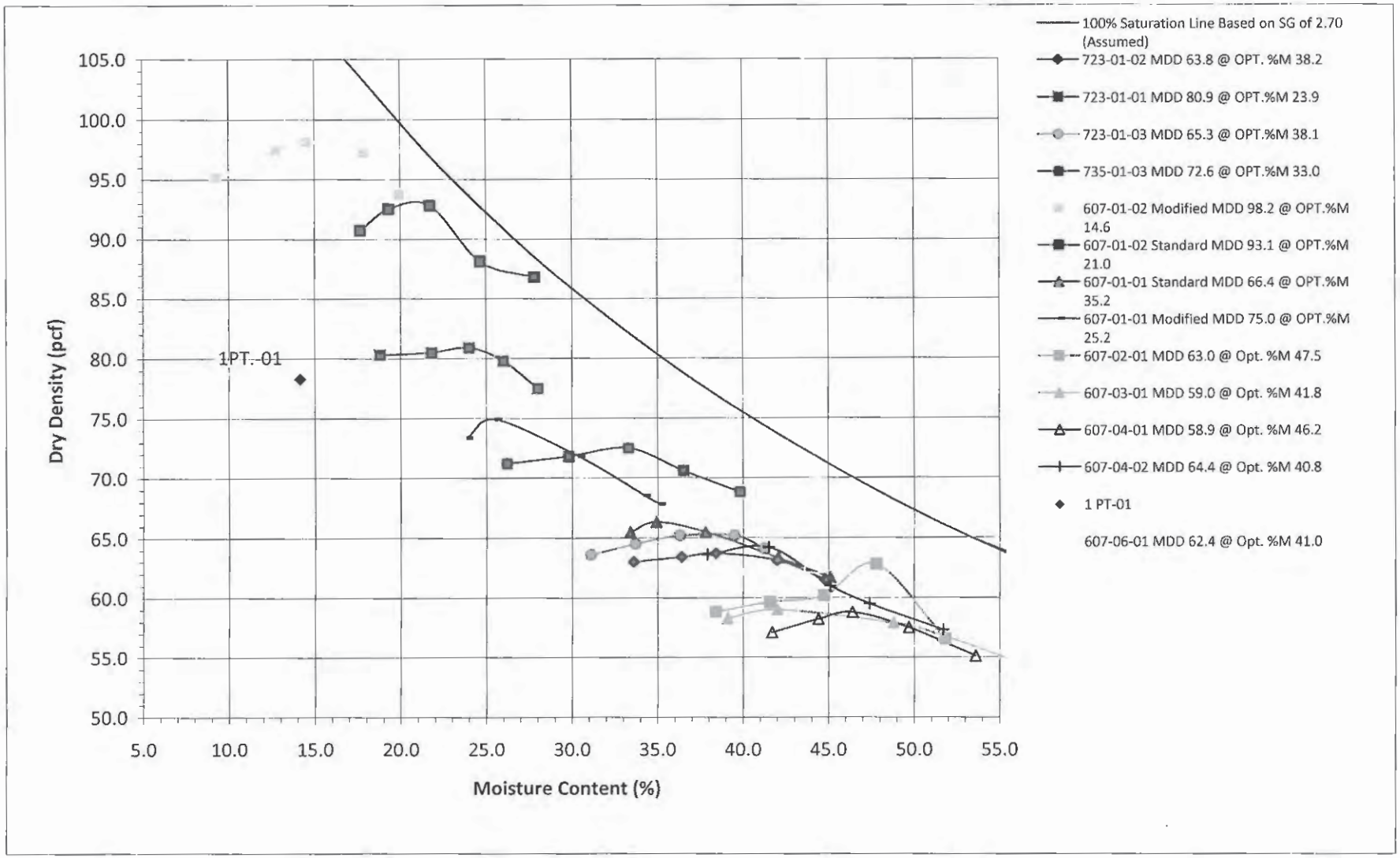
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-38



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Day:	Thurs.
Date:	10/4/2012
Log No.:	39
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:40 AM **Departed:** 2:25 PM
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Billy Bradford

Weather Conditions:	cloudy	**Temperature:**	80
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	~5		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Billy Bradford.
- Geotechnics Rep. performed 14 Moisture / Density testing of previously placed and compacted fly ash material. Testing locations chosen by Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained.
- Geotechnics Rep. departed the site.

Prepared By: MLB **Date:** 10/4/2012 **Checked By:** MM **Date:** 10/9

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-39**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 10/4/12**	Reviewed By : MMS	Date : 10/18

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6E	534.1	8"	607-01-01	66.4	35.2	**85.1**	**29.4**	**65.8**	**99.0%**	**95.0%**	
ND - 2	PHASE 6E	536.4	8"	723-01-03	65.3	38.1	**84.4**	**31.1**	**64.4**	**98.6%**	**95.0%**	
DC 1	PHASE 6E	536.4	N/A	723-01-03	65.3	38.1	**84.2**	**31.1**	**64.2**	**98.4%**	**95.0%**	
ND - 3	PHASE 6E	524	8"	720-01-01	85.9	22.6	**99.4**	**33.4**	**74.5**	**86.7%**	**90.0%**	
ND - 4	PHASE 6E	525.9	8"	723-01-01	80.9	23.9	**95.0**	**35.2**	**70.3**	**86.9%**	**90.0%**	
ND - 5	PHASE 6E	518.3	8"	607-01-01	66.4	35.2	**82.5**	**36.0**	**60.7**	**91.4%**	**90.0%**	
ND - 6	PHASE 6E	518.7	8"	735-01-03	72.6	33.0	**87.6**	**38.8**	**63.1**	**86.9%**	**90.0%**	
ND - 7	PHASE 6E	516.4	8"	735-01-03	72.6	33.0	**89.1**	**33.2**	**66.9**	**92.1%**	**90.0%**	
ND - 8	PHASE 6E	525.1	8"	723-01-02	63.8	38.2	**78.8**	**37.5**	**57.3**	**89.8%**	**90.0%**	
ND - 9	PHASE 6E	522.8	8"	624-01-01	89.6	19.5	**97.0**	**30.1**	**74.6**	**83.2%**	**90.0%**	
ND - 10	PHASE 6E	522.2	8"	723-01-01	80.9	23.9	**97.7**	**35.3**	**72.2**	**89.3%**	**90.0%**	
ND - 11	PHASE 6E	524.2	8"	735-01-03	72.6	33.0	**89.2**	**33.6**	**66.8**	**92.0%**	**90.0%**	
DC 2	PHASE 6E	524.2	N/A	735-01-03	72.6	33.0	**93.3**	**33.6**	**69.8**	**96.2%**	**90.0%**	
ND - 12	PHASE 6E	523.9	8"	735-01-03	72.6	33.0	**84.8**	**35.0**	**62.8**	**86.5%**	**90.0%**	
ND - 13	PHASE 6E	525.4	8"	735-01-03	72.6	33.0	**82.9**	**24.1**	**66.8**	**92.0%**	**90.0%**	
ND - 14	PHASE 6E	527.4	8"	735-01-03	72.6	33.0	**84.5**	**32.1**	**64.0**	**88.1%**	**90.0%**	

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	534.1	536.4	524.0	525.9	518.3
Tare Number	398	314	311	318	308
Wt. of Tare & WS (gm)	484.65	440.64	486.68	513.38	516.17
Wt. of Tare & DS (gm)	393.62	356.26	385.95	402.32	403
Wt. of Tare (gm)	84.36	84.80	84.68	86.63	88.55
Wt. of Water (gm)	91.03	84.38	100.73	111.06	113.17
Wt. of DS (gm)	309.26	271.46	301.27	315.69	314.45
Water Content (%)	**29.4**	**31.1**	**33.4**	**35.2**	**36.0**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-06	ND-07	ND-08	ND-09	ND-10
Location:	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	518.7	516.4	525.1	522.8	522.2
Tare Number	312	304	305	317	309
Wt. of Tare & WS (gm)	506.29	542.94	436.71	489.83	503.77
Wt. of Tare & DS (gm)	388.44	435.11	340.76	396.11	400.83
Wt. of Tare (gm)	84.5	110.75	84.87	84.48	109.57
Wt. of Water (gm)	117.85	107.83	95.95	93.72	102.94
Wt. of DS (gm)	303.94	324.36	255.89	311.63	291.26
Water Content (%)	**38.8**	**33.2**	**37.5**	**30.1**	**35.3**

Notes : *NA*

Tested By *MLB* *Date* *10/4/2012* *Checked By* *Date* *10/8*

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-11	WC-12	WC-14
Nuclear Test Number:	ND-11	ND-12	ND-14
Location:	PHASE 6E	PHASE 6E	PHASE 6E
Depth:	524.2	523.9	527.4
Tare Number	310	307	300
Wt. of Tare & WS (gm)	533.91	524.00	460.61
Wt. of Tare & DS (gm)	427.35	416.77	375.69
Wt. of Tare (gm)	110.37	110.44	111.04
Wt. of Water (gm)	106.56	107.23	84.92
Wt. of DS (gm)	316.98	306.33	264.65
Water Content (%)	**33.6**	**35.0**	**32.1**

Notes : *NA*

Tested By *MLB* *Date* *10/4/2012* *Checked By* *MLB* *Date* *10/8*

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-39**
Date (s) :	10/4/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-02	ND-11
Location:	Phase 6E	Phase 6E
Depth (ft):	536.4	524.2
Date :	10/4/2012	10/4/2012

Mold

Cylinder ID	1	1
Weight of Cylinder (lbs.)	1.31	1.29
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.09	4.31
Wt. of Cylinder (lbs.)	1.31	1.23
Wt. of WS	2.78	3.08
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	314	310
Wt. of Tare & WS (gm)	440.64	533.91
Wt. of Tare & DS (gm)	356.26	427.35
Wt. of Tare (gm)	84.80	110.37
Wt. of Water (gm)	84.38	106.56
Wt. of DS (gm)	271.46	316.98
Wet Density (pcf):	84.2	93.3
Moisture Content (%):	**31.1**	**33.6**
Dry Density (pcf):	**64.3**	**69.9**

Geotechnics Representative : M. BLACKLEY

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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Report Number :	**FDR-39**
Date (s) :	10/4/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	ND-05	ND-11
Depth (ft):	518.3	524.2
Date :	10/4/2012	10/4/2012

Mold

Weight of Mold (lbs.)	4.51	4.51
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	7.59	7.56
Weight of Mold (lbs)	4.51	4.51
Weight of WS (lbs)	3.08	3.05
Volume OF Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	368	303
Wt. of Tare & WS (gm)	753.29	830.64
Wt. of Tare & DS (gm)	586.91	652.19
Wt. of Tare (gm)	111.36	111.55
Wt. of Water (gm)	166.38	178.45
Wt. of DS (gm)	475.55	540.64
Wet Density (pcf):	93.3	92.4
Moisture Content (%):	**35.0**	**33.0**
Dry Density (pcf):	**69.1**	**69.5**

Geotechnics Representative : MARK BLACKLEY MBB

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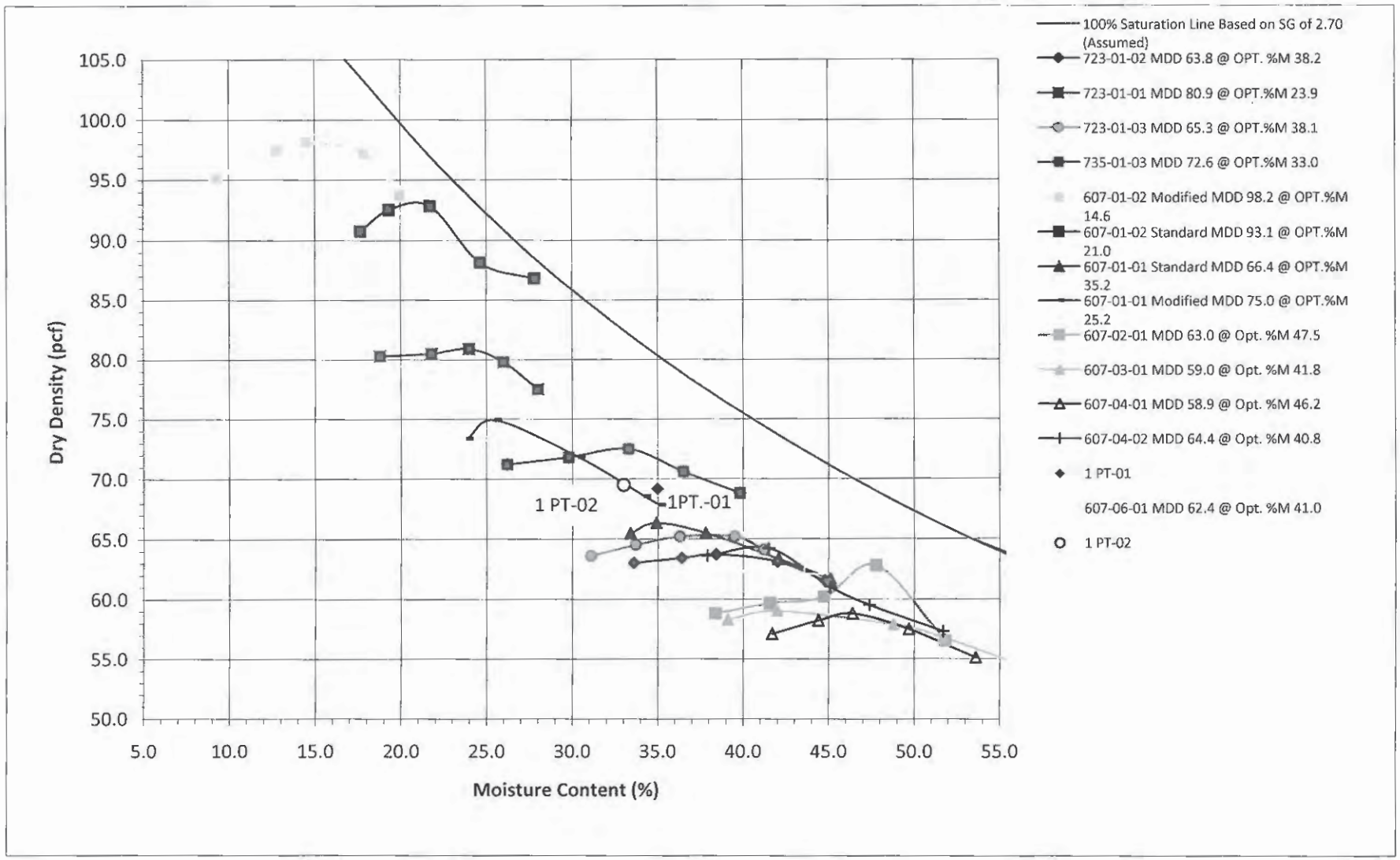
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-39



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Day:	**Thurs.**
Date:	**10/11/2012**
Log No.:	**40**
Page:	**1 of 1**

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:35 AM **Departed:** 2:00 PM
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Billy Bradford

Weather Conditions:	clear	**Temperature:**	75
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	~5		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Billy Bradford.
- Geotechnics Rep. performed 11 Moisture / Density testing of previously placed and compacted fly ash material. Testing locations chosen by Blackrock representative.
- Drive Cylinder, Water Content and One-point proctor samples were obtained.
- Geotechnics Rep. departed the site.

Prepared By: MLB **Date:** 10/11/2012 **Checked By:** MPS **Date:** 10/16

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-40**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **Thursday, 10/11/12**	Reviewed By : [illegible]	Date : 10/15

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6	532.3	8"	607-01-01	66.4	35.2	**78.6**	**34.3**	**58.5**	**88.1%**	**95.0%**	
ND - 2	PHASE 6	530.2	8"	723-01-03	75.0	25.2	**87.6**	**31.8**	**66.5**	**88.6%**	**95.0%**	
ND - 3	PHASE 6	523.9	8"	723-01-01	80.9	23.9	**89.7**	**29.2**	**69.4**	**85.8%**	**90.0%**	
DC 1	PHASE 6	523.9	N/A	723-01-01	80.9	23.9	**89.4**	**29.2**	**69.2**	**85.5%**	**90.0%**	
ND - 4	PHASE 6	512.8	8"	723-01-01	80.9	23.9	**87.9**	**8.8**	**80.8**	**99.9%**	**90.0%**	
ND - 5	PHASE 6	513.6	8"	723-01-01	80.9	23.9	**96.5**	**33.1**	**72.5**	**89.6%**	**90.0%**	
ND - 6	PHASE 6	513.3	8"	735-01-03	72.6	33.0	**91.6**	**34.0**	**68.4**	**94.2%**	**90.0%**	
ND - 7	PHASE 6	514.6	8"	723-01-01	80.9	23.9	**95.9**	**27.9**	**75.0**	**92.7%**	**90.0%**	
ND - 8	PHASE 6	521.2	8"	607-02-01	63.0	47.5	**79.9**	**38.1**	**57.9**	**91.8%**	**90.0%**	
ND - 9	PHASE 6	520.2	8"	735-01-03	72.6	33.0	**90.0**	**31.6**	**68.4**	**94.2%**	**90.0%**	
ND - 10	PHASE 6	521.3	8"	720-01-01	85.9	22.6	**102.6**	**26.4**	**81.2**	**94.5%**	**90.0%**	
DC 2	PHASE 6	521.3	N/A	720-01-01	85.9	22.6	**104.8**	**26.4**	**82.9**	**96.5%**	**90.0%**	
ND - 11	PHASE 6	522.1	8"	723-01-03	65.3	38.1	**84.5**	**32.5**	**63.8**	**97.7%**	**90.0%**	

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-40**
Date (s) :	10/11/2012

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-03	ND-10
Location:	Phase 6	Phase 6
Depth (ft):	536.4	524.2
Date :	10/11/2012	10/11/2012

Mold

Cylinder ID	1	1
Weight of Cylinder (lbs.)	1.32	1.32
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.27	4.69
Wt. of Cylinder (lbs.)	1.32	1.23
Wt. of WS	2.95	3.46
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	317	314
Wt. of Tare & WS (gm)	408.01	437.92
Wt. of Tare & DS (gm)	334.85	364.17
Wt. of Tare (gm)	84.45	84.79
Wt. of Water (gm)	73.16	73.75
Wt. of DS (gm)	250.40	279.38
Wet Density (pcf):	89.4	104.8
Moisture Content (%):	**29.2**	**26.4**
Dry Density (pcf):	**69.2**	**83.0**

Geotechnics Representative : M. BLACKLEY

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	532.3	530.2	523.9	512.8	513.6
Tare Number	368	311	317	308	307
Wt. of Tare & WS (gm)	422.26	455.50	408.01	408.53	476.72
Wt. of Tare & DS (gm)	342.86	366.10	334.85	382.52	385.69
Wt. of Tare (gm)	111.31	84.67	84.45	88.54	110.45
Wt. of Water (gm)	79.4	89.4	73.16	26.01	91.03
Wt. of DS (gm)	231.55	281.43	250.4	293.98	275.24
Water Content (%)	**34.3**	**31.8**	**29.2**	**8.8**	**33.1**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11
Nuclear Test Number:	ND-06	ND-07	ND-08	ND-09	ND-10	ND-11
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	513.6	514.6	521.2	520.2	521.3	522.1
Tare Number	304	398	310	300	314	303
Wt. of Tare & WS (gm)	564.89	504.53	407.35	418.61	437.92	470.43
Wt. of Tare & DS (gm)	449.55	412.8	325.42	344.77	364.17	382.41
Wt. of Tare (gm)	110.65	84.35	110.33	110.84	84.79	111.55
Wt. of Water (gm)	115.34	91.73	81.93	73.84	73.75	88.02
Wt. of DS (gm)	338.9	328.45	215.09	233.93	279.38	270.86
Water Content (%)	**34.0**	**27.9**	**38.1**	**31.6**	**26.4**	**32.5**

Notes : *NA*

Tested By *MLB* *Date* *10/11/2012* *Checked By* *MPS* *Date* *10/16*

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-676

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INTEGRITY IN TESTING

Report Number :	**FDR-40**
Date (s) :	10/11/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	ND-06
Depth (ft):	513.3
Date :	10/11/2012

Mold

Weight of Mold (lbs.)	4.51
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	7.74
Weight of Mold (lbs)	4.51
Weight of WS (lbs)	3.23
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	305
Wt. of Tare & WS (gm)	597.92
Wt. of Tare & DS (gm)	471.38
Wt. of Tare (gm)	84.80
Wt. of Water (gm)	126.54
Wt. of DS (gm)	386.58
Wet Density (pcf):	97.9
Moisture Content (%):	**32.7**
Dry Density (pcf):	**73.7**

Geotechnics Representative : MARK BLACKLEY

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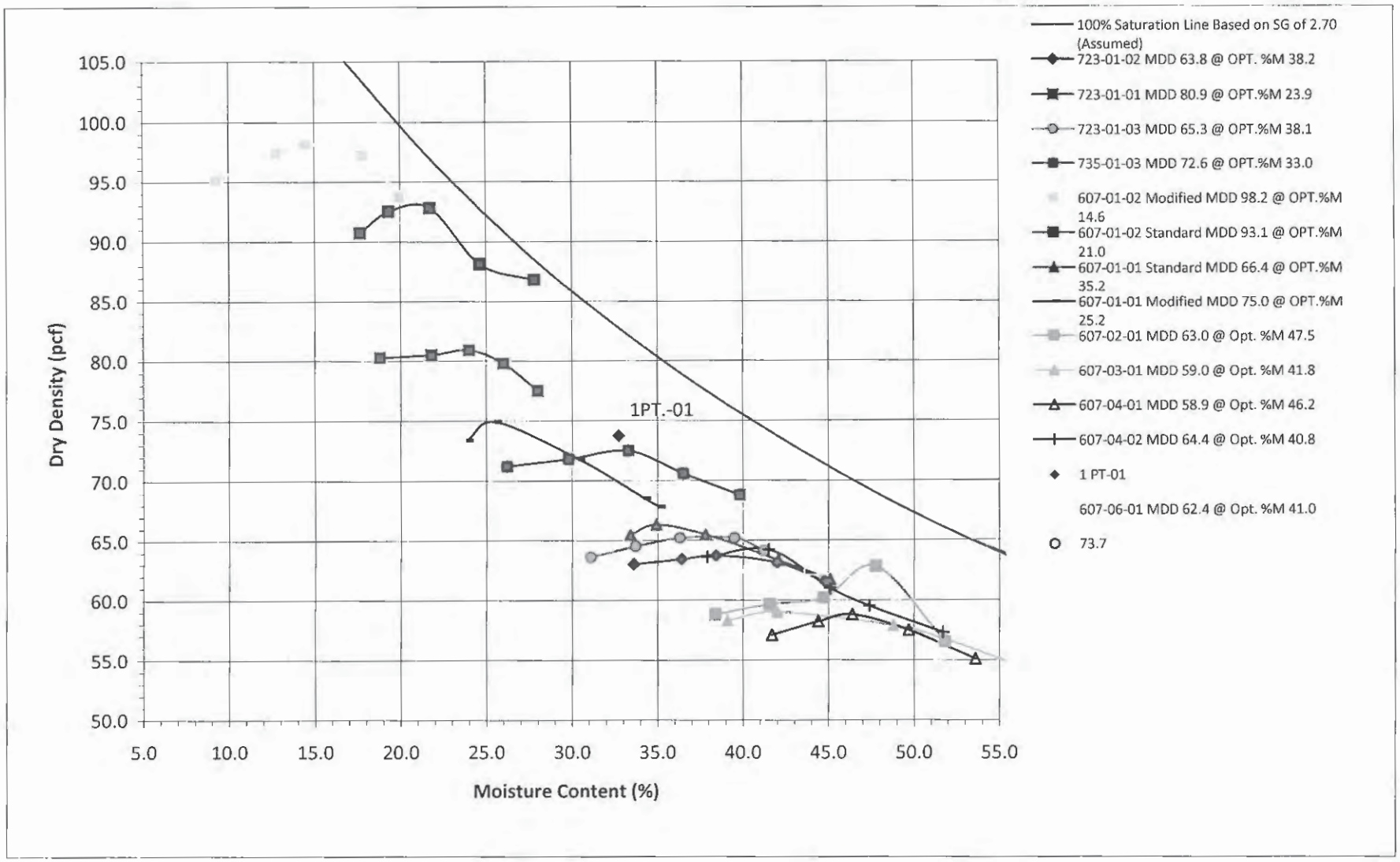
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-40



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Day:	**Fri.**
Date:	**10.19.12**
Log No.:	**41**
Page:	**1 of 1**

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:25am **Departed:** 3:00pm
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Bill Lupi

Weather Conditions:	clear	**Temperature:**	75
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	~5		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed 10 Moisture / Density testing of previously placed and compacted fly ash material. Testing locations chosen by Blackrock representative. One drive cylinder was obtained at ND-03 location.
- Geotechnics Rep. obtained a proctor sample from test location ND-01.
- Geotechnics Rep. obtained three One-point proctor samples at test locations ND-01, ND-02, and ND-10 from 10.11.12 visit.
- Geotechnics Rep. sampled soil for proctor testing from the skimmer basin.
- Geotechnics Rep. obtained a sample of DOT 25 sand from the Hanson Quarry in Durham, NC for proctor testing.
- Geotechnics Rep. departed the site and delivered soil samples to Geotechnics laboratory facility.

Prepared By:	JRB	**Date:**	10.24.12	**Checked By:**		**Date:**	**10.24.12**

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number :	**FDR-41**	Geotechnics Representative :	MARK BLACKLEY	Page :	1 of 1
Date (s) :	**10.19.12**	Reviewed By :	JB3	Date :	**10.25.12**

Contractor :	CHARAH	Borrow Source :	ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
ND - 1	PHASE 6	520.2	8"	720-01-02	66.5	35.7	**84.6**	**34.9**	**62.7**	**94.3%**	**95.0%**	All %M Corrected
ND - 2	PHASE 6	518.2	8"	607-06-01	62.4	41.0	**76.5**	**31.3**	**58.3**	**93.4%**	**95.0%**	
ND - 3	PHASE 6	517.5	8"	720-01-02	66.5	35.7	**89.5**	**25.2**	**71.5**	**107.5%**	**95.0%**	
DC 1	PHASE 6	517.5	N/A	720-01-02	66.5	35.7	**90.9**	**25.2**	**72.6**	**109.2%**	**90.0%**	DC-01
ND - 4	PHASE 6	515.1	8"	735-01-03	72.6	33.0	**90.3**	**27.1**	**71.0**	**97.9%**	**90.0%**	
ND - 5	PHASE 6	516.7	8"	720-01-02	66.5	35.7	**84.2**	**31.8**	**63.9**	**96.1%**	**90.0%**	
ND - 6	PHASE 6	518.9	8"	720-01-02	66.5	35.7	**82.2**	**35.6**	**60.6**	**91.2%**	**90.0%**	
ND - 7	PHASE 6	519.1	8"	735-01-03	72.6	33.0	**84.6**	**32.9**	**63.7**	**87.7%**	**90.0%**	
ND - 8	PHASE 6	521.2	8"	624-01-01	89.6	19.5	**101.5**	**30.9**	**77.5**	**86.5%**	**90.0%**	
ND - 9	PHASE 6	521.3	8"	720-01-02	66.5	35.7	**85.2**	**39.9**	**60.9**	**91.6%**	**90.0%**	
ND - 10	PHASE 6	523.9	8"	624-01-01	89.6	19.5	**90.3**	**29.2**	**69.9**	**78.0%**	**90.0%**	RETEST OF ND-03 F/ 10.11.12

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LF
Project No.	2012-607

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	520.2	518.2	517.5	515.1	516.7
Tare Number	305	303	304	310	300
Wt. of Tare & WS (gm)	414.77	466.82	481.02	525.92	458.93
Wt. of Tare & DS (gm)	329.35	382.16	406.52	437.37	374.96
Wt. of Tare (gm)	84.85	111.55	110.74	110.42	110.85
Wt. of Water (gm)	85.42	84.66	74.5	88.55	83.97
Wt. of DS (gm)	244.5	270.61	295.78	326.95	264.11
Water Content (%)	**34.9**	**31.3**	**25.2**	**27.1**	**31.8**

Test Number:	WC-06	WC-07	WC-08	WC-09	WC-10
Nuclear Test Number:	ND-06	ND-07	ND-08	ND-09	ND-10
Location:	PHASE 6	PHASE 6	PHASE 6	PHASE 6	PHASE 6
Depth:	518.9	519.1	521.2	521.3	523.9
Tare Number	314	368	308	311	398
Wt. of Tare & WS (gm)	453.96	491.1	505.63	462.79	518.26
Wt. of Tare & DS (gm)	356.95	397.09	407.2	354.98	420.1
Wt. of Tare (gm)	84.83	111.37	88.6	84.72	84.4
Wt. of Water (gm)	97.01	94.01	98.43	107.81	98.16
Wt. of DS (gm)	272.12	285.72	318.6	270.26	335.7
Water Content (%)	**35.6**	**32.9**	**30.9**	**39.9**	**29.2**

Notes : *NA*

Tested By *MLB* *Date* *10.19.12* *Checked By* *JPB* *Date* ***10.24.12***

Client:	BLACKROCK ENG.
Project Name :	ROXBORO ASH LF PHASE 6A
Project Number :	2012-607

Report Number :	**FDR-41**
Date (s) :	10.19.12

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-03
Location:	Phase 6
Depth (ft):	517.5
Date :	10.19.12

Mold

Cylinder ID	1
Weight of Cylinder (lbs.)	1.31
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.31
Wt. of Cylinder (lbs.)	1.31
Wt. of WS	3.00
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	304
Wt. of Tare & WS (gm)	481.02
Wt. of Tare & DS (gm)	406.52
Wt. of Tare (gm)	110.74
Wt. of Water (gm)	74.50
Wt. of DS (gm)	295.78
Wet Density (pcf):	90.9
Moisture Content (%):	**25.2**
Dry Density (pcf):	**72.6**

Geotechnics Representative : M. BLACKLEY

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LF
Project Number : 2012-607

Report Number : **FDR-40**
Date (s) : 10/11/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03
Location:	ND-10	ND-01	ND-02
Depth (ft):	523.9	NA	NA
Date :	10/11/2012	10.11.12	10.11.12

Mold

Weight of Mold (lbs.)	9.44	9.44	9.44
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.43	12.25	12.41
Weight of Mold (lbs)	9.44	9.44	9.44
Weight of WS (lbs)	2.99	2.81	2.96
Volume OF Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	312	307	317
Wt. of Tare & WS (gm)	716.42	581.84	709.98
Wt. of Tare & DS (gm)	583.06	479.94	574.14
Wt. of Tare (gm)	84.52	110.53	84.46
Wt. of Water (gm)	133.36	101.90	135.84
Wt. of DS (gm)	498.54	369.41	489.68
Wet Density (pcf):	90.5	85.2	89.8
Moisture Content (%):	**26.8**	**27.6**	**27.7**
Dry Density (pcf):	**71.4**	**66.7**	**70.3**

Geotechnics Representative : MARK BLACKLEY

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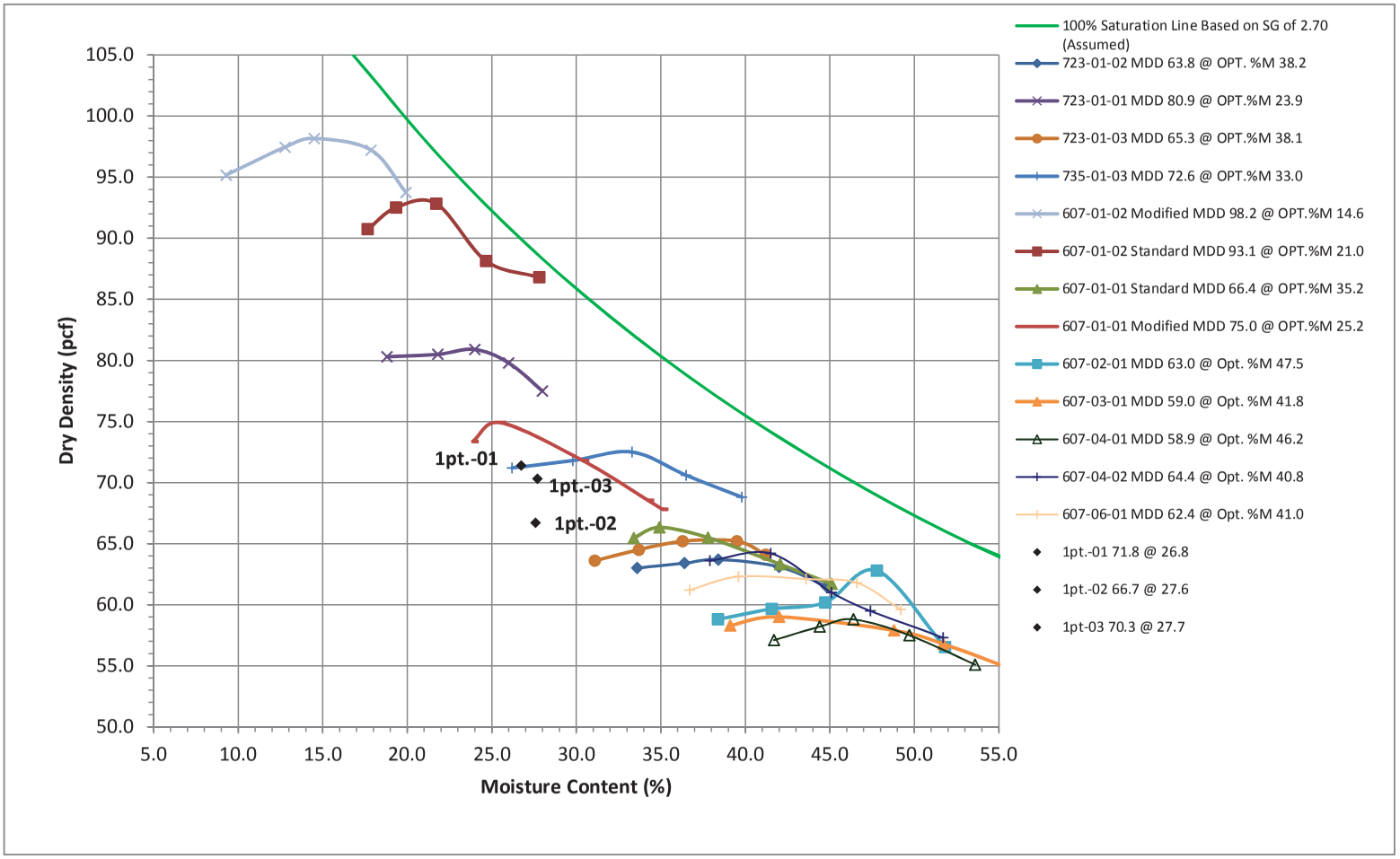
Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-40



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Day:	**Thursday**
Date:	**10.25.12**
Log No.:	**42**
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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2012-607
Client Name:	Blackrock Eng.	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** **Departed:**
General Contractor:	Charah	**Superintendent:**	Justin Mize

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock	Bill Lupi

Weather Conditions:	clear	**Temperature:**	75
Contractor's Equipment:	1 CAT Smoothdrum Roller		
Contractor's Personnel:	~5		

Description of Daily Activities & Events

- Geotechnics Rep. Mark Blackley arrived on site and made contact with Blackrock representative Bill Lupi.
- Geotechnics Rep. performed 8 Moisture / Density tests of previously compacted fly ash material. Drive Cylinder method was used. Testing locations chosen by Blackrock representative.
- Geotechnics Rep. obtained a One-point proctor sample.
- Geotechnics Rep. departed the site and delivered soil samples to Geotechnics laboratory facility.
- Geotechnics Rep. departed the site and delivered soil samples to Geotechnics laboratory facility.

Prepared By:	JRB	**Date:**	10.24.12	**Checked By:**	MM	**Date:**	10/30

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-42**	Geotechnics Representative : MARK BLACKLEY	Page : 1 of 1
Date (s) : **10.25.12**	Reviewed By : MMS	Date : 10/30

Contractor : CHARAH	Borrow Source : ON-SITE

Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER
13957	3401-B		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
DC 1	PHASE 6	523.6	N/A	607-01-01	72.6	33.0	**88.2**	**28.8**	**68.5**	**94.3%**	**90.0%**	
DC 2	PHASE 6	521.4	N/A	607-03-01	72.6	33.0	**93.3**	**24.7**	**74.8**	**103.1%**	**90.0%**	
DC 3	PHASE 6	518	N/A	720-01-02	72.6	33.0	**93.3**	**21.5**	**76.8**	**105.8%**	**90.0%**	
DC 4	PHASE 6	513.7	N/A	720-01-02	66.4	35.2	**70.0**	**27.3**	**55.0**	**82.8%**	**90.0%**	
DC 5	PHASE 6	514.3	N/A	735-01-03	66.4	35.2	**83.6**	**27.7**	**65.5**	**98.6%**	**90.0%**	
DC 6	PHASE 6	515.9	N/A	720-01-02	66.4	35.2	**87.0**	**30.7**	**66.6**	**100.2%**	**90.0%**	
DC 7	PHASE 6	518	N/A	720-01-02	66.4	35.2	**87.0**	**27.0**	**68.5**	**103.2%**	**90.0%**	

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-42**
Date (s) : 10.25.12

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-01	DC-02	DC-03	DC-04
Nuclear Test Number :	NA	NA	NA	NA
Location:	Phase 6	Phase 6	Phase 6	Phase 6
Depth (ft):	523.6	524.2	525.8	526.2
Date :	10.25.12	10.25.12	10.25.12	10.25.12
Mold				
Cylinder ID	1	1	3	4
Weight of Cylinder (lbs.)	1.32	1.32	1.32	1.32
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Wt. of Cylinder & WS (lbs.)	4.23	4.31	4.40	3.63
Wt. of Cylinder (lbs.)	1.32	1.23	1.32	1.32
Wt. of WS	2.91	3.08	3.08	2.31
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	317	398	300	304
Wt. of Tare & WS (gm)	497.86	647.29	624.55	390.49
Wt. of Tare & DS (gm)	405.34	535.92	533.61	330.47
Wt. of Tare (gm)	84.29	84.18	110.69	110.54
Wt. of Water (gm)	92.52	111.37	90.94	60.02
Wt. of DS (gm)	321.05	451.74	422.92	219.93
Wet Density (pcf):	88.2	93.3	93.3	70.0
Moisture Content (%):	**28.8**	**24.7**	**21.5**	**27.3**
Dry Density (pcf):	**68.5**	**74.9**	**76.8**	**55.0**

Geotechnics Representative : M. BLACKLEY MBS

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Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF PHASE 6A
Project Number : 2012-607

Report Number : **FDR-42**
Date (s) : 10.25.12

Drive Cylinder - ASTM D 2937

Test Information			
Test Number :	DC-05	DC-06	DC-07
Nuclear Test Number :	NA	NA	NA
Location:	Phase 6	Phase 6	Phase 6
Depth (ft):	514.3	515.9	518
Date :	10.25.12	10.25.12	10.25.12
Mold			
Cylinder ID	1	1	3
Weight of Cylinder (lbs.)	1.32	1.32	1.32
Volume of Cylinder (ft^3)	0.033	0.033	0.033
Specimen			
Wt. of Cylinder & WS (lbs.)	4.08	4.10	4.19
Wt. of Cylinder (lbs.)	1.32	1.23	1.32
Wt. of WS	2.76	2.87	2.87
Cylinder Volume (ft^3)	0.033	0.033	0.033
Moisture / Density			
Tare Number	308	307	312
Wt. of Tare & WS (gm)	469.03	454.58	435.50
Wt. of Tare & DS (gm)	386.35	373.64	360.80
Wt. of Tare (gm)	88.37	110.38	84.27
Wt. of Water (gm)	82.68	80.94	74.70
Wt. of DS (gm)	297.98	263.26	276.53
Wet Density (pcf):	83.6	87.0	87.0
Moisture Content (%):	**27.7**	**30.7**	**27.0**
Dry Density (pcf):	**65.5**	**66.5**	**68.5**

Geotechnics Representative : M. BLACKLEY MBS

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LF
Project Number :	2012-607

Report Number :	**FDR-42**
Date (s) :	10/25/2012

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	Phase 6
Depth (ft):	na
Date :	10/25/2012

Mold

Weight of Mold (lbs.)	9.44
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.28
Weight of Mold (lbs)	9.44
Weight of WS (lbs)	2.83
Volume OF Mold (ft^3)	0.033

Moisture / Density

Tare Number	AL
Wt. of Tare & WS (gm)	454.75
Wt. of Tare & DS (gm)	350.13
Wt. of Tare (gm)	13.85
Wt. of Water (gm)	104.62
Wt. of DS (gm)	336.28
Wet Density (pcf):	85.9
Moisture Content (%):	**31.1**
Dry Density (pcf):	**65.5**

Geotechnics Representative : MARK BLACKLEY

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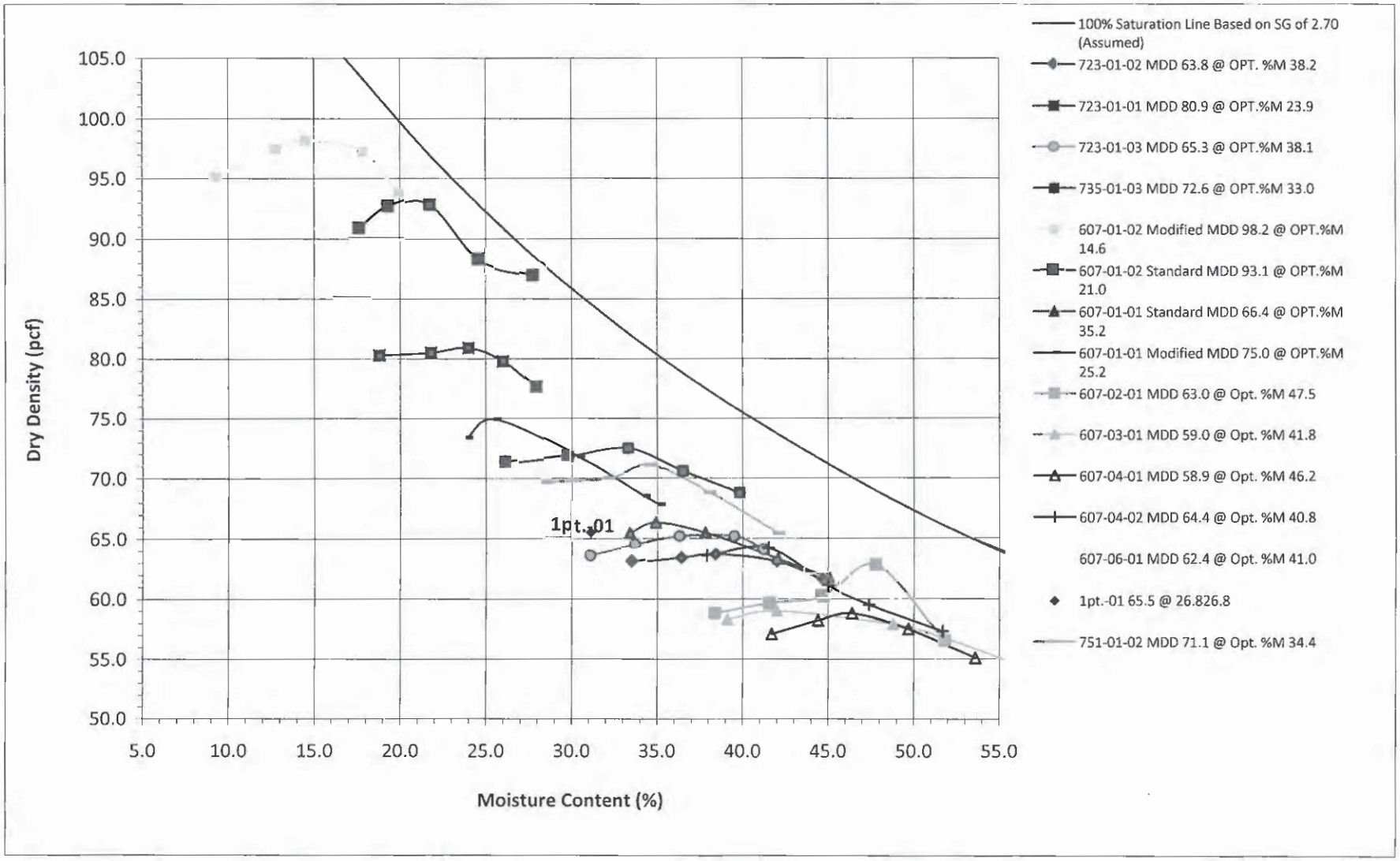
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Client: BLACKROCK ENG.
Project Name : ROXBORO ASH LF
Project Number : 2012-607

FDR-42



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Appendix C – P6 Structural Fill Testing
Section 3 – Nuclear Density Testing Reports
– Glover Construction

Day:	Thursday
Date:	11.21.13
Log No.:	1
Page:	1 of 1

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 6:45 AM **Departed:** 4:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 44

Contractor's Equipment: (1) CAT D6 Dozer, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT static smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (7) Nuclear Density and (1) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR for results).
- Geotechnics Rep. performed a 1-point proctor on site using material at test location ND-04. Rep. determined ash sample was dry at ND-04. Water was added to ash before proctor test.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 11.21.13 **Checked By:** MMT **Date:** 12-2-13

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-01**	Geotechnics Representative : Abe Gaeta	Page : 1 of 6
Date (s) : **11.21.13**	Reviewed By : MMS	Date : 12-2-13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben			
Gauge Number	Gauge Model	Compaction Equipment :	CAT SMOOTHDRUM ROLLER, CAT D6 DOZER
32387	3440		
Moisture Offset: K=96.77	WD Offset = N/A		Rod Depth= 12" MS= 690 DS= 2324

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	01	P6A	517.1	12"	600-02-01	64.3	38.2	**76.5**	**32.5**	**57.7**	**89.8%**	**90.0%**	
ND -	02	P6A	519.3	12"	600-02-01	64.3	38.2	**80.9**	**33.6**	**60.6**	**94.2%**	**90.0%**	
ND -	03	P6A	521.5	12"	600-02-01	64.3	38.2	**85.3**	**34.4**	**63.5**	**98.7%**	**90.0%**	
ND -	04	P6A	525.9	12"	600-04-01	72.5	30.5	**84.4**	**28.7**	**65.6**	**90.5%**	**90.0%**	1pt.-01 location
ND -	05	P6A	523.8	12"	600-04-01	72.5	30.5	**83.3**	**30.3**	**63.9**	**88.2%**	**90.0%**	
ND -	06	P6A	521.6	12"	600-04-01	72.5	30.5	**89.8**	**32.2**	**67.9**	**93.7%**	**90.0%**	
ND -	07	P6A	525.2	12"	600-01-01	68.1	34.6	**78.2**	**29.8**	**60.2**	**88.5%**	**90.0%**	
DC -	01	P6A	525.2	N/A	600-01-01	68.1	34.6	**82.1**	**28.8**	**63.7**	**93.6%**	**90.0%**	DC-01 taken @ ND-07

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Report Number :	**FDR-01**
Date (s) :	11.21.13

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-07
Location:	P6A
Depth (ft):	525.2
Date :	11.21.13

Mold

Cylinder ID	#4
Weight of Cylinder (lbs.)	1.23
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	3.94
Wt. of Cylinder (lbs.)	1.23
Wt. of WS	2.71
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	A-1
Wt. of Tare & WS (gm)	585.40
Wt. of Tare & DS (gm)	502.00
Wt. of Tare (gm)	212.00
Wt of water (gm)	83.40
Wt. of DS (gm)	290.00

Wet Density (pcf):	82.1

Moisture Content (%):	**28.8**
Dry Density (pcf):	**63.8**

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Report Number :	**FDR-01**
Date (s) :	11.21.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	P6A/ND-04
Depth (ft):	525.9
Date :	11.21.13

Mold

Weight of Mold (lbs.)	9.25
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.15
Weight of Mold (lbs)	9.25
Weight of WS (lbs)	2.90
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	A-1
Wt. of Tare & WS (gm)	437.00
Wt. of Tare & DS (gm)	388.00
Wt. of Tare (gm)	212.00
Wt. of water (gm)	49.00
Wt. of DS (gm)	176.00
Wet **Density (pcf):**	87.9
Moisture Content (%):	**27.8**
Dry Density (pcf):	**68.7**

Comments: 1pt-01 was performed in-field. Water was added to 1pt-01.

Geotechnics Representative : Abe Gaeta

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Geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LANDFILL P6A
Project No.	2013-784
Date (s) :	11.21.13

Test Number:	WC-01	WC-02	WC-03	WC-04	WC-05
Nuclear Test Number:	ND-01	ND-02	ND-03	ND-04	ND-05
Location:	P6A	P6A	P6A	P6A	P6A
Depth:	517.1	519.3	521.5	525.9	523.8
Tare Number	Z-1	Z-2	Z-1	Z-2	Z-1
Wt. of Tare & WS (gm)	485.00	526.80	443.60	461.60	479.80
Wt. of Tare & DS (gm)	418.20	447.80	384.40	406.00	417.60
Wt. of Tare (gm)	212.40	212.40	212.40	212.40	212.40
Wt. of Water (gm)	66.8	79	59.2	55.6	62.2
Wt. of DS (gm)	205.8	235.4	172	193.6	205.2
Water Content (%)	**32.5**	**33.6**	**34.4**	**28.7**	**30.3**

Test Number:	WC-06	WC-07
Nuclear Test Number:	ND-06	ND-07
Location:	P6A	P6A
Depth:	521.6	525.2
Tare Number	Z-2	Z-1
Wt. of Tare & WS (gm)	480.60	430.40
Wt. of Tare & DS (gm)	415.20	380.40
Wt. of Tare (gm)	212.40	212.40
Wt. of Water (gm)	65.4	50
Wt. of DS (gm)	202.8	168
Water Content (%)	**32.2**	**29.8**

Comment(s): All samples are original to on-site moisture conditions

Tested By *AG* *Date* *11.21.13* *Checked By:* MDS

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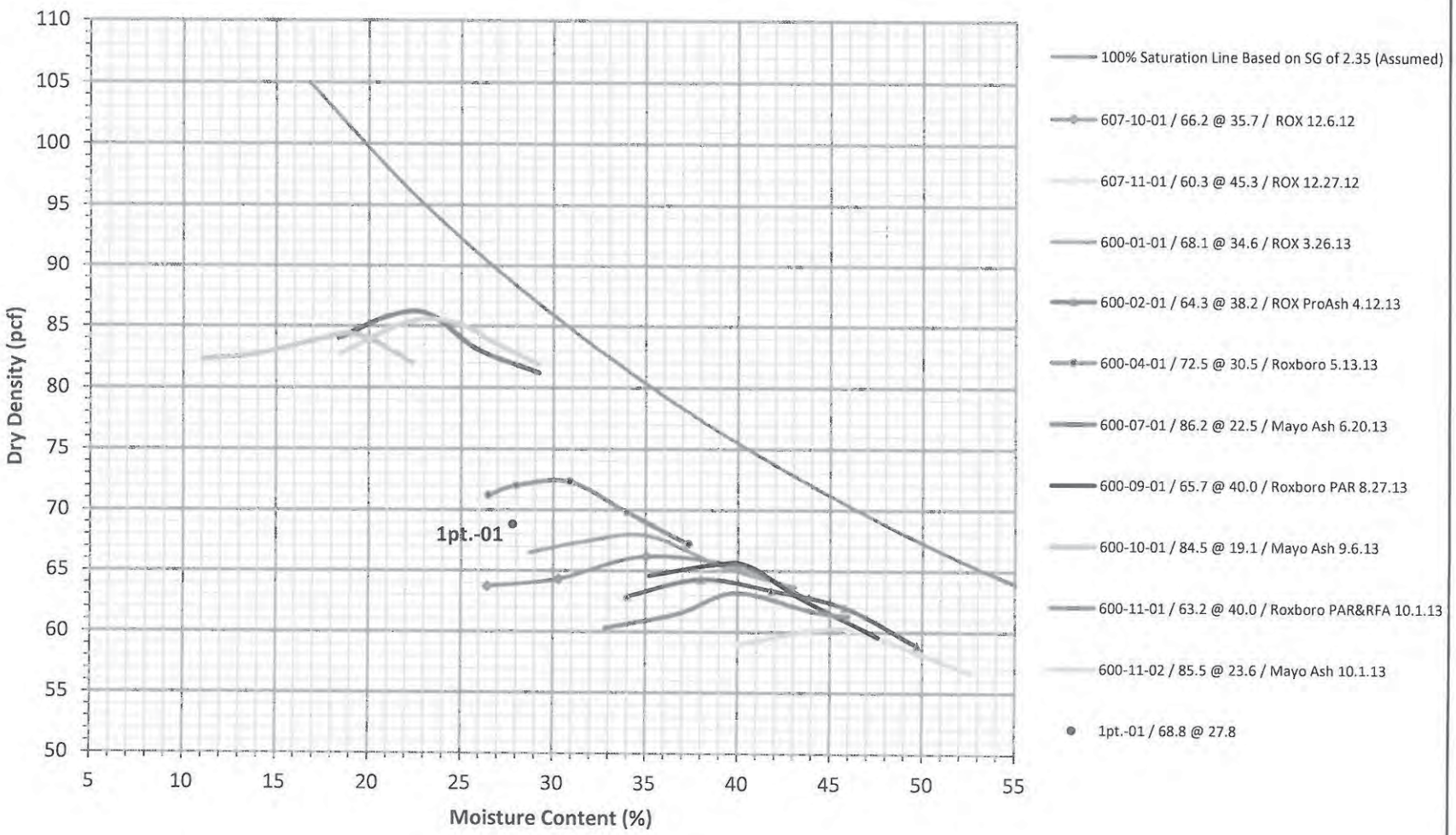
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 11.21.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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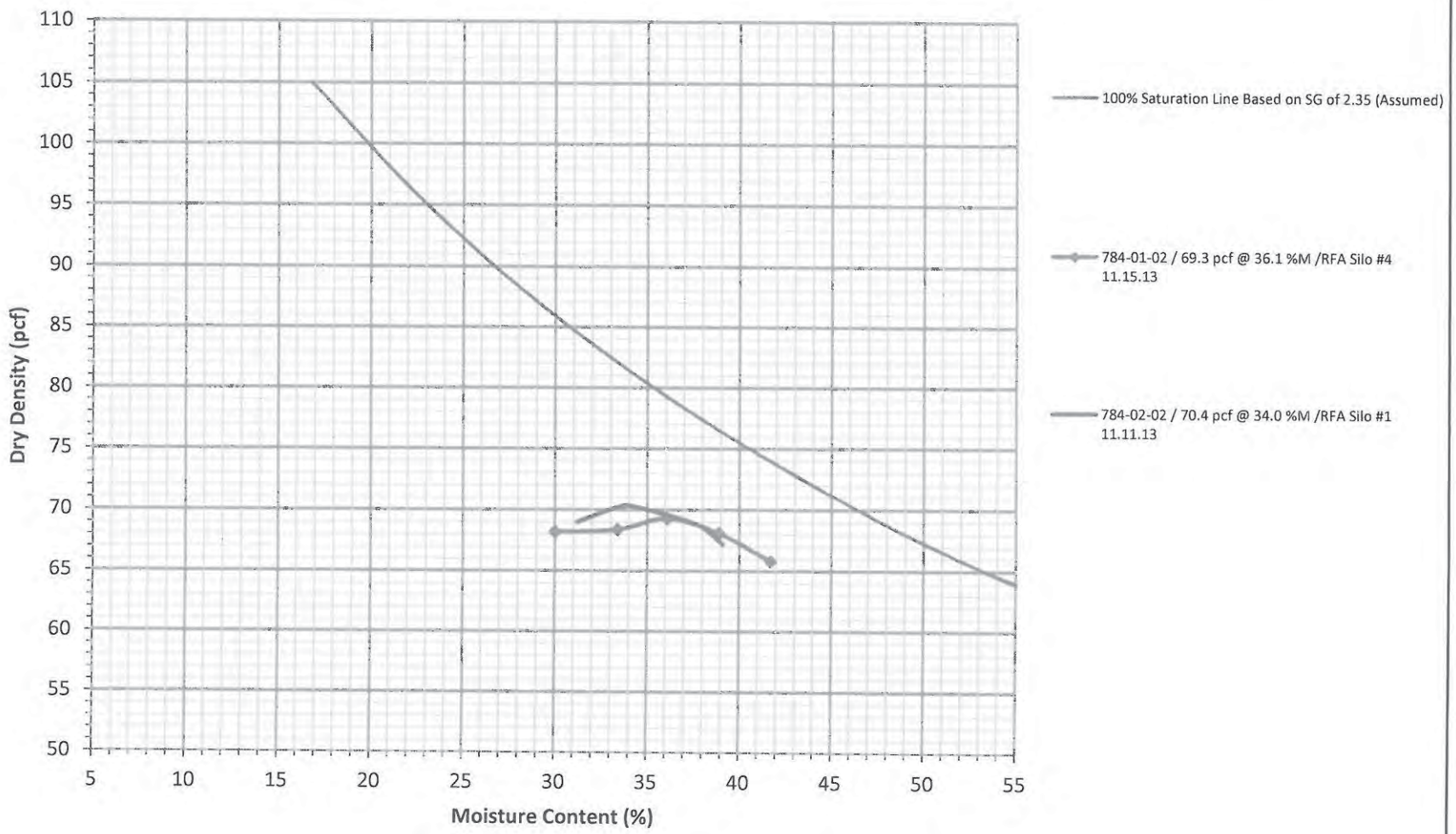
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 11.21.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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Day:	**Friday**
Date:	**11.22.13**
Log No.:	**2**
Page:	**1 of 1**

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 2:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Bill Lupi / P.E.

Weather Conditions: Sunny **Temperature:** 50

Contractor's Equipment: (1) CAT D6 Dozer, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT static smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (2) Drive Cylinder tests in the presence of Blackrock Engineer Bill Lupi. (see FDR for results).
- Geotechnics Rep. performed a 1-point proctor on site using material at test location ND-01.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 11.22.13 **Checked By:** MMS **Date:** 12-2-13

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-02**	Geotechnics Representative : Abe Gaeta	Page : 1 of 6
Date (s) : **11.22.13**	Reviewed By : AMPS	Date : 12-2-13

Contractor : Glover Construction						Borrow Source : SILOS 1 - 4							
Superintendent : Reuben													
Gauge Number	Gauge Model		Compaction Equipment :			CAT SMOOTHDRUM ROLLER, CAT D6 DOZER							
32387	3440												
Moisture Offset = N/A		WD Offset = N/A				Rod Depth= N/A		MS= 685	DS= 2310				
Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
DC -	01	P6A	528.5	N/A	600-09-01	65.7	40.0	**74.8**	**29.2**	**57.9**	**88.1%**	**90.0%**	Taken @ ND-01 location
DC -	02	P6A	526.8	N/A	600-09-01	65.7	40.0	**77.3**	**28.7**	**60.1**	**91.4%**	**90.0%**	Taken @ ND-02 location

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-02**
Date (s) :	11.22.13

Drive Cylinder - ASTM D 2937

Test Information		
Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-01	ND-02
Location:	P6A	P6A
Depth (ft):	528.5	526.8
Date :	11.22.13	11.22.13
Mold		
Cylinder ID	#4	#4
Weight of Cylinder (lbs.)	1.23	1.23
Volume of Cylinder (ft^3)	0.033	0.033
Specimen		
Wt. of Cylinder & WS (lbs.)	3.70	3.78
Wt. of Cylinder (lbs.)	1.23	1.23
Wt. of WS	2.47	2.55
Cylinder Volume (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	S-4	S-4
Wt. of Tare & WS (gm)	525.20	497.00
Wt. of Tare & DS (gm)	454.20	433.20
Wt. of Tare (gm)	211.00	211.00
Wt of water (gm)	71.00	63.80
Wt. of DS (gm)	243.20	222.20
Wet Density (pcf):	74.8	77.3
Moisture Content (%):	**29.2**	**28.7**
Dry Density (pcf):	**57.9**	**60.0**

Comment(s): Nuclear density gauge data was not recorded due to inaccurate proccessed mois

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-02**
Date (s) :	11.22.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	P6A/ND-01
Depth (ft):	528.5
Date :	11.22.13

Mold

Weight of Mold (lbs.)	9.25
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.06
Weight of Mold (lbs)	9.25
Weight of WS (lbs)	2.81
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	Z-1
Wt. of Tare & WS (gm)	621.00
Wt. of Tare & DS (gm)	520.40
Wt. of Tare (gm)	212.40
Wt. of water (gm)	100.60
Wt. of DS (gm)	308.00
Wet **Density (pcf):**	85.2
Moisture Content (%):	**32.7**
Dry Density (pcf):	**64.2**

Comments: 1pt-01 was performed in-field.

Geotechnics Representative : Abe Gaeta

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Geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LANDFILL P6A
Project No.	2013-784
Date (s) :	11.22.13

Test Number:	WC-01	WC-02	WC-03
Nuclear Test Number:	ND-01	ND-02	ND-03
Location:	P6A	P6A	P6A
Depth/Elev:	528.5	526.8	524.5
Tare Number	S-4	S-4	A-3
Wt. of Tare & WS (gm)	525.20	497.00	500.00
Wt. of Tare & DS (gm)	454.20	433.20	433.50
Wt. of Tare (gm)	211.00	211.00	212.00
Wt. of Water (gm)	71	63.8	66.5
Wt. of DS (gm)	243.2	222.2	221.5
Water Content (%)	**29.2**	**28.7**	**30.0**

Comment(s): All samples are original to on-site moisture conditions

Tested By *AG* *Date* *11.22.13* *Checked By:* MWS

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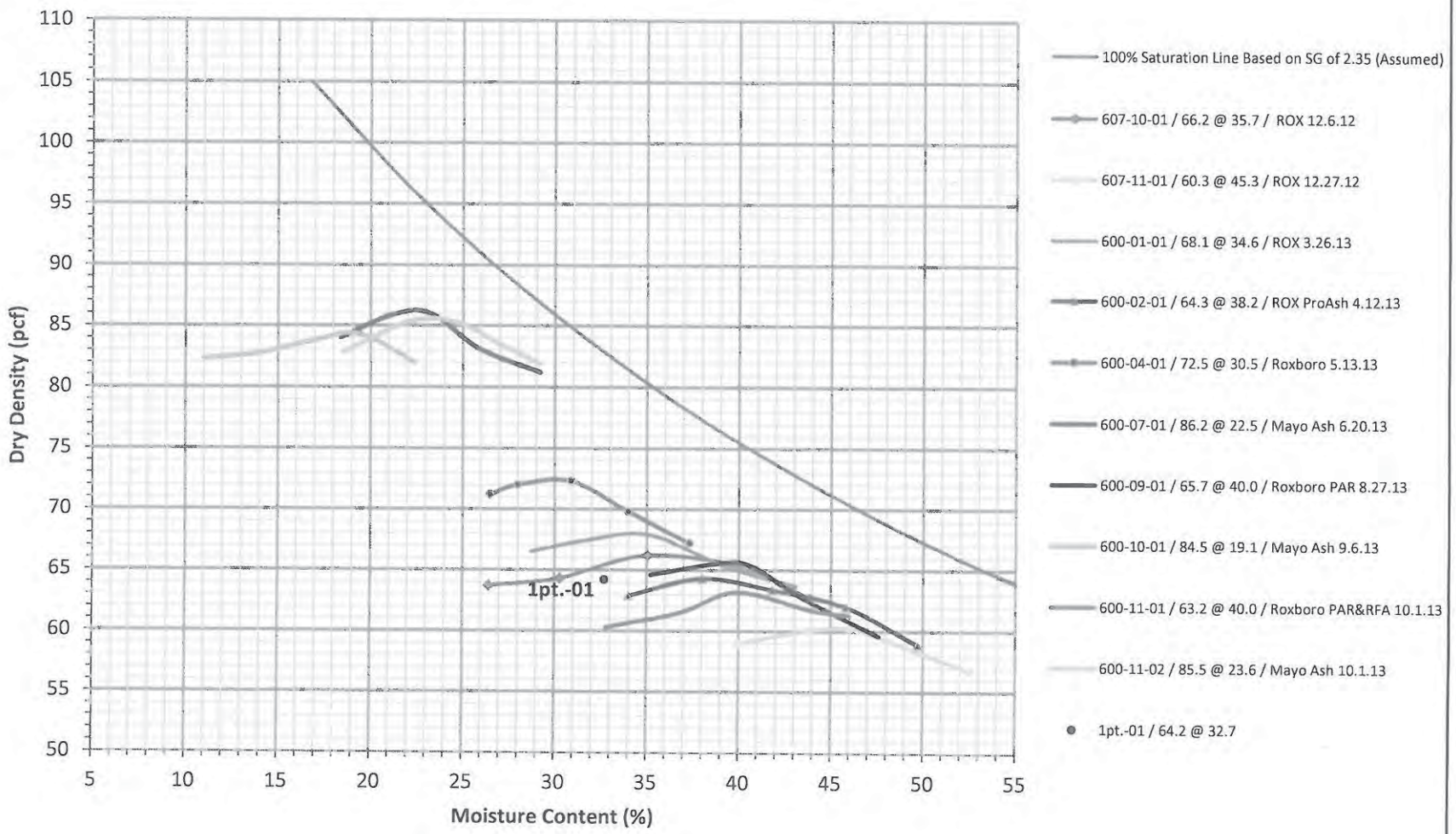
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 11.22.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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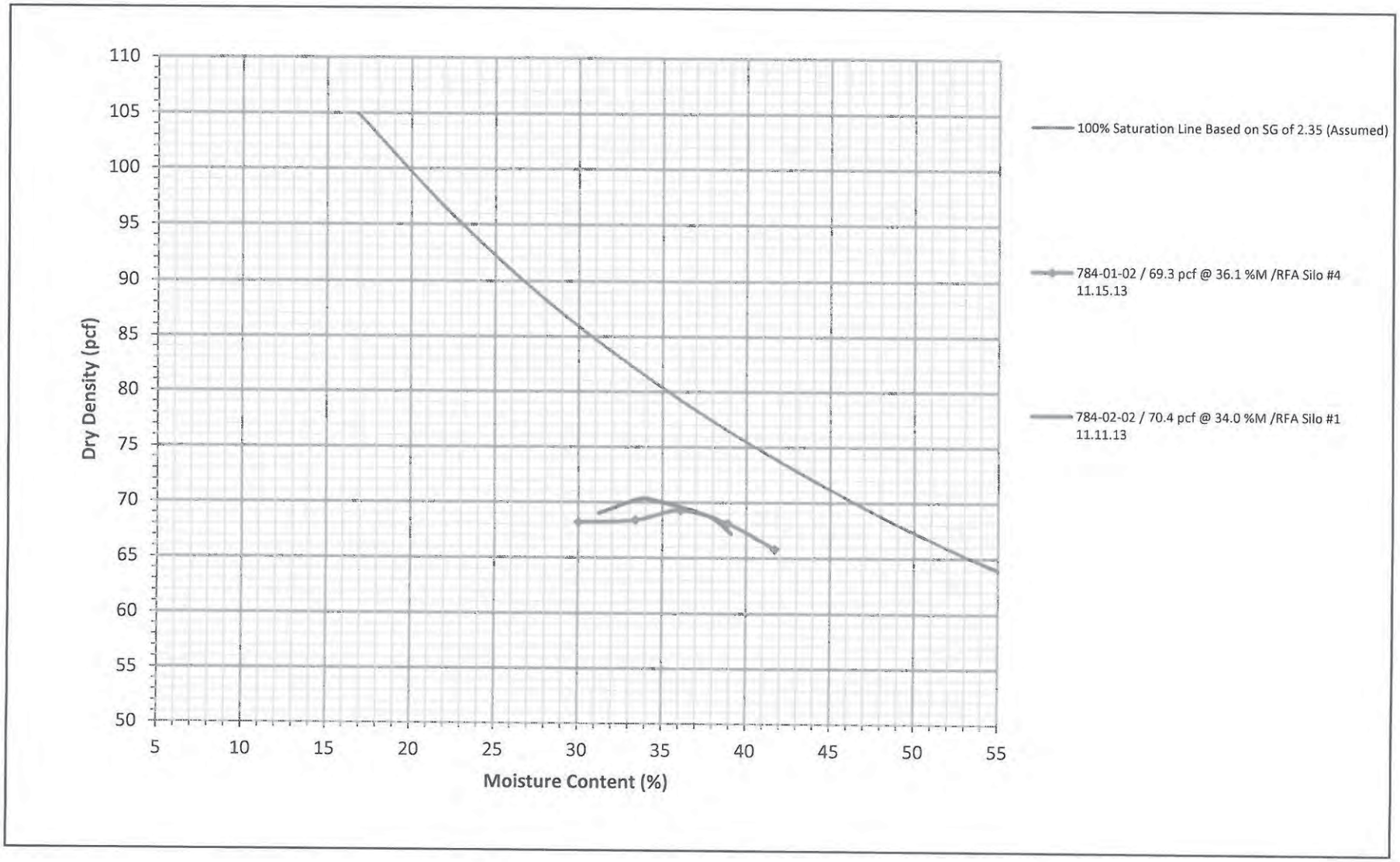
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 11.21.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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Day:	**Monday**
Date:	**12.2.13**
Log No.:	**3**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 1:00 PM **Departed:** 3:45 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 57

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (10) Nuclear Density tests and (1) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-03 for results). Test locations were covered before located by surveyor.
- Geotechnics Rep. performed a 1-point proctor on site using material at test location ND-01.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.2.13 **Checked By:** [illegible] **Date:** 12-10-13

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Day:	Tuesday
Date:	12.3.13
Log No.:	4
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 4:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 61

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (25) Nuclear Density tests and (2) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-03 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material locations ND-11 & ND-31.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.3.13 **Checked By:** MMS **Date:** 12-10-13

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Day:	Wed.
Date:	12.4.13
Log No.:	5
Page:	1 of 1

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro P6A Ash LF	**Project No.:**	2013-784
Client Name:	Blackrock	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:30am **Departed:** 11:30pm
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor

Weather Conditions:	Overcast	**Temperature:**	50's

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived on site.
- Glover continued placing and compacted P6A subgrade Fly Ash.
- Geotechnics Rep. performed CQA Moisture / Density testing of previously placed Fly Ash material.
- Blackrock Reps. laid out a 100' testing grid for CQA density testing.
- Geotechnics Rep. departed the site.

Prepared By:	JRB	**Date:**	12.4.13	**Checked By:**	MMS JRB	**Date:**	12.5.13

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Day:	**Thursday**
Date:	**12.5.13**
Log No.:	**6**
Page:	**1 of 1**

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 1:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 71

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (15) Nuclear Density tests and (2) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-03 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material at test location ND-01.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.5.13 **Checked By:** MMS **Date:** 12/4/13

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-03**	Geotechnics Representative : Abe Gaeta	Page : 1 of 4
Date (s) : **12.2-12.6.13**	Reviewed By : [illegible]	Date : 12-10-13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 123.06	WD Offset = N/A		Rod Depth= 8-12" MS= 685 DS= 2299

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	01	P6A	N/A	12"	784-02-02	70.4	34.0	**93.2**	**37.1**	**68.0**	**96.6%**	**90.0%**	Tested on 12.2.13
ND -	02	P6A	N/A	12"	784-02-02	70.4	34.0	**99.2**	**33.0**	**74.6**	**105.9%**	**90.0%**	Tested on 12.2.13
DC -	04	P6A	N/A	N/A	784-02-02	70.4	34.0	**95.0**	**27.5**	**74.5**	**105.8%**	**90.0%**	DC-04 taken @ ND-02
ND -	03	P6A	N/A	12"	784-02-02	70.4	34.0	**86.9**	**31.8**	**65.9**	**93.7%**	**90.0%**	Tested on 12.2.13
ND -	04	P6A	N/A	12"	784-02-02	70.4	34.0	**92.1**	**39.2**	**66.2**	**94.0%**	**90.0%**	Tested on 12.2.13
ND -	05	P6A	N/A	12"	784-02-02	70.4	34.0	**85.9**	**35.0**	**63.6**	**90.4%**	**90.0%**	Tested on 12.2.13
ND -	06	P6A	N/A	12"	784-02-02	70.4	34.0	**84.7**	**32.6**	**63.9**	**90.7%**	**90.0%**	Tested on 12.2.13
ND -	07	P6A	N/A	12"	784-02-02	70.4	34.0	**84.1**	**31.7**	**63.9**	**90.7%**	**90.0%**	Tested on 12.2.13
ND -	08	P6A	N/A	12"	784-02-02	70.4	34.0	**89.4**	**35.2**	**66.1**	**93.9%**	**90.0%**	Tested on 12.2.13
ND -	09	P6A	N/A	12"	784-02-02	70.4	34.0	**88.6**	**36.3**	**65.0**	**92.3%**	**90.0%**	Tested on 12.2.13
ND -	10	P6A	N/A	12"	784-02-02	70.4	34.0	**85.1**	**32.5**	**64.2**	**91.2%**	**90.0%**	Tested on 12.2.13
ND -	11	P6A	N/A	12"	784-02-02	70.4	34.0	**92.0**	**34.1**	**68.6**	**97.5%**	**90.0%**	Tested on 12.3.13
ND -	12	P6A	N/A	12"	784-02-02	70.4	34.0	**85.5**	**33.0**	**64.3**	**91.3%**	**90.0%**	Tested on 12.3.13
ND -	13	P6A	521.1	12"	784-02-02	70.4	34.0	**94.3**	**32.5**	**71.2**	**101.1%**	**90.0%**	Tested on 12.3.13
ND -	14	P6A	523	12"	784-02-02	70.4	34.0	**74.3**	**17.3**	**63.3**	**90.0%**	**90.0%**	Tested on 12.3.13
ND -	15	P6A	525.1	12"	784-02-02	70.4	34.0	**81.0**	**26.0**	**64.3**	**91.3%**	**90.0%**	Tested on 12.3.13
ND -	16	P6A	528.3	12"	784-02-02	70.4	34.0	**82.8**	**28.5**	**64.4**	**91.5%**	**90.0%**	Tested on 12.3.13
ND -	17	P6A	528.8	12"	784-02-02	70.4	34.0	**89.7**	**28.2**	**70.0**	**99.4%**	**90.0%**	Tested on 12.3.13
ND -	18	P6A	N/A	12"	784-02-02	70.4	34.0	**89.5**	**39.5**	**64.2**	**91.1%**	**90.0%**	Tested on 12.3.13
ND -	19	P6A	N/A	12"	784-02-02	70.4	34.0	**80.8**	**25.0**	**64.6**	**91.8%**	**90.0%**	Tested on 12.3.13
ND -	20	P6A	N/A	12"	784-02-02	70.4	34.0	**86.5**	**34.6**	**64.3**	**91.3%**	**90.0%**	Tested on 12.3.13
ND -	21	P6A	540.9	12"	784-02-02	70.4	34.0	**90.4**	**33.2**	**67.9**	**96.4%**	**90.0%**	Tested on 12.3.13
DC -	05	P6A	540.9	12"	784-02-02	70.4	34.0	**90.0**	**33.1**	**67.6**	**96.0%**	**90.0%**	DC-05 taken @ ND-21
ND -	22	P6A	544.5	12"	784-02-02	70.4	34.0	**86.9**	**35.3**	**64.2**	**91.2%**	**90.0%**	Tested on 12.3.13
ND -	23	P6A	548.6	12"	784-02-02	70.4	34.0	**88.2**	**38.1**	**63.9**	**90.7%**	**90.0%**	Tested on 12.3.13
ND -	24	P6A	551.7	12"	784-02-02	70.4	34.0	**85.7**	**34.3**	**63.8**	**90.6%**	**90.0%**	Tested on 12.3.13

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-03**	Geotechnics Representative : Abe Gaeta	Page : 2 of 4
Date (s) : **12.2-12.6.13**	Reviewed By : MVK	Date : 12-10-13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A		Rod Depth= 8-12" MS= 685 DS= 2299

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	25	P6A	554.4	12"	784-02-02	70.4	34.0	**83.8**	**31.4**	**63.8**	**90.6%**	**90.0%**	Tested on 12.3.13
ND -	26	P6A	556.0	12"	784-02-02	70.4	34.0	**82.7**	**26.8**	**65.2**	**92.6%**	**90.0%**	Tested on 12.3.13
ND -	27	P6A	555.7	12"	784-02-02	70.4	34.0	**84.3**	**28.5**	**65.6**	**93.2%**	**90.0%**	Tested on 12.3.13
ND -	28	P6A	551.1	12"	784-02-02	70.4	34.0	**84.2**	**31.5**	**64.0**	**91.0%**	**90.0%**	Tested on 12.3.13
ND -	29	P6A	551.0	12"	784-02-02	70.4	34.0	**80.6**	**26.3**	**63.8**	**90.6%**	**90.0%**	Tested on 12.3.13
ND -	30	P6A	549.6	12"	784-02-02	70.4	34.0	**79.9**	**25.0**	**63.9**	**90.8%**	**90.0%**	Tested on 12.3.13
ND -	31	P6A	547.3	12"	784-02-02	70.4	34.0	**83.0**	**27.9**	**64.9**	**92.2%**	**90.0%**	Tested on 12.3.13
ND -	32	P6A	544.2	12"	784-02-02	70.4	34.0	**84.7**	**32.5**	**63.9**	**90.8%**	**90.0%**	Tested on 12.3.13
ND -	33	P6A	540.6	12"	784-02-02	70.4	34.0	**91.9**	**42.5**	**64.5**	**91.6%**	**90.0%**	Tested on 12.3.13
ND -	34	P6A	541.9	12"	784-02-02	70.4	34.0	**86.9**	**36.2**	**63.8**	**90.6%**	**90.0%**	Tested on 12.3.13
ND -	35	P6A	544.8	12"	784-02-02	70.4	34.0	**83.5**	**24.1**	**67.3**	**95.6%**	**90.0%**	Tested on 12.3.13
DC -	06	P6A	544.8	N/A	784-02-02	70.4	34.0	**86.2**	**32.9**	**64.9**	**92.1%**	**90.0%**	DC-06 taken @ ND-35
ND -	36	P6A	530.7	8"	723-01-03	65.3	38.1	**81.1**	**36.4**	**59.5**	**91.1%**	**90.0%**	Tested on 12.4.13
ND -	37	P6A	528.8	8"	723-01-03	65.3	38.1	**87.1**	**39.1**	**62.6**	**95.9%**	**90.0%**	Tested on 12.4.13
ND -	38	P6A	526.7	8"	723-01-03	65.3	38.1	**85.2**	**38.6**	**61.5**	**94.1%**	**90.0%**	Tested on 12.4.13
ND -	39	P6A	524.5	8"	784-01-01	70.4	34.0	**87.7**	**34.7**	**65.1**	**92.5%**	**90.0%**	Tested on 12.4.13
ND -	40	P6A	522.3	8"	784-01-01	70.4	34.0	**82.7**	**30.4**	**63.4**	**90.1%**	**90.0%**	Tested on 12.4.13
ND -	41	P6A	520.5	8"	784-01-01	70.4	34.0	**87.6**	**33.2**	**65.8**	**93.4%**	**90.0%**	Tested on 12.4.13
ND -	42	P6A	518.2	8"	784-01-01	70.4	34.0	**92.1**	**33.2**	**69.1**	**98.2%**	**90.0%**	Tested on 12.4.13
ND -	43	P6A	516	8"	784-01-01	70.4	34.0	**91.7**	**32.0**	**69.5**	**98.7%**	**90.0%**	Tested on 12.4.13
ND -	44	P6A	513.8	8"	784-01-01	70.4	34.0	**103.7**	**42.5**	**72.8**	**103.4%**	**90.0%**	Tested on 12.4.13
ND -	45	P6A	516.2	8"	784-01-01	70.4	34.0	**99.2**	**38.6**	**71.6**	**101.7%**	**90.0%**	Tested on 12.4.13
ND -	46	P6A	518	8"	784-01-01	70.4	34.0	**87.9**	**35.9**	**64.7**	**91.9%**	**90.0%**	Tested on 12.4.13
ND -	47	P6A	519.9	8"	784-01-01	70.4	34.0	**87.9**	**33.0**	**66.1**	**93.9%**	**90.0%**	Tested on 12.4.13
ND -	48	P6A	521.9	8"	784-01-01	70.4	34.0	**94.4**	**34.5**	**70.2**	**99.7%**	**90.0%**	Tested on 12.4.13
ND -	49	P6A	523.9	8"	723-01-03	65.3	38.1	**78.0**	**28.5**	**60.7**	**93.0%**	**90.0%**	Tested on 12.4.13

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-03**	Geotechnics Representative : Abe Gaeta	Page : 3 of 4
Date (s) : **12.2-12.6.13**	Reviewed By : [illegible]	Date : 12-3-13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A		Rod Depth= N/A; MS= 685; DS= 2299

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	50	P6A	525.6	8"	723-01-03	65.3	38.1	**87.3**	**34.9**	**64.7**	**99.1%**	**90.0%**	Tested on 12.4.13
ND -	51	P6A	527.4	8"	723-01-03	65.3	38.1	**80.0**	**30.0**	**61.5**	**94.2%**	**90.0%**	Tested on 12.4.13
ND -	52	P6A	529.3	8"	723-01-03	65.3	38.1	**84.7**	**30.2**	**65.1**	**99.6%**	**90.0%**	Tested on 12.4.13
ND -	53	P6A	531.5	8"	784-01-01	70.4	34.0	**92.3**	**32.4**	**69.7**	**99.0%**	**90.0%**	Tested on 12.4.13
ND -	54	P6A	529.4	8"	723-01-03	65.3	38.1	**87.2**	**40.4**	**62.1**	**95.1%**	**90.0%**	Tested on 12.4.13
ND -	55	P6A	527.2	8"	723-01-03	65.3	38.1	**80.1**	**30.3**	**61.5**	**94.1%**	**90.0%**	Tested on 12.4.13
ND -	56	P6A	524.9	8"	723-01-03	65.3	38.1	**83.8**	**33.3**	**62.9**	**96.3%**	**90.0%**	Tested on 12.4.13
ND -	57	P6A	522.9	8"	784-01-01	70.4	34.0	**92.5**	**30.7**	**70.8**	**100.5%**	**90.0%**	Tested on 12.4.13
ND -	58	P6A	520.8	8"	723-01-03	65.3	38.1	**83.8**	**39.6**	**60.0**	**91.9%**	**90.0%**	Tested on 12.4.13
ND -	59	P6A	518.7	8"	723-01-03	65.3	38.1	**85.5**	**33.2**	**64.2**	**98.3%**	**90.0%**	Tested on 12.4.13
ND -	60	P6A	523.3	8"	784-01-01	70.4	34.0	**102.8**	**42.6**	**72.1**	**102.4%**	**95.0%**	Tested on 12.4.13
ND -	61	P6A	525	8"	723-01-03	65.3	38.1	**84.7**	**31.6**	**64.4**	**98.6%**	**95.0%**	Tested on 12.4.13
ND -	62	P6A	526.9	8"	723-01-03	65.3	38.1	**82.7**	**32.0**	**62.7**	**95.9%**	**95.0%**	Tested on 12.4.13
ND -	63	P6A	528.8	8"	723-01-03	65.3	38.1	**80.4**	**30.1**	**61.8**	**94.6%**	**95.0%**	Tested on 12.4.13
ND -	64	P6A	532.7	12"	600-09-01	65.7	40.0	**80.3**	**31.1**	**61.3**	**93.2%**	**90.0%**	Tested on 12.5.13
ND -	65	P6A	535.9	12"	600-09-01	65.7	40.0	**86.6**	**32.6**	**65.3**	**99.4%**	**90.0%**	Tested on 12.5.13
ND -	66	P6A	540.5	12"	784-01-02	69.3	36.1	**89.4**	**28.4**	**69.6**	**100.5%**	**90.0%**	Tested on 12.5.13
ND -	67	P6A	544.3	12"	784-01-02	69.3	36.1	**87.5**	**30.6**	**67.0**	**96.7%**	**90.0%**	Tested on 12.5.13
ND -	68	P6A	548.7	12"	600-09-01	65.7	40.0	**86.7**	**32.2**	**65.6**	**99.8%**	**95.0%**	Tested on 12.5.13
ND -	69	P6A	532.8	12"	600-09-01	65.7	40.0	**80.6**	**34.5**	**59.9**	**91.2%**	**90.0%**	Tested on 12.5.13
ND -	70	P6A	529.5	12"	784-01-02	69.3	36.1	**88.9**	**31.7**	**67.5**	**97.4%**	**90.0%**	Tested on 12.5.13
DC -	07	P6A	529.5	12"	784-01-02	69.3	36.1	**86.2**	**33.5**	**64.6**	**93.2%**	**90.0%**	DC-07 taken @ ND-70
ND -	71	P6A	533	12"	600-09-01	65.7	40.0	**80.0**	**32.9**	**60.2**	**91.6%**	**90.0%**	Tested on 12.5.13
ND -	72	P6A	535.7	12"	600-09-01	65.7	40.0	**83.0**	**32.5**	**62.6**	**95.3%**	**90.0%**	Tested on 12.5.13
ND -	73	P6A	537.6	12"	600-09-01	65.7	40.0	**84.0**	**39.5**	**60.2**	**91.7%**	**90.0%**	Tested on 12.5.13
ND -	74	P6A	540.1	12"	600-09-01	65.7	40.0	**81.5**	**30.5**	**62.5**	**95.1%**	**90.0%**	Tested on 12.5.13

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-03**	Geotechnics Representative : Abe Gaeta	Page : 4 of 4
Date (s) : **12.2-12.6.13**	Reviewed By : MPS	Date : 12.20.13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A		Rod Depth= N/A MS= 685 DS= 2299

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND - 75	P6A	536.8	12"	600-04-01	72.5	30.5	**92.9**	**23.1**	**75.5**	**104.1%**	**95.0%**	Tested on 12.5.13
DC - 08	P6A	536.8	N/A	600-04-01	72.5	30.5	**94.4**	**25.9**	**75.0**	**103.4%**	**95.0%**	DC-08 taken @ ND-75
ND - 76	P6A	535	12"	600-09-01	65.7	40.0	**82.7**	**30.5**	**63.4**	**96.5%**	**90.0%**	Tested on 12.5.13
ND - 77	P6A	533	12"	600-09-01	65.7	40.0	**78.7**	**25.8**	**62.6**	**95.2%**	**90.0%**	Tested on 12.5.13
ND - 78	P6A	531.5	12"	600-09-01	65.7	40.0	**77.8**	**31.0**	**59.4**	**90.4%**	**90.0%**	Tested on 12.5.13

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-03**
Date (s) :	12.2-12.5.13

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-04	DC-05	DC-06	DC-07
Nuclear Test Number :	ND-02	ND-21	ND-35	ND-70
Location:	P6A	P6A	P6A	P6A
Depth (ft):	N/A	540.9	544.8	529.5
Date :	12.2.13	12.3.13	12.3.13	12.5.13

Mold

Cylinder ID	#1	#1	#1	#1
Weight of Cylinder (lbs.)	1.04	1.04	1.04	1.04
Volume of Cylinder (ft^3)	0.034	0.034	0.034	0.034

Specimen

Wt. of Cylinder & WS (lbs.)	4.27	4.10	3.97	3.97
Wt. of Cylinder (lbs.)	1.04	1.04	1.04	1.04
Wt. of WS	3.23	3.06	2.93	2.93
Cylinder Volume (ft^3)	0.034	0.034	0.034	0.034

Moisture / Density

Tare Number	Z-1	Z-2	Z-2	Z-3
Wt. of Tare & WS (gm)	648.40	517.80	609.20	696.20
Wt. of Tare & DS (gm)	554.40	441.60	510.80	574.80
Wt. of Tare (gm)	212.00	211.40	211.40	212.20
Wt of water (gm)	94.00	76.20	98.40	121.40
Wt. of DS (gm)	342.40	230.20	299.40	362.60
Wet Density (pcf):	95.0	90.0	86.2	86.2
Moisture Content (%):	**27.5**	**33.1**	**32.9**	**33.5**
Dry Density (pcf):	**74.5**	**67.6**	**64.9**	**64.6**

Comment(s):

Geotechnics Representative : Abe Gaeta

2200 Westinghouse Boulevard • Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Report Number :	**FDR-03**
Date (s) :	12.2-12.5.13

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-08
Nuclear Test Number :	ND-75
Location:	P6A
Depth (ft):	536.8
Date :	12.5.13

Mold

Cylinder ID	#1
Weight of Cylinder (lbs.)	1.04
Volume of Cylinder (ft^3)	0.034

Specimen

Wt. of Cylinder & WS (lbs.)	4.25
Wt. of Cylinder (lbs.)	1.04
Wt. of WS	3.21
Cylinder Volume (ft^3)	0.034

Moisture / Density

Tare Number	Z-3
Wt. of Tare & WS (gm)	680.20
Wt. of Tare & DS (gm)	583.80
Wt. of Tare (gm)	212.20
Wt of water (gm)	96.40
Wt. of DS (gm)	371.60
Wet Density (pcf):	94.4
Moisture Content (%):	**25.9**
Dry Density (pcf):	**75.0**

Comment(s):

Geotechnics Representative : Abe Gaeta

2200 Westinghouse Boulevard • Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-03**
Date (s) :	12.2-12.5.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03	1pt-04
Location:	P6A/ND-01	P6A/ND-11	P6A/ND-31	P6A/ND-36
Depth (ft):	N/A	N/A	547.3	530.7
Date :	12.2.13	12.3.13	12.3.13	12.4.13

Mold

Weight of Mold (lbs.)	9.25	9.25	9.25	9.24
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.55	12.51	12.11	12.09
Weight of Mold (lbs)	9.25	9.25	9.25	9.24
Weight of WS (lbs)	3.30	3.26	2.86	2.85
Volume of Mold (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2	Z-2	398
Wt. of Tare & WS (gm)	513.20	508.40	435.80	246.53
Wt. of Tare & DS (gm)	441.60	432.80	383.20	206.04
Wt. of Tare (gm)	212.00	211.40	211.10	84.19
Wt. of water (gm)	71.60	75.60	52.60	40.49
Wt. of DS (gm)	229.60	221.40	172.10	121.85
Wet Density (pcf):	100.0	98.8	86.7	86.4
Moisture Content (%):	**31.2**	**34.1**	**30.6**	**33.2**
Dry Density (pcf):	**76.2**	**73.6**	**66.4**	**64.8**

Comments: WATER WAS ADDED TO 1PT-03.

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-03**
Date (s) :	12.2-12.5.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt.-05	1pt-06
Location:	P6A/ND-39	P6A/ND-64
Depth (ft):	524.5	532.7
Date :	12.4.13	12.5.13

Mold

Weight of Mold (lbs.)	9.24	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.13	12.23
Weight of Mold (lbs)	9.24	9.25
Weight of WS (lbs)	2.89	2.98
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	312	Z-3
Wt. of Tare & WS (gm)	249.75	467.60
Wt. of Tare & DS (gm)	211.44	392.80
Wt. of Tare (gm)	84.45	212.20
Wt. of water (gm)	38.31	74.80
Wt. of DS (gm)	126.99	180.60
Wet Density (pcf):	87.6	90.3
Moisture Content (%):	**30.2**	**41.4**
Dry Density (pcf):	**67.3**	**63.9**

Comments: WATER WAS ADDED TO 1PT-06.

Geotechnics Representative : Abe Gaeta AMS

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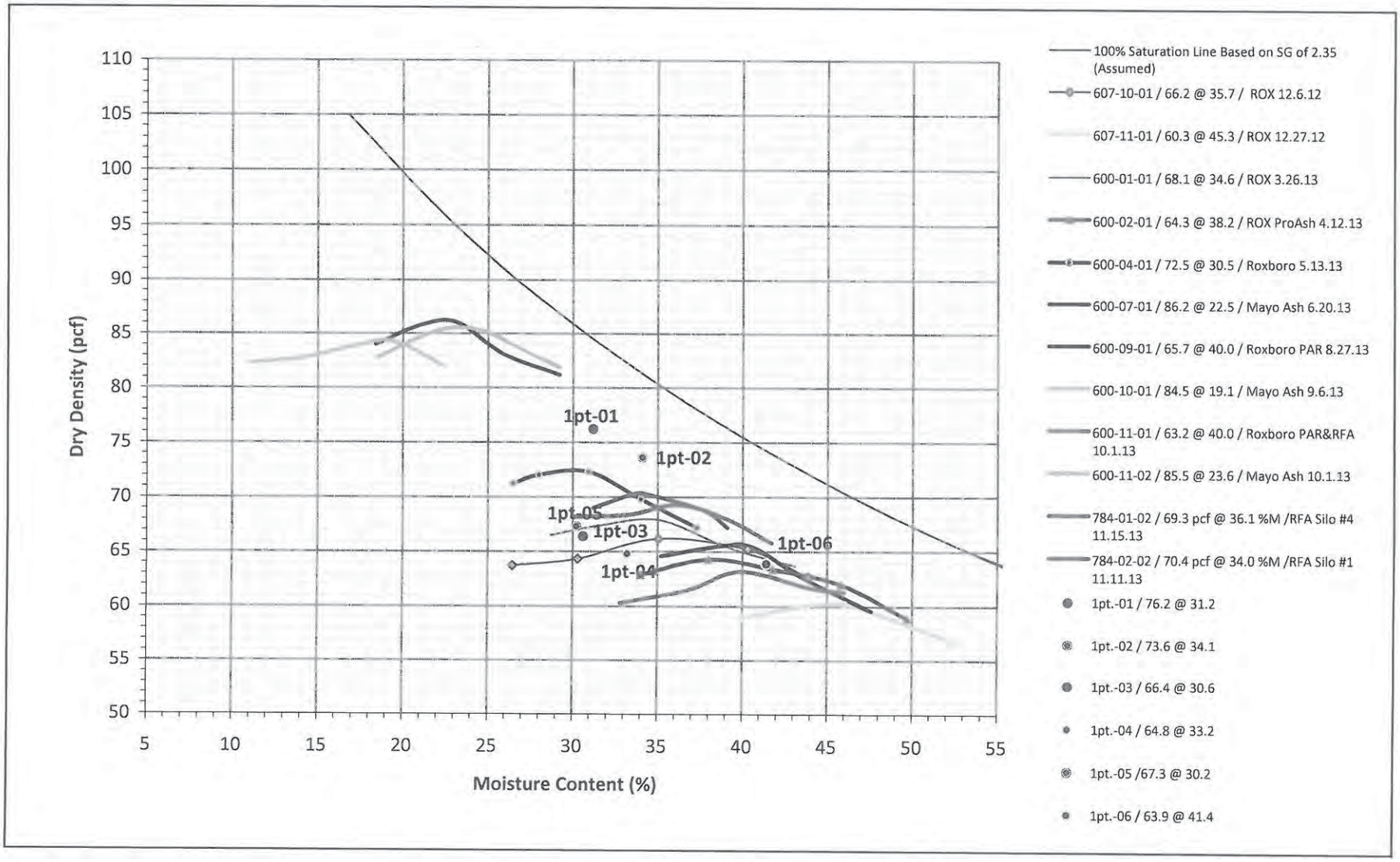
geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 12.2-12.5.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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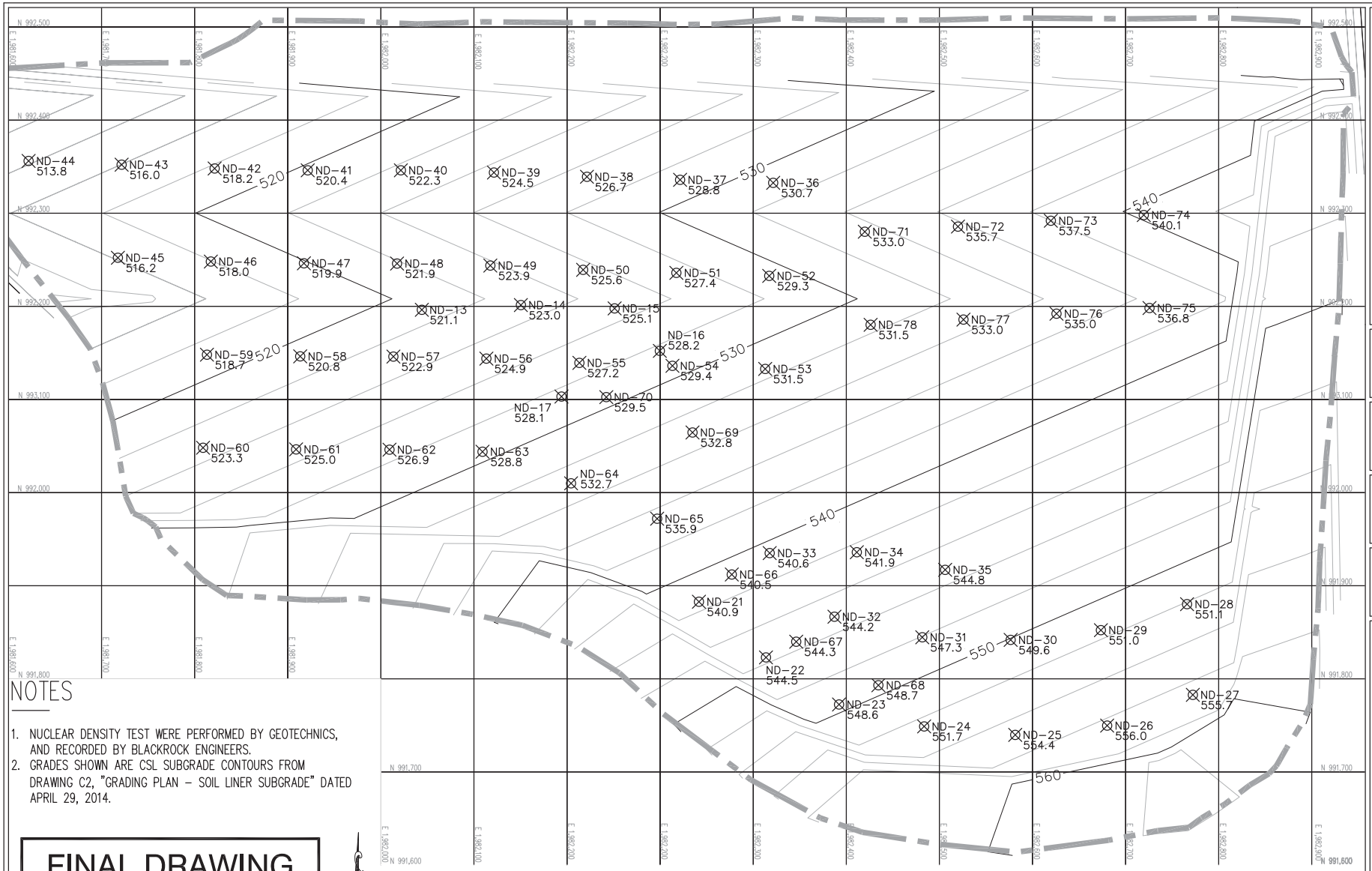

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6A-FDR03
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=100'
PROJECT NO.	11001
CHECKED BY:	WML
DATE:	14.07.16
DRAWN BY:	NAP

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-03

Day:	Thurs
Date:	12.12.13
Log No.:	7
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 1:45 PM **Departed:** 4:15 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor
Blackrock Engineering	Bill Lupi / P.E.

Weather Conditions: Sunny **Temperature:** 40

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (6) Nuclear Density tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-04 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material at test location ND-82.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. obtained (2) bucket soil samples for proctor testing in lab from Blackrock Engineer Bill Lupi.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.12.13 **Checked By:** MMS **Date:** 12-17-13

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Day:	**Friday**
Date:	**12.13.13**
Log No.:	**8**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:15 AM **Departed:** 5:15 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 46

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (6) Nuclear Density tests and (1) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-04 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material hauled to site from borrow pit.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade. Glover workers also began test pad construction placing/compacting first lift.
- Geotechnics Rep. tested test pad for compaction and pushed shelby tube(s) for lab testing. Shelby tubes were dropped off at laboratory for hydraulic conductivity testing.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.13.13 **Checked By:** MMS **Date:** 12-17-13

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-04**	Geotechnics Representative : Abe Gaeta	Page : 1 of 1
Date (s) : **12.12-12.13.13**	Reviewed By : MMS	Date : 12-17-13

Contractor : Glover Construction			Borrow Source : SILOS 1 - 4
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A		Rod Depth= 6-12" MS= 683 DS= 2302

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	79	P6A	SG	12"	784-02-02	70.4	34.0	**96.9**	**50.1**	**64.6**	**91.7%**	**90.0%**	Tested on 12.12.13
ND -	80	P6A	SG	12"	784-02-02	70.4	34.0	**81.2**	**23.4**	**65.8**	**93.5%**	**90.0%**	Tested on 12.12.13
ND -	81	P6A	SG	12"	784-02-02	70.4	34.0	**79.5**	**16.9**	**68.0**	**96.6%**	**90.0%**	Tested on 12.12.13
ND -	82	P6A	SG	12"	784-02-02	70.4	34.0	**83.7**	**26.0**	**66.4**	**94.4%**	**90.0%**	Tested on 12.12.13
ND -	83	P6A	SG	12"	784-02-02	70.4	34.0	**92.7**	**38.3**	**67.0**	**95.2%**	**90.0%**	Tested on 12.12.13
ND -	84	P6A	SG	12"	784-02-02	70.4	34.0	**81.5**	**20.9**	**67.4**	**95.8%**	**90.0%**	Tested on 12.12.13
ND -	01	P6A	TP/L1	6"	771-01-04	91.1	29.2	**117.8**	**34.5**	**87.6**	**96.1%**	**95.0%**	Tested on 12.13.13
DC -	01	P6A	TP/L1	N/A	771-01-04	91.1	29.2	**115.9**	**34.5**	**86.2**	**94.6%**	**95.0%**	Tested on 12.13.13
ND -	02	P6A	TP/L1	6"	771-01-04	91.1	29.2	**116.2**	**33.4**	**87.1**	**95.6%**	**95.0%**	Tested on 12.13.13
ND -	03	P6A	TP/L1	6"	720-06-01	98.1	21.6	**125.0**	**34.2**	**93.1**	**94.9%**	**95.0%**	Tested on 12.13.13
ND -	04	P6A	TP/L1	6"	771-01-04	91.1	29.2	**117.0**	**33.0**	**88.0**	**96.6%**	**95.0%**	Tested on 12.13.13
ND -	05	P6A	TP/L1	6"	771-01-04	91.1	29.2	**114.3**	**35.0**	**84.7**	**92.9%**	**95.0%**	Tested on 12.13.13
ND -	06	P6A	TP/L1	6"	771-01-04	91.1	29.2	**114.8**	**31.0**	**87.6**	**96.2%**	**95.0%**	Tested on 12.13.13

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-04**
Date (s) :	12.12 - 12.13.13

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01
Nuclear Test Number :	ND-01
Location:	P6A
Depth (ft):	TP/L1
Date :	12.13.13

Mold

Cylinder ID	#1
Weight of Cylinder (lbs.)	1.05
Volume of Cylinder (ft^3)	0.034

Specimen

Wt. of Cylinder & WS (lbs.)	4.99
Wt. of Cylinder (lbs.)	1.05
Wt. of WS	3.94
Cylinder Volume (ft^3)	0.034

Moisture / Density

Tare Number	Z-3
Wt. of Tare & WS (gm)	509.40
Wt. of Tare & DS (gm)	432.80
Wt. of Tare (gm)	211.40
Wt of water (gm)	76.60
Wt. of DS (gm)	221.40
Wet Density (pcf):	115.9
Moisture Content (%):	**34.6**
Dry Density (pcf):	**86.1**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784
Report Number :	**FDR-04**
Date (s) :	12.12 - 12.13.13

geotechnics
INTEGRITY IN TESTING

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/ND-82	STOCKPILE
Depth (ft):	N/A	N/A
Date :	12.12.13	12.13.13

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.70	13.27
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	3.45	4.02
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2
Wt. of Tare & WS (gm)	509.20	538.40
Wt. of Tare & DS (gm)	447.00	470.00
Wt. of Tare (gm)	212.00	211.80
Wt. of water (gm)	62.20	68.40
Wt. of DS (gm)	235.00	258.20
Wet Density (pcf):	104.5	121.8
Moisture Content (%):	**26.5**	**26.5**
Dry Density (pcf):	**82.7**	**96.3**

Comment(s): 1PT-02 was dried back before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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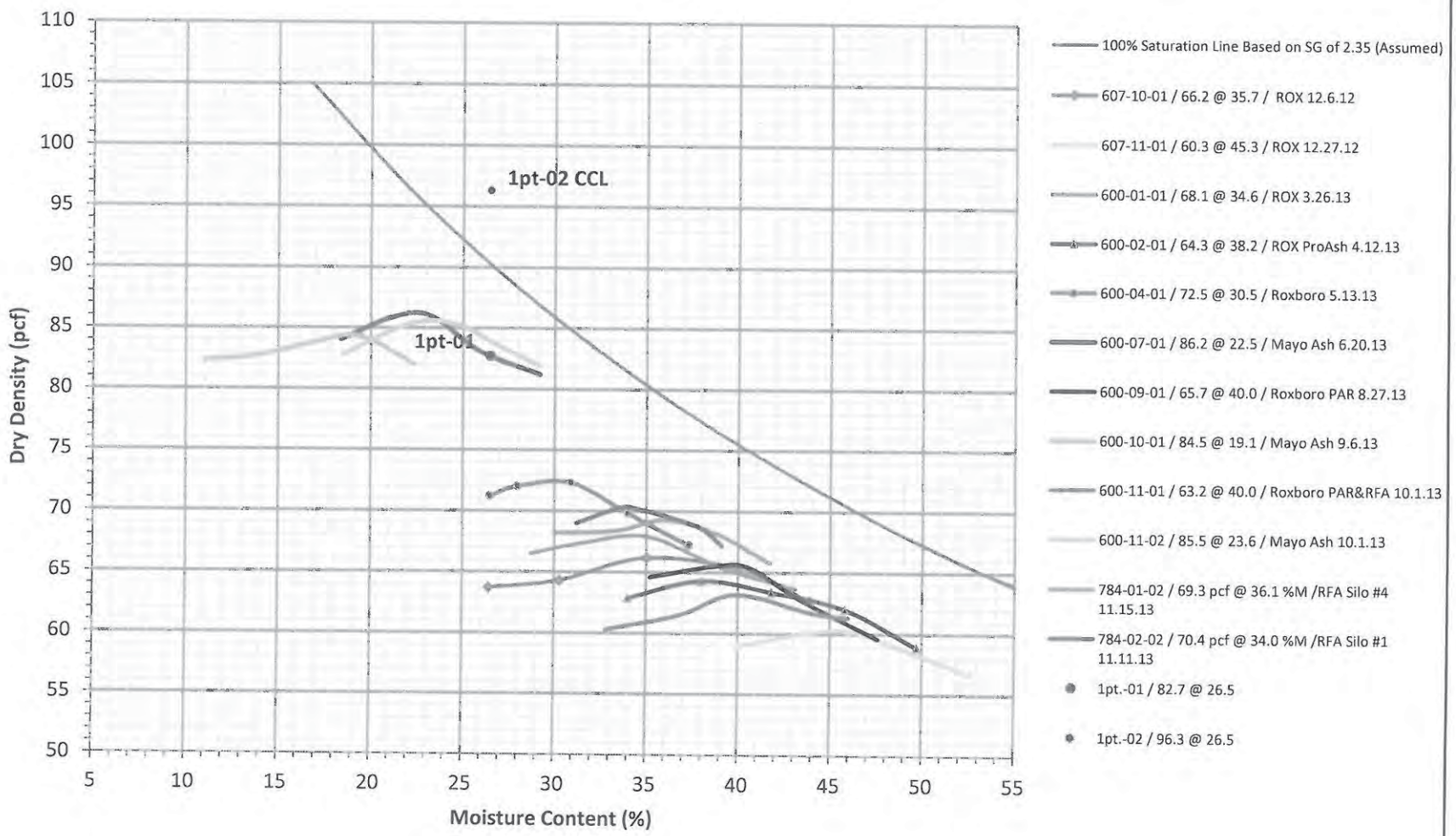
geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 12.12-12.13.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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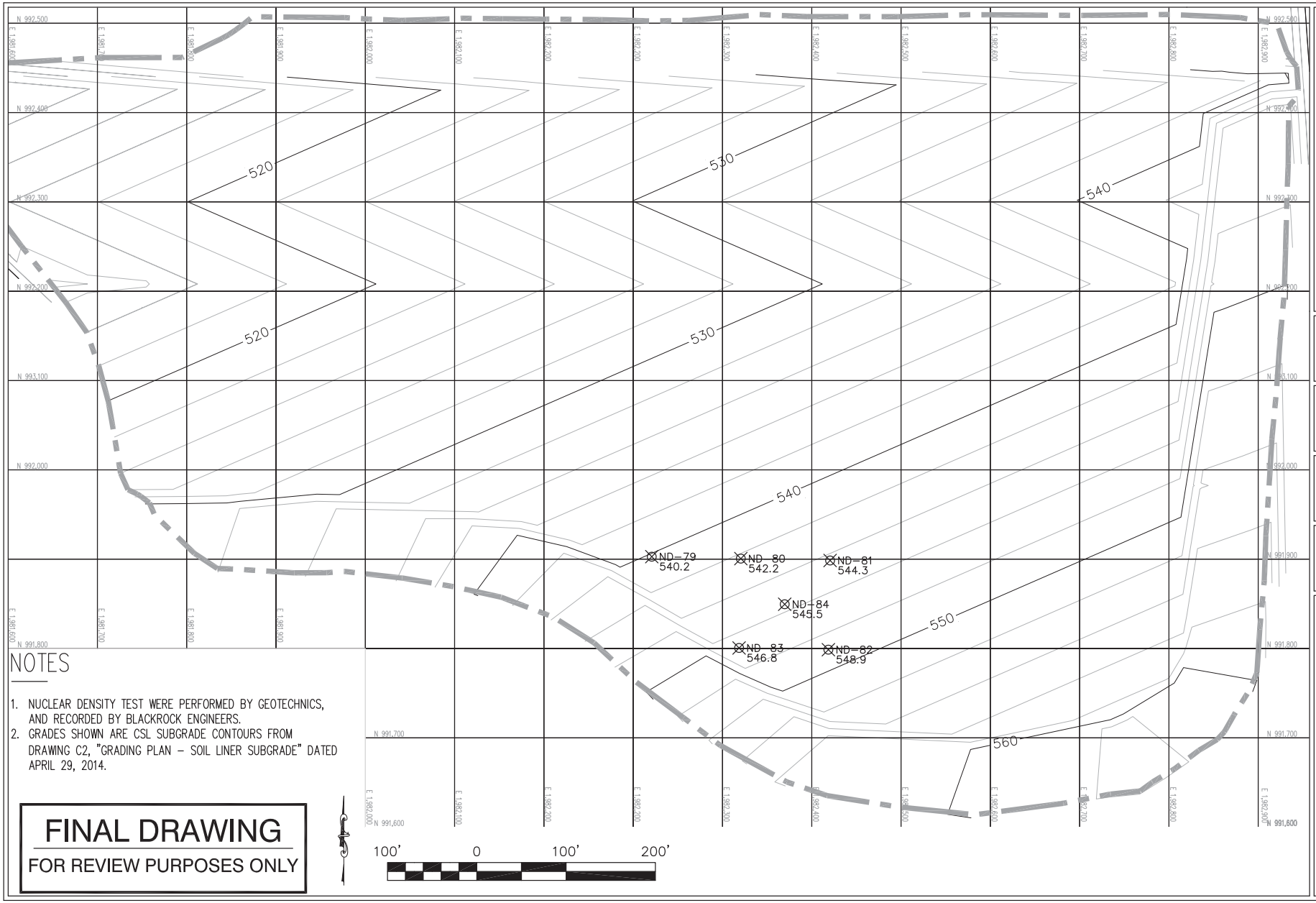

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6A-FDR04
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=100'
PROJECT NO.	11001
CHECKED BY:	WML
DATE:	14.07.16
DRAWN BY:	NAP

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-04

Day:	Tuesday
Date:	12.17.13
Log No.:	9
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:30 AM **Departed:** 4:15 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 55

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (29) Nuclear Density, and (3) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-05 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material at test locations ND-92, and ND-109.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.17.13 **Checked By:** MNPS **Date:** 1/3/14

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Day:	**Wed**
Date:	**12.18.13**
Log No.:	**10**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 1:45 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 47

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (7) Nuclear Density tests and (1) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-05 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material hauled to site from borrow pit.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade. Glover workers also began CCL test pad construction placing/compacting first lift.
- Geotechnics Rep. tested test pad for compaction and pushed Lift 1 shelby tube(s) for lab testing. Shelby tubes were dropped off at laboratory for hydraulic conductivity testing.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.18.13 **Checked By:** MMS **Date:** 1/3/14

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Day:	Thurs
Date:	12.19.13
Log No.:	11
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:00 PM **Departed:** 5:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Mark Nunn / Surveyor
Geotechnics	Mike Smith / Reginal Manager

Weather Conditions: Sunny **Temperature:** 60

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (19) Nuclear Density tests and (1) Drive Cylinder tests in the presence of Blackrock Rep. Randy Berarducci. (see FDR-05 for results).
- Glover placed lift 2 & 3 for CCL test pad. Geotechnics Rep. performed (12) Nuclear Density tests.
- Glover workers continued relocating exsisting undercut ash to areas within cell P6A placing and compacting for subgrade.
- Geotechnics Rep. obtained (2) bucket soil samples for proctor testing in lab from Blackrock Rep. Randy Berarducci.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.19.13 **Checked By:** MMS **Date:** 1/3/14

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Day:	Friday
Date:	12.20.13
Log No.:	12
Page:	1 of 1

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2013-784
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 1:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 68

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (6) Nuclear Density tests on Lift 4 of CCl test pad in the presence of Blackrock Rep. Randy Berarducci. (see FDR-05 for results).
- Geotechnics Rep. performed a 1-point proctor on site using material placed for test pad construction.
- Glover workers relocated exsisting undercut ash to areas within cell P6A placing/compacting as subgrade.
- Geotechnics Rep. pushed shelby tube(s) for Lift 2, 3 and 4 of CCL test pad. Shelby tubes were dropped off at laboratory for hydraulic conductivity testing.
- Geotechnics Rep. departed the site.

Prepared By: AG **Date:** 12.20.13 **Checked By:** MWS **Date:** 1/3/14

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-05**	Geotechnics Representative : Abe Gaeta	Page : 1 of 3
Date (s) : **12.17-12.20.13**	Reviewed By : MMS	Date : 1-3-14

Contractor : Glover Construction		Borrow Source : SILOS 1 - 4 and Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 123.06	WD Offset = N/A	Rod Depth= 6-12"	MS= 675 DS= 2290

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	85	P6A	557.5										SOUTH BERM testing N/A
ND -	86	P6A	550.4	12"	784-01-02	69.3	36.1	**83.2**	**16.9**	**71.2**	**102.7%**	**95.0%**	Tested on 12.17.13
ND -	87	P6A	545.8	12"	784-01-02	69.3	36.1	**80.6**	**15.3**	**69.9**	**100.9%**	**90.0%**	Tested on 12.17.13
ND -	88	P6A	541.2	12"	784-01-02	69.3	36.1	**82.9**	**31.3**	**63.1**	**91.1%**	**90.0%**	Tested on 12.17.13
ND -	89	P6A	536.7	12"	784-01-02	69.3	36.1	**84.1**	**29.8**	**64.8**	**93.5%**	**90.0%**	Tested on 12.17.13
ND -	90	P6A	532.1	12"	600-07-01	86.2	22.5	**94.3**	**19.1**	**79.2**	**91.9%**	**90.0%**	Tested on 12.17.13
ND -	91	P6A	534.1	12"	600-07-01	86.2	22.5	**99.7**	**21.8**	**81.9**	**95.0%**	**90.0%**	Tested on 12.17.13
ND -	92	P6A	538.7	12"	600-02-01	64.3	38.2	**74.8**	**35.9**	**55.0**	**85.6%**	**90.0%**	Tested on 12.17.13
DC -	09	P6A	538.7	N/A	600-02-01	64.3	38.2	**79.7**	**39.7**	**57.1**	**88.7%**	**90.0%**	Taken @ ND-92
ND -	93	P6A	543.2	12"	600-02-01	64.3	38.2	**79.0**	**27.5**	**62.0**	**96.4%**	**90.0%**	Tested on 12.17.13
ND -	94	P6A	547.8	12"	784-01-02	69.3	36.1	**82.0**	**22.3**	**67.0**	**96.8%**	**90.0%**	Tested on 12.17.13
ND -	95	P6A	552.4	12"	784-01-02	69.3	36.1	**89.1**	**21.8**	**73.2**	**105.6%**	**90.0%**	Tested on 12.17.13
ND -	96	P6A	557.9									**90.0%**	SOUTH BERM testing N/A
ND -	97	P6A	561.7									**90.0%**	SOUTH BERM testing N/A
ND -	98	P6A	554.4	12"	600-02-01	64.3	36.1	**79.1**	**14.7**	**69.0**	**107.3%**	**95.0%**	Tested on 12.17.13
ND -	99	P6A	549.8	12"	600-02-01	64.3	38.2	**84.2**	**33.1**	**63.3**	**98.4%**	**90.0%**	Tested on 12.17.13
ND -	100	P6A	545.2	N/A	600-02-01	64.3	38.2	**79.6**	**37.1**	**58.1**	**90.3%**	**90.0%**	Taken @ ND-101
ND -	101	P6A	540.7	12"	600-02-01	64.3	38.2	**81.2**	**30.6**	**62.2**	**96.7%**	**90.0%**	Tested on 12.17.13
DC -	10	P6A	540.7	12"	600-02-01	64.3	38.2	**82.1**	**34.1**	**61.2**	**95.2%**	**90.0%**	Tested on 12.17.13
ND -	102	P6A	536.1	12"	600-02-01	64.3	38.2	**82.1**	**35.2**	**60.7**	**94.4%**	**90.0%**	Tested on 12.17.13
ND -	103	P6A	538.2	12"	600-02-01	64.3	38.2	**80.3**	**33.1**	**60.3**	**93.8%**	**90.0%**	Tested on 12.17.13
ND -	104	P6A	542.6	12"	600-02-01	64.3	38.2	**86.0**	**29.5**	**66.4**	**103.3%**	**90.0%**	Tested on 12.17.13
ND -	105	P6A	547.2	12"	600-02-01	64.3	38.2	**84.0**	**37.3**	**61.2**	**95.1%**	**90.0%**	Tested on 12.17.13
ND -	106	P6A	551.8	12"	600-04-01	72.5	30.5	**95.6**	**31.4**	**72.8**	**100.4%**	**90.0%**	Tested on 12.17.13
ND -	107	P6A	556.3	12"	600-04-01	72.5	30.5	**85.2**	**19.3**	**71.4**	**98.5%**	**95.0%**	Tested on 12.17.13
ND -	108	P6A	539.3	12"	600-02-01	64.3	38.1	**84.4**	**41.8**	**59.5**	**92.6%**	**90.0%**	Tested on 12.17.13
ND -	109	P6A	534.6	12"	784-01-02	69.3	36.1	**83.0**	**30.7**	**63.5**	**91.6%**	**90.0%**	Tested on 12.17.13
ND -	110	P6A	530.1	12"	600-02-01	64.3	38.1	**82.1**	**38.8**	**59.1**	**92.0%**	**90.0%**	Tested on 12.17.13

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

Geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-05**		Geotechnics Representative : Abe Gaeta	Page : 2 of 3
Date (s) : **12.17-12.20.13**		Reviewed By : AMM	Date : 1-3-14

Contractor : Glover Construction		Borrow Source : SILOS 1 - 4 and Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 123.06	WD Offset = N/A	Rod Depth= 6-12"	MS= 671 DS= 2307

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	111	P6A	532.5	12"	600-02-01	64.3	38.1	**84.1**	**38.9**	**60.5**	**94.2%**	**90.0%**	Tested on 12.17.13
ND -	112	P6A	537.2	12"	784-01-02	69.3	36.1	**88.8**	**36.1**	**65.2**	**94.2%**	**90.0%**	Tested on 12.17.13
DC -	11	P6A	537.2	12"	784-01-02	69.3	36.1	**91.8**	**44.0**	**63.8**	**92.0%**	**90.0%**	Tested on 12.17.13
ND -	92R	P6A	538.7	12"	600-02-01	64.3	38.2	**79.2**	**32.3**	**59.9**	**93.1%**	**90.0%**	Retest for ND-92
ND -	113	P6A	527.4	12"	784-01-02	69.3	36.1	**81.9**	**31.0**	**62.5**	**90.2%**	**90.0%**	Tested on 12.18.13
ND -	114	P6A	525.0	12"	784-01-02	69.3	36.1	**88.1**	**30.7**	**67.4**	**97.3%**	**90.0%**	Tested on 12.18.13
ND -	115	P6A	522.9	12"	784-01-02	69.3	36.1	**79.8**	**27.7**	**62.5**	**90.2%**	**90.0%**	Tested on 12.18.13
ND -	116	P6A	520.6	12"	784-01-02	69.3	36.1	**85.4**	**29.6**	**65.9**	**95.1%**	**90.0%**	Tested on 12.18.13
ND -	117	P6A	518.3	12"	784-01-02	69.3	36.1	**89.5**	**33.0**	**67.3**	**97.1%**	**90.0%**	Tested on 12.18.13
ND -	118	P6A	516.4	12"	784-01-02	69.3	36.1	**94.2**	**33.3**	**70.7**	**102.0%**	**90.0%**	Tested on 12.18.13
DC -	12	P6A	516.4	N/A	784-01-02	69.3	36.1	**92.1**	**35.3**	**68.1**	**98.2%**	**90.0%**	Tested on 12.18.13
ND -	119	P6A	513.7	12"	784-01-02	69.3	36.1	**98.9**	**43.4**	**69.0**	**99.5%**	**90.0%**	Tested on 12.18.13
ND -	120	P6A	538.0	12"	784-01-02	69.3	36.1	**83.7**	**18.0**	**70.9**	**102.4%**	**95.0%**	Tested on 12.19.13
ND -	121	P6A	534.3	12"	784-01-02	69.3	36.1	**83.0**	**20.0**	**69.2**	**99.8%**	**90.0%**	Tested on 12.19.13
ND -	122	P6A	531.3	12"	784-01-02	69.3	36.1	**84.6**	**20.6**	**70.1**	**101.2%**	**90.0%**	Tested on 12.19.13
ND -	123	P6A	528.8	12"	784-01-02	69.3	36.1	**89.3**	**29.6**	**68.9**	**99.4%**	**90.0%**	Tested on 12.19.13
ND -	124	P6A	526.8	12"	784-01-02	69.3	36.1	**89.9**	**26.9**	**70.8**	**102.2%**	**90.0%**	Tested on 12.19.13
ND -	125	P6A	524.5	12"	784-01-02	69.3	36.1	**88.2**	**30.1**	**67.8**	**97.8%**	**90.0%**	Tested on 12.19.13
ND -	126	P6A	519.2	12"	607-11-01	60.3	45.3	**78.4**	**40.2**	**55.9**	**92.7%**	**90.0%**	Tested on 12.19.13
ND -	127	P6A	521.9	12"	600-04-01	72.5	30.5	**99.6**	**36.6**	**72.9**	**100.6%**	**90.0%**	Tested on 12.19.13
ND -	128	P6A	523.8	12"	600-04-01	72.5	30.5	**96.0**	**35.5**	**70.8**	**97.7%**	**90.0%**	Tested on 12.19.13
ND -	129	P6A	525.7	12"	600-04-01	72.5	30.5	**97.1**	**45.9**	**66.6**	**91.8%**	**90.0%**	Tested on 12.19.13
ND -	130	P6A	527.6	12"	600-04-01	72.5	30.5	**99.3**	**38.7**	**71.6**	**98.7%**	**90.0%**	Tested on 12.19.13
ND -	131	P6A	529.7	12"	600-02-01	64.3	38.2	**81.8**	**32.6**	**61.7**	**95.9%**	**90.0%**	Tested on 12.19.13
ND -	132	P6A	526.5	12"	600-02-01	64.3	38.2	**89.2**	**32.8**	**67.2**	**104.5%**	**90.0%**	Tested on 12.19.13
ND -	133	P6A	524.4	12"	600-02-01	64.3	38.2	**84.8**	**45.9**	**58.1**	**90.4%**	**90.0%**	Tested on 12.19.13
ND -	134	P6A	522.4	12"	600-02-01	64.3	38.2	**85.1**	**33.1**	**63.9**	**99.4%**	**90.0%**	Tested on 12.19.13
ND -	135	P6A	520.6	12"	600-02-01	64.3	38.2	**84.1**	**35.5**	**62.1**	**96.5%**	**90.0%**	Tested on 12.19.13

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-05**	Geotechnics Representative : Abe Gaeta	Page : 3 of 3
Date (s) : **12.17-12.20.13**	Reviewed By : MMS	Date : 1-3-14

Contractor :	Glover Construction	Borrow Source :	ASH SILOS 1 - 4 and Site "G" Borrow Pit (CLAY)
Superintendent :	Reuben Williams		
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER, CAT 825G QUAD SHEEPSFOOT COMPACTOR.
Moisture Offset = -38.16	WD Offset = N/A	Rod Depth= 6-12"	MS= 681 DS= 2312

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND - 136	P6A	518.6	12"	600-02-01	64.3	38.1	**83.7**	**40.1**	**59.7**	**92.9%**	**90.0%**	Tested on 12.19.13
ND - 137	P6A	516.5	12"	784-01-02	69.3	36.1	**89.6**	**34.4**	**66.7**	**96.2%**	**90.0%**	Tested on 12.19.13
DC - 13	P6A	516.5	N/A	784-01-02	69.3	36.1	**86.8**	**37.9**	**62.9**	**90.8%**	**90.0%**	Tested on 12.19.13
ND - 138	P6A	515.6	12"	784-01-02	69.3	36.1	**92.6**	**37.4**	**67.4**	**97.3%**	**90.0%**	Clay Test Pad tested 12.19.13
ND - 01	P6A	Test Pad	12"	771-01-04	91.1	29.2	**119.1**	**32.5**	**89.9**	**98.7%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 02	P6A	Test Pad	12"	771-01-04	91.1	29.2	**119.1**	**34.6**	**88.5**	**97.1%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 03	P6A	Test Pad	12"	771-01-04	91.1	29.2	**118.6**	**32.4**	**89.6**	**98.3%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 04	P6A	Test Pad	12"	771-01-04	91.1	29.2	**120.6**	**31.3**	**91.9**	**100.8%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 05	P6A	Test Pad	12"	771-01-04	91.1	29.2	**120.8**	**34.1**	**90.1**	**98.9%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 06	P6A	Test Pad	12"	771-01-04	91.1	29.2	**117.7**	**33.4**	**88.2**	**96.9%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 07	P6A	Test Pad	N/A	771-01-04	91.1	29.2	**118.0**	**36.0**	**86.8**	**95.2%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 08	P6A	Test Pad	12"	771-01-04	91.1	29.2	**117.8**	**35.2**	**87.1**	**95.6%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 09	P6A	Test Pad	12"	771-01-04	91.1	29.2	**116.4**	**33.1**	**87.5**	**96.0%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 10	P6A	Test Pad	12"	771-01-04	91.1	29.2	**116.4**	**34.5**	**86.5**	**95.0%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 11	P6A	Test Pad	12"	771-01-04	91.1	29.2	**119.6**	**33.7**	**89.5**	**98.2%**	**95.0%**	Clay Test Pad tested 12.19.13
ND - 12	P6A	Test Pad	12"	771-01-04	91.1	29.2	**116.9**	**34.5**	**86.9**	**95.4%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 01	P6A	Test Pad	12"	605-01-03	93.2	28.2	**120.5**	**30.6**	**92.3**	**99.0%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 02	P6A	Test Pad	12"	720-06-01	98.1	21.6	**123.6**	**29.3**	**95.6**	**97.4%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 03	P6A	Test Pad	12"	605-01-03	93.2	28.2	**119.1**	**29.2**	**92.2**	**98.9%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 04	P6A	Test Pad	12"	605-01-03	93.2	28.2	**116.6**	**30.7**	**89.2**	**95.7%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 05	P6A	Test Pad	12"	605-01-03	93.2	28.2	**121.9**	**31.4**	**92.8**	**99.5%**	**95.0%**	Clay Test Pad tested 12.20.13
ND - 06	P6A	Test Pad	12"	605-01-03	93.2	28.2	**121.9**	**28.9**	**94.6**	**101.5%**	**95.0%**	Clay Test Pad tested 12.20.13

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-05**
Date (s) :	12.17 - 12.20.13

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-09	DC-10	DC-11	DC-12
Nuclear Test Number :	ND-92	ND-101	ND-112	ND-01
Location:	P6A	P6A	P6A	P6A
Depth (ft):	538.7	540.7	537.2	516.4
Date :	12.17.13	12.17.13	12.17.13	12.18.13
Mold				
Cylinder ID	#1	#1	#1	#1
Weight of Cylinder (lbs.)	1.05	1.05	1.05	1.05
Volume of Cylinder (ft^3)	0.034	0.034	0.034	0.034
Specimen				
Wt. of Cylinder & WS (lbs.)	3.76	3.84	4.17	4.18
Wt. of Cylinder (lbs.)	1.05	1.05	1.05	1.05
Wt. of WS	2.71	2.79	3.12	3.13
Cylinder Volume (ft^3)	0.034	0.034	0.034	0.034
Moisture / Density				
Tare Number	Z-3	Z-3	Z-3	Z-1
Wt. of Tare & WS (gm)	535.40	542.60	511.60	682.20
Wt. of Tare & DS (gm)	443.20	458.40	419.80	559.00
Wt. of Tare (gm)	211.20	211.20	211.20	210.00
Wt of water (gm)	92.20	84.20	91.80	123.20
Wt. of DS (gm)	232.00	247.20	208.60	349.00
Wet Density (pcf):	79.7	82.1	91.8	92.1
Moisture Content (%):	**39.7**	**34.1**	**44.0**	**35.3**
Dry Density (pcf):	**57.0**	**61.2**	**63.7**	**68.0**

Comment(s):

Geotechnics Representative : Abe Gaeta

2200 Westinghouse Boulevard • Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Report Number :	**FDR-05**
Date (s) :	12.17 - 12.20.13

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-13
Nuclear Test Number :	ND-137
Location:	P6A
Depth (ft):	516.5
Date :	12.19.13

Mold

Cylinder ID	#1
Weight of Cylinder (lbs.)	1.05
Volume of Cylinder (ft^3)	0.034

Specimen

Wt. of Cylinder & WS (lbs.)	4.00
Wt. of Cylinder (lbs.)	1.05
Wt. of WS	2.95
Cylinder Volume (ft^3)	0.034

Moisture / Density

Tare Number	Z-2
Wt. of Tare & WS (gm)	494.60
Wt. of Tare & DS (gm)	416.60
Wt. of Tare (gm)	211.00
Wt of water (gm)	78.00
Wt. of DS (gm)	205.60

Wet Density (pcf):	86.8
Moisture Content (%):	**37.9**
Dry Density (pcf):	**62.9**

Comment(s):

Geotechnics Representative : Abe Gaeta

2200 Westinghouse Boulevard • Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

Geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-05**
Date (s) :	12.17 - 12.20.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information				
Test Number :	1pt-01	1pt-02	1pt-03	1pt-04
Location:	P6A/ND-92	P6A/ND-109	TP MATERIAL	P6A/ND-114
Depth (ft):	538.7	534.6	N/A	N/A
Date :	12.17.13	12.17.13	12.18.13	12.18.13
Mold				
Weight of Mold (lbs.)	9.23	9.23	9.23	9.23
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Weight of Mold & WS (lbs)	12.23	12.34	13.08	12.35
Weight of Mold (lbs)	9.23	9.23	9.23	9.23
Weight of WS (lbs)	3.00	3.11	3.85	3.12
Volume of Mold (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	Z-3	Z-3	Z-3	Z-1
Wt. of Tare & WS (gm)	504.80	534.80	490.80	500.40
Wt. of Tare & DS (gm)	418.60	449.00	427.60	422.20
Wt. of Tare (gm)	211.20	211.20	211.20	210.00
Wt. of water (gm)	86.20	85.80	63.20	78.20
Wt. of DS (gm)	207.40	237.80	216.40	212.20
Wet **Density (pcf):**	90.9	94.2	116.7	94.5
Moisture Content (%):	**41.6**	**36.1**	**29.2**	**36.9**
Dry Density (pcf):	**64.2**	**69.3**	**90.3**	**69.1**

Comment(s): 1PT-01, 02, 04 had water added to material before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2013-784

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-05**
Date (s) :	12.17 - 12.20.13

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-05
Location:	Test Pad
Depth (ft):	N/A
Date :	12.20.13

Mold

Weight of Mold (lbs.)	9.23
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	13.11
Weight of Mold (lbs)	9.23
Weight of WS (lbs)	3.88
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	Z-4
Wt. of Tare & WS (gm)	573.00
Wt. of Tare & DS (gm)	486.00
Wt. of Tare (gm)	212.00
Wt. of water (gm)	87.00
Wt. of DS (gm)	274.00
Wet **Density (pcf):**	117.6
Moisture Content (%):	**31.8**
Dry Density (pcf):	**89.2**

Comment(s): N/A

Geotechnics Representative : Abe Gaeta

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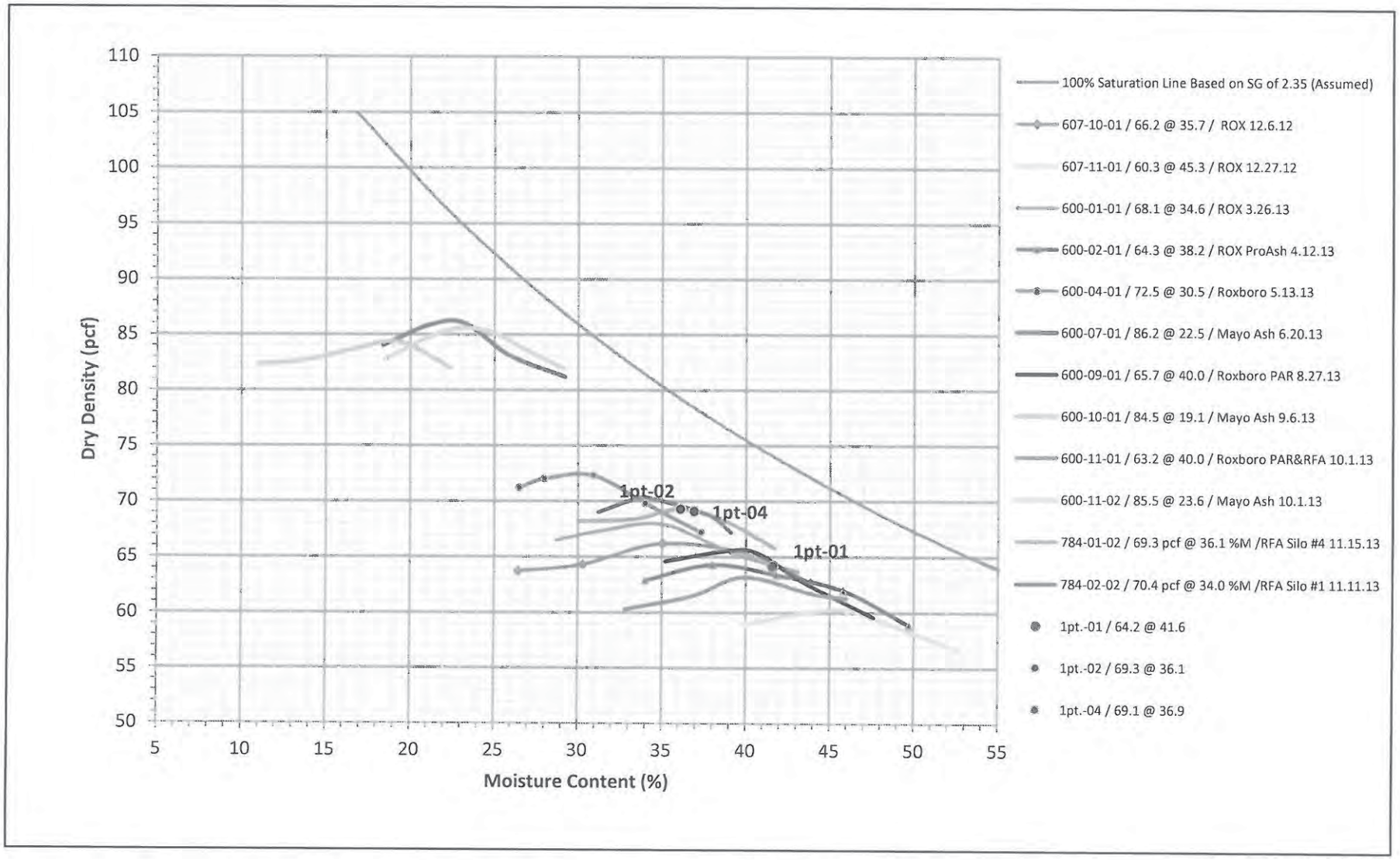
geotechnics
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 12.17-12.20.13
Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2013-784



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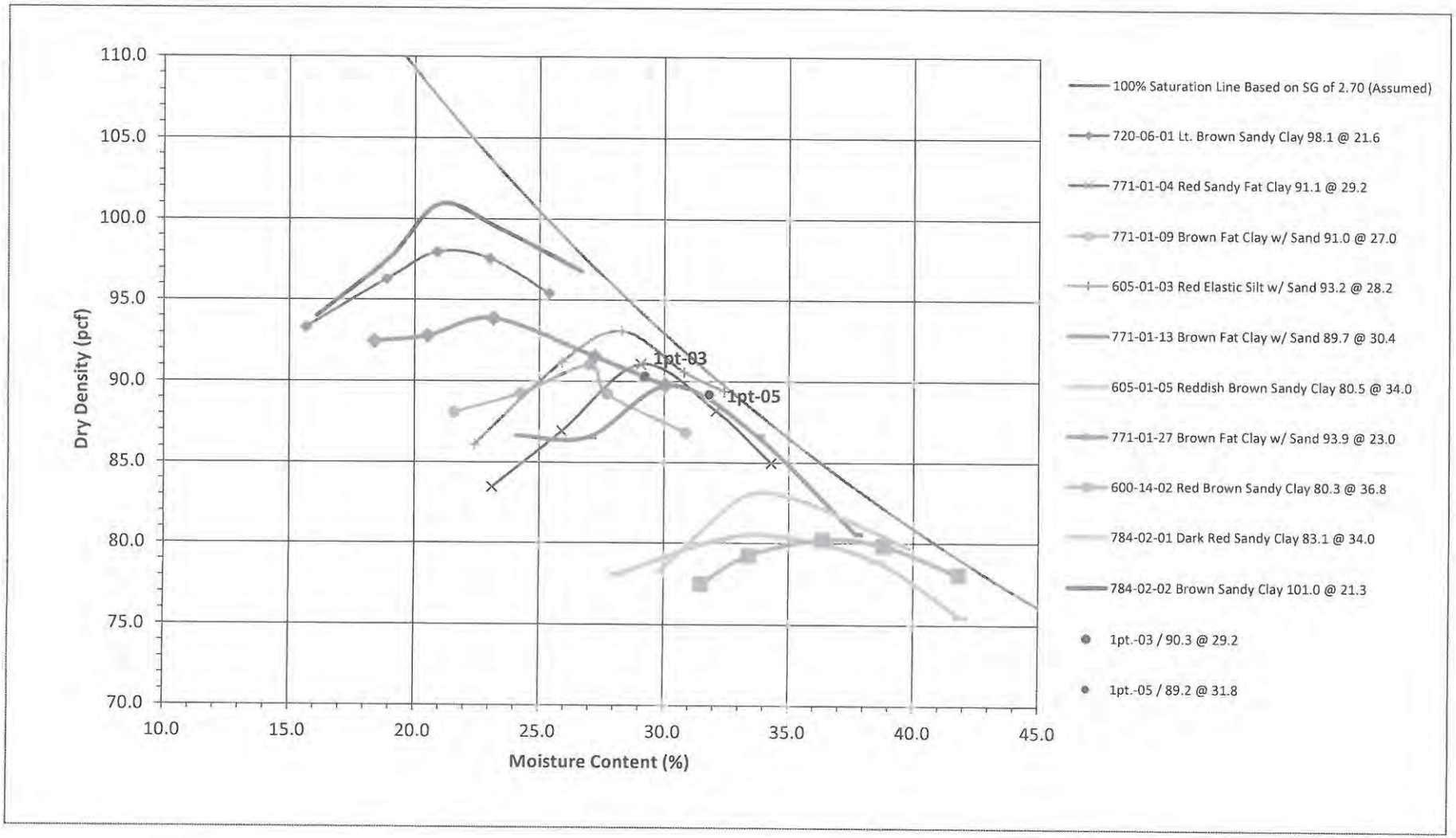
geotechnics
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Client: BLACKROCK
Project Name : ROXBORO P6A ASH LF
Project Number : 2013-784



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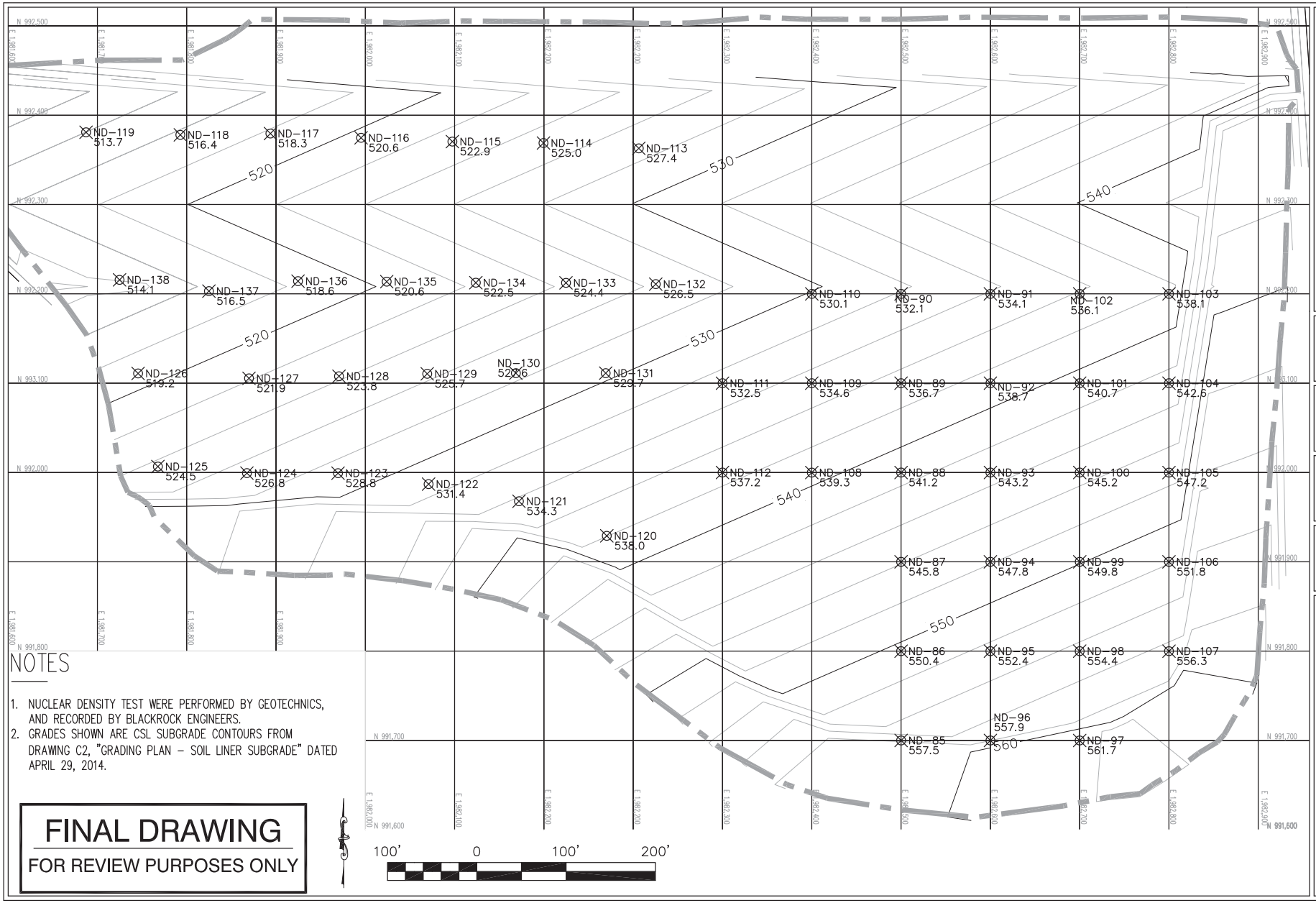

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6A-FDR05
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=100'
PROJECT NO.	11001
CHECKED BY:	WML
DATE:	14.07.16
DRAWN BY:	NAP

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-05

Day:	Wed
Date:	4.2.14
Log No.:	14
Page:	1 of 2

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 1:45 PM **Departed:** 4:15 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 83

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for areas of ash subgrade that had been previously filled due to rain washout.
- A total of (15) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci. In addition (1) Drive Cylinder test was performed in field.
- Geotechnics Rep. departed the site.

Prepared By:	APG	4.2.14	**Checked By:**	MPS	**Date:** 4.7.14

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Day:	Thursday
Date:	4.3.14
Log No.:	15
Page:	2 of 2

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 10:45 AM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title

Weather Conditions: Sunny **Temperature:** 42

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for areas of ash subgrade that had been previously filled due to rain washout. Testing was performed at floor of cell and along berm.
- A total of (17) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci. In addition (1) Drive Cylinder test was performed in field.
- Geotechnics Rep. ran a One-point Proctor on-site using material taken at ND-19.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	4.3.14	**Checked By:**	MPS	**Date:**	4.7.14

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-06**	Geotechnics Representative : Abe Gaeta	Page : 1 of 5
Date (s) : **4.2 & 4.3.14**	Reviewed By : MPS	Date : 4.7.14

Contractor : Glover Construction		Borrow Source : ONSITE SILOS 1 - 4	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 129.79	WD Offset = +4.0 pcf	Rod Depth= 6-12"	MS= 679 DS= 2276

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	01	P6A	SG	8"	600-11-01	63.2	40.0	**75.7**	**26.7**	**59.7**	**94.5%**	**90.0%**	Tested on 4.2.14
ND -	02	P6A	SG	8"	602-03-02	65.9	36.1	**82.0**	**26.8**	**64.7**	**98.1%**	**90.0%**	Tested on 4.2.14
ND -	03	P6A	SG	8"	602-03-02	65.9	36.1	**80.6**	**28.7**	**62.6**	**95.0%**	**90.0%**	Tested on 4.2.14
ND -	04	P6A	SG	8"	602-03-02	65.9	36.1	**82.9**	**31.1**	**63.2**	**96.0%**	**90.0%**	Tested on 4.2.14
ND -	05	P6A	SG	8"	602-01-01	75.6	31.0	**90.9**	**23.0**	**73.9**	**97.8%**	**90.0%**	Tested on 4.2.14
ND -	06	P6A	SG	8"	600-11-02	85.5	23.6	**86.0**	**11.3**	**77.3**	**90.4%**	**90.0%**	Tested on 4.2.14
ND -	07	P6A	SG	8"	602-01-01	75.6	31.0	**82.5**	**16.8**	**70.6**	**93.4%**	**90.0%**	Tested on 4.2.14
ND -	08	P6A	SG	8"	602-01-01	75.6	31.0	**87.5**	**20.4**	**72.7**	**96.1%**	**90.0%**	Tested on 4.2.14
ND -	09	P6A	SG	8"	600-11-01	63.2	40.0	**86.9**	**41.5**	**61.4**	**97.2%**	**90.0%**	Tested on 4.2.14
ND -	10	P6A	SG	8"	600-11-01	63.2	40.0	**78.1**	**30.0**	**60.1**	**95.1%**	**90.0%**	Tested on 4.2.14
DC -	1	P6A	SG	N/A	600-11-01	63.2	40.0	**78.5**	**33.3**	**58.9**	**93.2%**	**90.0%**	DC-01 taken @ ND-10
ND -	11	P6A	SG	8"	602-01-01	75.6	31.0	**89.7**	**23.7**	**72.5**	**95.9%**	**90.0%**	Tested on 4.2.14
ND -	12	P6A	SG	8"	602-01-01	75.6	31.0	**90.7**	**23.6**	**73.4**	**97.1%**	**90.0%**	Tested on 4.2.14
ND -	13	P6A	SG	8"	N/A			**119.9**	**18.2**	**101.4**		**90.0%**	Tested @ North Road 4.2.14
ND -	14	P6A	SG	8"	N/A			**130.4**	**22.5**	**106.4**		**90.0%**	Tested @ North Road 4.2.14
ND -	15	P6A	SG	8"	N/A			**93.2**	**43.2**	**65.1**		**90.0%**	Tested @ North Road 4.2.14
ND -	16	P6A	SG	8"	602-01-01	75.6	31.0	**102.7**	**36.8**	**75.1**	**99.3%**	**90.0%**	Tested on 4.3.14
ND -	17	P6A	SG	8"	602-01-01	75.6	31.0	**100.0**	**39.7**	**71.6**	**94.7%**	**90.0%**	Tested on 4.3.14
ND -	18	P6A	SG	8"	602-01-01	75.6	31.0	**88.7**	**24.3**	**71.4**	**94.4%**	**90.0%**	Tested on 4.3.14
ND -	19	P6A	SG	8"	784-01-01	70.4	34.0	**92.7**	**35.6**	**68.4**	**97.1%**	**90.0%**	Tested on 4.3.14
ND -	20	P6A	SG	8"	784-01-02	69.3	36.1	**86.5**	**36.0**	**63.6**	**91.8%**	**90.0%**	Tested on 4.3.14
ND -	21	P6A	SG	8"	602-01-01	75.6	31.0	**90.5**	**24.0**	**73.0**	**96.5%**	**90.0%**	Tested on 4.3.14
ND -	22	P6A	SG	8"	602-01-01	75.6	31.0	**96.1**	**33.9**	**71.8**	**94.9%**	**90.0%**	Tested on 4.3.14
ND -	23	P6A	SG	8"	602-01-01	75.6	31.0	**94.6**	**27.1**	**74.4**	**98.5%**	**90.0%**	Tested on 4.3.14
DC -	2	P6A	SG	N/A	602-01-01	75.6	31.0	**90.3**	**29.3**	**69.8**	**92.4%**	**90.0%**	DC-02 taken @ ND-23
ND -	24	P6A	South Berm	12"	600-10-01	84.5	19.1	**102.8**	**31.3**	**78.3**	**92.7%**	**90.0%**	Tested on 4.3.14
ND -	25	P6A	South Berm	12"	600-10-01	84.5	19.1	**108.4**	**37.0**	**79.1**	**93.6%**	**90.0%**	Tested on 4.3.14
ND -	26	P6A	South Berm	12"	600-11-01	63.2	40.0	**85.8**	**38.5**	**61.9**	**98.0%**	**90.0%**	Tested on 4.3.14

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-06**	Geotechnics Representative : Abe Gaeta	Page : 2 of 5
Date (s) : **4.2 & 4.3.14**	Reviewed By : MPS	Date : 4.7.14

Contractor : Glover Construction		Borrow Source : ONSITE SILOS 1 - 4	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 129.79	WD Offset = +4.0 pcf	Rod Depth= 6-12"	MS= 679 DS= 2276

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	27	P6A	South Berm	12"	784-01-02	69.3	36.1	**87.1**	**32.6**	**65.7**	**94.8%**	**90.0%**	Tested on 4.3.14
ND -	28	P6A	South Berm	12"	600-11-01	63.2	40.0	**75.9**	**30.2**	**58.3**	**92.2%**	**90.0%**	Tested on 4.3.14
DC -	29	P6A	South Berm	12"	784-01-02	69.3	36.1	**88.6**	**34.6**	**65.8**	**95.0%**	**90.0%**	Tested on 4.3.14
ND -	30	P6A	South Berm	12"	784-01-02	69.3	36.1	**81.8**	**24.5**	**65.7**	**94.8%**	**90.0%**	Tested on 4.3.14
ND -	31	P6A	South Berm	12"	602-01-01	75.6	31.0	**88.1**	**23.2**	**71.5**	**94.6%**	**90.0%**	Tested on 4.3.14
ND -	32	P6A	South Berm	12"	602-01-01	75.6	31.0	**86.3**	**23.5**	**69.9**	**92.4%**	**90.0%**	Tested on 4.3.14

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2014-610

Report Number :	**FDR-06**
Date (s) :	4.2 & 4.3.14

Drive Cylinder - ASTM D 2937

Test Information		
Test Number :	DC-01	DC-02
Nuclear Test Number :	ND-10	ND-23
Location:	P6A	P6A
Depth (ft):	SG	SG
Date :	4.2.14	4.3.14
Mold		
Cylinder ID	#1	#2
Weight of Cylinder (lbs.)	1.49	1.48
Volume of Cylinder (ft^3)	0.033	0.033
Specimen		
Wt. of Cylinder & WS (lbs.)	4.08	4.46
Wt. of Cylinder (lbs.)	1.49	1.48
Wt. of WS	2.59	2.98
Cylinder Volume (ft^3)	0.033	0.033
Moisture / Density		
Tare Number	Z-2	Z-2
Wt. of Tare & WS (gm)	530.40	624.60
Wt. of Tare & DS (gm)	449.80	530.10
Wt. of Tare (gm)	208.00	208.00
Wt of water (gm)	80.60	94.50
Wt. of DS (gm)	241.80	322.10
Wet Density (pcf):	78.5	90.3
Moisture Content (%):	**33.3**	**29.3**
Dry Density (pcf):	**58.9**	**69.8**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2014-610

geotechnics
INTEGRITY IN TESTING

Report Number :	**FDR-06**
Date (s) :	4.3.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	P6A/ND-19
Depth (ft):	SG
Date :	4.3.14

Mold

Weight of Mold (lbs.)	9.25
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	12.31
Weight of Mold (lbs)	9.25
Weight of WS (lbs)	3.06
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	Z-2
Wt. of Tare & WS (gm)	587.60
Wt. of Tare & DS (gm)	491.40
Wt. of Tare (gm)	208.00
Wt. of water (gm)	96.20
Wt. of DS (gm)	283.40
Wet **Density (pcf):**	92.7
Moisture Content (%):	**33.9**
Dry Density (pcf):	**69.2**

Comment(s): Additional water was added to material before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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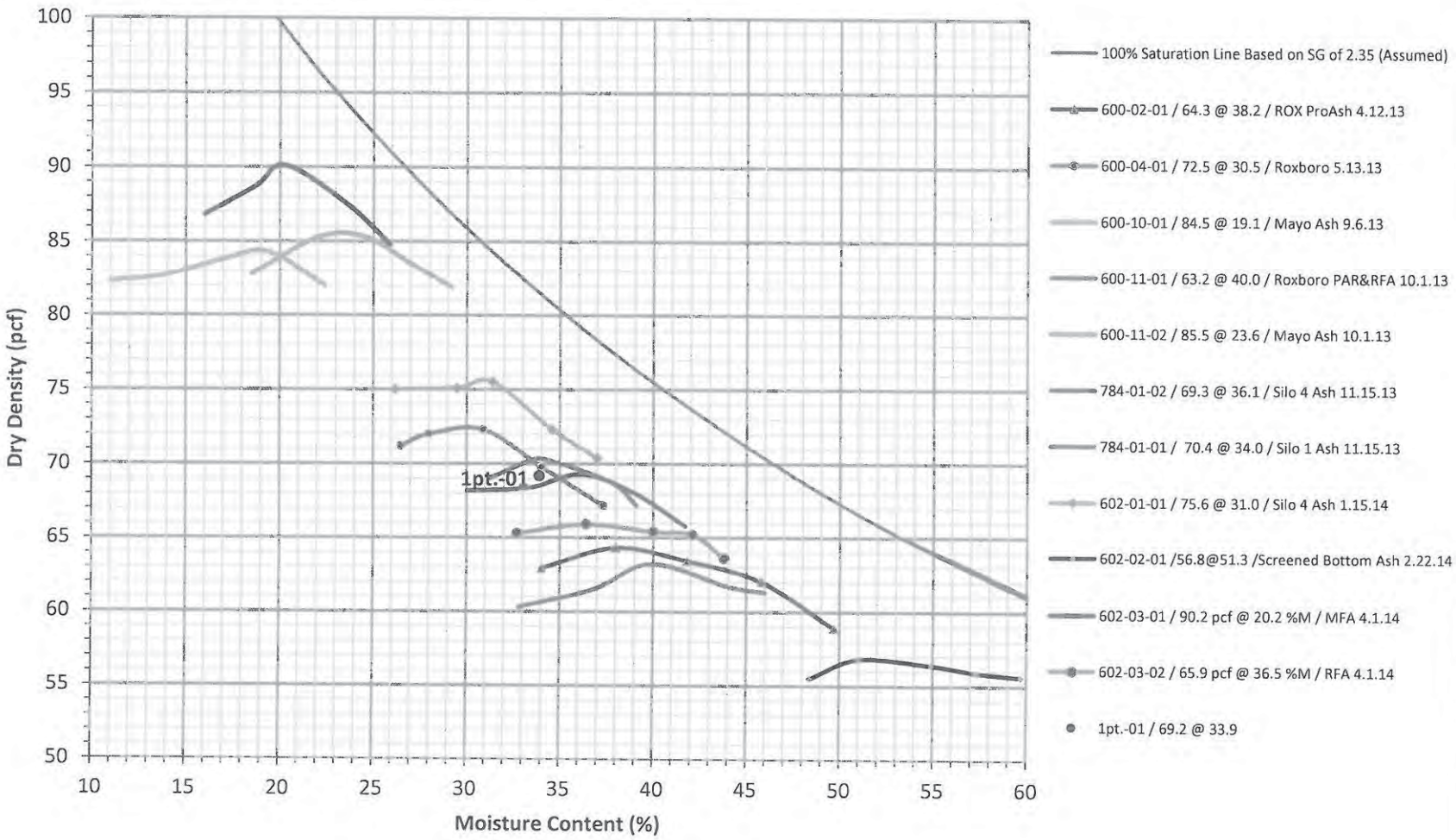
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 4.3.14
Client: Blackrock Engineers
Project Name : Roxboro Ash Landfill Phase 6A
Project Number : 2014-610



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Day:	**Thursday**
Date:	**4.10.14**
Log No.:	**16**
Page:	**1 of 2**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:30 PM **Departed:** 5:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 72-76 F

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for certified subgrade that had been set to grade by Glover Construction.
- A total of (18) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn.In addition (2) Drive Cylinder tests were performed onsite at nuclear density locations ND-06, and ND-17.
- Geotechnics Rep. performed a 1-point test at nuclear density test location ND-01.
- Geotechnics Rep. departed the site.

Prepared By:	APG	4.10.14	**Checked By:**	MPS	**Date:** 4.14.14

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Day:	**Friday**
Date:	**4.11.14**
Log No.:	**17**
Page:	**2 of 2**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 1:00 PM **Departed:** 5:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-79 F

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for certified subgrade (CSG) that had been set to grade by Glover Construction.
- A total of (15) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn.In addition (2) Drive Cylinder tests were performed onsite at nuclear density locations ND-23, and ND-33.
- Geotechnics Rep. performed a 1-point test at nuclear density test location ND-22.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	4.11.14	**Checked By:**	MPS	**Date:**	4.14.14

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-07**		Geotechnics Representative : Abe Gaeta	Page : 1 of 5
Date (s) : **4.10 & 4.11.14**		Reviewed By :	Date :

Contractor : Glover Construction		Borrow Source : ONSITE SILOS 1 - 4	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER
Moisture Offset = 129.79	WD Offset = +4.0 pcf	Rod Depth= 4"	MS= 679 DS= 2294

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	01	P6A	CSG	4"	602-01-01	75.6	31.0	**95.5**	**32.9**	**71.9**	**95.1%**	**95.0%**	Tested on 4.10.14
ND -	02	P6A	CSG	4"	602-01-01	75.6	31.0	**96.9**	**28.7**	**75.3**	**99.6%**	**95.0%**	Tested on 4.10.14
ND -	03	P6A	CSG	4"	602-02-01	56.8	51.3	**69.2**	**19.9**	**57.7**	**101.6%**	**95.0%**	Tested on 4.10.14
ND -	04	P6A	CSG	4"	600-11-01	63.2	40.0	**82.6**	**36.9**	**60.3**	**95.5%**	**95.0%**	Tested on 4.10.14
ND -	05	P6A	CSG	4"	602-02-01	56.8	51.3	**69.3**	**20.5**	**57.5**	**101.3%**	**90.0%**	Tested on 4.10.14
ND -	06	P6A	CSG	4"	600-11-01	63.2	40.0	**82.9**	**37.4**	**60.3**	**95.5%**	**90.0%**	Tested on 4.10.14
DC -	1	P6A	CSG	4"	600-11-01	63.2	40.0	**82.4**	**41.0**	**58.4**	**92.5%**	**90.0%**	DC-01 taken @ ND-06
ND -	07	P6A	CSG	4"	600-11-01	63.2	40.0	**78.8**	**25.8**	**62.6**	**99.1%**	**90.0%**	Tested on 4.10.14
ND -	08	P6A	CSG	4"	600-11-01	63.2	40.0	**80.2**	**35.5**	**59.2**	**93.7%**	**90.0%**	Tested on 4.10.14
ND -	09	P6A	CSG	4"	600-11-01	63.2	40.0	**76.8**	**31.0**	**58.6**	**92.8%**	**90.0%**	Tested on 4.10.14
ND -	10	P6A	CSG	4"	600-11-01	63.2	40.0	**78.0**	**22.4**	**63.7**	**100.8%**	**90.0%**	Tested on 4.10.14
ND -	11	P6A	CSG	4"	600-11-01	63.2	40.0	**77.1**	**22.1**	**63.1**	**99.9%**	**95.0%**	Tested on 4.10.14
ND -	12	P6A	CSG	4"	600-11-01	63.2	40.0	**68.6**	**13.4**	**60.5**	**95.7%**	**95.0%**	Tested on 4.10.14
ND -	13	P6A	CSG	4"	784-01-01	70.4	34.0	**77.7**	**14.1**	**68.1**	**96.7%**	**90.0%**	Tested on 4.10.14
ND -	14	P6A	CSG	4"	600-11-01	63.2	40.0	**81.7**	**33.6**	**61.2**	**96.8%**	**90.0%**	Tested on 4.10.14
ND -	15	P6A	CSG	4"	600-11-01	63.2	40.0	**76.8**	**29.3**	**59.4**	**94.0%**	**90.0%**	Tested on 4.10.14
ND -	16	P6A	CSG	4"	600-11-02	85.5	23.6	**94.5**	**20.8**	**78.2**	**91.5%**	**90.0%**	Tested on 4.10.14
ND -	17	P6A	CSG	4"	784-01-01	70.4	34.0	**89.0**	**26.0**	**70.6**	**100.3%**	**90.0%**	Tested on 4.10.14
DC -	2	P6A	CSG	4"	784-01-01	70.4	34.0	**85.5**	**27.2**	**67.2**	**95.5%**	**90.0%**	DC-02 taken @ ND-17
ND -	18	P6A	CSG	4"	602-01-01	75.6	31.0	**92.9**	**26.2**	**73.6**	**97.4%**	**90.0%**	Tested on 4.10.14
ND -	19	P6A	CSG	4"	600-11-02	85.5	23.6	**107.3**	**23.8**	**86.7**	**101.4%**	**90.0%**	Tested on 4.11.14
ND -	20	P6A	CSG	4"	602-01-01	75.6	31.0	**93.1**	**26.0**	**73.9**	**97.7%**	**90.0%**	Tested on 4.11.14
ND -	21	P6A	CSG	4"	600-11-02	85.5	23.6	**120.1**	**35.7**	**88.5**	**103.5%**	**95.0%**	Tested on 4.11.14
ND -	22	P6A	CSG	4"	602-03-02	65.9	36.5	**90.0**	**42.6**	**63.1**	**95.8%**	**95.0%**	Tested on 4.11.14
ND -	23	P6A	CSG	4"	602-03-02	65.9	36.5	**83.5**	**29.0**	**64.7**	**98.2%**	**90.0%**	Tested on 4.11.14
DC -	3	P6A	CSG	4"	602-03-02	65.9	36.5	**84.5**	**27.6**	**66.2**	**100.5%**	**90.0%**	DC-03 taken @ ND-23
ND -	24	P6A	CSG	4"	602-01-01	75.6	31.0	**97.7**	**29.9**	**75.2**	**99.5%**	**90.0%**	Tested on 4.11.14
ND -	25	P6A	CSG	4"	602-01-01	75.6	31.0	**87.3**	**24.8**	**70.0**	**92.5%**	**90.0%**	Tested on 4.11.14

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-06**	Geotechnics Representative : Abe Gaeta	Page : 2 of 5
Date (s) : **4.2 & 4.3.14**	Reviewed By :	Date :

Contractor : Glover Construction						Borrow Source : ONSITE SILOS 1 - 4							
Superintendent : Reuben Williams													
Gauge Number		Gauge Model		Compaction Equipment :		CAT C554 SMOOTHDRUM ROLLER, CAT D6 DOZER							
32387		3440											
Moisture Offset = 129.79			WD Offset = +4.0 pcf			Rod Depth= 6-12"		MS= 679	DS= 2276				
Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	26	P6A	CSG	4"	602-01-01	75.6	31.0	**98.7**	**34.2**	**73.5**	**97.3%**	**90.0%**	Tested on 4.11.14
ND -	27	P6A	CSG	4"	602-01-01	75.6	31.0	**103.9**	**38.0**	**75.3**	**99.6%**	**95.0%**	Tested on 4.11.14
ND -	28	P6A	CSG	4"	602-01-01	75.6	31.0	**92.5**	**27.6**	**72.5**	**95.9%**	**95.0%**	Tested on 4.11.14
ND -	29	P6A	CSG	4"	602-03-02	65.9	36.5	**84.9**	**35.6**	**62.6**	**95.0%**	**95.0%**	Tested on 4.11.14
ND -	30	P6A	CSG	4"	602-01-01	75.6	31.0	**102.8**	**34.9**	**76.2**	**100.8%**	**95.0%**	Tested on 4.11.14
ND -	31	P6A	CSG	4"	784-01-01	70.4	34.0	**89.3**	**32.4**	**67.4**	**95.8%**	**95.0%**	Tested on 4.11.14
ND -	32	P6A	CSG	4"	784-01-01	70.4	34.0	**86.4**	**25.4**	**68.9**	**97.9%**	**95.0%**	Tested on 4.11.14
ND -	33	P6A	CSG	4"	602-01-01	75.6	31.0	**98.3**	**35.3**	**72.7**	**96.1%**	**95.0%**	Tested on 4.11.14
DC -	4	P6A	CSG	4"	602-01-01	75.6	31.0	**99.4**	**33.5**	**74.5**	**98.5%**	**95.0%**	DC-04 taken @ ND-33

Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-07**
Date (s) : 4.10 & 4.11.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02	DC-03	DC-04
Nuclear Test Number :	ND-06	ND-17	ND-23	ND-33
Location:	P6A	P6A	P6A	P6A
Depth (ft):	CSG	CSG	CSG	CSG
Date :	4.10.14	4.10.14	4.11.14	4.11.14

Mold

Cylinder ID	#2	#2	#2	#2
Weight of Cylinder (lbs.)	1.48	1.48	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.20	4.30	4.27	4.76
Wt. of Cylinder (lbs.)	1.48	1.48	1.48	1.48
Wt. of WS	2.72	2.82	2.79	3.28
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-1	Z-2	Z-2
Wt. of Tare & WS (gm)	587.60	571.60	584.00	512.00
Wt. of Tare & DS (gm)	478.00	494.00	503.40	436.50
Wt. of Tare (gm)	211.00	208.20	211.00	211.00
Wt of water (gm)	109.60	77.60	80.60	75.50
Wt. of DS (gm)	267.00	285.80	292.40	225.50
Wet Density (pcf):	82.4	85.5	84.5	99.4
Moisture Content (%):	**41.0**	**27.2**	**27.6**	**33.5**
Dry Density (pcf):	**58.4**	**67.2**	**66.3**	**74.5**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-07**
Date (s) : 4.10 & 4.11.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/ND-01	P6A/ND-22
Depth (ft):	CSG	CSG
Date :	4.10.14	4.11.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	12.38	12.10
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	3.13	2.85
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2
Wt. of Tare & WS (gm)	554.00	604.00
Wt. of Tare & DS (gm)	482.40	505.00
Wt. of Tare (gm)	208.20	211.00
Wt. of water (gm)	71.60	99.00
Wt. of DS (gm)	274.20	294.00
Wet **Density (pcf):**	94.8	86.4
Moisture Content (%):	**26.1**	**33.7**
Dry Density (pcf):	**75.2**	**64.6**

Comment(s): Additional water was added to material before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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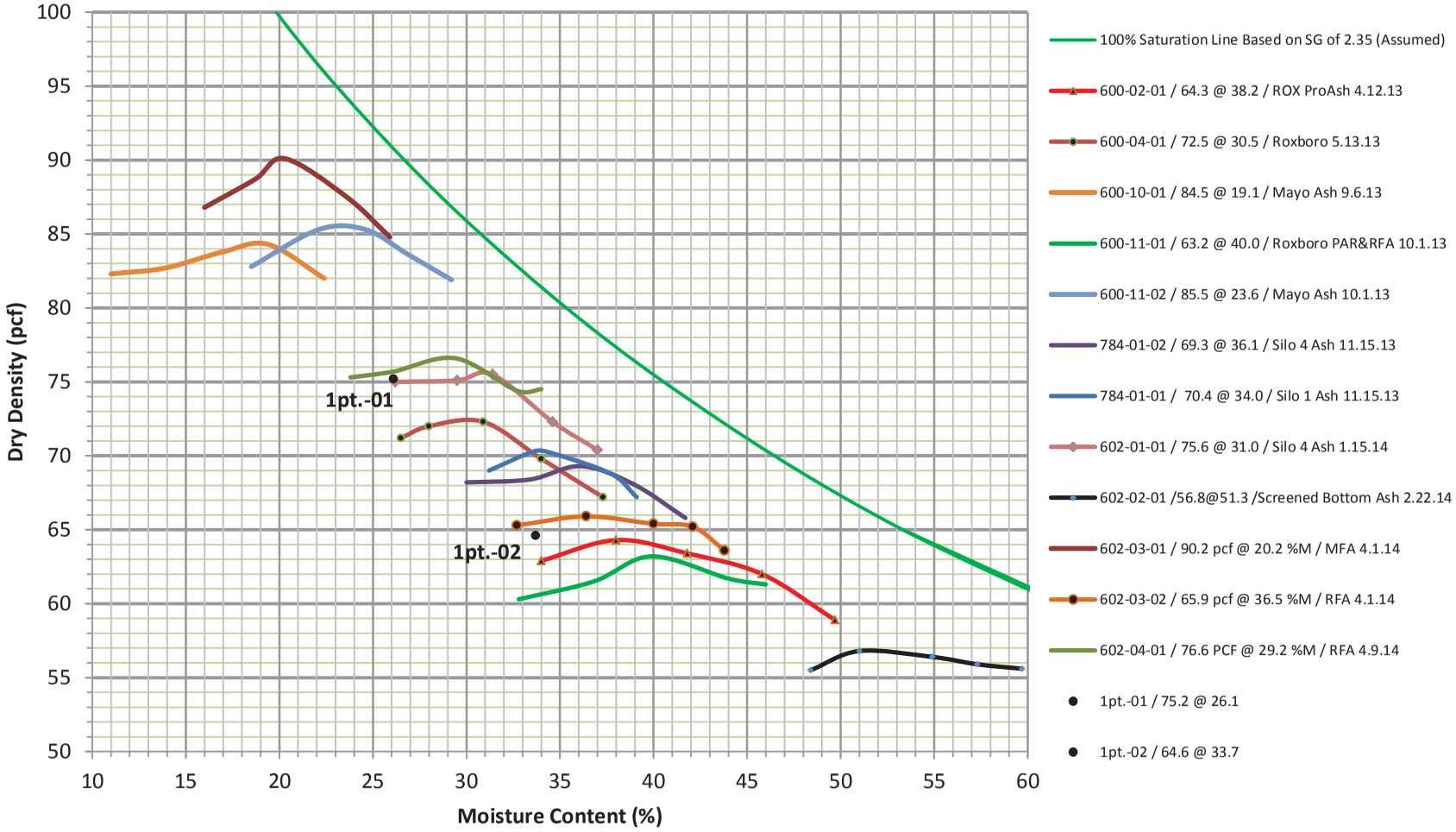
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 4.10 - 4.11.14
Client: Blackrock Engineers
Project Name : Roxboro Ash Landfill Phase 6A
Project Number : 2014-610



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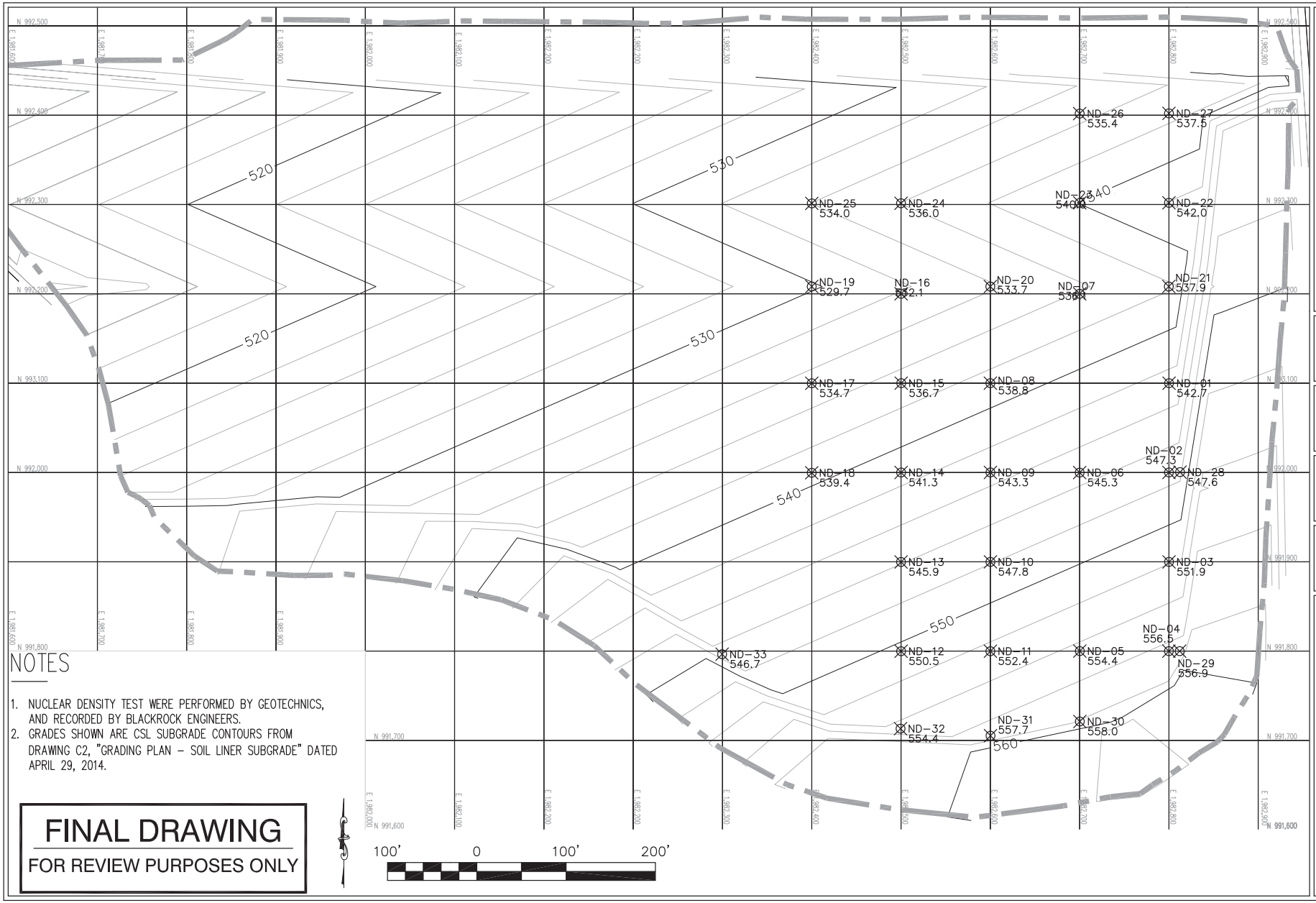

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
NAP	WML	1"=100'	P6A-FDR07
DATE:	PROJECT NO.		FILE NAME
14.07.16	11001		P6-ST-FILL-CT

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-07

Day:	**Monday**
Date:	**4.14.14**
Log No.:	**18**
Page:	**1 of 1**

Geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:00 AM **Departed:** 12:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 60-65 F

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. discussed daily work progress with Randy Berarducci of Blackrock Engineers. It was concluded that Glover Construction would not be placing any soil for Lift 1 CCL of cell P6A.
- Geotechnics Rep. took (2) moisture content readings for previously placed soil within cell.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	4.14.14	**Checked By:**	MPS	**Date:**	4.21.14

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INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	BLACKROCK ENGINEERING
Client Reference	ROXBORO ASH LANDFILL P6A
Project No.	2014-610
Date (s) :	4.14.14

Test Number:	WC-01	WC-02
Nuclear Test Number:	N/A	N/A
Location:	P6A	P6A
Depth/Elev:	Lift 1	Lift 1
Tare Number	Z-1	Z-2
Wt. of Tare & WS (gm)	672.80	609.80
Wt. of Tare & DS (gm)	565.20	517.20
Wt. of Tare (gm)	211.00	208.40
Wt. of Water (gm)	107.6	92.6
Wt. of DS (gm)	354.2	308.8
Water Content (%)	**30.4**	**30.0**

Comment(s): All samples are original to on-site moisture conditions

Tested By *APG* *Date* *4.14.14* *Checked By:* *MPS* *4.21.14*

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Day:	**Wed**
Date:	**4.23.14**
Log No.:	**19**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineering	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 11:00 AM **Departed:** 1:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 65-70 F

Contractor's Equipment: (2) CAT D6 Dozers, (4) Volvo Off-road trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 8

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. discussed daily work progress with Randy Berarducci of Blackrock Engineers. It was concluded that Glover Construction would not have CCL ready for testing for cell P6A.
- Geotechnics collected a bulk sample of CCL material from Area "A" borrow source for lab testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	4.23.14	**Checked By:**	MPS	**Date:**	4.25.14

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Day:	**Tuesday**
Date:	**5.6.14**
Log No.:	**20**
Page:	**1 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30 AM **Departed:** 4:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 70-75 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 10

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for certified subgrade that had been set to grade by Glover Construction.
- A total of (12) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn.In addition (1) Drive Cylinder test was performed onsite at nuclear density locations ND-42.
- Geotechnics Rep. performed a 1-point test at nuclear density test location ND-45.
- Geotechnics Rep. departed the site.

Prepared By:	APG	5.6.14	**Checked By:**	MPS	**Date:** 5.10.14

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Day:	**Thursday**
Date:	**5.8.14**
Log No.:	**21**
Page:	**2 of 3**

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 65-70 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 10

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. continued to performed In-place Nuclear Density testing for certified subgrade that had been set to grade by Glover Construction.
- A total of (17) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn.In addition (2) Drive Cylinder tests were performed onsite at nuclear density locations ND-52, and ND-63.
- Geotechnics Rep. performed a 1-point test at nuclear density test location ND-58.
- In addition Glover workers prepared Acre 1 and Acre 2 with compacted soil liner. Geotechnics Rep. tested the density of materials at these locations also, pushing a shelby tube w/ back-up for each acre for Lift 1 hydraulic conductivity testing.
- A total of (10) In-place nuclear density tests were performed by Geotechnics Rep. as well as (1) Drive Cylinder test at test location CSL-8, and 1 Point Proctor at CSL-04.
- Geotechnics Rep. delivered shelby tubes to lab for testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	5.8.14	**Checked By:**	MPS	**Date:**	5.10.14

Day:	**Friday**
Date:	**5.9.14**
Log No.:	**22**
Page:	**3 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued placing Compacted Soil Liner (CSL) . Workers completed Lift 1 for Acres 3, 4, 5, and 6. Geotechnics Rep. performed compaction testing for these acres within P6A.
- A total of (20) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn. In addition (2) Drive Cylinder tests were performed onsite at nuclear density locations CSL-20, and CSL-26.
- Geotechnics Rep. performed a 1-Point Proctor at nuclear density test location CSL-12.
- Geotechnics Rep. pushed a shelby tube w/ back-up for each prepared acre (3-6).
- Rep. delivered shelby tubes to lab for testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	5.9.14	**Checked By:**	MPS	**Date:**	5.10.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-08**	Geotechnics Representative : Abe Gaeta	Page : 1 of 7
Date (s) : 5.6.14 - 5.9.14	Reviewed By : MPS	Date : 5.10.14

Contractor : Glover Construction		Borrow Source : On-site Ash Silos 1 - 4	
Superintendent : Reuben Williams			
Gauge Number: 32387	Gauge Model: 3440	Compaction Equipment :	(1) NEW HOLLAND TRACTOR W/ SMOOTH DRUM BOX BLADE ROLLER, (1) CAT D6 DOZER.
Moisture Offset = 123.06	WD Offset = N/A	Rod Depth= 4"	MS= 680 DS= 2255

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	34	P6A	CSG	4"	784-01-02	69.3	36.1	**85.4**	**26.0**	**67.8**	**97.8%**	**90.0%**	ND tests for Certified Ash SG
ND -	35	P6A	CSG	4"	784-01-02	69.3	36.1	**83.9**	**24.8**	**67.2**	**97.0%**	**90.0%**	Tested on 5.6.14
ND -	36	P6A	CSG	4"	784-01-02	69.3	36.1	**86.2**	**26.6**	**68.1**	**98.3%**	**90.0%**	Tested on 5.6.14
ND -	37	P6A	CSG	4"	784-01-02	69.3	36.1	**77.9**	**30.6**	**59.6**	**86.1%**	**90.0%**	Tested on 5.6.14
ND -	38	P6A	CSG	4"	600-11-01	63.2	40.0	**79.1**	**31.0**	**60.4**	**95.5%**	**90.0%**	Tested on 5.6.14
ND -	39	P6A	CSG	4"	600-11-02	85.5	23.6	**107.8**	**28.7**	**83.8**	**98.0%**	**95.0%**	Tested on 5.6.14
ND -	40	P6A	CSG	4"	600-11-02	85.5	23.6	**108.9**	**29.2**	**84.3**	**98.6%**	**95.0%**	Tested on 5.6.14
ND -	41	P6A	CSG	4"	600-11-02	85.5	23.6	**106.5**	**28.0**	**83.2**	**97.3%**	**95.0%**	Tested on 5.6.14
ND -	42	P6A	CSG	4"	602-01-01	75.6	31.0	**92.3**	**29.6**	**71.2**	**94.2%**	**90.0%**	Tested on 5.6.14
DC -	5	P6A	CSG	4"	602-01-01	75.6	31.0	**93.0**	**27.7**	**72.8**	**96.3%**	**90.0%**	DC-05 taken @ ND-42
ND -	43	P6A	CSG	4"	600-11-01	63.2	40.0	**73.4**	**28.3**	**57.2**	**90.5%**	**90.0%**	Tested on 5.6.14
ND -	44	P6A	CSG	4"	600-11-01	63.2	40.0	**72.9**	**29.0**	**56.5**	**89.4%**	**90.0%**	Tested on 5.6.14
ND -	45	P6A	CSG	4"	600-11-01	63.2	40.0	**76.8**	**33.4**	**57.6**	**91.1%**	**90.0%**	Tested on 5.6.14
ND -	46	P6A	CSG	4"	784-01-02	69.3	36.1	**88.9**	**34.1**	**66.3**	**95.7%**	**90.0%**	Tested on 5.8.14
ND -	47	P6A	CSG	4"	610-05-02	62.8	41.6	**75.6**	**27.8**	**59.2**	**94.2%**	**90.0%**	Tested on 5.8.14
ND -	48	P6A	CSG	4"	610-05-02	62.8	41.6	**77.3**	**30.6**	**59.2**	**94.2%**	**90.0%**	Tested on 5.8.14
ND -	49	P6A	CSG	4"	610-05-02	62.8	41.6	**74.6**	**28.3**	**58.1**	**92.6%**	**90.0%**	Tested on 5.8.14
ND -	50	P6A	CSG	4"	610-05-02	62.8	41.6	**82.3**	**31.7**	**62.5**	**99.5%**	**95.0%**	Tested on 5.8.14
ND -	51	P6A	CSG	4"	600-04-01	72.5	30.5	**93.0**	**30.7**	**71.2**	**98.1%**	**95.0%**	Tested on 5.8.14
ND -	52	P6A	CSG	4"	784-01-02	69.3	36.1	**88.7**	**27.4**	**69.6**	**100.5%**	**90.0%**	Tested on 5.8.14
DC -	6	P6A	CSG	4"	784-01-02	69.3	36.1	**85.8**	**30.0**	**66.0**	**95.2%**	**90.0%**	DC-06 taken @ ND-52
ND -	53	P6A	CSG	4"	784-01-02	69.3	36.1	**84.8**	**30.2**	**65.1**	**94.0%**	**90.0%**	Tested on 5.8.14
ND -	54	P6A	CSG	4"	784-01-02	69.3	36.1	**88.2**	**36.1**	**64.8**	**93.5%**	**90.0%**	Tested on 5.8.14
ND -	55	P6A	CSG	4"	602-04-01	76.6	29.2	**103.4**	**39.1**	**74.3**	**97.0%**	**95.0%**	Tested on 5.8.14
ND -	56	P6A	CSG	4"	602-04-01	76.6	29.2	**105.8**	**40.2**	**75.5**	**98.5%**	**95.0%**	Tested on 5.8.14
ND -	57	P6A	CSG	4"	602-04-01	76.6	29.2	**96.8**	**37.1**	**70.6**	**92.2%**	**90.0%**	Tested on 5.8.14
ND -	58	P6A	CSG	4"	784-01-02	69.3	36.1	**86.7**	**29.1**	**67.2**	**96.9%**	**90.0%**	Tested on 5.8.14
ND -	59	P6A	CSG	4"	610-05-02	62.8	41.6	**77.9**	**29.6**	**60.1**	**95.7%**	**90.0%**	Tested on 5.8.14
ND -	60	P6A	CSG	4"	610-05-02	62.8	41.6	**75.3**	**30.6**	**57.7**	**91.8%**	**90.0%**	Tested on 5.8.14
ND -	61	P6A	CSG	4"	784-01-02	69.3	36.1	**86.8**	**27.3**	**68.2**	**98.4%**	**90.0%**	Tested on 5.8.14
ND -	62	P6A	CSG	4"	784-01-02	69.3	36.1	**91.4**	**34.1**	**68.2**	**98.4%**	**95.0%**	Tested on 5.8.14
DC -	7	P6A	CSG	4"	784-01-02	69.3	36.1	**90.9**	**33.1**	**68.3**	**98.5%**	**95.0%**	DC-07 taken @ ND-62

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-08**	Geotechnics Representative : Abe Gaeta	Page : 2 of 7
Date (s) : 5.6.14 - 5.9.14	Reviewed By : MPS	Date : 5.10.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT C COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A	Rod Depth= 6"	MS= 680 DS= 2255

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	01	P6A	A1/L1	6"	784-04-01	97.8	23.5	**122.8**	**30.3**	**94.2**	**96.4%**	**95.0%**	CSL (Clay Soil Liner)
CSL -	02	P6A	A1/L1	6"	610-01-01	101.6	21.6	**124.7**	**28.4**	**97.1**	**95.6%**	**95.0%**	Tested on 5.8.14
CSL -	03	P6A	A1/L1	6"	610-01-01	101.6	21.6	**125.6**	**24.0**	**101.3**	**99.7%**	**95.0%**	Tested on 5.8.14
CSL -	04	P6A	A1/L1	6"	610-01-01	101.6	21.6	**124.7**	**28.7**	**96.9**	**95.4%**	**95.0%**	Tested on 5.8.14
CSL -	05	P6A	A1/L1	6"	610-01-01	101.6	21.6	**126.0**	**26.1**	**99.9**	**98.3%**	**95.0%**	Tested on 5.8.14
CSL -	06	P6A	A2/L1	6"	610-01-01	101.6	21.6	**125.2**	**28.8**	**97.2**	**95.7%**	**95.0%**	Tested on 5.8.14
CSL -	07	P6A	A2/L1	6"	610-01-01	101.6	21.6	**126.8**	**25.0**	**101.4**	**99.8%**	**95.0%**	Tested on 5.8.14
CSL -	08	P6A	A2/L1	6"	610-01-01	101.6	21.6	**123.8**	**25.6**	**98.6**	**97.0%**	**95.0%**	Tested on 5.8.14
DC -	1	P6A	A2/L1	6"	610-01-01	101.6	21.6	**122.4**	**25.0**	**97.9**	**96.4%**	**95.0%**	DC-01 taken @ CSL-08
CSL -	09	P6A	A2/L1	6"	610-04-01	106.8	17.9	**130.1**	**21.9**	**106.7**	**99.9%**	**95.0%**	Tested on 5.8.14
CSL -	10	P6A	A2/L1	6"	610-01-01	101.6	21.6	**124.5**	**28.2**	**97.1**	**95.6%**	**95.0%**	Tested on 5.8.14
CSL -	11	P6A	A3/L1	6"	784-01-02	97.8	23.5	**123.6**	**28.0**	**96.6**	**98.7%**	**95.0%**	Tested on 5.9.14
CSL -	12	P6A	A3/L1	6"	784-01-02	97.8	23.5	**122.4**	**24.0**	**98.7**	**100.9%**	**95.0%**	Tested on 5.9.14
CSL -	13	P6A	A3/L1	6"	784-01-02	97.8	23.5	**120.9**	**26.1**	**95.9**	**98.0%**	**95.0%**	Tested on 5.9.14
CSL -	14	P6A	A3/L1	6"	610-01-01	101.6	21.6	**125.2**	**23.4**	**101.5**	**99.9%**	**95.0%**	Tested on 5.9.14
CSL -	15	P6A	A3/L1	6"	784-01-02	97.8	23.5	**121.5**	**25.2**	**97.0**	**99.2%**	**95.0%**	Tested on 5.9.14
CSL -	16	P6A	A4/L1	6"	784-01-02	97.8	23.5	**118.0**	**25.1**	**94.3**	**96.4%**	**95.0%**	Tested on 5.9.14
CSL -	17	P6A	A4/L1	6"	610-04-01	106.8	17.9	**125.3**	**21.4**	**103.2**	**96.6%**	**95.0%**	Tested on 5.9.14
CSL -	18	P6A	A4/L1	6"	610-01-01	101.6	21.6	**123.4**	**24.5**	**99.1**	**97.6%**	**95.0%**	Tested on 5.9.14
CSL -	19	P6A	A4/L1	6"	784-01-02	97.8	23.5	**119.0**	**25.3**	**95.0**	**97.1%**	**95.0%**	Tested on 5.9.14
CSL -	20	P6A	A4/L1	6"	610-01-01	101.6	21.6	**123.5**	**22.9**	**100.5**	**98.9%**	**95.0%**	Tested on 5.9.14
DC -	2	P6A	A4/L1	6"	610-01-01	101.6	21.6	**125.8**	**26.3**	**99.6**	**98.0%**	**95.0%**	DC-02 taken @ CSL-20
CSL -	21	P6A	A5/L1	6"	610-01-01	101.6	21.6	**122.5**	**23.4**	**99.3**	**97.7%**	**95.0%**	Tested on 5.9.14
CSL -	22	P6A	A5/L1	6"	610-01-01	101.6	21.6	**123.9**	**23.0**	**100.7**	**99.1%**	**95.0%**	Tested on 5.9.14
CSL -	23	P6A	A5/L1	6"	784-01-02	97.8	23.5	**118.1**	**23.1**	**95.9**	**98.1%**	**95.0%**	Tested on 5.9.14
CSL -	24	P6A	A5/L1	6"	784-01-02	97.8	23.5	**120.2**	**27.3**	**94.4**	**96.5%**	**95.0%**	Tested on 5.9.14
CSL -	25	P6A	A5/L1	6"	610-01-01	101.6	21.6	**124.8**	**21.8**	**102.5**	**100.8%**	**95.0%**	Tested on 5.9.14
CSL -	26	P6A	A6/L1	6"	784-04-02	88.8	29.2	**118.4**	**33.7**	**88.6**	**99.7%**	**95.0%**	Tested on 5.9.14
DC -	3	P6A	A6/L1	6"	784-04-02	88.8	29.2	**113.9**	**34.2**	**84.9**	**95.6%**	**95.0%**	DC-03 taken @ CSL-26
CSL -	27	P6A	A6/L1	6"	784-04-02	88.8	29.2	**120.9**	**31.8**	**91.7**	**103.3%**	**95.0%**	Tested on 5.9.14
CSL -	28	P6A	A6/L1	6"	784-01-02	97.8	23.5	**121.1**	**28.3**	**94.4**	**96.5%**	**95.0%**	Tested on 5.9.14
CSL -	29	P6A	A6/L1	6"	784-01-02	97.8	23.5	**122.1**	**27.8**	**95.5**	**97.7%**	**95.0%**	Tested on 5.9.14
CSL -	30	P6A	A6/L1	6"	610-04-01	106.8	17.9	**126.3**	**19.1**	**106.0**	**99.3%**	**95.0%**	Tested on 5.9.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-08**
Date (s) : 5.6 - 5.9.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-05	DC-06	DC-07
Nuclear Test Number :	ND-42	ND-52	ND-62
Location:	P6A	P6A	P6A
Depth (ft):	CSG	CSG	CSG
Date :	5.6.14	5.8.14	5.8.14

Mold

Cylinder ID	#1	#1	#1
Weight of Cylinder (lbs.)	1.48	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.55	4.31	4.48
Wt. of Cylinder (lbs.)	1.48	1.48	1.48
Wt. of WS	3.07	2.83	3.00
Cylinder Volume (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-3	Z-1	Z-2
Wt. of Tare & WS (gm)	655.80	665.80	680.00
Wt. of Tare & DS (gm)	559.20	560.00	563.00
Wt. of Tare (gm)	210.00	207.00	209.80
Wt of water (gm)	96.60	105.80	117.00
Wt. of DS (gm)	349.20	353.00	353.20
Wet Density (pcf):	93.0	85.8	90.9
Moisture Content (%):	**27.7**	**30.0**	**33.1**
Dry Density (pcf):	**72.9**	**66.0**	**68.3**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-08**
Date (s) : 5.6 - 5.9.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-01	DC-02	DC-03
Nuclear Test Number :	CSL-08	CSL-20	CSL-26
Location:	Acre 2	Acre 4	Acre 6
Depth (ft):	Lift 1	Lift 1	Lift 1
Date :	5.8.14	5.9.14	5.9.14

Mold

Cylinder ID	#1	#1	#1
Weight of Cylinder (lbs.)	1.48	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.52	5.63	5.24
Wt. of Cylinder (lbs.)	1.48	1.48	1.48
Wt. of WS	4.04	4.15	3.76
Cylinder Volume (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-5	Z-6	Z-7
Wt. of Tare & WS (gm)	608.80	654.80	642.20
Wt. of Tare & DS (gm)	528.80	562.40	532.00
Wt. of Tare (gm)	208.80	210.40	209.40
Wt of water (gm)	80.00	92.40	110.20
Wt. of DS (gm)	320.00	352.00	322.60
Wet Density (pcf):	122.4	125.8	113.9
Moisture Content (%):	**25.0**	**26.3**	**34.2**
Dry Density (pcf):	**97.9**	**99.6**	**84.9**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-08**
Date (s) : 5.6 - 5.9.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/ND-45	P6A/ND-58
Depth (ft):	CSG	CSG
Date :	5.6.14	5.8.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	11.82	12.23
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	2.57	2.98
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-4	Z-1
Wt. of Tare & WS (gm)	652.20	724.40
Wt. of Tare & DS (gm)	542.40	595.00
Wt. of Tare (gm)	208.20	207.00
Wt. of water (gm)	109.80	129.40
Wt. of DS (gm)	334.20	388.00
Wet **Density (pcf):**	77.9	90.3
Moisture Content (%):	**32.9**	**33.4**
Dry Density (pcf):	**58.6**	**67.7**

Comment(s): 1PT-01, 02, had water added to material before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-08**
Date (s) : 5.6 - 5.9.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/CSL-04	P6A/CSL-12
Depth (ft):	A1/L1	A3/L1
Date :	5.8.14	5.9.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.36	13.26
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	4.11	4.01
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-10	Z-6
Wt. of Tare & WS (gm)	679.40	667.00
Wt. of Tare & DS (gm)	594.20	577.00
Wt. of Tare (gm)	211.00	211.20
Wt. of water (gm)	85.20	90.00
Wt. of DS (gm)	383.20	365.80
Wet **Density (pcf):**	124.5	121.5
Moisture Content (%):	**22.2**	**24.6**
Dry Density (pcf):	**101.9**	**97.5**

Comment(s):

Geotechnics Representative : Abe Gaeta

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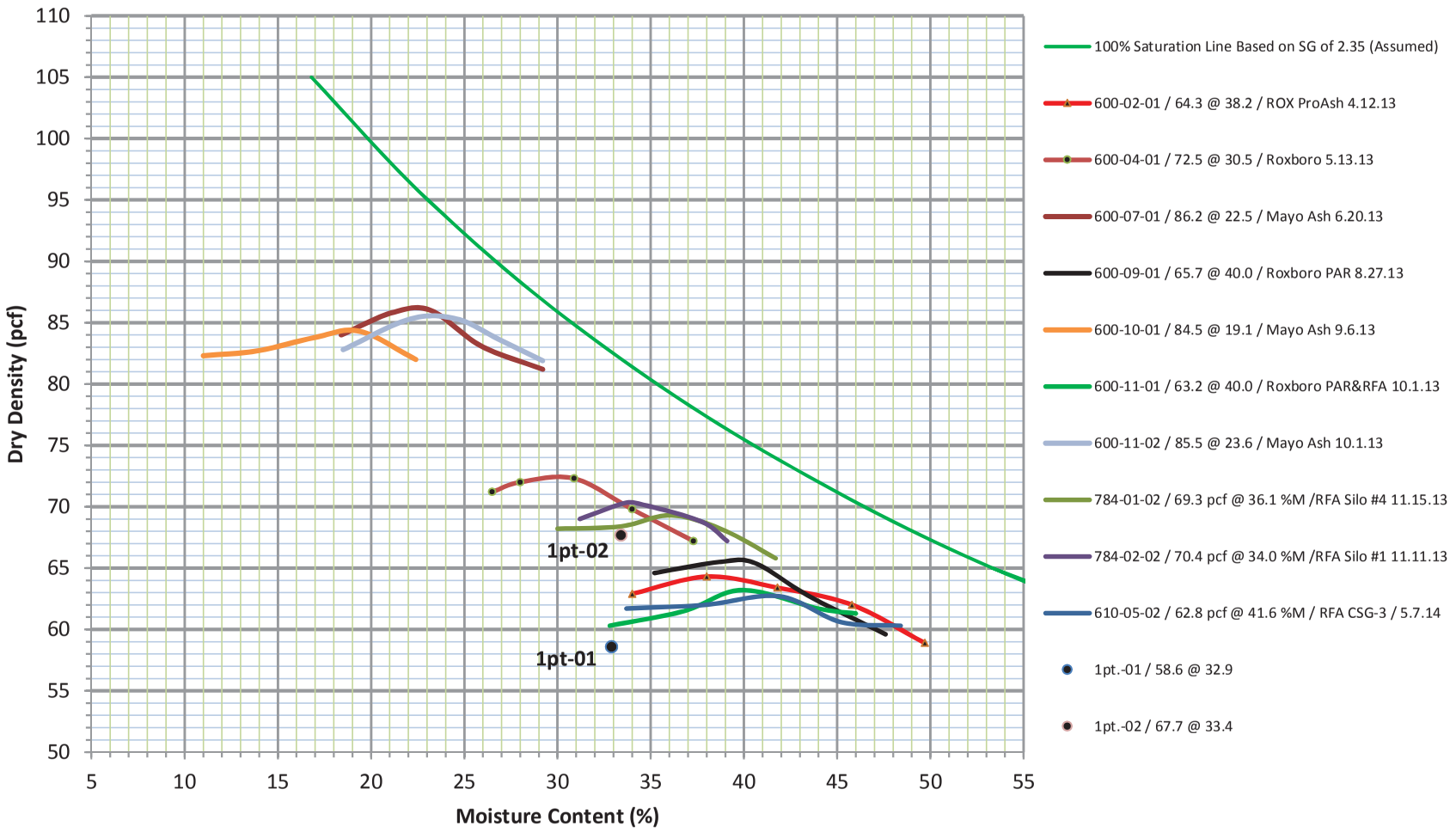
Fly Ash Moisture Density Relationships

Date: 5.6 - 5.9.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610



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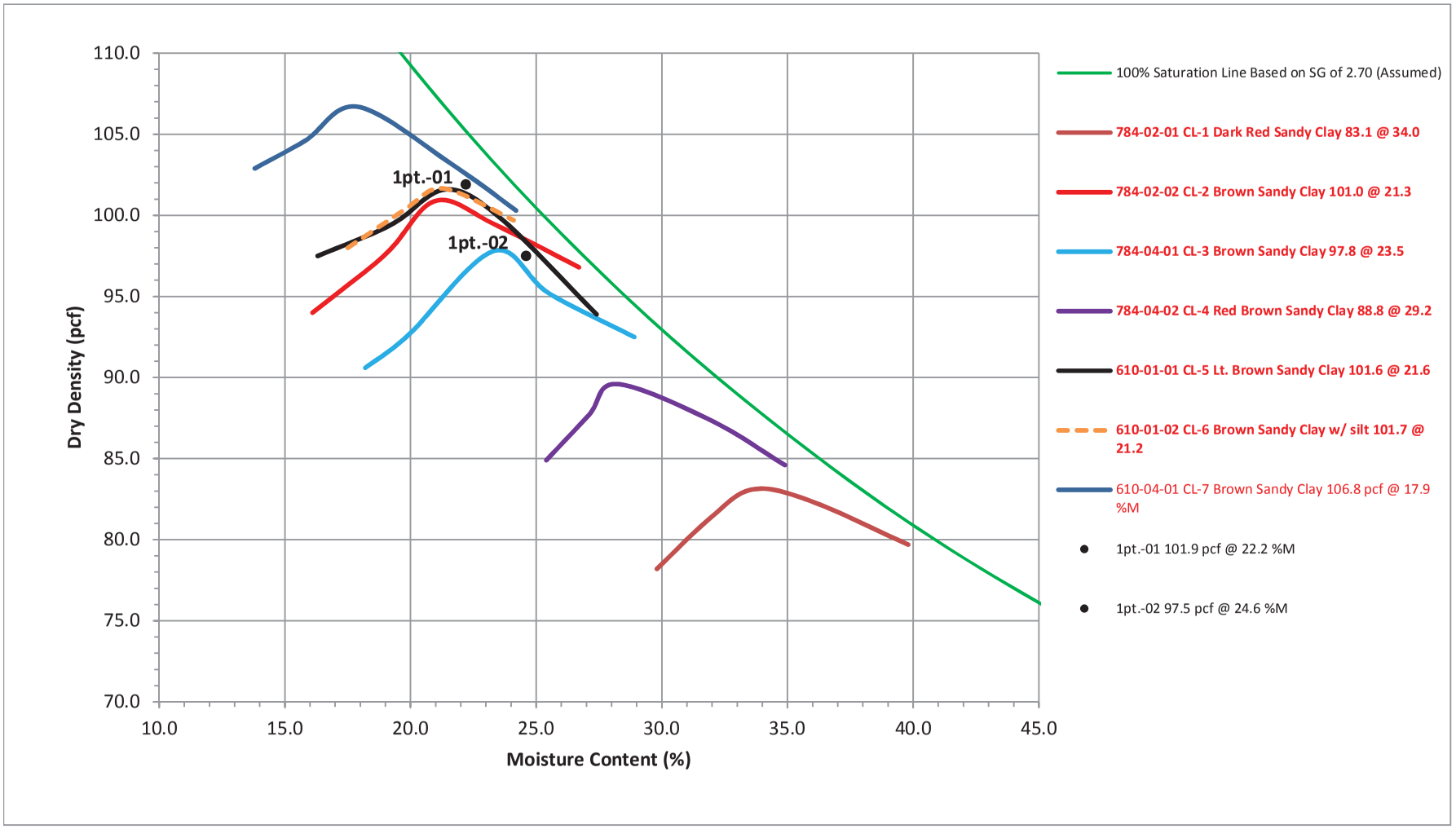
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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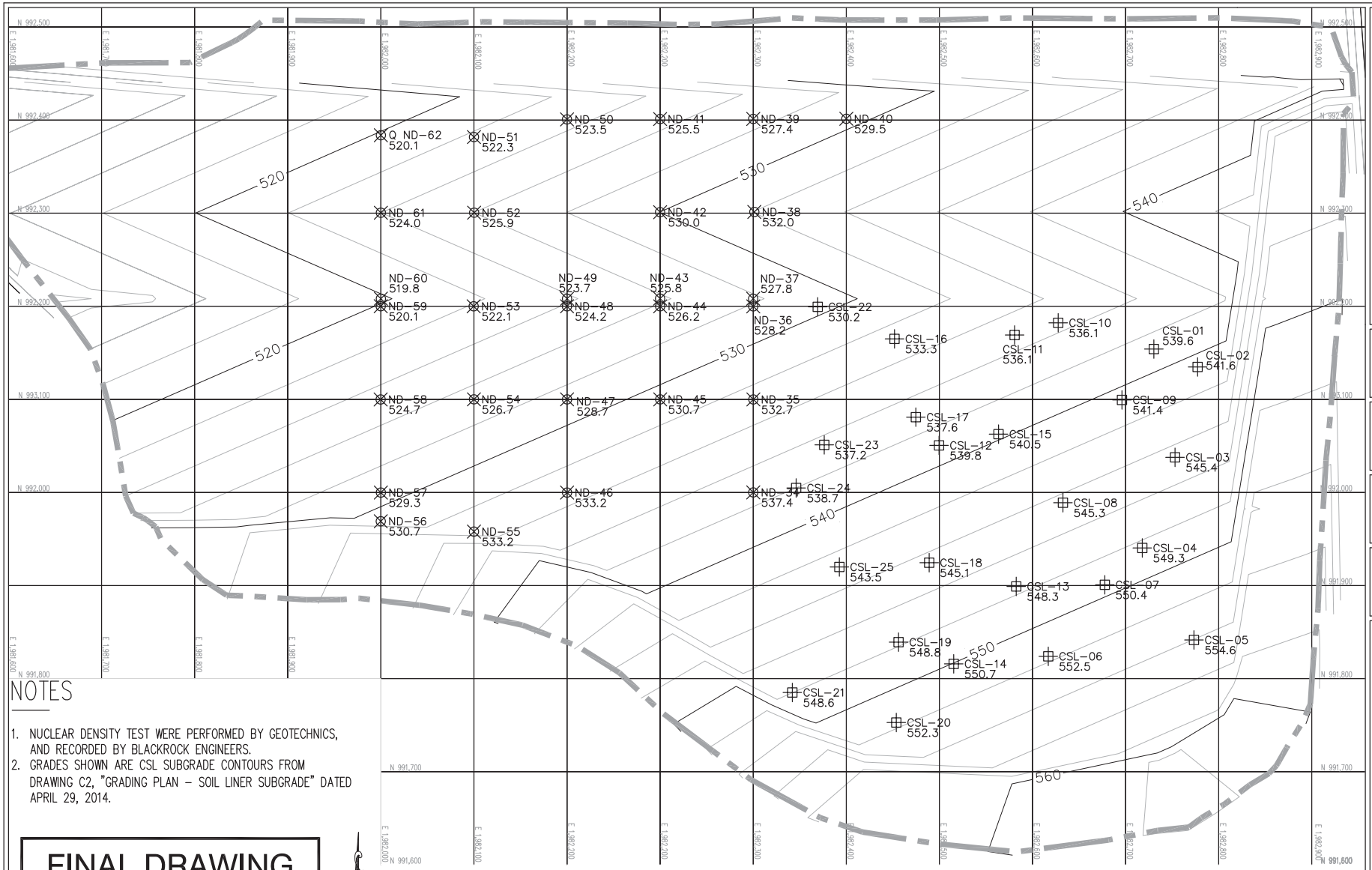

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
NAP	WML	1"=100'	P6A-FDR08
DATE:	PROJECT NO.		FILE NAME
14.07.16	11001		P6-ST-FILL-CT

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-08

Day:	**Monday**
Date:	**5.12.14**
Log No.:	**23**
Page:	**1 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:30 AM **Departed:** 4:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 80-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed In-place Nuclear Density testing for certified subgrade that had been set to grade by Glover Construction. Also, Rep. tested Clay Soil Liner material within Cell P6A
- A total of (23) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn. In addition (3) Drive Cylinder tests were performed onsite at nuclear density locations ND-67, CSL-31, and CSL-44.
- Geotechnics Rep. performed 1-point tests at nuclear density test locations ND-68, and CSL-35.
- Geotechnics Rep. performed In-place Nuclear Density testing on Clay Soil Liner material for Lift 1 of acres 7, 8, and 9 within cell P6A. In addition shelby tubes were pushed within each acre.
- Geotechnics Rep. departed the site.

Prepared By:	APG	5.12.14	**Checked By:**	MPS	**Date:** 5.19.14

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Day:	**Tuesday**
Date:	**5.13.14**
Log No.:	**24**
Page:	**2 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-88 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. continued to performed In-place Nuclear Density testing for certified subgrade that had been set to grade by Glover Construction.
- A total of (9) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and surveyor Mark Nunn. In addition (1) Drive Cylinder test was taken onsite at nuclear density locations ND-76.
- Geotechnics Rep. performed a 1-point test at nuclear density test location ND-75.
- Rep. delivered Acres 7, 8 and 9 shelby tubes of Lift 1 CSL to lab for Hydraulic Conductivity testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	5.13.14	**Checked By:**	MPS	**Date:**	5.19.14

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Day:	**Wed**
Date:	**5.14.14**
Log No.:	**25**
Page:	**3 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 3:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued placing Compacted Clay Liner (CCL) . Workers completed Lift 1 for Acres 10, and 11. Geotechnics Rep. performed compaction testing for these acres within P6A.
- A total of (10) Nuclear Density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci. In addition (1) Drive Cylinder test was taken at nuclear test location CSL-51
- Geotechnics Rep. performed a 1-Point Proctor at nuclear density test location CSL-55.
- Geotechnics Rep. pushed a shelby tube w/ back-up for each prepared acre (10-11).
- Geotechnics Rep. departed jobsite.
- Rep. delivered shelby tubes to lab for testing.

Prepared By:	APG	**Date:**	5.14.14	**Checked By:**	MPS	**Date:**	5.19.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-09**	Geotechnics Representative : Abe Gaeta	Page : 1 of 2	
Date (s) : 5.12.14 - 5.14.14	Reviewed By : MPS	Date : 5.19.14	

Contractor : Glover Construction		Borrow Source : On-site Ash Silos 1 - 4	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	(1) NEW HOLLAND TRACTOR W/ SMOOTH DRUM BOX BLADE ROLLER, (1) CAT D6 DOZER.
32387	3440		
Moisture Offset = 123.06	WD Offset = N/A	Rod Depth= 4-12"	MS= 685 DS= 2259

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	63	P6A	CSG	4"	610-05-02	62.8	41.6	**80.0**	**28.6**	**62.2**	**99.1%**	**90.0%**	Tested on 5.12.14
DC -	64	P6A	CSG	4"	610-05-02	62.8	41.6	**79.9**	**27.5**	**62.7**	**99.8%**	**90.0%**	Tested on 5.12.14
ND -	65	P6A	CSG	4"	784-01-02	69.3	36.1	**86.4**	**27.1**	**68.0**	**98.1%**	**95.0%**	Tested on 5.12.14
ND -	66	P6A	CSG	4"	600-04-01	72.5	30.5	**89.8**	**26.0**	**71.3**	**98.3%**	**95.0%**	Tested on 5.12.14
ND -	67	P6A	CSG	4"	600-11-01	85.5	23.6	**100.5**	**29.3**	**77.7**	**90.9%**	**90.0%**	Tested on 5.12.14
DC -	8	P6A	CSG	4"	600-11-01	85.5	23.6	**103.6**	**28.5**	**80.6**	**94.3%**	**90.0%**	DC-8 taken @ ND-67
ND -	68	P6A	CSG	4"	602-03-02	65.9	36.5	**78.3**	**29.5**	**60.5**	**91.8%**	**90.0%**	Tested on 5.12.14
ND -	69	P6A	P3 Pipe	12"	602-04-01	76.6	29.2	**100.8**	**30.8**	**77.1**	**100.6%**	**95.0%**	Tested on 5.12.14
ND -	70	P6A	P3 Pipe	12"	600-11-02	85.5	23.6	**98.4**	**15.7**	**85.0**	**99.5%**	**95.0%**	Tested on 5.12.14
ND -	71	P6A	CSG	4"	600-10-01	84.5	19.1	**102.3**	**26.7**	**80.7**	**95.6%**	**90.0%**	Tested on 5.12.14
ND -	72	P6A	CSG	4"	784-01-02	69.3	36.1	**89.1**	**31.3**	**67.9**	**97.9%**	**90.0%**	Tested on 5.12.14
ND -	73	P6A	CSG	4"	784-01-02	69.3	36.1	**90.5**	**29.9**	**69.7**	**100.5%**	**95.0%**	Tested on 5.12.14
ND -	74	P6A	CSG	4"	610-05-02	62.8	41.6	**79.4**	**31.2**	**60.5**	**96.4%**	**95.0%**	Tested on 5.12.14
ND -	75	P6A	CSG	4"	784-01-02	69.3	36.1	**87.4**	**29.1**	**67.7**	**97.7%**	**95.0%**	Tested on 5.12.14
ND -	76	P6A	CSG	4"	602-03-02	65.9	36.5	**84.7**	**32.1**	**64.1**	**97.3%**	**95.0%**	Tested on 5.12.14
ND -	77	P6A	CSG	4"	610-05-02	62.8	41.6	**77.7**	**29.5**	**60.0**	**95.5%**	**95.0%**	Tested on 5.12.14
ND -	78	P6A	CSG	4"	600-04-01	72.5	30.5	**91.4**	**26.7**	**72.1**	**99.5%**	**95.0%**	Tested on 5.12.14
DC -	9	P6A	CSG	4"	600-04-01	72.5	30.5	**90.6**	**27.5**	**71.1**	**98.0%**	**95.0%**	DC-9 taken @ ND-78
ND -	79	P6A	CSG	4"	602-03-02	65.9	36.5	**84.9**	**34.4**	**63.2**	**95.9%**	**95.0%**	Tested on 5.12.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-09**	Geotechnics Representative : Abe Gaeta	Page : 2 of 2	
Date (s) : 5.12.14 - 5.14.14	Reviewed By : MPS	Date : 5.19.14	

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT C COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = N/A	WD Offset = N/A	Rod Depth= 6"	MS= 687 DS= 2270

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	31	P6A	A7/L1	6"	610-01-01	101.6	21.6	**127.9**	**25.7**	**101.8**	**100.1%**	**95.0%**	CSL (Clay Soil Liner)
DC -	4	P6A	A7/L1	6"	610-01-01	101.6	21.6	**125.2**	**22.5**	**102.2**	**100.6%**	**95.0%**	DC-4 taken @ CSL-31
CSL -	32	P6A	A7/L1	6"	610-01-01	101.6	21.6	**125.8**	**26.6**	**99.4**	**97.8%**	**95.0%**	Tested on 5.12.14
CSL -	33	P6A	A7/L1	6"	784-04-02	88.8	29.2	**119.3**	**33.8**	**89.2**	**100.4%**	**95.0%**	Tested on 5.12.14
CSL -	34	P6A	A7/L1	6"	784-04-01	97.8	23.5	**120.4**	**27.9**	**94.1**	**96.3%**	**95.0%**	Tested on 5.12.14
CSL -	35	P6A	A7/L1	6"	784-04-02	88.8	29.2	**114.9**	**31.1**	**87.6**	**98.7%**	**95.0%**	Tested on 5.12.14
CSL -	36	P6A	A8/L1	6"	784-04-02	88.8	29.2	**120.6**	**32.5**	**91.0**	**102.5%**	**95.0%**	Tested on 5.12.14
CSL -	37	P6A	A8/L1	6"	784-02-01	83.1	34.0	**116.6**	**40.2**	**83.2**	**100.1%**	**95.0%**	Tested on 5.12.14
CSL -	38	P6A	A8/L1	6"	784-04-02	88.8	29.2	**117.3**	**35.3**	**86.7**	**97.6%**	**95.0%**	DC-01 taken @ CSL-08
CSL -	39	P6A	A8/L1	6"	784-02-01	83.1	34.0	**113.8**	**40.7**	**80.9**	**97.3%**	**95.0%**	Tested on 5.12.14
CSL -	40	P6A	A8/L1	6"	784-02-01	83.1	34.0	**112.9**	**41.0**	**80.1**	**96.4%**	**95.0%**	Tested on 5.12.14
CSL -	41	P6A	A9/L1	6"	784-02-01	83.1	34.0	**115.8**	**40.5**	**82.4**	**99.2%**	**95.0%**	Tested on 5.12.14
CSL -	42	P6A	A9/L1	6"	784-02-01	83.1	34.0	**116.1**	**40.8**	**82.5**	**99.2%**	**95.0%**	Tested on 5.12.14
CSL -	43	P6A	A9/L1	6"	784-02-01	83.1	34.0	**112.5**	**41.3**	**79.6**	**95.8%**	**95.0%**	Tested on 5.12.14
CSL -	44	P6A	A9/L1	6"	784-04-02	88.8	29.2	**118.2**	**33.2**	**88.7**	**99.9%**	**95.0%**	Tested on 5.12.14
DC -	5	P6A	A9/L1	6"	784-04-02	88.8	29.2	**118.2**	**31.6**	**89.8**	**101.1%**	**95.0%**	DC-5 taken @ CSL-44
CSL -	45	P6A	A9/L1	6"	784-02-01	83.1	34.0	**115.9**	**40.9**	**82.3**	**99.0%**	**95.0%**	Tested on 5.12.14
CSL -	46	P6A	A10/L1	6"	784-04-02	88.8	29.2	**117.4**	**34.8**	**87.1**	**98.1%**	**95.0%**	Tested on 5.14.14
CSL -	47	P6A	A10/L1	6"	784-02-01	83.1	34.0	**115.7**	**39.0**	**83.2**	**100.2%**	**95.0%**	Tested on 5.14.14
CSL -	48	P6A	A10/L1	6"	784-04-02	88.8	29.2	**117.7**	**32.4**	**88.9**	**100.1%**	**95.0%**	Tested on 5.14.14
CSL -	49	P6A	A10/L1	6"	784-04-01	97.8	23.5	**122.2**	**28.7**	**94.9**	**97.1%**	**95.0%**	Tested on 5.14.14
CSL -	50	P6A	A10/L1	6"	784-04-02	88.8	29.2	**115.4**	**33.9**	**86.2**	**97.1%**	**95.0%**	Tested on 5.14.14
CSL -	51	P6A	A11/L1	6"	784-04-01	97.8	23.5	**124.9**	**27.1**	**98.3**	**100.5%**	**95.0%**	Tested on 5.14.14
DC -	6	P6A	A11/L1	6"	784-04-01	97.8	23.5	**123.0**	**27.5**	**96.5**	**98.6%**	**95.0%**	DC-6 taken @ CSL-51
CSL -	52	P6A	A11/L1	6"	784-04-02	88.8	29.2	**119.5**	**33.6**	**89.4**	**100.7%**	**95.0%**	Tested on 5.14.14
CSL -	53	P6A	A11/L1	6"	784-04-01	97.8	23.5	**121.1**	**27.5**	**95.0**	**97.1%**	**95.0%**	Tested on 5.14.14
CSL -	54	P6A	A11/L1	6"	784-04-01	97.8	23.5	**121.6**	**28.6**	**94.6**	**96.7%**	**95.0%**	Tested on 5.14.14
CSL -	55	P6A	A11/L1	6"	784-04-01	97.8	23.5	**119.9**	**24.0**	**96.7**	**98.9%**	**95.0%**	Tested on 5.14.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-09**
Date (s) : 5.12 - 5.13.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-8	DC-9
Nuclear Test Number :	ND-67	ND-78
Location:	P6A	P6A
Depth (ft):	CSG	CSG
Date :	5.12.14	5.13.14

Mold

Cylinder ID	#1	#1
Weight of Cylinder (lbs.)	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	4.90	4.47
Wt. of Cylinder (lbs.)	1.48	1.48
Wt. of WS	3.42	2.99
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-1
Wt. of Tare & WS (gm)	765.00	671.00
Wt. of Tare & DS (gm)	642.00	571.60
Wt. of Tare (gm)	211.00	209.80
Wt of water (gm)	123.00	99.40
Wt. of DS (gm)	431.00	361.80
Wet Density (pcf):	103.6	90.6
Moisture Content (%):	**28.5**	**27.5**
Dry Density (pcf):	**80.6**	**71.1**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-09**
Date (s) : 5.12 - 5.14.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-4	DC-5	DC-6
Nuclear Test Number :	CSL-31	CSL-44	CSL-51
Location:	Acre 7	Acre 9	Acre 11
Depth (ft):	Lift 1	Lift 1	Lift 1
Date :	5.12.14	5.12.14	5.14.14

Mold

Cylinder ID	#1	#1	#1
Weight of Cylinder (lbs.)	1.48	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.61	5.38	5.54
Wt. of Cylinder (lbs.)	1.48	1.48	1.48
Wt. of WS	4.13	3.90	4.06
Cylinder Volume (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-2	Z-4
Wt. of Tare & WS (gm)	637.00	686.60	677.40
Wt. of Tare & DS (gm)	558.80	572.40	576.60
Wt. of Tare (gm)	211.00	211.00	210.00
Wt of water (gm)	78.20	114.20	100.80
Wt. of DS (gm)	347.80	361.40	366.60
Wet Density (pcf):	125.2	118.2	123.0
Moisture Content (%):	**22.5**	**31.6**	**27.5**
Dry Density (pcf):	**102.2**	**89.8**	**96.5**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-08**
Date (s) : 5.12 - 5.13.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/ND-68	P6A/ND-77
Depth (ft):	CSG	CSG
Date :	5.12.14	5.13.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	11.93	12.03
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	2.68	2.78
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-3
Wt. of Tare & WS (gm)	584.40	644.60
Wt. of Tare & DS (gm)	496.60	529.60
Wt. of Tare (gm)	211.00	209.40
Wt. of water (gm)	87.80	115.00
Wt. of DS (gm)	285.60	320.20
Wet **Density (pcf):**	81.2	84.2
Moisture Content (%):	**30.7**	**35.9**
Dry Density (pcf):	**62.1**	**62.0**

Comment(s): 1PT-01, 02, had water added to material before 1 point testing was performed.

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-09**
Date (s) : 5.12 - 5.14.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	P6A/CSL-35	P6A/CSL-55
Depth (ft):	A7/L1	A11/L1
Date :	5.12.14	5.14.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.04	13.22
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	3.79	3.97
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-5
Wt. of Tare & WS (gm)	580.80	665.80
Wt. of Tare & DS (gm)	483.60	577.00
Wt. of Tare (gm)	211.00	210.60
Wt. of water (gm)	97.20	88.80
Wt. of DS (gm)	272.60	366.40
Wet **Density (pcf):**	114.8	120.3
Moisture Content (%):	**35.7**	**24.2**
Dry Density (pcf):	**84.7**	**96.8**

Comment(s):

Geotechnics Representative : Abe Gaeta

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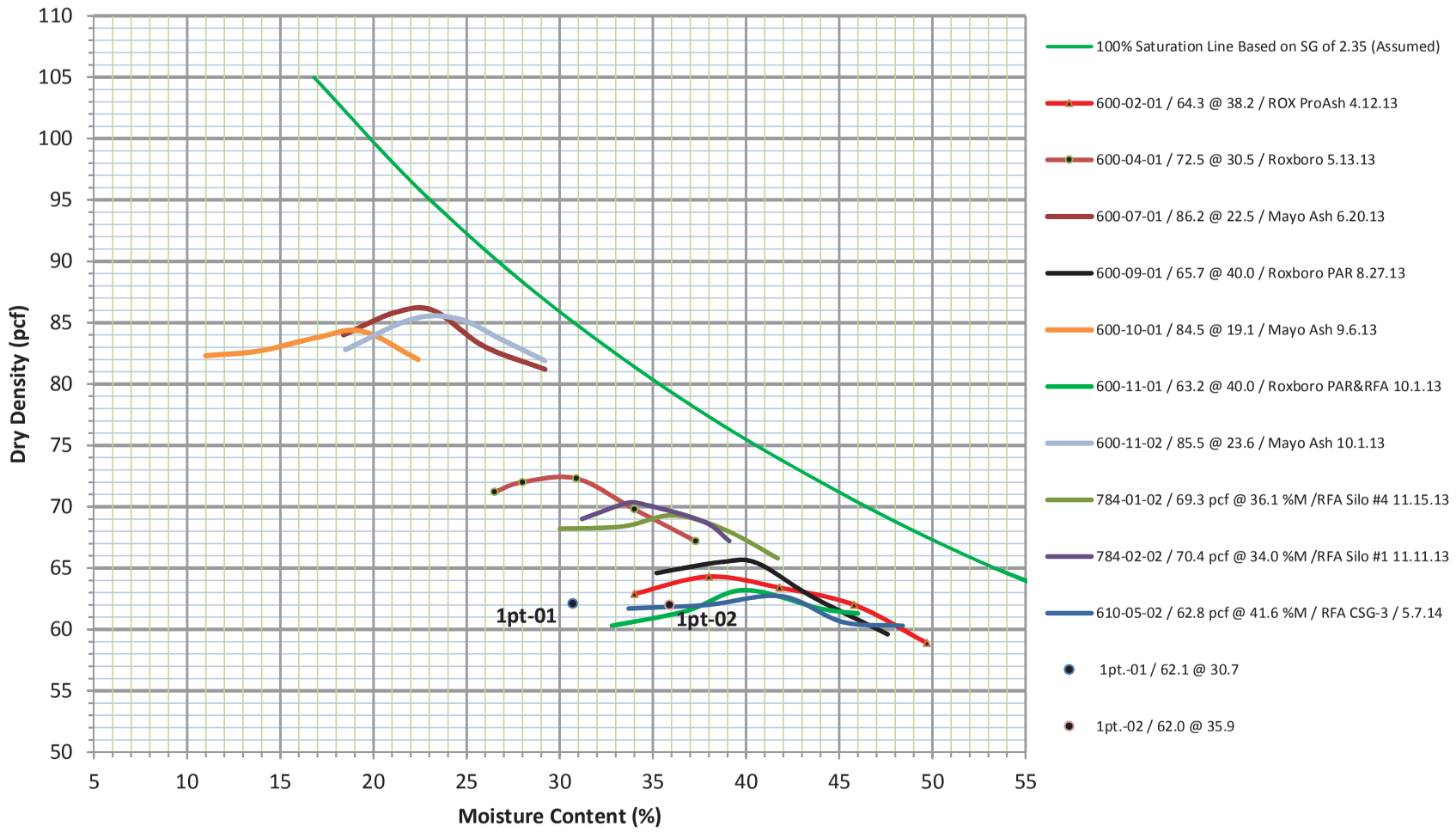
INTEGRITY IN TESTING

Fly Ash Moisture Density Relationships

Date: 5.12 - 5.13.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610



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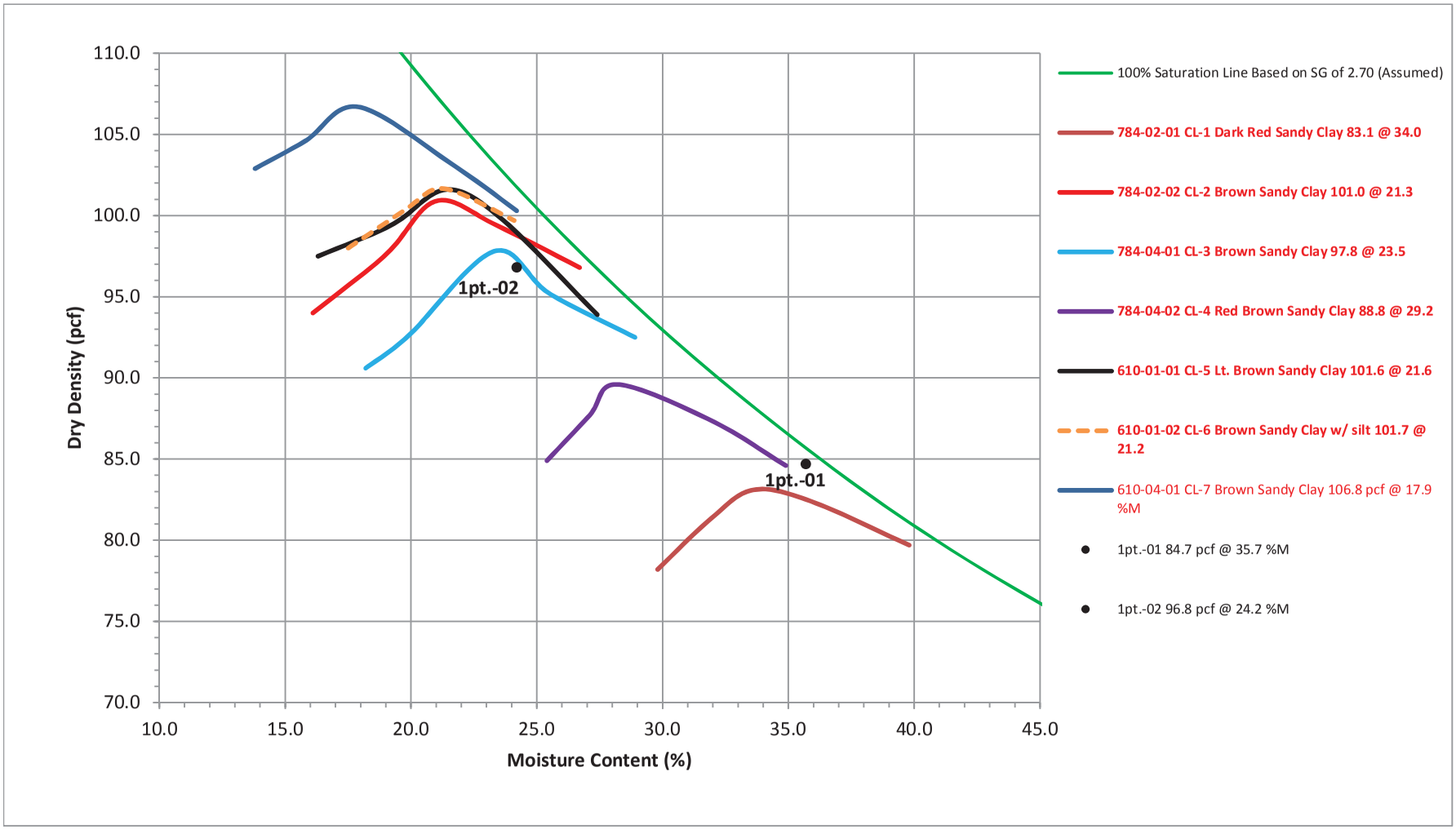
geotechnics
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 5.12 - 5.14.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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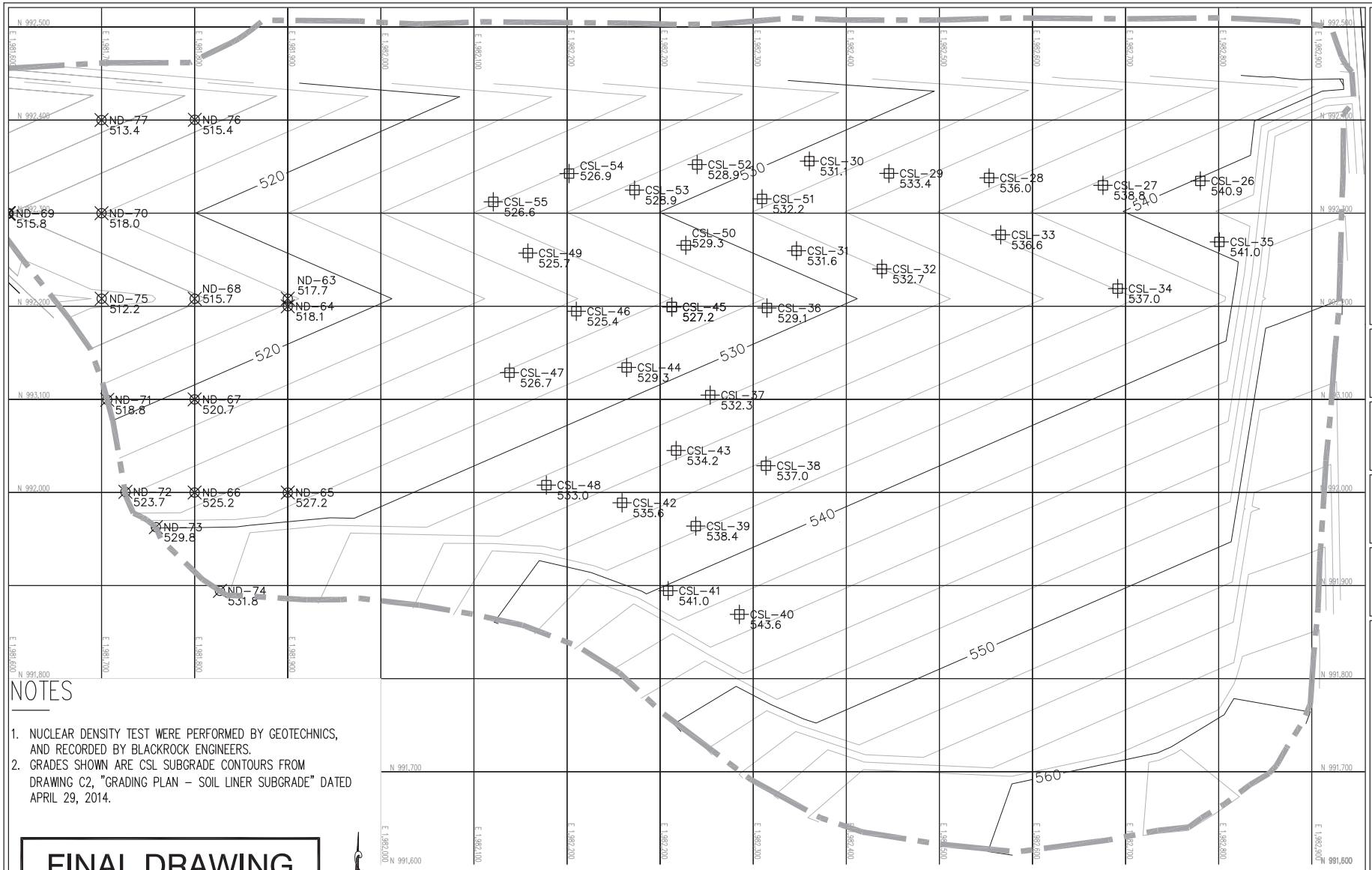

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.
5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
NAP	WML	1"=100'	P6A-FDR09
DATE:	PROJECT NO.		FILE NAME
14.07.16	11001		P6-ST-FILL-CT

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-09

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 5:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed density testing and pushed shelby tubes on Acres 12, 13, 14, and 15.
- A total of (20) nuclear density tests were taken within these acres in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (1) drive cylinder was taken at nuclear density location CSL-61.
- Geotechnics Rep. performed a 1-point proctor at nuclear density test locations CSL-56, and CSL-66.
- Geotechnics Rep. delivered shelby tubes pushed for acres 12, and 13 along with bucket soil samples for CL-09, and CL-10 to lab for testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	5.20.14	**Checked By:**	MPS	**Date:**	5.28.14

Day:	**Wed**
Date:	**5.21.14**
Log No.:	**28**
Page:	**3 of 5**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 3:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 75-89 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. delivered shelby tubes pushed for acres 14, and 15 to lab for testing.
- Glover workers began placing soil along top of berm around cell.
- Geotechnics Rep. performed a 1-point proctor for material placed along toe of south slope @ berm.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	5.21.14	**Checked By:**	MPS	**Date:**	5.28.14

Day:	**Thursday**
Date:	**5.22.14**
Log No.:	**29**
Page:	**4 of 5**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 2:00 PM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued placing first lift of Compacted Clay Liner (CCL) along top of berm.
- Geotechnics Rep. collected a bucket soil sample for a cummulative 25,000 cy soil placed for P6A cell. Sample CL-11 was obtained along south berm @ toe of slope.
- Geotechnics Rep. collected a bag sample of protective cover material from sand stockpile for lab testing.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	5.22.14	**Checked By:**	MPS	**Date:**	5.28.14

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Day:	**Friday**
Date:	**5.23.14**
Log No.:	**30**
Page:	**5 of 5**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 8:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-85 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover began compacting CCL material along east slope of cell P6A berm.
- Geotechnics Rep. performed a 1-point proctor using CCL material placed on east slope of berm.
- Geotechnics Rep. worked on field reports.
- Geotechnics Rep. departed jobsite.
- Rep. delivered Sand sample PC-2, Soil sample CL-11, and Geotextile sample to lab for testing.

Prepared By:	APG	**Date:**	5.23.14	**Checked By:**	MPS	**Date:**	5.28.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-10**	Geotechnics Representative : Abe Gaeta	Page : 1 of 1
Date (s) : 5.19.14 - 5.23.14	Reviewed By : MPS	Date : 5.28.14

Contractor : Glover Construction			Borrow Source : Site "G" Borrow Pit
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = N/A	WD Offset = N/A		Rod Depth= 6" MS= 685 DS= 2262

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	56	P6A	A12/L1	6"	784-04-01	97.8	23.5	**124.2**	**30.3**	**95.3**	**97.5%**	**95.0%**	CSL (Clay Soil Liner)
CSL -	57	P6A	A12/L1	6"	784-04-01	97.8	23.5	**123.3**	**30.5**	**94.5**	**96.6%**	**95.0%**	Tested on 5.20.14
CSL -	58	P6A	A12/L1	6"	784-04-01	97.8	23.5	**124.0**	**31.1**	**94.6**	**96.7%**	**95.0%**	ST
CSL -	59	P6A	A12/L1	6"	784-04-01	97.8	23.5	**125.0**	**29.3**	**96.7**	**98.8%**	**95.0%**	Tested on 5.20.14
CSL -	60	P6A	A12/L1	6"	784-02-02	101.0	21.3	**128.8**	**30.0**	**99.1**	**98.1%**	**95.0%**	Tested on 5.20.14
CSL -	61	P6A	A13/L1	6"	784-04-01	97.8	23.5	**124.2**	**27.5**	**97.4**	**99.6%**	**95.0%**	Tested on 5.20.14
DC -	7	P6A	A13/L1	N/A	784-04-01	97.8	23.5	**123.6**	**26.9**	**97.4**	**99.6%**	**95.0%**	DC-7 taken @ CSL-61
CSL -	62	P6A	A13/L1	6"	771-01-13	89.7	30.4	**118.8**	**33.5**	**89.0**	**99.2%**	**95.0%**	Tested on 5.20.14
CSL -	63	P6A	A13/L1	6"	784-04-01	97.8	23.5	**126.3**	**30.5**	**96.8**	**99.0%**	**95.0%**	Tested on 5.20.14
CSL -	64	P6A	A13/L1	6"	784-04-01	97.8	23.5	**124.7**	**30.1**	**95.8**	**98.0%**	**95.0%**	Tested on 5.20.14
CSL -	65	P6A	A13/L1	6"	784-04-01	97.8	23.5	**123.9**	**31.5**	**94.2**	**96.3%**	**95.0%**	ST
CSL -	66	P6A	A14/L1	6"	784-02-02	101.0	21.3	**125.2**	**26.0**	**99.4**	**98.4%**	**95.0%**	Tested on 5.20.14
CSL -	67	P6A	A14/L1	6"	605-01-03	93.2	28.2	**120.6**	**32.1**	**91.3**	**98.0%**	**95.0%**	Tested on 5.20.14
CSL -	68	P6A	A14/L1	6"	605-01-03	93.2	28.2	**121.6**	**31.3**	**92.6**	**99.4%**	**95.0%**	Tested on 5.20.14
CSL -	69	P6A	A14/L1	6"	605-01-03	93.2	28.2	**121.3**	**31.7**	**92.1**	**98.8%**	**95.0%**	ST
CSL -	70	P6A	A14/L1	6"	784-02-02	101.0	21.3	**126.4**	**26.0**	**100.3**	**99.3%**	**95.0%**	Tested on 5.20.14
CSL -	71	P6A	A15/L1	6"	784-02-02	101.0	21.3	**126.0**	**26.2**	**99.8**	**98.9%**	**95.0%**	Tested on 5.20.14
CSL -	72	P6A	A15/L1	6"	784-02-02	101.0	21.3	**126.6**	**25.0**	**101.3**	**100.3%**	**95.0%**	Tested on 5.20.14
CSL -	73	P6A	A15/L1	6"	784-04-01	97.8	23.5	**124.1**	**30.7**	**95.0**	**97.1%**	**95.0%**	ST
CSL -	74	P6A	A15/L1	6"	605-01-03	93.2	28.2	**121.4**	**30.5**	**93.0**	**99.8%**	**95.0%**	Tested on 5.20.14
CSL -	75	P6A	A15/L1	6"	784-02-02	101.0	21.3	**124.3**	**25.7**	**98.9**	**97.9%**	**95.0%**	Tested on 5.20.14

Client:	BLACKROCK ENGINEERS
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2014-610

Report Number :	**FDR-10**
Date (s) :	5.20.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-7
Nuclear Test Number :	CSL-61
Location:	Acre 13
Depth (ft):	Lift 1
Date :	5.20.14

Mold

Cylinder ID	#2
Weight of Cylinder (lbs.)	1.49
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.57
Wt. of Cylinder (lbs.)	1.49
Wt. of WS	4.08
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	Z-1
Wt. of Tare & WS (gm)	706.80
Wt. of Tare & DS (gm)	601.40
Wt. of Tare (gm)	209.80
Wt of water (gm)	105.40
Wt. of DS (gm)	391.60

Wet Density (pcf): 123.6

Moisture Content (%): **26.9**
Dry Density (pcf): **97.4**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-10**
Date (s) : 5.19 - 5.23.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03	1pt-04
Location:	P6A	P6A/CSL-56	P6A/CSL-66	P6A
Depth (ft):	A12/L1	A12/L1	A14/L1	SW SLOPE
Date :	5.19.14	5.20.14	5.20.14	5.21.14

Mold

Weight of Mold (lbs.)	9.25	9.25	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.29	13.26	13.31	13.52
Weight of Mold (lbs)	9.25	9.25	9.25	9.25
Weight of WS (lbs)	4.04	4.01	4.06	4.27
Volume of Mold (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-1	Z-3	Z-4
Wt. of Tare & WS (gm)	645.80	658.80	655.20	696.20
Wt. of Tare & DS (gm)	578.20	554.40	570.00	627.40
Wt. of Tare (gm)	208.20	209.80	206.00	207.00
Wt. of water (gm)	67.60	104.40	85.20	68.80
Wt. of DS (gm)	370.00	344.60	364.00	420.40
Wet **Density (pcf):**	122.4	121.5	123.0	129.4
Moisture Content (%):	**18.3**	**30.3**	**23.4**	**16.4**
Dry Density (pcf):	**103.5**	**93.3**	**99.7**	**111.2**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERS
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2014-610

Report Number :	**FDR-10**
Date (s) :	5.22.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-05
Location:	P6A
Depth (ft):	East Slope
Date :	5.23.14

Mold

Weight of Mold (lbs.)	9.25
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	13.37
Weight of Mold (lbs)	9.25
Weight of WS (lbs)	4.12
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	Y-3
Wt. of Tare & WS (gm)	766.40
Wt. of Tare & DS (gm)	663.00
Wt. of Tare (gm)	237.00
Wt. of water (gm)	103.40
Wt. of DS (gm)	426.00

Wet **Density (pcf):**	124.8

Moisture Content (%):	**24.3**
Dry Density (pcf):	**100.5**

Comment(s):

Geotechnics Representative : Abe Gaeta

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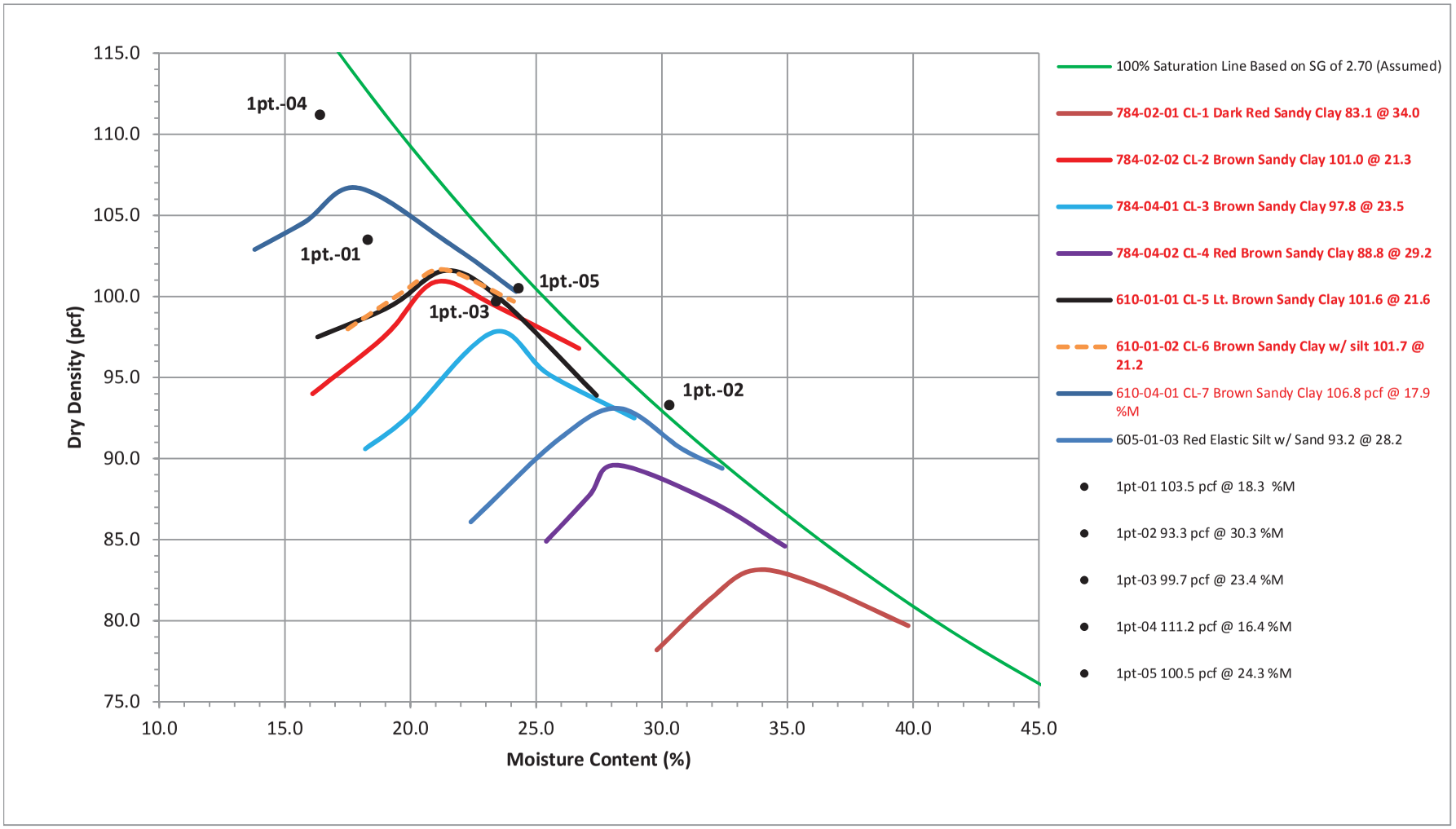
geotechnics
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 5.19 - 5.23.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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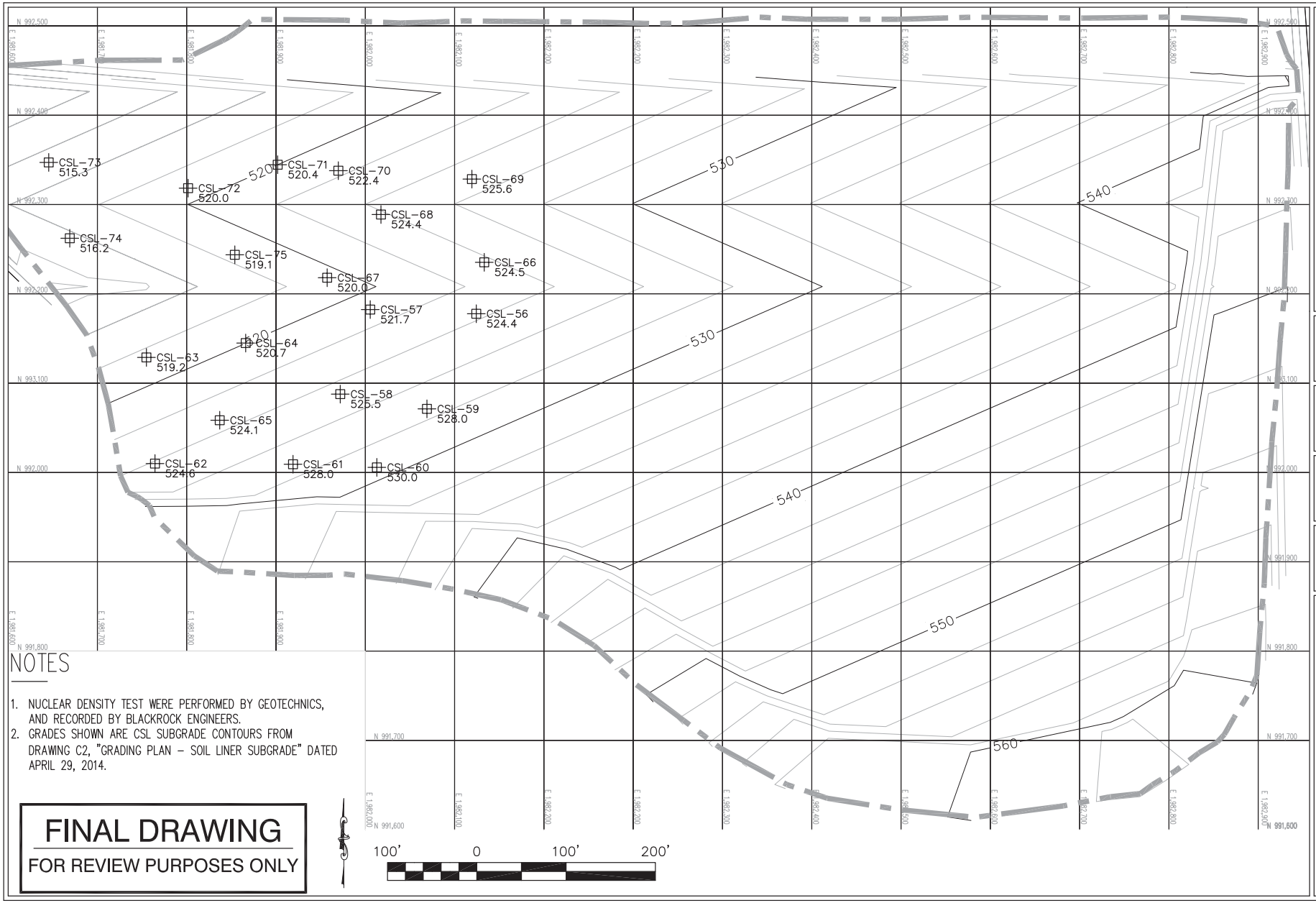

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6A-FDR10
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=100'
PROJECT NO.	11001
CHECKED BY:	WML
DATE:	14.07.16
DRAWN BY:	NAP

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-10

Day:	**Monday**
Date:	**5.26.14**
Log No.:	**31**
Page:	**1 of 6**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-91 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. began testing Acres 16, 17, and 18 along the top of P6A berm.
- A total of (15) nuclear density tests were taken within these acres in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (1) drive cylinder was taken at nuclear density location CSL-84.
- Geotechnics Rep. performed a 1-point proctor on material being tested at CSL-80.
- Geotechnics Rep. related to Glover Superintendent (after testing prepared clay) that soil needed additional water added and rolled again before retesting would begin for Acre 16 / Lift 1.
- Geotechnics Rep. departed the site.

Prepared By:	APG	5.26.14	**Checked By:**	MPS	**Date:** 6.2.14

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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 6:45 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. retested CSL material at Acre 16 once contractors reworked area.
- A total of (15) nuclear density tests were taken within these acres in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (2) drive cylinders were taken at nuclear density location CSL(R)-80, and CSL-100
- Geotechnics Rep. performed (2) 1-point proctors at nuclear density test locations CSL-80, and CSL-94.
- Geotechnics Rep. delivered shelby tubes pushed for Acres 16, 17, and 18 - Lift 1 to lab for testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	5.30.14	**Checked By:**	MPS	**Date:**	6.2.14

Day:	**Wed**
Date:	**5.28.14**
Log No.:	**33**
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geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 3:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 75-89 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction prepared 5.5 acres of CSL material within cell P6A. Workers disced soil, added water, then compacted preparing Lift 2 for testing.
- Geotechnics Rep. delivered shelby tubes pushed for Acres 1, and 2 - Lift 2 to lab for testing.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	5.31.14	**Checked By:**	MPS	**Date:**	6.2.14

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:00 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 72-92 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (30) nuclear density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (3) drive cylinder tests were taken at nuclear density test locations CSL-111, CSL-23, and CSL-132.
- Geotechnics Rep. tested Acres 3, 4, 5, 6, 7, and 8 for density and pushed shelby tubes within these areas.
- Geotechnics Rep. delivered shelby tubes for these acreas, along with sand sample PC-03, and soil sample CL-12. CL-12 was collected at a job accumulation estimate of 25,000 yd3.
- Geotechnics Rep. departed jobsite.

Prepared By: APG **Date:** 5.29.14 **Checked By:** MPS **Date:** 6.2.14

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:00 PM **Departed:** 4:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 65-75 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (15) nuclear density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (2) drive cylinder tests were
- taken at nuclear density test locations CSL-140, and CSL-147.
- Geotechnics Rep. performed nuclear density tests on acres 9, 10, and 11.
- Geotechnics Rep. departed jobsite.

Prepared By: APG **Date:** 5.30.14 **Checked By:** MPS **Date:** 6.2.14

Day:	**Saturday**
Date:	**5.31.14**
Log No.:	**36**
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Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 12:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-85 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (15) nuclear density tests on Lift 2 within acres 16, 17, and 18. In addition (1) drive cylinder test was taken at CSL-160.
- Rep. delivered sand sample PC-4, and shelby tubes for acres 9, 10, 11, 16, 17, and 18. All tubes were pushed in second lift of CSL material.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	5.31.14	**Checked By:**	MPS	**Date:**	6.2.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-11**	Geotechnics Representative : Abe Gaeta	Page : 1 of 4
Date (s) : 5.26.14 - 5.31.14	Reviewed By : MPS	Date : 6.2.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A	Rod Depth= 6"	MS= 686 DS= 2263

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	76	P6A	A16/L1	6"	784-04-01	97.8	23.5	**121.5**	**24.9**	**97.3**	**99.5%**	**95.0%**	CSL (Clay Soil Liner)
CSL -	77	P6A	A16/L1	6"	610-04-01	106.8	17.9	**122.9**	**19.5**	**102.8**	**96.3%**	**95.0%**	Tested on 5.26.14
CSL -	78	P6A	A16/L1	6"	610-04-01	106.8	17.9	**124.2**	**18.0**	**105.3**	**98.6%**	**95.0%**	Tested on 5.26.14
CSL -	79	P6A	A16/L1	6"	784-04-01	97.8	23.5	**114.1**	**19.4**	**95.6**	**97.7%**	**95.0%**	Tested on 5.26.14
CSL -	80	P6A	A16/L1	6"	610-04-01	106.8	17.9	**123.8**	**20.8**	**102.5**	**96.0%**	**95.0%**	Tested on 5.26.14
CSL -	R76	P6A	A16/L1	6"	784-04-01	97.8	23.5	**119.7**	**28.0**	**93.5**	**95.6%**	**95.0%**	Retest for CSL-76
CSL -	R77	P6A	A16/L1	6"	784-04-01	97.8	23.5	**120.6**	**26.2**	**95.6**	**97.7%**	**95.0%**	Retest for CSL-77
CSL -	R78	P6A	A16/L1	6"	610-04-01	106.8	17.9	**126.4**	**21.3**	**104.2**	**97.6%**	**95.0%**	Retest for CSL-78
CSL -	R79	P6A	A16/L1	6"	784-04-01	97.8	23.5	**123.2**	**27.5**	**96.6**	**98.8%**	**95.0%**	ST
CSL -	R80	P6A	A16/L1	6"	610-04-01	106.8	17.9	**127.7**	**21.0**	**105.5**	**98.8%**	**95.0%**	Retest for CSL-80
DC -	8	P6A	A16/L1	N/A	610-04-01	106.8	17.9	**127.9**	**22.4**	**104.5**	**97.8%**	**95.0%**	DC-08 taken @ CSL-R80
CSL -	81	P6A	A17/L1	6"	784-04-02	88.8	29.2	**116.8**	**31.6**	**88.8**	**99.9%**	**95.0%**	Tested on 5.26.14
CSL -	82	P6A	A17/L1	6"	784-04-01	97.8	23.5	**119.1**	**25.8**	**94.7**	**96.8%**	**95.0%**	Tested on 5.26.14
CSL -	83	P6A	A17/L1	6"	610-01-01	101.6	21.6	**123.8**	**21.4**	**102.0**	**100.4%**	**95.0%**	Tested on 5.26.14
CSL -	84	P6A	A17/L1	6"	610-04-01	106.8	17.9	**126.3**	**22.6**	**103.0**	**96.5%**	**95.0%**	ST
DC -	9	P6A	A17/L1	N/A	610-04-01	106.8	17.9	**127.9**	**20.6**	**106.1**	**99.3%**	**95.0%**	DC-09 taken @ CSL-84
CSL -	85	P6A	A17/L1	6"	610-01-01	101.6	21.6	**119.8**	**20.0**	**99.8**	**98.3%**	**95.0%**	Tested on 5.26.14
CSL -	86	P6A	A18/L1	6"	784-04-01	97.8	23.5	**120.7**	**25.8**	**95.9**	**98.1%**	**95.0%**	Tested on 5.26.14
CSL -	87	P6A	A18/L1	6"	784-04-01	97.8	23.5	**120.3**	**28.1**	**93.9**	**96.0%**	**95.0%**	Tested on 5.26.14
CSL -	88	P6A	A18/L1	6"	784-04-01	97.8	23.5	**118.8**	**24.7**	**95.3**	**97.4%**	**95.0%**	Tested on 5.26.14
CSL -	89	P6A	A18/L1	6"	784-04-02	88.8	29.2	**116.4**	**31.4**	**88.6**	**99.8%**	**95.0%**	ST
CSL -	90	P6A	A18/L1	6"	784-04-02	88.8	29.2	**118.9**	**30.9**	**90.8**	**102.3%**	**95.0%**	Tested on 5.26.14
CSL -	91	P6A	A1/L2	6"	610-01-01	101.6	21.6	**125.7**	**24.3**	**101.1**	**99.5%**	**95.0%**	Tested on 5.27.14
CSL -	92	P6A	A1/L2	6"	784-04-01	97.8	23.5	**120.6**	**28.3**	**94.0**	**96.1%**	**95.0%**	Tested on 5.27.14
CSL -	93	P6A	A1/L2	6"	610-04-01	106.8	17.9	**129.1**	**20.1**	**107.5**	**100.6%**	**95.0%**	Tested on 5.27.14
CSL -	94	P6A	A2/L2	6"	610-01-01	101.6	21.6	**123.2**	**23.0**	**100.2**	**98.6%**	**95.0%**	Tested on 5.27.14
CSL -	95	P6A	A2/L2	6"	784-04-01	97.8	23.5	**122.1**	**26.5**	**96.5**	**98.7%**	**95.0%**	ST
CSL -	96	P6A	A2/L2	6"	784-04-01	97.8	23.5	**122.5**	**24.4**	**98.5**	**100.7%**	**95.0%**	Tested on 5.27.14
CSL -	97	P6A	A2/L2	6"	784-04-01	97.8	23.5	**122.2**	**30.6**	**93.6**	**95.7%**	**95.0%**	Tested on 5.27.14
CSL -	98	P6A	A2/L2	6"	784-04-01	97.8	23.5	**117.3**	**26.0**	**93.1**	**95.2%**	**95.0%**	Tested on 5.27.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-11**		Geotechnics Representative : Abe Gaeta	Page : 2 of 4
Date (s) : 5.26.14 - 5.31.14		Reviewed By : MPS	Date : 6.2.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A	Rod Depth= 6"	MS= 685 DS= 2261

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	99	P6A	A1/L2	6"	784-04-01	97.8	23.5	**122.6**	**29.3**	**94.8**	**97.0%**	**95.0%**	Tested on 5.27.13
CSL -	100	P6A	A1/L2	6"	784-04-01	97.8	23.5	**123.1**	**27.8**	**96.3**	**98.5%**	**95.0%**	ST
DC -	10	P6A	A1/L2	N/A	784-04-01	97.8	23.5	**121.8**	**28.0**	**95.2**	**97.3%**	**95.0%**	DC-10 taken @ CSL-100
CSL -	101	P6A	A2/L2	6"	784-04-01	97.8	23.5	**119.8**	**27.9**	**93.7**	**95.8%**	**95.0%**	Tested on 5.28.14
CSL -	102	P6A	A2/L2	6"	610-01-01	101.6	21.6	**122.9**	**23.0**	**99.9**	**98.3%**	**95.0%**	Tested on 5.28.14
CSL -	103	P6A	A2/L2	6"	610-04-01	106.8	17.9	**123.9**	**19.5**	**103.7**	**97.1%**	**95.0%**	Tested on 5.28.14
CSL -	104	P6A	A3/L2	6"	610-04-01	106.8	17.9	**123.8**	**19.3**	**103.8**	**97.2%**	**95.0%**	Tested on 5.29.14
CSL -	105	P6A	A3/L2	6"	610-01-01	101.6	21.6	**122.4**	**23.2**	**99.4**	**97.8%**	**95.0%**	Tested on 5.29.14
CSL -	106	P6A	A3/L2	6"	610-01-01	101.6	21.6	**125.0**	**22.6**	**102.0**	**100.4%**	**95.0%**	Tested on 5.29.14
CSL -	107	P6A	A3/L2	6"	784-04-01	97.8	23.5	**122.3**	**28.4**	**95.2**	**97.4%**	**95.0%**	ST
CSL -	108	P6A	A3/L2	6"	610-01-01	101.6	21.6	**118.4**	**22.3**	**96.8**	**95.3%**	**95.0%**	Tested on 5.29.14
CSL -	109	P6A	A4/L2	6"	610-01-01	101.6	21.6	**120.9**	**23.5**	**97.9**	**96.4%**	**95.0%**	Tested on 5.29.14
CSL -	110	P6A	A4/L2	6"	784-04-01	97.8	23.5	**124.2**	**26.2**	**98.4**	**100.6%**	**95.0%**	ST
CSL -	111	P6A	A4/L2	6"	610-04-01	106.8	17.9	**125.5**	**19.2**	**105.3**	**98.6%**	**95.0%**	Tested on 5.29.14
DC -	11	P6A	A4/L2	N/A	610-04-01	106.8	17.9	**123.6**	**21.6**	**101.6**	**95.2%**	**95.0%**	DC-11 taken @ CSL-111
CSL -	112	P6A	A4/L2	6"	610-01-01	101.6	21.6	**123.0**	**22.7**	**100.2**	**98.7%**	**95.0%**	Tested on 5.29.14
CSL -	113	P6A	A4/L2	6"	610-04-01	106.8	17.9	**124.2**	**20.9**	**102.7**	**96.2%**	**95.0%**	Tested on 5.29.14
CSL -	114	P6A	A5/L2	6"	610-04-01	106.8	17.9	**126.9**	**22.6**	**103.5**	**96.9%**	**95.0%**	Tested on 5.29.14
CSL -	115	P6A	A5/L2	6"	610-01-01	101.6	21.6	**125.4**	**25.2**	**100.2**	**98.6%**	**95.0%**	Tested on 5.29.14
CSL -	116	P6A	A5/L2	6"	610-01-01	101.6	21.6	**126.2**	**24.1**	**101.7**	**100.1%**	**95.0%**	Tested on 5.29.14
CSL -	117	P6A	A5/L2	6"	610-01-01	101.6	21.6	**126.0**	**23.6**	**101.9**	**100.3%**	**95.0%**	ST
CSL -	118	P6A	A5/L2	6"	610-04-01	106.8	17.9	**126.3**	**22.0**	**103.5**	**96.9%**	**95.0%**	Tested on 5.29.14
CSL -	119	P6A	A6/L2	6"	784-04-01	106.8	17.9	**129.1**	**21.7**	**106.1**	**99.3%**	**95.0%**	Tested on 5.29.14
CSL -	120	P6A	A6/L2	6"	784-04-01	97.8	23.5	**121.5**	**26.2**	**96.3**	**98.4%**	**95.0%**	Tested on 5.29.14
CSL -	121	P6A	A6/L2	6"	610-04-01	106.8	17.9	**127.9**	**20.4**	**106.2**	**99.5%**	**95.0%**	ST
CSL -	122	P6A	A6/L2	6"	784-04-01	98.3	22.1	**121.5**	**26.1**	**96.4**	**98.0%**	**95.0%**	Tested on 5.29.14
CSL -	123	P6A	A6/L2	6"	610-01-01	101.6	21.6	**126.9**	**24.9**	**101.6**	**100.0%**	**95.0%**	Tested on 5.29.14
DC -	12	P6A	A6/L2	N/A	610-01-01	101.6	21.6	**124.5**	**26.4**	**98.5**	**96.9%**	**95.0%**	DC-12 taken @ CSL-123
CSL -	124	P6A	A7/L2	6"	610-04-01	106.8	17.9	**128.4**	**19.7**	**107.3**	**100.4%**	**95.0%**	Tested on 5.29.14
CSL -	125	P6A	A7/L2	6"	610-01-01	101.6	21.6	**125.0**	**25.5**	**99.6**	**98.0%**	**95.0%**	Tested on 5.29.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-11**		Geotechnics Representative : Abe Gaeta	Page : 3 of 4
Date (s) : 5.26.14 - 5.31.14		Reviewed By : MPS	Date : 6.2.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A	Rod Depth= 6"	MS= 683 DS= 2267

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	126	P6A	A7/L2	6"	784-04-01	97.8	23.5	**122.3**	**25.6**	**97.4**	**99.6%**	**95.0%**	Tested on 5.29.14
CSL -	127	P6A	A7/L2	6"	610-01-01	101.6	21.6	**124.7**	**22.5**	**101.8**	**100.2%**	**95.0%**	Tested on 5.29.14
CSL -	128	P6A	A7/L2	6"	610-04-01	106.8	17.9	**128.8**	**21.2**	**106.3**	**99.5%**	**95.0%**	ST
CSL -	129	P6A	A8/L2	6"	784-04-01	101.6	21.6	**124.0**	**22.7**	**101.1**	**99.5%**	**95.0%**	Tested on 5.29.14
CSL -	130	P6A	A8/L2	6"	610-01-01	101.6	21.6	**119.7**	**22.9**	**97.4**	**95.9%**	**95.0%**	Tested on 5.29.14
CSL -	131	P6A	A8/L2	6"	610-01-01	101.6	21.6	**118.8**	**23.0**	**96.6**	**95.1%**	**95.0%**	Tested on 5.29.14
CSL -	132	P6A	A8/L2	6"	610-01-01	101.6	21.6	**123.5**	**23.0**	**100.4**	**98.8%**	**95.0%**	Tested on 5.29.14
DC -	13	P6A	A8/L2	N/A	610-01-01	101.6	21.6	**123.9**	**22.1**	**101.5**	**99.9%**	**95.0%**	DC-13 taken @ CSL-132
CSL -	133	P6A	A8/L2	6"	784-04-01	97.8	23.5	**122.2**	**27.9**	**95.5**	**97.7%**	**95.0%**	ST
CSL -	134	P6A	A9/L2	6"	610-04-01	106.8	17.9	**126.5**	**22.4**	**103.3**	**96.8%**	**95.0%**	ST
CSL -	135	P6A	A9/L2	6"	784-04-01	97.8	23.5	**120.7**	**25.0**	**96.6**	**98.7%**	**95.0%**	Tested on 5.30.14
CSL -	136	P6A	A9/L2	6"	610-01-01	101.6	21.6	**123.6**	**24.3**	**99.4**	**97.9%**	**95.0%**	Tested on 5.30.14
CSL -	137	P6A	A9/L2	6"	605-01-03	97.8	23.5	**122.0**	**27.8**	**95.5**	**97.6%**	**95.0%**	Tested on 5.30.14
CSL -	138	P6A	A9/L2	6"	610-01-01	101.6	21.6	**123.9**	**23.0**	**100.7**	**99.1%**	**95.0%**	Tested on 5.30.14
CSL -	139	P6A	A10/L2	6"	610-01-01	101.6	21.6	**125.4**	**24.0**	**101.1**	**99.5%**	**95.0%**	Tested on 5.30.14
CSL -	140	P6A	A10/L2	6"	610-04-01	106.8	17.9	**124.5**	**22.6**	**101.5**	**95.1%**	**95.0%**	Tested on 5.30.14
DC -	14	P6A	A10/L2	N/A	610-04-01	106.8	17.9	**126.4**	**23.1**	**102.7**	**96.1%**	**95.0%**	DC-14 taken @ CSL-140
CSL -	141	P6A	A10/L2	6"	784-04-01	97.8	23.5	**119.1**	**27.7**	**93.3**	**95.4%**	**95.0%**	Tested on 5.30.14
CSL -	142	P6A	A10/L2	6"	784-04-01	97.8	23.5	**121.6**	**27.7**	**95.2**	**97.4%**	**95.0%**	ST
CSL -	143	P6A	A10/L2	6"	784-04-01	97.8	23.5	**121.4**	**27.7**	**95.1**	**97.2%**	**95.0%**	Tested on 5.30.14
CSL -	144	P6A	A11/L2	6"	610-01-01	101.6	21.6	**122.7**	**22.7**	**100.0**	**98.4%**	**95.0%**	Tested on 5.30.14
CSL -	145	P6A	A11/L2	6"	610-04-00	106.8	17.9	**128.7**	**19.2**	**108.0**	**101.1%**	**95.0%**	ST
CSL -	146	P6A	A11/L2	6"	610-04-01	106.8	17.9	**131.1**	**26.1**	**104.0**	**97.3%**	**95.0%**	Tested on 5.30.14
CSL -	147	P6A	A11/L2	6"	610-04-01	106.8	17.9	**128.5**	**22.9**	**104.6**	**97.9%**	**95.0%**	Tested on 5.30.14
DC -	15	P6A	A11/L2	N/A	610-04-01	106.8	17.9	**123.6**	**19.4**	**103.5**	**96.9%**	**95.0%**	DC-15 taken @ CSL-147
CSL -	148	P6A	A11/L2	6"	784-04-01	97.8	23.5	**121.4**	**26.5**	**96.0**	**98.1%**	**95.0%**	Tested on 5.30.14
CSL -	149	P6A	A16/L2	6"	610-01-01	101.6	21.6	**127.9**	**27.9**	**100.0**	**98.4%**	**95.0%**	Tested on 5.31.14
CSL -	150	P6A	A16/L2	6"	610-01-01	101.6	21.6	**126.6**	**26.4**	**100.2**	**98.6%**	**95.0%**	Tested on 5.31.14
CSL -	151	P6A	A16/L2	6"	784-04-01	97.8	23.5	**123.0**	**30.7**	**94.1**	**96.2%**	**95.0%**	Tested on 5.31.14
CSL -	152	P6A	A16/L2	6"	784-04-01	97.8	23.5	**125.6**	**30.2**	**96.5**	**98.6%**	**95.0%**	Tested on 5.31.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-11**	Geotechnics Representative : Abe Gaeta	Page : 4 of 4
Date (s) : 5.26.14 - 5.31.14	Reviewed By : MPS	Date : 6.2.14

Contractor : Glover Construction			Borrow Source : Site "G" Borrow Pit
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 815 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A		Rod Depth= 6" MS= 682 DS= 2280

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	153	P6A	A16/L2	6"	610-01-01	101.6	21.6	**128.3**	**27.2**	**100.9**	**99.3%**	**95.0%**	ST
CSL -	154	P6A	A17/L2	6"	610-01-01	101.6	21.6	**128.0**	**26.1**	**101.5**	**99.9%**	**95.0%**	Tested on 5.31.14
CSL -	155	P6A	A17/L2	6"	610-10-04	93.8	25.8	**119.7**	**32.2**	**90.5**	**96.5%**	**95.0%**	Tested on 5.31.14
CSL -	156	P6A	A17/L2	6"	784-04-01	97.8	23.5	**123.5**	**28.8**	**95.9**	**98.0%**	**95.0%**	Tested on 5.31.14
CSL -	157	P6A	A17/L2	6"	784-04-01	97.8	23.5	**123.4**	**30.8**	**94.3**	**96.5%**	**95.0%**	Tested on 5.31.14
CSL -	158	P6A	A17/L2	6"	784-04-01	97.8	23.5	**123.8**	**31.4**	**94.2**	**96.3%**	**95.0%**	Tested on 5.31.14
CSL -	159	P6A	A18/L2	6"	784-04-01	97.8	23.5	**123.8**	**27.2**	**97.3**	**99.5%**	**95.0%**	Tested on 5.31.14
CSL -	160	P6A	A18/L2	6"	784-04-01	97.8	23.5	**124.0**	**27.4**	**97.3**	**99.5%**	**95.0%**	Tested on 5.31.14
DC -	16	P6A	A18/L2	N/A	784-04-01	97.8	23.5	**123.3**	**25.6**	**98.2**	**100.4%**	**95.0%**	DC-16 taken @ CSL-160
CSL -	161	P6A	A18/L2	6"	610-12-02	109.8	17.8	**132.7**	**21.0**	**109.7**	**99.9%**	**95.0%**	Tested on 5.31.14
CSL -	162	P6A	A18/L2	6"	610-10-04	93.8	25.8	**120.4**	**32.4**	**90.9**	**96.9%**	**95.0%**	Tested on 5.31.14
CSL -	163	P6A	A18/L2	6"	784-04-01	97.8	23.5	**126.0**	**27.5**	**98.8**	**101.0%**	**95.0%**	ST

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-11**
Date (s) : 5.26 - 5.31.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-8	DC-9	DC-10	DC-11
Nuclear Test Number :	CSL-R80	CSL-84	CSL-100	CSL-111
Location:	Acre 16	Acre 17	Acre 1	Acre 4
Depth (ft):	Lift 1	Lift 1	Lift 2	Lift 2
Date :	5.27.14	5.27.14	5.27.14	5.27.14

Mold

Cylinder ID	#1	#2	#2	#1
Weight of Cylinder (lbs.)	1.48	1.49	1.49	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.70	5.71	5.51	5.56
Wt. of Cylinder (lbs.)	1.48	1.49	1.49	1.48
Wt. of WS	4.22	4.22	4.02	4.08
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2	Z-1	Z-1
Wt. of Tare & WS (gm)	637.00	793.00	676.60	604.00
Wt. of Tare & DS (gm)	558.20	693.60	573.80	533.60
Wt. of Tare (gm)	207.00	210.00	207.00	207.00
Wt of water (gm)	78.80	99.40	102.80	70.40
Wt. of DS (gm)	351.20	483.60	366.80	326.60
Wet Density (pcf):	127.9	127.9	121.8	123.6
Moisture Content (%):	**22.4**	**20.6**	**28.0**	**21.6**
Dry Density (pcf):	**104.4**	**106.1**	**95.2**	**101.7**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-11**
Date (s) : 5.26 - 5.31.14

Drive Cylinder - ASTM D 2937

Test Information				
Test Number :	DC-12	DC-13	DC-14	DC-15
Nuclear Test Number :	CSL-123	CSL-132	CSL-140	CSL-147
Location:	Acre 6	Acre 8	Acre 10	Acre 11
Depth (ft):	Lift 2	Lift 2	Lift 2	Lift 2
Date :	5.28.14	5.28.14	5.29.14	5.29.14
Mold				
Cylinder ID	#2	#2	#1	#2
Weight of Cylinder (lbs.)	1.49	1.49	1.48	1.49
Volume of Cylinder (ft^3)	0.033	0.033	0.033	0.033
Specimen				
Wt. of Cylinder & WS (lbs.)	5.60	5.58	5.65	5.57
Wt. of Cylinder (lbs.)	1.49	1.49	1.49	1.49
Wt. of WS	4.11	4.09	4.16	4.08
Cylinder Volume (ft^3)	0.033	0.033	0.033	0.033
Moisture / Density				
Tare Number	Z-1	Z-1	Z-1	Z-1
Wt. of Tare & WS (gm)	544.00	616.40	591.40	572.80
Wt. of Tare & DS (gm)	473.60	542.40	519.40	513.40
Wt. of Tare (gm)	207.00	207.00	207.00	207.00
Wt of water (gm)	70.40	74.00	72.00	59.40
Wt. of DS (gm)	266.60	335.40	312.40	306.40
Wet Density (pcf):	124.5	123.9	126.1	123.6
Moisture Content (%):	**26.4**	**22.1**	**23.0**	**19.4**
Dry Density (pcf):	**98.5**	**101.5**	**102.4**	**103.6**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client:	BLACKROCK ENGINEERS
Project Name :	ROXBORO ASH LANDFILL P6A
Project Number :	2014-610

Report Number :	**FDR-11**
Date (s) :	5.26 - 5.31.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-16
Nuclear Test Number :	CSL-160
Location:	Acre 18
Depth (ft):	Lift 2
Date :	5.30.14

Mold

Cylinder ID	#1
Weight of Cylinder (lbs.)	1.48
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.55
Wt. of Cylinder (lbs.)	1.48
Wt. of WS	4.07
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	Z-1
Wt. of Tare & WS (gm)	574.40
Wt. of Tare & DS (gm)	499.60
Wt. of Tare (gm)	207.00
Wt of water (gm)	74.80
Wt. of DS (gm)	292.60

Wet Density (pcf):	123.3

Moisture Content (%):	**25.6**
Dry Density (pcf):	**98.2**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-11**
Date (s) : 5.26 - 5.31.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03	1pt-04
Location:	P6A/CSL-80	P6A/CSL-94	P6A/CSL-104	P6A/CSL-133
Depth (ft):	A16/L1	A2/L2	A3/L2	A8/L2
Date :	5.26.14	5.27.14	5.29.14	5.29.14

Mold

Weight of Mold (lbs.)	9.25	9.25	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.41	13.26	13.31	13.32
Weight of Mold (lbs)	9.25	9.25	9.25	9.25
Weight of WS (lbs)	4.16	4.01	4.06	4.07
Volume of Mold (ft^3)	0.033	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-1	Z-2	Z-4
Wt. of Tare & WS (gm)	643.40	622.00	634.00	696.20
Wt. of Tare & DS (gm)	566.60	547.00	570.40	627.40
Wt. of Tare (gm)	210.00	207.00	210.00	207.00
Wt. of water (gm)	76.80	75.00	63.60	68.80
Wt. of DS (gm)	356.60	340.00	360.40	420.40
Wet **Density (pcf):**	126.1	121.5	123.0	123.3
Moisture Content (%):	**21.5**	**22.1**	**17.6**	**16.4**
Dry Density (pcf):	**103.7**	**99.6**	**104.6**	**106.0**

Comment(s): Water was added prior to testing for test 1pt.-01.

Geotechnics Representative : Abe Gaeta

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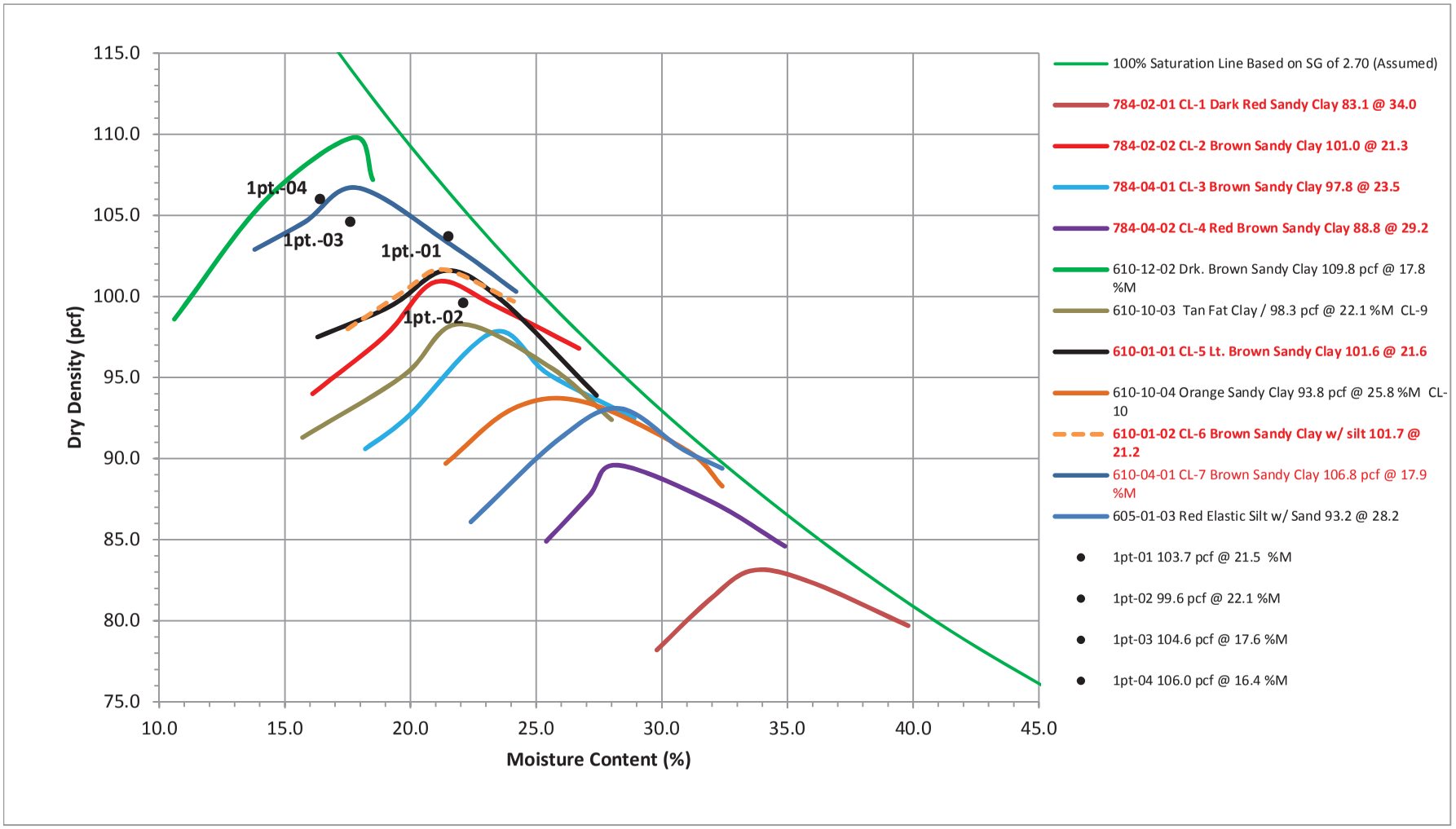
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 5.26 - 5.31.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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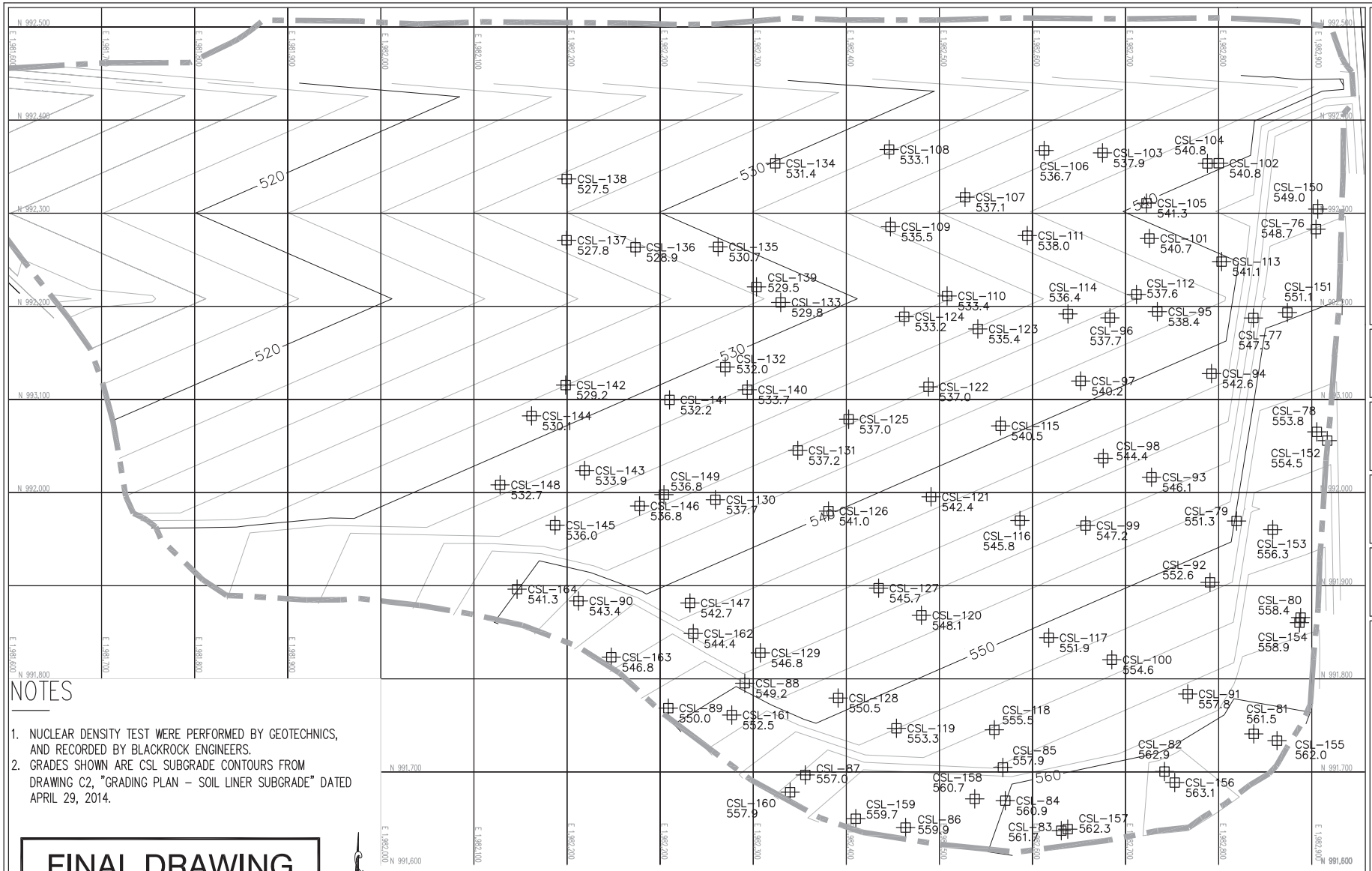

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

DRAWN BY: NAP	CHECKED BY: WML	SCALE: 1"=100'	FIGURE NO. P6A-FDR11
DATE: 14.07.16	PROJECT NO. 11001		FILE NAME P6-ST-FILL-CT

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-11

Day:	**Monday**
Date:	**6.2.14**
Log No.:	**37**
Page:	**1 of 6**

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-91 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued preparing areas of cell to certify subgrade in preparation of liner crew who is mobilizing on-site.
- Geotechnics Rep. worked on field reports, etc.
- Geotechnics Rep. departed the site.

Prepared By:	APG	6.2.14	**Checked By:**	MPS	**Date:** 6.12.14

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 8:30 AM **Departed:** 7:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 70-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (5) nuclear density tests were taken at Acre 19 in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn.
- Geotechnics Rep. performed a 1-point proctor at nuclear density test location CSL-167.
- Geotechnics Rep. pushed shelby tube (s) for Acre 19 - Lift 1.
- GSI liner crew began deploying liner starting at SE corner of cell.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	6.3.14	**Checked By:**	MPS	**Date:**	6.12.14

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Day:	**Wed**
Date:	**6.4.14**
Log No.:	**39**
Page:	**3 of 6**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 72-91 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued final grading at cell areas for certification of Compacted Soil Liner.
- GSI continued laying geomembrane panels near SE corner of cell.
- Geotechnics Rep. delivered shelby tubes for lab testing.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	6.4.14	**Checked By:**	MPS	**Date:**	6.12.14

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Day:	**Thursday**
Date:	**6.5.14**
Log No.:	**40**
Page:	**4 of 6**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 71-90 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (20) nuclear density tests were taken in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci and Surveyor Mark Nunn. In addition (2) drive cylinder tests were taken at nuclear density test locations CSL-182, and CSL-188.
- Geotechnics Rep. tested Acres 12, 13, 14, Lift -1 ,and Acre 19 Lift - 2 for compaction testing. Shelby tubes were pushed within these acres for hydraulic conductivity testing in lab.
- Geotechnics Rep. delivered shelby tubes for these acres, along with sand sample PC-05, and soil sample CL-13, and 14. CL-13 was collected at a job accumulation estimate of 30,000 yd3. While CL-14 was for 35,000 yd3 soil placed onsite.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	6.5.14	**Checked By:**	MPS	**Date:**	6.12.14

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INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 75-88 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Glover Construction continued final grading at cell areas for certification of Compacted Soil Liner.
- GSI continued laying geomembrane panels within cell P6A..
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	6.6.14	**Checked By:**	MPS	**Date:**	6.12.14

Day:	**Saturday**
Date:	**6.7.14**
Log No.:	**42**
Page:	**6 of 6**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 8:00 AM **Departed:** 2:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-85 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. performed (10) nuclear density tests on Lift 1 within acres 21, and 22.
- Geotechnics Rep. performed a 1 point proctor at nuclear test location CSL-195.
- Rep. delivered shelby tubes for acres 21, and 22 to lab for testing.
- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	6.7.14	**Checked By:**	MPS	**Date:**	6.12.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-12**	Geotechnics Representative : Abe Gaeta	Page : 1 of 2
Date (s) : 6.3.14 - 6.7.14	Reviewed By : MPS	Date : 6.12.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 825 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A	Rod Depth= 6"	MS= 686 DS= 2252

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	164	P6A	A19/L1	6"	610-04-01	106.8	17.9	**125.3**	**22.3**	**102.5**	**95.9%**	**95.0%**	Tested on 6.3.14
CSL -	165	P6A	A19/L1	6"	610-04-01	106.8	17.9	**126.7**	**20.8**	**104.9**	**98.2%**	**95.0%**	ST
CSL -	166	P6A	A19/L1	6"	610-04-01	106.8	17.9	**125.2**	**21.1**	**103.4**	**96.8%**	**95.0%**	Tested on 6.3.14
CSL -	167	P6A	A19/L1	6"	610-04-01	106.8	17.9	**125.8**	**22.7**	**102.5**	**96.0%**	**95.0%**	1pt.-01 location
CSL -	168	P6A	A19/L1	6"	784-04-01	97.8	23.5	**117.8**	**26.5**	**93.1**	**95.2%**	**95.0%**	Tested on 6.3.14
CSL -	169	P6A	A12/L2	6"	610-04-01	106.8	17.9	**130.5**	**24.3**	**105.0**	**98.3%**	**95.0%**	Tested on 6.5.14
CSL -	170	P6A	A12/L2	6"	610-04-01	106.8	17.9	**131.5**	**24.2**	**105.9**	**99.1%**	**95.0%**	ST
CSL -	171	P6A	A12/L2	6"	610-04-01	106.8	17.9	**130.2**	**24.6**	**104.5**	**97.8%**	**95.0%**	Tested on 6.5.14
CSL -	172	P6A	A12/L2	6"	610-04-01	106.8	17.9	**128.5**	**21.2**	**106.0**	**99.3%**	**95.0%**	Tested on 6.5.14
CSL -	173	P6A	A12/L2	6"	784-04-01	97.8	23.5	**120.4**	**27.1**	**94.7**	**96.9%**	**95.0%**	Tested on 6.5.14
CSL -	174	P6A	A13/L2	6"	784-04-01	97.8	23.5	**122.8**	**30.6**	**94.0**	**96.1%**	**95.0%**	Tested on 6.5.14
CSL -	175	P6A	A13/L2	6"	610-04-01	106.8	17.9	**126.9**	**24.0**	**102.3**	**95.8%**	**95.0%**	Tested on 6.5.14
CSL -	176	P6A	A13/L2	6"	610-04-01	106.8	17.9	**128.0**	**24.8**	**102.6**	**96.0%**	**95.0%**	ST
CSL -	177	P6A	A13/L2	6"	610-04-01	106.8	17.9	**129.2**	**22.5**	**105.5**	**98.8%**	**95.0%**	Tested on 6.5.14
CSL -	178	P6A	A13/L2	6"	610-12-02	109.8	17.9	**132.3**	**18.8**	**111.4**	**101.4%**	**95.0%**	Tested on 6.5.14
CSL -	179	P6A	A14/L2	6"	610-04-01	106.8	17.9	**124.7**	**21.0**	**103.1**	**96.5%**	**95.0%**	Tested on 6.5.14
CSL -	180	P6A	A14/L2	6"	610-04-01	106.8	17.9	**127.4**	**25.5**	**101.5**	**95.1%**	**95.0%**	Tested on 6.5.14
CSL -	181	P6A	A14/L2	6"	610-04-01	106.8	17.9	**125.9**	**20.7**	**104.3**	**97.7%**	**95.0%**	Tested on 6.5.14
CSL -	182	P6A	A14/L2	6"	610-01-01	101.6	21.6	**126.5**	**26.2**	**100.2**	**98.7%**	**95.0%**	1pt.-02 location & ST
DC -	17	P6A	A14/L2	N/A	610-01-01	101.6	21.6	**123.3**	**27.4**	**96.8**	**95.3%**	**95.0%**	DC-17 taken @ CSL-182
CSL -	183	P6A	A19/L2	6"	610-12-02	109.8	17.9	**128.5**	**19.3**	**107.7**	**98.1%**	**95.0%**	Tested on 6.5.14
CSL -	184	P6A	A19/L2	6"	784-04-01	97.8	23.5	**121.9**	**28.7**	**94.7**	**96.8%**	**95.0%**	Tested on 6.5.14
CSL -	185	P6A	A19/L2	6"	610-04-01	106.8	17.9	**127.5**	**21.0**	**105.4**	**98.7%**	**95.0%**	Tested on 6.5.14
CSL -	186	P6A	A19/L2	6"	610-04-01	106.8	17.9	**128.5**	**24.8**	**103.0**	**96.4%**	**95.0%**	Tested on 6.5.14
CSL -	187	P6A	A19/L2	6"	610-12-02	109.8	17.9	**130.9**	**19.4**	**109.6**	**99.8%**	**95.0%**	Tested on 6.5.14
CSL -	188	P6A	A22/L1	6"	610-04-01	106.8	17.9	**126.7**	**20.8**	**104.9**	**98.2%**	**95.0%**	ST
DC -	18	P6A	A22/L1	N/A	610-04-01	106.8	17.9	**125.8**	**22.5**	**102.7**	**96.2%**	**95.0%**	DC-18 taken @ CSL-188
CSL -	189	P6A	A22/L1	6"	784-04-01	97.8	23.5	**121.2**	**26.9**	**95.5**	**97.7%**	**95.0%**	Tested on 6.7.14
CSL -	190	P6A	A22/L1	6"	784-04-01	97.8	23.5	**121.0**	**28.2**	**94.4**	**96.5%**	**95.0%**	ST
CSL -	191	P6A	A22/L1	6"	610-01-01	101.6	21.6	**117.6**	**21.3**	**96.9**	**95.4%**	**95.0%**	Tested on 6.7.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

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INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-11**	Geotechnics Representative : Abe Gaeta	Page : 2 of 2
Date (s) : 5.26.14 - 5.31.14	Reviewed By : MPS	Date : 6.12.14

Contractor : Glover Construction			Borrow Source : Site "G" Borrow Pit
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 825 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A		Rod Depth= 6" MS= 681 DS= 2269

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	192	P6A	A21/L1	6"	784-04-01	97.8	23.5	**119.0**	**24.8**	**95.4**	**97.5%**	**95.0%**	Tested on 6.7.14
CSL -	193	P6A	A21/L1	6"	784-04-01	97.8	23.5	**116.9**	**25.0**	**93.5**	**95.6%**	**95.0%**	Tested on 6.7.14
CSL -	194	P6A	A21/L1	6"	610-01-01	101.6	21.6	**124.6**	**22.6**	**101.6**	**100.0%**	**95.0%**	Tested on 6.7.14
CSL -	195	P6A	A21/L1	6"	610-04-01	106.8	17.9	**128.2**	**23.1**	**104.1**	**97.5%**	**95.0%**	1pt.-03 location
CSL -	196	P6A	A21/L1	6"	610-04-01	106.8	17.9	**126.4**	**23.8**	**102.1**	**95.6%**	**95.0%**	ST
CSL -	197	P6A	A21/L2	6"	610-04-01	106.8	17.9	**125.1**	**23.2**	**101.5**	**95.1%**	**95.0%**	Tested on 6.7.14
CSL -	198	P6A	A21/L3	6"	610-04-01	106.8	17.9	**128.1**	**20.2**	**106.6**	**99.8%**	**95.0%**	Tested on 6.7.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-12**
Date (s) : 6.3 - 6.7.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-17	DC-18
Nuclear Test Number :	CSL-182	CSL-188
Location:	Acre 14	Acre 19
Depth (ft):	Lift 2	Lift 2
Date :	6.5.14	6.5.14

Mold

Cylinder ID	#1	#2
Weight of Cylinder (lbs.)	1.48	1.49
Volume of Cylinder (ft^3)	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.55	5.64
Wt. of Cylinder (lbs.)	1.48	1.49
Wt. of WS	4.07	4.15
Cylinder Volume (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-2
Wt. of Tare & WS (gm)	607.40	586.60
Wt. of Tare & DS (gm)	522.00	517.50
Wt. of Tare (gm)	210.80	210.80
Wt of water (gm)	85.40	69.10
Wt. of DS (gm)	311.20	306.70
Wet Density (pcf):	123.3	125.8
Moisture Content (%):	**27.4**	**22.5**
Dry Density (pcf):	**96.8**	**102.6**

Comment(s):

Geotechnics Representative : Abe Gaeta

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-12**
Date (s) : 6.3 - 6.7.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02	1pt-03
Location:	P6A/CSL-167	P6A/CSL-182	P6A/CSL-195
Depth (ft):	A19/L1	A14/L2	A21/L1
Date :	6.3.14	6.5.14	6.7.14

Mold

Weight of Mold (lbs.)	9.25	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.47	13.18	13.41
Weight of Mold (lbs)	9.25	9.25	9.25
Weight of WS (lbs)	4.22	3.93	4.16
Volume of Mold (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2	Z-1
Wt. of Tare & WS (gm)	641.20	652.40	661.60
Wt. of Tare & DS (gm)	561.60	580.00	579.00
Wt. of Tare (gm)	207.00	210.80	207.00
Wt. of water (gm)	79.60	72.40	82.60
Wt. of DS (gm)	354.60	369.20	372.00
Wet **Density (pcf):**	127.9	119.1	126.1
Moisture Content (%):	**22.4**	**19.6**	**22.2**
Dry Density (pcf):	**104.4**	**99.6**	**103.2**

Comment(s): 1PT.-01 & 03 had water added prior to testing.

Geotechnics Representative : Abe Gaeta

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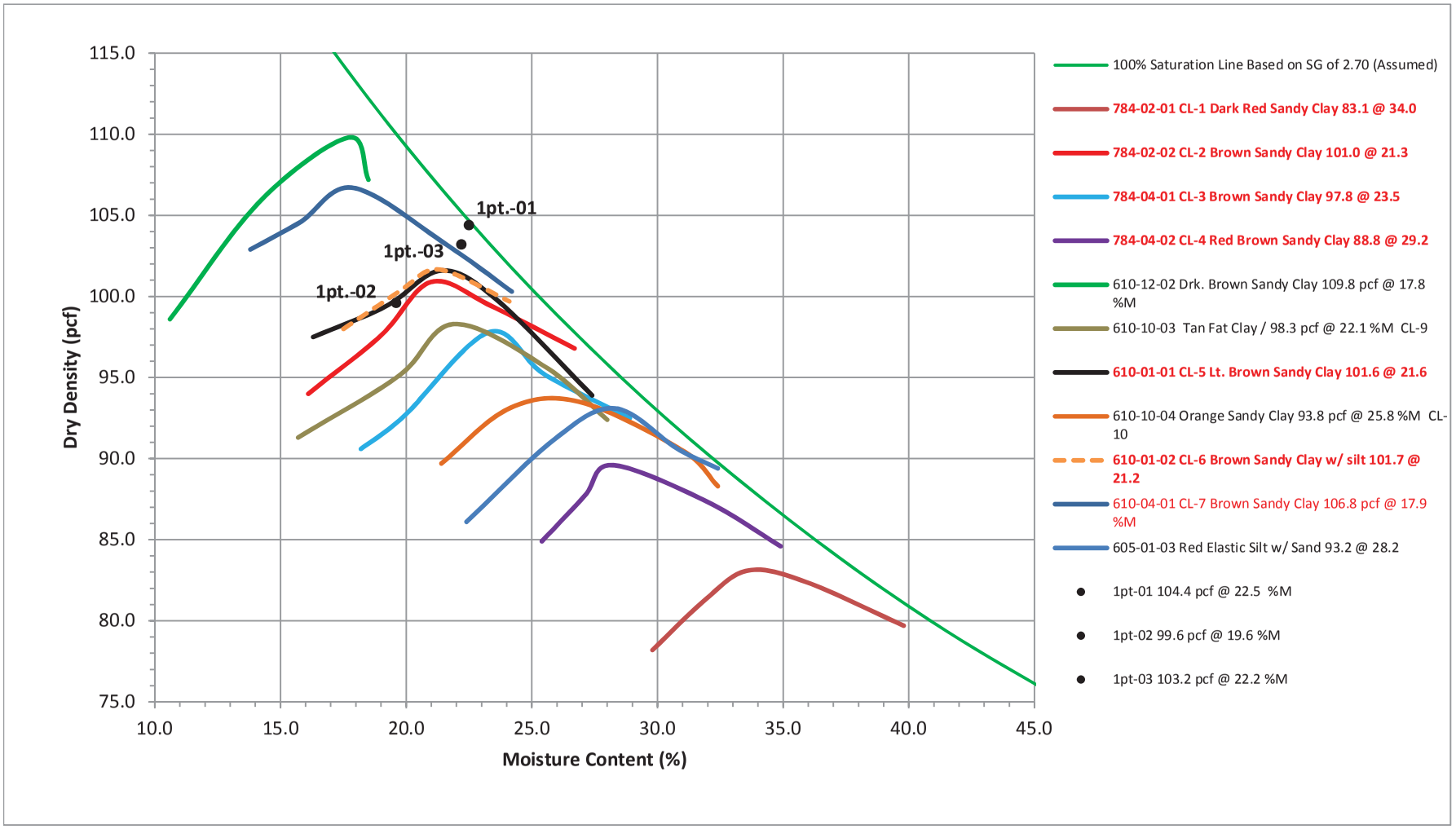
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 6.3 - 6.7.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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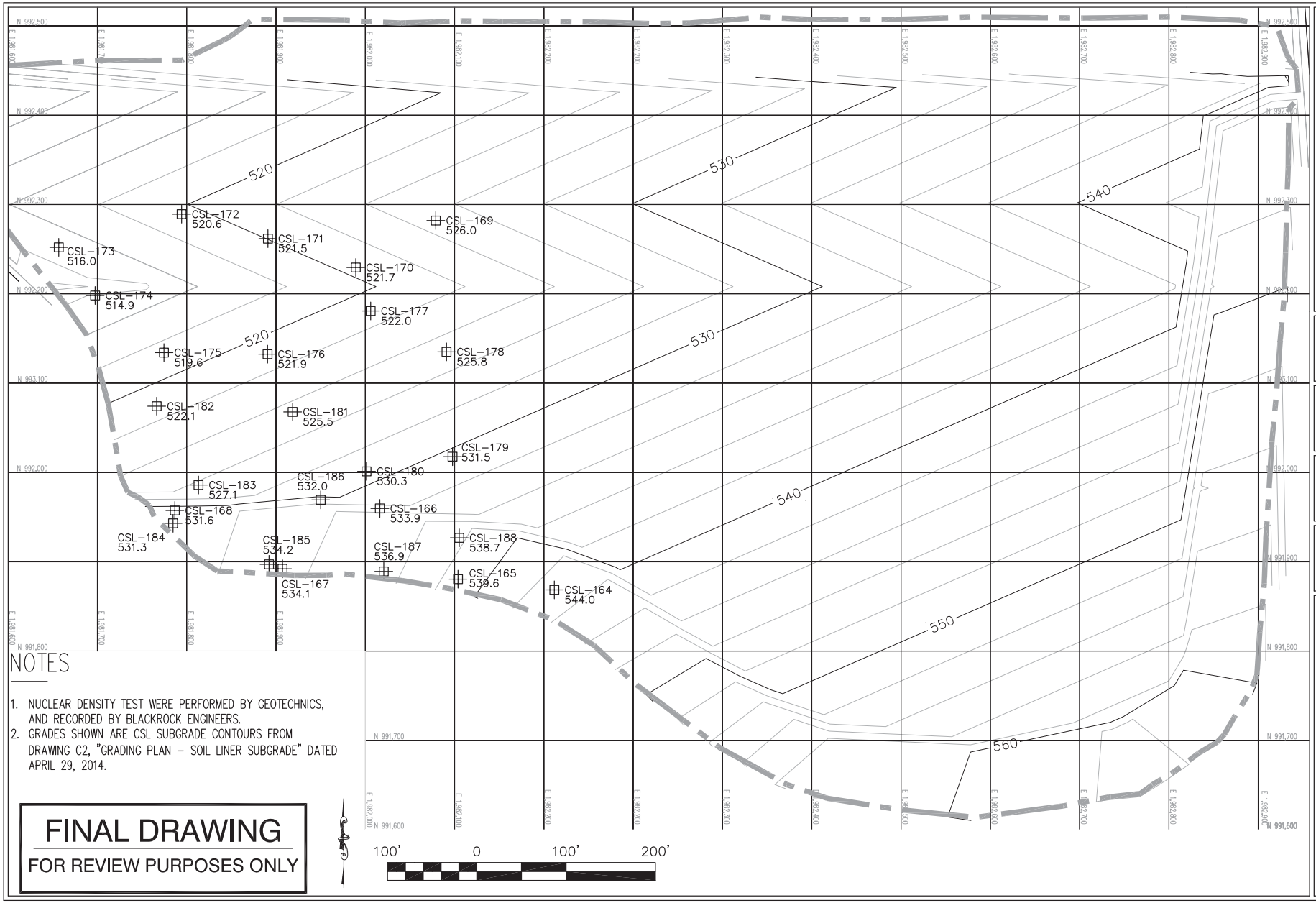

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
NAP	WML	1"=100'	P6A-FDR12
DATE:	PROJECT NO.		FILE NAME
14.07.16	11001		P6-ST-FILL-CT

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-12

Day:	**Tuesday**
Date:	**6.10.14**
Log No.:	**43**
Page:	**1 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 7:30 AM **Departed:** 6:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 75-95 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (10) nuclear density tests were taken at Acres 21, and 22 for lift 2 of CSL. Shelby tubes were pushed for these acres. All testing was performed in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci.
- Geotechnics Rep. took a drive cylinder for Acre 21 at test location CSL-199.
- Geotechnics Rep. departed the site.
- Geotechnics Rep. delivered shelby tubes, and bag soil samples from drilling to lab for testing.

Prepared By:	APG	6.10.14	**Checked By:**	MPS	**Date:** 6.19.14

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Day:	**Thursday**
Date:	**6.12.14**
Log No.:	**44**
Page:	**2 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro Ash LF Phase 6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:00 AM **Departed:** 4:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 70-94 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (5) nuclear density tests were taken at Acre 20 for lift 1. Also, (3) additional tests were taken for ash subgrade near NW area of cell. Testing was performed in the presence of Blackrock Engineers CQA Rep. Randy Berarducci.
- Geotechnics Rep. pushed shelby tube (s) for Acres 20 - Lift 1.
- Geotechnics Rep. took a drive cylinder for Acre 20 at test location CSL-209.
- Geotechnics Rep. delivered shelby tubes, PC-06 sand, and CL-15 soil samples to lab for testing.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	6.12.14	**Checked By:**	MPS	**Date:**	6.19.14

Day:	**Friday**
Date:	**6.13.14**
Log No.:	**45**
Page:	**3 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 2:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineering	Billy Bradford / Surveyor

Weather Conditions: Sunny **Temperature:** 70-91 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- A total of (10) nuclear density tests were taken at Acre 20 - Lift 2, and Acre 15 - Lift 2. Shelby tubes were pushed for these acres. All testing was performed in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci.
- Geotechnics Rep. took a drive cylinder at Acre 15 test location CSL-222, and a 1 point proctor test at CSL-223.
- Geotechnics Rep. departed jobsite.
- Geotechnics Rep. delivered shelby tubes for lab testing.

Prepared By:	APG	**Date:**	6.13.14	**Checked By:**	MPS	**Date:**	6.19.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-13**	Geotechnics Representative : Abe Gaeta	Page : 1 of 2
Date (s) : 6.10.14 - 6.13.14	Reviewed By : MPS	Date : 6.19.14

Contractor : Glover Construction		Borrow Source : Site "G" Borrow Pit	
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 825 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset = -32.83	WD Offset = N/A	Rod Depth= 6"	MS= 689 DS= 2282

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
CSL -	199	P6A	A21/L2	6"	784-04-01	97.8	23.5	**123.8**	**25.7**	**98.5**	**100.7%**	**95.0%**	Tested on 6.10.14
DC -	20	P6A	A21/L2	N/A	784-04-01	97.8	23.5	**121.8**	**29.0**	**94.4**	**96.5%**	**95.0%**	DC-20 taken @ CSL-199
CSL -	200	P6A	A21/L2	6"	610-01-01	101.6	21.6	**123.9**	**22.9**	**100.8**	**99.2%**	**95.0%**	Tested on 6.10.14
CSL -	201	P6A	A21/L2	6"	784-04-01	97.8	23.5	**119.1**	**27.5**	**93.4**	**95.5%**	**95.0%**	Tested on 6.10.14
CSL -	202	P6A	A21/L2	6"	784-04-01	97.8	23.5	**121.8**	**26.8**	**96.1**	**98.2%**	**95.0%**	ST
CSL -	203	P6A	A21/L2	6"	610-04-01	106.8	17.9	**125.6**	**19.9**	**104.8**	**98.1%**	**95.0%**	Tested on 6.10.14
CSL -	204	P6A	A22/L2	6"	610-01-01	101.6	21.6	**122.7**	**22.7**	**100.0**	**98.4%**	**95.0%**	Tested on 6.10.14
CSL -	205	P6A	A22/L2	6"	610-04-01	106.8	17.9	**127.0**	**24.6**	**101.9**	**95.4%**	**95.0%**	Tested on 6.10.14
CSL -	206	P6A	A22/L2	6"	784-04-01	97.8	23.5	**119.8**	**26.5**	**94.7**	**96.8%**	**95.0%**	Tested on 6.10.14
CSL -	207	P6A	A22/L2	6"	610-04-01	106.8	17.9	**127.9**	**24.1**	**103.1**	**96.5%**	**95.0%**	ST
CSL -	208	P6A	A22/L2	6"	610-12-02	109.8	17.8	**130.8**	**19.0**	**109.9**	**100.1%**	**95.0%**	Tested on 6.10.14
CSL -	209	P6A	A20/L1	6"	610-04-01	106.8	17.9	**126.7**	**23.0**	**103.0**	**96.4%**	**95.0%**	Tested on 6.12.14
DC -	21	P6A	A20/L1	N/A	610-04-01	106.8	17.9	**126.4**	**24.5**	**101.5**	**95.1%**	**95.0%**	DC-21 taken @ CSL-209
CSL -	210	P6A	A20/L1	6"	784-04-01	97.8	23.5	**120.9**	**26.9**	**95.3**	**97.4%**	**95.0%**	Tested on 6.12.14
CSL -	211	P6A	A20/L1	6"	610-04-01	106.8	17.9	**126.0**	**23.7**	**101.9**	**95.4%**	**95.0%**	ST
CSL -	212	P6A	A20/L1	6"	610-12-02	109.8	17.8	**131.9**	**20.8**	**109.2**	**99.4%**	**95.0%**	Tested on 6.12.14
CSL -	213	P6A	A20/L1	6"	610-04-01	106.8	17.9	**125.5**	**21.7**	**103.1**	**96.6%**	**95.0%**	Tested on 6.12.14
CSL -	214	P6A	A20/L2	6"	610-04-01	106.8	17.9	**124.1**	**21.1**	**102.5**	**96.0%**	**95.0%**	Tested on 6.13.14
CSL -	215	P6A	A20/L2	6"	784-04-01	97.8	23.5	**120.0**	**27.8**	**93.9**	**96.0%**	**95.0%**	ST
CSL -	216	P6A	A20/L2	6"	610-04-01	106.8	17.9	**127.5**	**22.3**	**104.3**	**97.6%**	**95.0%**	Tested on 6.13.14
CSL -	217	P6A	A20/L2	6"	610-04-01	106.8	17.9	**124.7**	**22.1**	**102.1**	**95.6%**	**95.0%**	Tested on 6.13.14
CSL -	218	P6A	A20/L2	6"	610-04-01	106.8	17.9	**127.3**	**24.5**	**102.2**	**95.7%**	**95.0%**	Tested on 6.13.14
CSL -	219	P6A	A15/L2	6"	610-01-01	101.6	21.6	**122.8**	**22.6**	**100.2**	**98.6%**	**95.0%**	ST
CSL -	220	P6A	A15/L2	6"	610-01-01	101.6	21.6	**123.7**	**25.5**	**98.6**	**97.0%**	**95.0%**	Tested on 6.13.14
CSL -	221	P6A	A15/L2	6"	610-04-01	106.8	17.9	**124.3**	**18.1**	**105.2**	**98.5%**	**95.0%**	Tested on 6.13.14
CSL -	222	P6A	A15/L2	6"	610-01-01	101.6	21.6	**125.1**	**26.7**	**98.7**	**97.2%**	**95.0%**	Tested on 6.13.14
DC -	22	P6A	A15/L2	N/A	610-01-01	101.6	21.6	**123.9**	**22.7**	**101.0**	**99.4%**	**95.0%**	DC-22 taken @ CSL-222
CSL -	223	P6A	A15/L2	6"	610-12-02	109.8	17.8	**129.3**	**20.5**	**107.3**	**97.7%**	**95.0%**	Tested on 6.13.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-13**	Geotechnics Representative : Abe Gaeta	Page : 2 of 2
Date (s) : 6.12.14	Reviewed By : MPS	Date : 6.19.14

Contractor : Glover Construction			Borrow Source : Silos 1 - 4
Superintendent : Reuben Williams			
Gauge Number	Gauge Model	Compaction Equipment :	CAT C554 SMOOTHDRUM VIBRATORY ROLLER, CAT D6 DOZER, CAT 825 QUAD SHEEPSFOOT CO COMPACTOR, CASE TRACTOR W/ DISC, CAT WATER TRUCK.
32387	3440		
Moisture Offset (K) = 129.79	WD Offset = + 4.0 pcf		Rod Depth= 4" MS= 694 DS= 2270

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	80	P6A	CSG	4"	683-02-01	90.6	21.8	**123.4**	**34.5**	**91.7**	**101.3%**	**90.0%**	Tested on 6.12.14
ND -	81	P6A	CSG	4"	600-10-01	84.5	19.1	**108.5**	**30.7**	**83.0**	**98.2%**	**90.0%**	Tested on 6.12.14
ND -	82	P6A	CSG	4"	683-02-01	90.6	21.8	**123.5**	**33.1**	**92.8**	**102.4%**	**90.0%**	Tested on 6.12.14

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-13**
Date (s) : 6.10 - 6.13.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-20	DC-21	DC-22
Nuclear Test Number :	CSL-199	CSL-209	CSL-222
Location:	Acre 21	Acre 20	Acre 15
Depth (ft):	Lift 2	Lift 1	Lift 2
Date :	6.10.14	6.12.14	6.13.14

Mold

Cylinder ID	#2	#1	#1
Weight of Cylinder (lbs.)	1.49	1.48	1.48
Volume of Cylinder (ft^3)	0.033	0.033	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.51	5.65	5.57
Wt. of Cylinder (lbs.)	1.49	1.48	1.48
Wt. of WS	4.02	4.17	4.09
Cylinder Volume (ft^3)	0.033	0.033	0.033

Moisture / Density

Tare Number	Z-2	Z-1	Z-2
Wt. of Tare & WS (gm)	679.40	575.20	685.60
Wt. of Tare & DS (gm)	574.20	502.80	597.80
Wt. of Tare (gm)	211.00	207.20	211.00
Wt of water (gm)	105.20	72.40	87.80
Wt. of DS (gm)	363.20	295.60	386.80
Wet Density (pcf):	121.8	126.4	123.9
Moisture Content (%):	**29.0**	**24.5**	**22.7**
Dry Density (pcf):	**94.5**	**101.5**	**101.0**

Comment(s):

Geotechnics Representative : Abe Gaeta

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A
Project Number : 2014-610

Report Number : **FDR-13**
Date (s) : 6.13.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01
Location:	P6A/CSL-223
Depth (ft):	A15/L2
Date :	6.13.14

Mold

Weight of Mold (lbs.)	9.25
Volume OF Mold (ft^3)	0.033

Specimen

Weight of Mold & WS (lbs)	13.52
Weight of Mold (lbs)	9.25
Weight of WS (lbs)	4.27
Volume of Mold (ft^3)	0.033

Moisture / Density

Tare Number	Z-2
Wt. of Tare & WS (gm)	540.00
Wt. of Tare & DS (gm)	484.00
Wt. of Tare (gm)	211.00
Wt. of water (gm)	56.00
Wt. of DS (gm)	273.00

Wet **Density (pcf):** 129.4

Moisture Content (%): **20.5**
Dry Density (pcf): **107.4**

Comment(s):

Geotechnics Representative : Abe Gaeta

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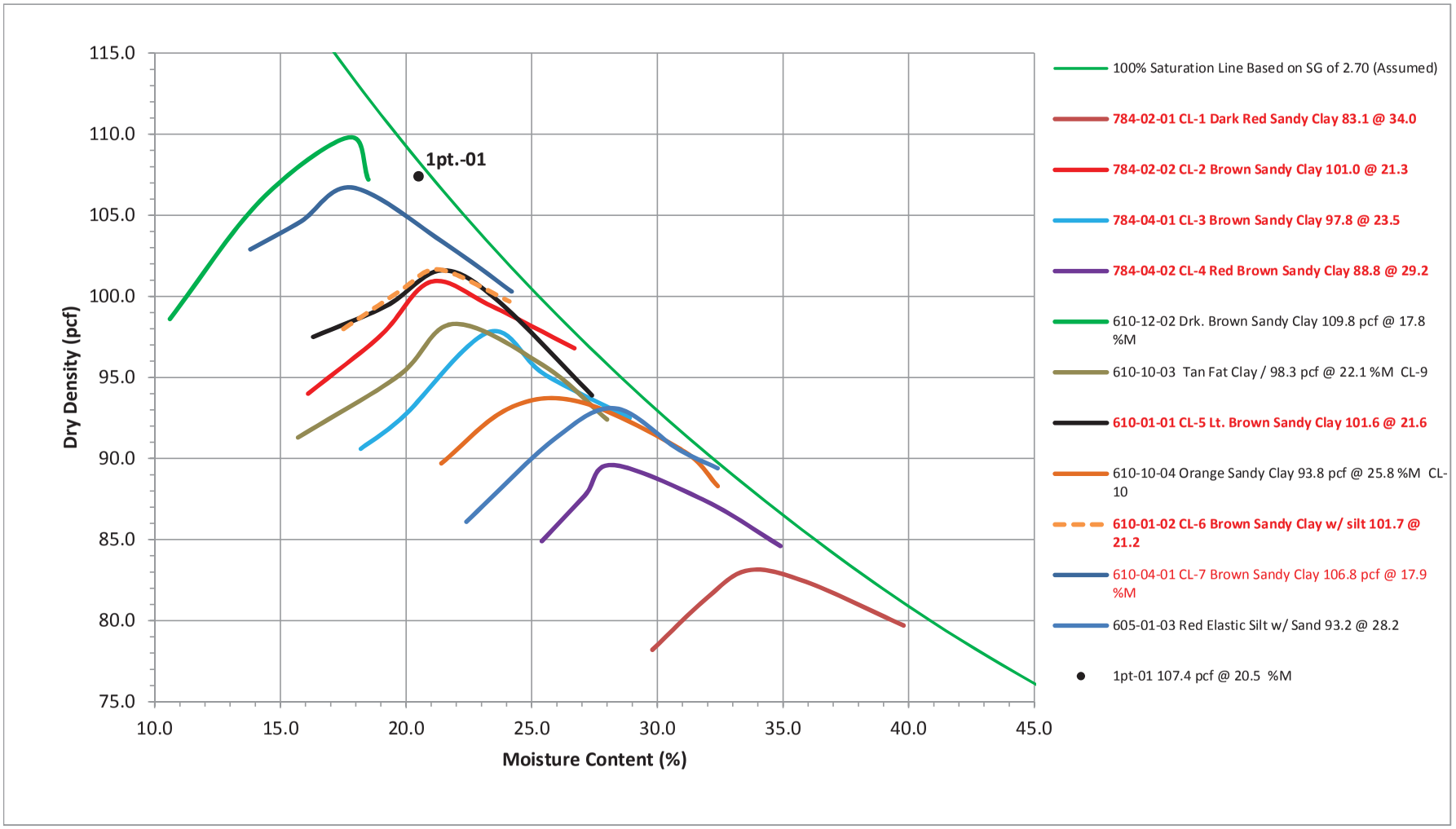
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 6.10 - 6.13.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO P6A ASH LF
Project Number : 2014-610



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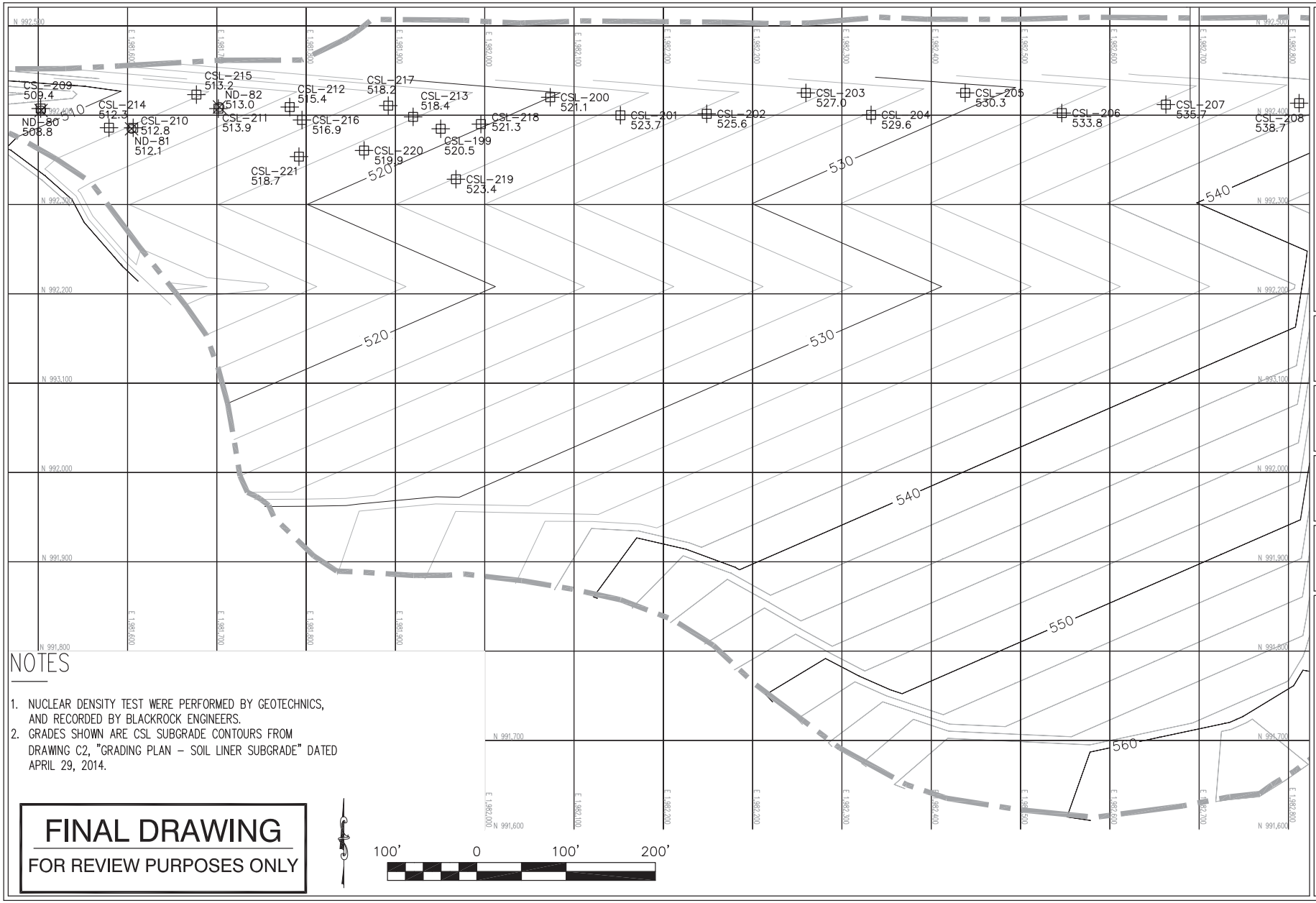

NOTES

1. NUCLEAR DENSITY TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE CSL SUBGRADE CONTOURS FROM DRAWING C2, "GRADING PLAN – SOIL LINER SUBGRADE" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6A-FDR13
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=100'
PROJECT NO.	11001
CHECKED BY:	WML
DATE:	14.07.16
DRAWN BY:	NAP

TITLE: P6 STRUCTURAL FILL COMPACTION TESTS GEOTECHNICS FDR-13

Day:	**Thurs.**
Date:	**6.19.14**
Log No.:	**46**
Page:	**1 of 1**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 2:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.
Blackrock Engineers	Mark Nunn / Surveyor

Weather Conditions: Sunny **Temperature:** 80's

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 12

Description of Daily Activities & Events

- Geotechnics Rep. Jacob R. Buda arrived at jobsite.
- A total of (4) nuclear density tests and (1) Drive Cylinder were taken in reworked Acre 15 - Lift 2. Shelby Tubes were obtained. All testing was performed in the presence of Blackrock Engineers on-site CQA Rep. Randy Berarducci.
- Geotechnics Rep. departed jobsite.
- Geotechnics Rep. delivered shelby tubes for lab testing.

Prepared By: JRB **Date:** 6.19.14 **Checked By:** MPS **Date:** 7/15

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Client: BLACKROCK ENGINEERING
Project Name : ROXBORO LAM P6A
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-14**		Geotechnics Representative : JACOB R. BUDA	
Date (s) : **6.19.14**		Reviewed By : MPS	DATE: 7.15.14

Contractor : GLOVER CONSTRUCTION	Borrow Source : Onsite Excavation

Gauge Number	Gauge Model	Compaction Equipment :	CAT 825, CAT SMOOTHDRUM ROLLER
33577	3440		

Test Number	Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
					MDD pcf	Opt. %M	WD (pcf)	% M	DD (pcf)	% C	% Req.	
CSL 219R1	ACRE 15	LIFT 2	6"	784-04-01	97.8	23.5	**120.8**	**27.3**	**94.9**	**97.0%**	**95.0%**	REWORK
CSL 220R1	ACRE 15	LIFT 2	6"	784-04-01	97.8	23.5	**122.3**	**26.2**	**96.9**	**99.1%**	**95.0%**	REWORK
DC 22R1	ACRE 15	LIFT 2	NA	784-04-01	97.8	23.5	**121.8**	**26.2**	**96.5**	**98.7%**	**95.0%**	REWORK
CSL 221R1	ACRE 15	LIFT 2	6"	784-04-01	97.8	23.5	**122.5**	**26.0**	**97.2**	**99.4%**	**95.0%**	REWORK
CSL 222R1	ACRE 15	LIFT 2	6"	784-04-01	97.8	23.5	**124.4**	**28.5**	**96.8**	**99.0%**	**95.0%**	REWORK

Client:	BLACKROCK ENGINEERING
Project Name :	ROXBORO LAM P6A
Project Number :	2014-610

Report Number :	**FDR-14**
Date (s) :	6.19.14

Drive Cylinder - ASTM D 2937

Test Information

Test Number :	DC-22R1
Nuclear Test Number :	ND-220R1
Location:	ACRE 15
Depth (ft):	LIFT 2
Date :	6.19.14

Mold

Cylinder ID	JB-DC-06
Weight of Cylinder (lbs.)	1.50
Volume of Cylinder (ft^3)	0.033

Specimen

Wt. of Cylinder & WS (lbs.)	5.52
Wt. of Cylinder (lbs.)	1.50
Wt. of WS	4.02
Cylinder Volume (ft^3)	0.033

Moisture / Density

Tare Number	866
Wt. of Tare & WS (gm)	688.69
Wt. of Tare & DS (gm)	563.62
Wt. of Tare (gm)	86.61
Wt. of Water (gm)	125.07
Wt. of DS (gm)	477.01
Wet Density (pcf):	121.8
Moisture Content (%):	**26.2**
Dry Density (pcf):	**96.5**

Geotechnics Representative : JACOB R. BUDA

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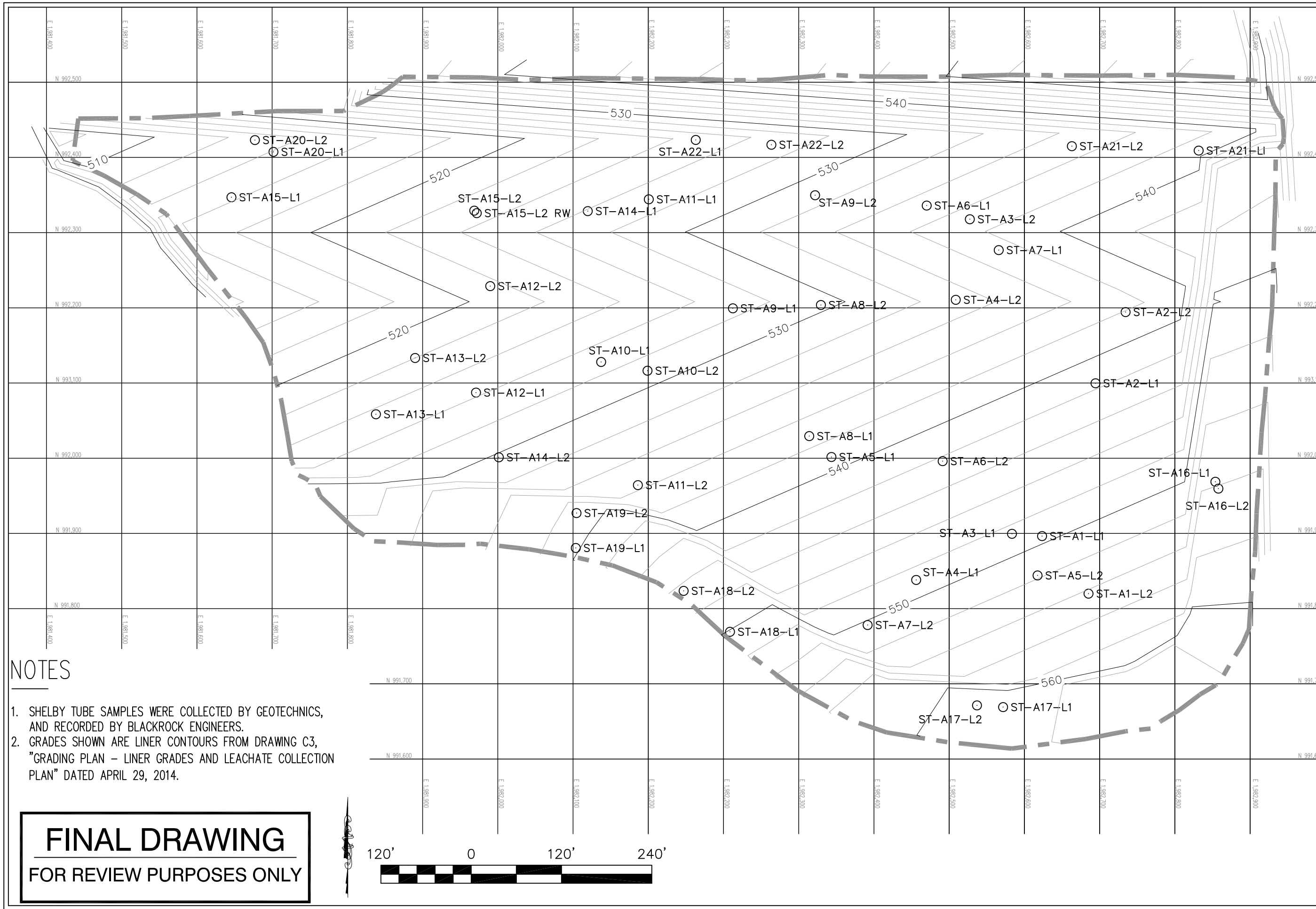
Appendix D – Compacted Soil Liner (CSL)

Appendix D – Compacted Soil Liner (CSL)
Section 1 – Shelby Tube Permeability Test Results, And Shelby Tube Locations



NOTES

1. SHELBY TUBE SAMPLES WERE COLLECTED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN ARE LINER CONTOURS FROM DRAWING C3, "GRADING PLAN – LINER GRADES AND LEACHATE COLLECTION PLAN" DATED APRIL 29, 2014.

FINAL DRAWING

FOR REVIEW PURPOSES ONLY

BLACKROCK ENGINEERS, INC.

5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

FIGURE NO.	P6-CSL-ST
FILE NAME	P6-ST-FILL-CT
SCALE:	1"=120'
PROJECT NO.	11001
CHECKED BY:	WML
DRAWN BY:	NAP
DATE:	14.07.16

TITLE: P6 STRUCTURAL FILL SHELBY TUBE SAMPLE LOCATIONS

SUMMARY OF SHELBY TUBE PERMEABILITY LABORATORY TEST RESULTS

Duke Energy Progress - Roxboro Lined Ash Monofill - Phase 6A

McGhees Mill Rd Borrow Area - Roxboro, North Carolina

AREA	LIFT 1				LIFT 2			
	Moisture content (%)	Dry Density (pcf)	Average Permeability (cm/sec)	Pass/Fail	Moisture content (%)	Dry Density (pcf)	Average Permeability (cm/sec)	Pass/Fail
ACRE 1	23.5	100.7	4.7E-09	P	22.3	100.1	3.1E-08	P
ACRE 2	20.2	105.3	1.7E-08	P	24.5	99.0	1.2E-08	P
ACRE 3	25.1	97.4	3.9E-09	P	22.3	101.3	1.4E-08	P
ACRE 4	33.9	85.6	7.7E-09	P	23.7	100.8	2.7E-08	P
ACRE 5	30.1	91.6	1.2E-08	P	19.6	104.5	5.4E-09	P
ACRE 6	29.5	94.2	3.2E-09	P	21.5	104.8	6.5E-09	P
ACRE 7	27.1	95.9	3.0E-09	P	21.0	106.8	4.7E-08	P
ACRE 8	32.9	87.4	1.8E-08	P	25.8	95.2	1.6E-08	P
ACRE 9	32.9	87.6	2.6E-08	P	29.7	98.3	1.4E-08	P
ACRE 10	34.7	85.1	2.4E-08	P	26.7	98.4	8.9E-09	P
ACRE 11	26.4	97.4	1.7E-08	P	21.3	102.9	2.1E-08	P
ACRE 12	23.6	96.9	1.9E-08	P	22.7	99.0	1.9E-08	P
ACRE 13	27.2	95.0	1.7E-08	P	22.3	101.5	6.3E-09	P
ACRE 14	30.2	91.1	2.6E-08	P	27.7	97.1	3.9E-09	P
ACRE 15	27.3	96.0	6.1E-09	P	**18.1**	**97.8**	**3.8E-07**	**F**
ACRE 15 RETEST	-	-	-	-	24.1	99.2	3.5E-08	P
ACRE 16	25.7	98.1	1.8E-08	P	21.9	102.0	2.4E-08	P
ACRE 17	25.1	96.4	1.1E-08	P	22.7	100.8	1.8E-08	P
ACRE 18	32.4	88.6	1.9E-08	P	29.3	95.4	2.4E-08	P
ACRE 19	22.5	101.2	5.0E-09	P	21.6	106.0	7.6E-09	P
ACRE 20	21.4	105.8	3.0E-08	P	22.2	101.3	2.1E-08	P
ACRE 21	26.5	98.5	4.1E-08	P	26.0	95.0	1.1E-08	P
ACRE 22	27.3	95.1	3.2E-08	P	27.2	95.9	1.6E-08	P

FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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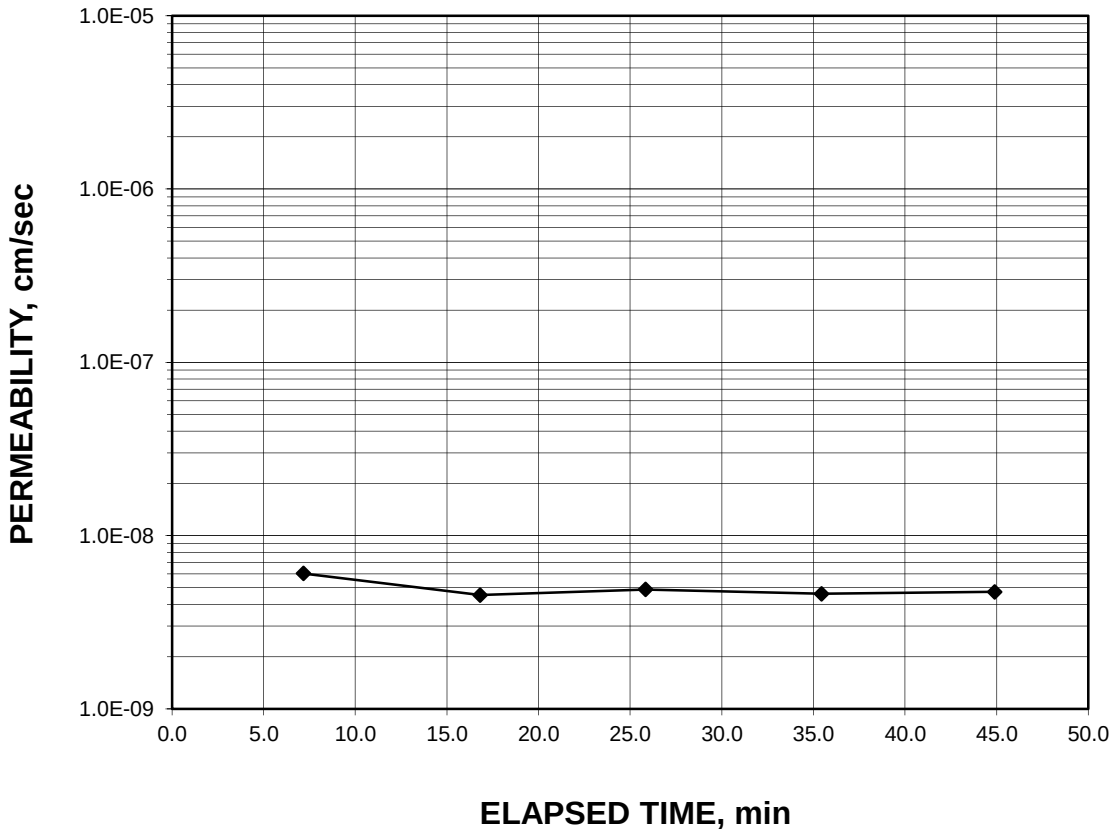
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A1-L1
Lab ID No.	2014-610-06-01		

Visual Description: LIGHT BROWN SANDY CLAY

AVERAGE PERMEABILITY = 4.7E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.7E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A1-L1
Lab ID No.	2014-610-06-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	334.42	416.19
Wt. of Tare & DS (gm.)	288.92	349.1
Wt. of Tare (gm.)	95.55	95.35
Wt. of Water (gm.)	45.50	67.09
Wt. of DS (gm.)	193.37	253.75
Moisture Content (%)	**23.5**	**26.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	607.93	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	607.93	622.25
Length 1 (in.)	2.898	2.896
Length 2 (in.)	2.896	2.891
Length 3 (in.)	2.903	2.897
Top Diameter (in.)	2.864	2.876
Middle Diameter (in.)	2.855	2.877
Bottom Diameter (in.)	2.859	2.867
Average Length (in.)	2.90	2.89
Average Area (in.^{2})	6.42	6.48
Sample Volume (cm^3)	305.05	307.58
Unit Wet Wt. (gm./ cm^3)	1.993	2.023
Unit Wet Wt. (pcf)	124.4	126.3
Unit Dry Wt. (pcf)	100.7	99.9
Unit Dry Wt. (gm./ cm^3)	1.613	1.600
Void Ratio, e	0.674	0.688
Porosity, n	0.402	0.407
Pore Volume (cm^3)	122.8	125.3
Total Wt. Of Sample After Test		616.00

Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-06-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A1-L1
Lab ID No.	2014-610-06-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.35
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.83
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 4.7E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.7E-11 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/10/14	10	17	5	17.08	0.000	16.1	26.8	23.2	NA
5/10/14	10	24	16	24.27	7.183	16.0	26.6	23.2	6.0E-09
5/10/14	10	33	54	33.90	16.817	15.9	26.5	23.2	4.5E-09
5/10/14	10	42	55	42.92	25.833	15.8	26.3	23.2	4.9E-09
5/10/14	10	52	32	52.53	35.450	15.7	26.1	23.2	4.6E-09
5/10/14	11	1	58	1.97	44.883	15.6	25.9	23.2	4.7E-09

Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-06-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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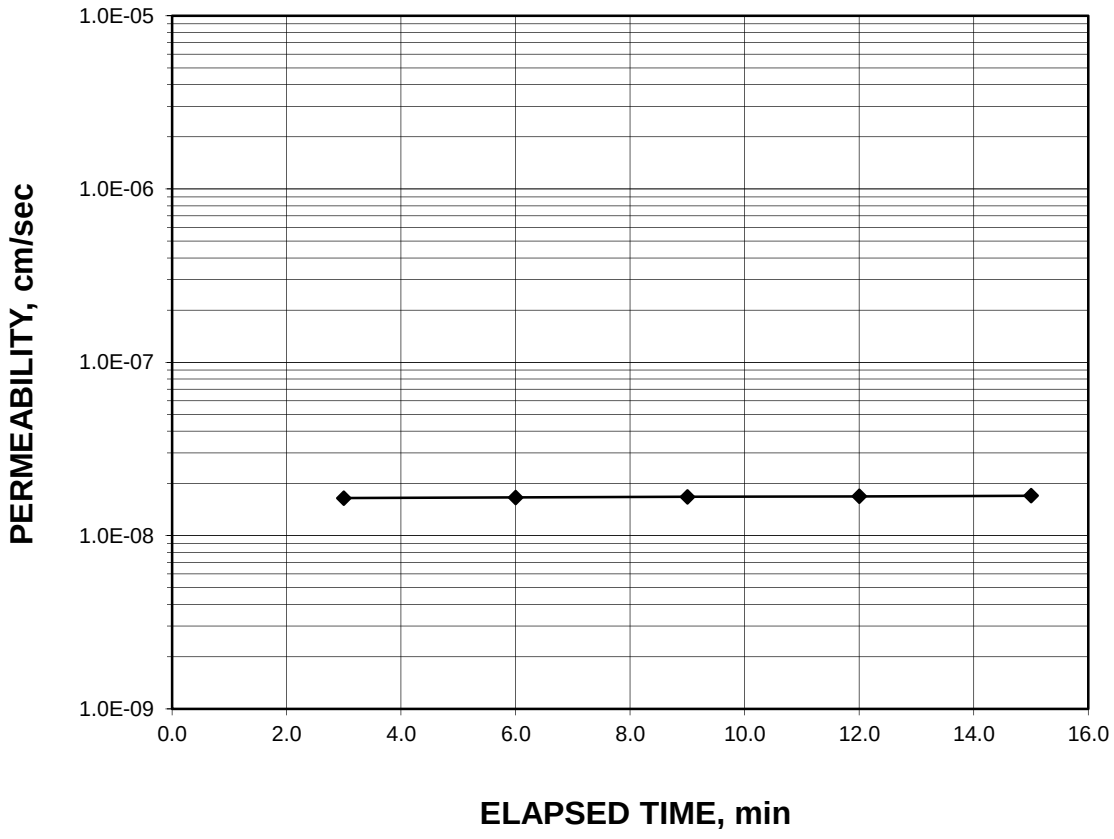
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A2-L1
Lab ID No.	2014-610-06-02		

Visual Description: LIGHT BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A2-L1
Lab ID No.	2014-610-06-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	809
Wt. of Tare & WS (gm.)	324.94	411.66
Wt. of Tare & DS (gm.)	286.08	354.75
Wt. of Tare (gm.)	93.76	112.85
Wt. of Water (gm.)	38.86	56.91
Wt. of DS (gm.)	192.32	241.90
Moisture Content (%)	**20.2**	**23.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	585.68	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	585.68	601.86
Length 1 (in.)	2.757	2.776
Length 2 (in.)	2.754	2.746
Length 3 (in.)	2.767	2.765
Top Diameter (in.)	2.853	2.859
Middle Diameter (in.)	2.858	2.859
Bottom Diameter (in.)	2.846	2.862
Average Length (in.)	2.76	2.76
Average Area (in.^{2})	6.39	6.42
Sample Volume (cm^3)	288.93	290.80
Unit Wet Wt. (gm./ cm^3)	2.027	2.070
Unit Wet Wt. (pcf)	126.5	129.2
Unit Dry Wt. (pcf)	105.3	104.6
Unit Dry Wt. (gm./ cm^3)	1.686	1.675
Void Ratio, e	0.601	0.611
Porosity, n	0.375	0.379
Pore Volume (cm^3)	108.5	110.3
Total Wt. Of Sample After Test		595.32

Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-06-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-06	Sample No.	ST-A2-L1
Lab ID No.	2014-610-06-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.02
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.45
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/10/14	10	14	25	14.42	0.000	13.8	23.8	23.2	NA
5/10/14	10	17	25	17.42	3.000	13.7	23.6	23.2	1.6E-08
5/10/14	10	20	25	20.42	6.000	13.6	23.5	23.2	1.7E-08
5/10/14	10	23	25	23.42	9.000	13.5	23.3	23.2	1.7E-08
5/10/14	10	26	25	26.42	12.000	13.4	23.1	23.2	1.7E-08
5/10/14	10	29	25	29.42	15.000	13.3	22.9	23.2	1.7E-08

Tested By: SFS Date: 5/9/14 Checked By: GEM Date: 5/12/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-06-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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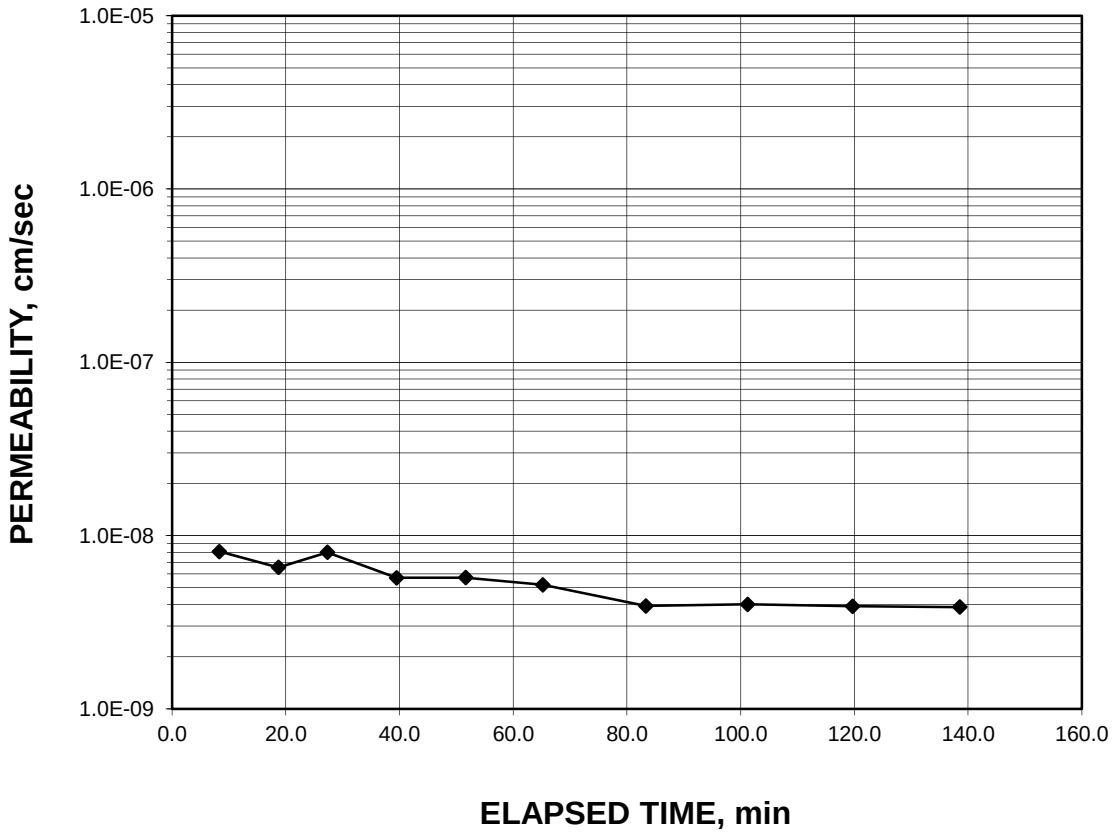
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A3-L1
Lab ID No.	2014-610-07-01		

Visual Description: LIGHT BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.9E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.9E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A3-L1
Lab ID No.	2014-610-07-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	806	813
Wt. of Tare & WS (gm.)	478.22	399.68
Wt. of Tare & DS (gm.)	402.36	335.21
Wt. of Tare (gm.)	100.53	111.04
Wt. of Water (gm.)	75.86	64.47
Wt. of DS (gm.)	301.83	224.17
Moisture Content (%)	**25.1**	**28.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	630.79	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	630.79	649.07
Length 1 (in.)	3.077	3.044
Length 2 (in.)	3.090	3.061
Length 3 (in.)	3.080	3.042
Top Diameter (in.)	2.846	2.853
Middle Diameter (in.)	2.863	2.852
Bottom Diameter (in.)	2.854	2.837
Average Length (in.)	3.08	3.05
Average Area (in.^{2})	6.40	6.37
Sample Volume (cm^3)	323.21	318.14
Unit Wet Wt. (gm./ cm^3)	1.952	2.040
Unit Wet Wt. (pcf)	121.8	127.4
Unit Dry Wt. (pcf)	97.4	98.9
Unit Dry Wt. (gm./ cm^3)	1.560	1.584
Void Ratio, e	0.731	0.704
Porosity, n	0.422	0.413
Pore Volume (cm^3)	136.5	131.4
Total Wt. Of Sample After Test		636.21

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A3-L1
Lab ID No.	2014-610-07-01		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.74
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.08
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.9E-09 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.9E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/12/14	10	26	40	26.67	0.000	11.4	17.5	23.2	NA
5/12/14	10	35	1	35.02	8.350	11.3	17.4	23.3	8.1E-09
5/12/14	10	45	24	45.40	18.733	11.2	17.2	23.4	6.6E-09
5/12/14	10	54	0	54.00	27.333	11.1	17.0	23.4	8.0E-09
5/12/14	11	6	9	6.15	39.483	11.0	16.9	23.5	5.7E-09
5/12/14	11	18	21	18.35	51.683	10.9	16.7	23.6	5.7E-09
5/12/14	11	31	53	31.88	65.217	10.8	16.5	23.7	5.2E-09
5/12/14	11	50	0	50.00	83.333	10.7	16.4	23.7	3.9E-09
5/12/14	12	7	53	7.88	101.217	10.6	16.2	23.8	4.0E-09
5/12/14	12	26	22	26.37	119.700	10.5	16.0	23.9	3.9E-09
5/12/14	12	45	13	45.22	138.550	10.4	15.9	24.0	3.9E-09

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-01 Permometer.xls]Sheet1

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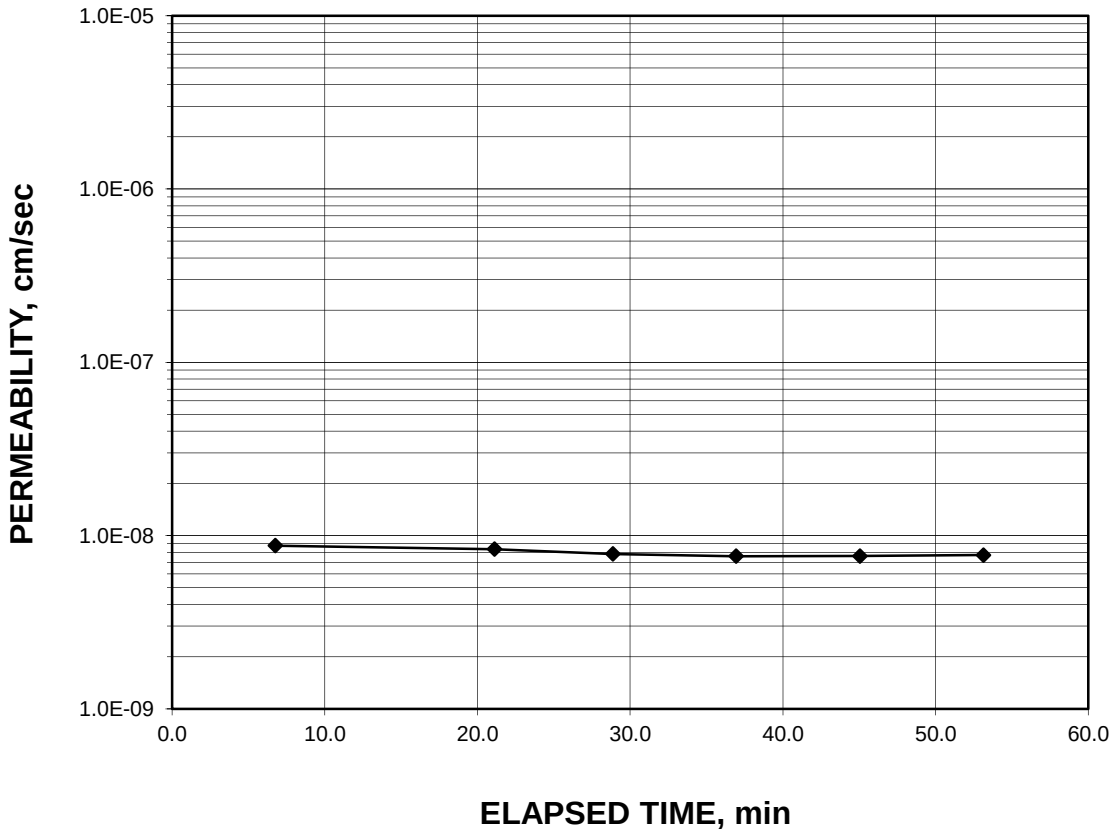
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A4-L1
Lab ID No.	2014-610-07-02		

Visual Description: TAN SILTY CLAY

AVERAGE PERMEABILITY = 7.7E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.7E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A4-L1
Lab ID No.	2014-610-07-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: TAN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	804	804
Wt. of Tare & WS (gm.)	372.30	448.92
Wt. of Tare & DS (gm.)	304.75	355.83
Wt. of Tare (gm.)	105.37	105.25
Wt. of Water (gm.)	67.55	93.09
Wt. of DS (gm.)	199.38	250.58
Moisture Content (%)	**33.9**	**37.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	610.24	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	610.24	625.14
Length 1 (in.)	3.159	3.130
Length 2 (in.)	3.185	3.084
Length 3 (in.)	3.163	3.109
Top Diameter (in.)	2.856	2.852
Middle Diameter (in.)	2.855	2.838
Bottom Diameter (in.)	2.853	2.830
Average Length (in.)	3.17	3.11
Average Area (in.^{2})	6.40	6.33
Sample Volume (cm^3)	332.37	322.60
Unit Wet Wt. (gm./ cm^3)	1.836	1.938
Unit Wet Wt. (pcf)	114.6	121.0
Unit Dry Wt. (pcf)	85.6	88.2
Unit Dry Wt. (gm./ cm^3)	1.371	1.413
Void Ratio, e	0.969	0.911
Porosity, n	0.492	0.477
Pore Volume (cm^3)	163.6	153.8
Total Wt. Of Sample After Test		610.64

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A4-L1
Lab ID No.	2014-610-07-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.89
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.87
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 7.7E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.7E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/12/14	14	22	30	22.50	0.000	12.8	19.5	24.6	NA
5/12/14	14	29	16	29.27	6.767	12.7	19.4	24.6	8.7E-09
5/12/14	14	43	37	43.62	21.117	12.5	19.0	24.6	8.3E-09
5/12/14	14	51	22	51.37	28.867	12.4	18.9	24.6	7.8E-09
5/12/14	14	59	26	59.43	36.933	12.3	18.7	24.6	7.6E-09
5/12/14	15	7	33	7.55	45.050	12.2	18.5	24.6	7.6E-09
5/12/14	15	15	38	15.63	53.133	12.1	18.4	24.6	7.7E-09

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-02 Permometer.xls]Sheet1

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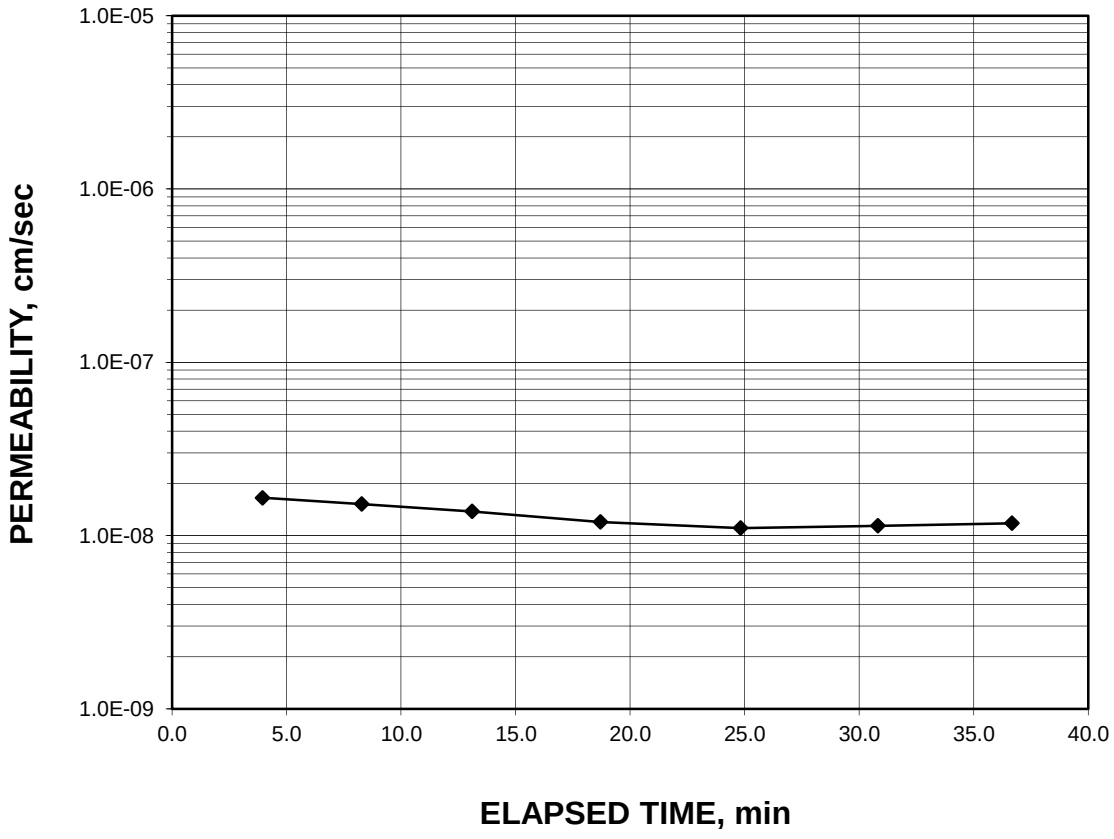
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A5-L1
Lab ID No.	2014-610-07-03		

Visual Description: LIGHT BROWN SILTY CLAY

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A5-L1
Lab ID No.	2014-610-07-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	813	811
Wt. of Tare & WS (gm.)	382.53	432.18
Wt. of Tare & DS (gm.)	319.72	356.39
Wt. of Tare (gm.)	111.14	107.31
Wt. of Water (gm.)	62.81	75.79
Wt. of DS (gm.)	208.58	249.08
Moisture Content (%)	**30.1**	**30.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	604.28	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	604.28	605.74
Length 1 (in.)	3.034	3.029
Length 2 (in.)	3.047	3.009
Length 3 (in.)	3.055	2.995
Top Diameter (in.)	2.840	2.853
Middle Diameter (in.)	2.851	2.850
Bottom Diameter (in.)	2.836	2.859
Average Length (in.)	3.05	3.01
Average Area (in.^{2})	6.35	6.40
Sample Volume (cm^3)	316.65	315.65
Unit Wet Wt. (gm./ cm^3)	1.908	1.919
Unit Wet Wt. (pcf)	119.1	119.8
Unit Dry Wt. (pcf)	91.6	91.8
Unit Dry Wt. (gm./ cm^3)	1.467	1.471
Void Ratio, e	0.841	0.835
Porosity, n	0.457	0.455
Pore Volume (cm^3)	144.6	143.6
Total Wt. Of Sample After Test		609.85

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A5-L1
Lab ID No.	2014-610-07-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.65
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.27
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/12/14	10	27	33	27.55	0.000	11.6	18.1	23.2	NA
5/12/14	10	31	30	31.50	3.950	11.5	17.9	23.2	1.7E-08
5/12/14	10	35	50	35.83	8.283	11.4	17.8	23.2	1.5E-08
5/12/14	10	40	39	40.65	13.100	11.3	17.6	23.3	1.4E-08
5/12/14	10	46	15	46.25	18.700	11.2	17.4	23.3	1.2E-08
5/12/14	10	52	22	52.37	24.817	11.1	17.2	23.4	1.1E-08
5/12/14	10	58	22	58.37	30.817	11.0	17.1	23.4	1.1E-08
5/12/14	11	4	13	4.22	36.667	10.9	16.9	23.4	1.2E-08

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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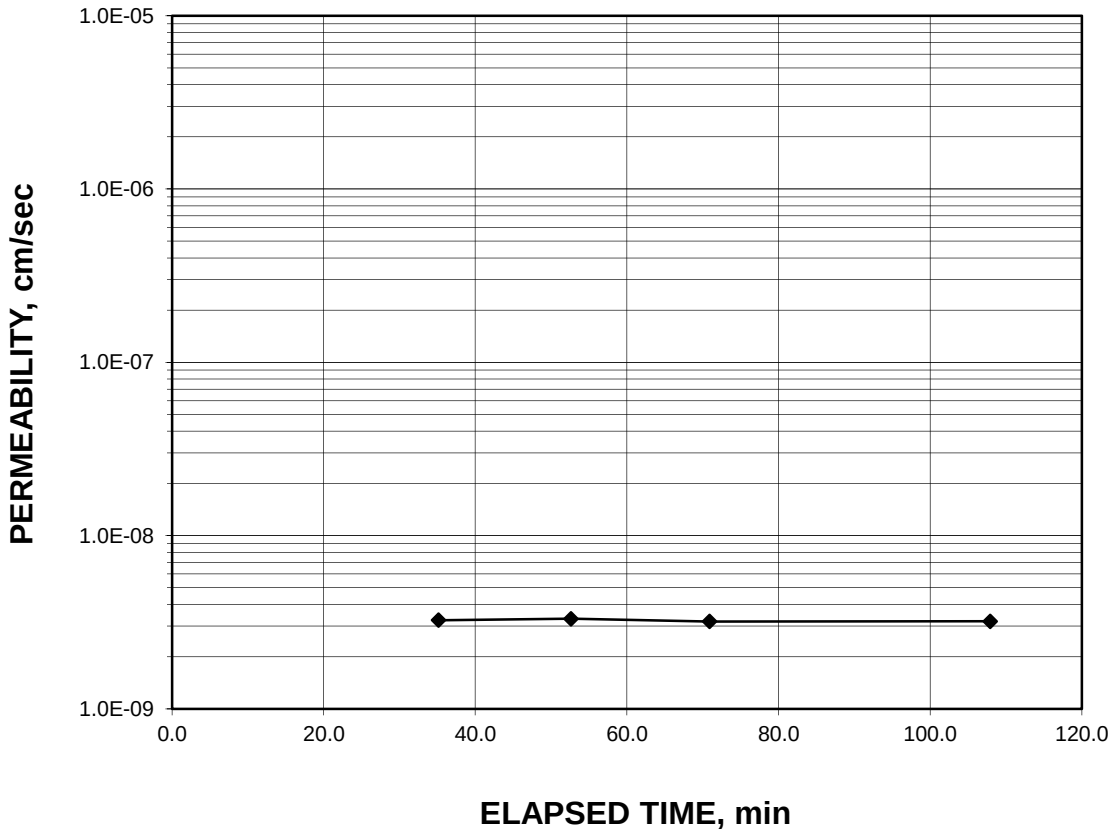
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A6-L1
Lab ID No.	2014-610-07-04		

Visual Description: TAN SILTY SANDY CLAY

AVERAGE PERMEABILITY = 3.2E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/14/14

DCN: CT-22A DATE:2-2-10 REVISION:5 S:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A6-L1
Lab ID No.	2014-610-07-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: TAN SILTY SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	806
Wt. of Tare & WS (gm.)	347.51	375.39
Wt. of Tare & DS (gm.)	292.79	314.77
Wt. of Tare (gm.)	107.39	100.53
Wt. of Water (gm.)	54.72	60.62
Wt. of DS (gm.)	185.40	214.24
Moisture Content (%)	**29.5**	**28.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	598.40	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	598.40	592.77
Length 1 (in.)	2.914	2.915
Length 2 (in.)	2.919	2.904
Length 3 (in.)	2.917	2.912
Top Diameter (in.)	2.862	2.852
Middle Diameter (in.)	2.861	2.841
Bottom Diameter (in.)	2.846	2.856
Average Length (in.)	2.92	2.91
Average Area (in.^{2})	6.41	6.38
Sample Volume (cm^3)	306.26	304.17
Unit Wet Wt. (gm./ cm^3)	1.954	1.949
Unit Wet Wt. (pcf)	122.0	121.6
Unit Dry Wt. (pcf)	94.2	94.8
Unit Dry Wt. (gm./ cm^3)	1.509	1.519
Void Ratio, e	0.790	0.778
Porosity, n	0.441	0.437
Pore Volume (cm^3)	135.1	133.1
Total Wt. Of Sample After Test		604.55

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/14/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-04 Permometer.xls]Sheet1

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PERMOMETER METHOD
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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-07	Sample No.	ST-A6-L1
Lab ID No.	2014-610-07-04		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.39
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.15
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.2E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/13/14	9	36	46	36.77	0.000	12.8	20.8	23.2	NA
5/13/14	10	11	55	11.92	35.150	12.6	20.5	23.2	3.2E-09
5/13/14	10	29	24	29.40	52.633	12.5	20.3	23.2	3.3E-09
5/13/14	10	47	41	47.68	70.917	12.4	20.1	23.2	3.2E-09
5/13/14	11	24	40	24.67	107.900	12.2	19.8	23.2	3.2E-09

Tested By: SFS Date: 5/10/14 Checked By: GEM Date: 5/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-07-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

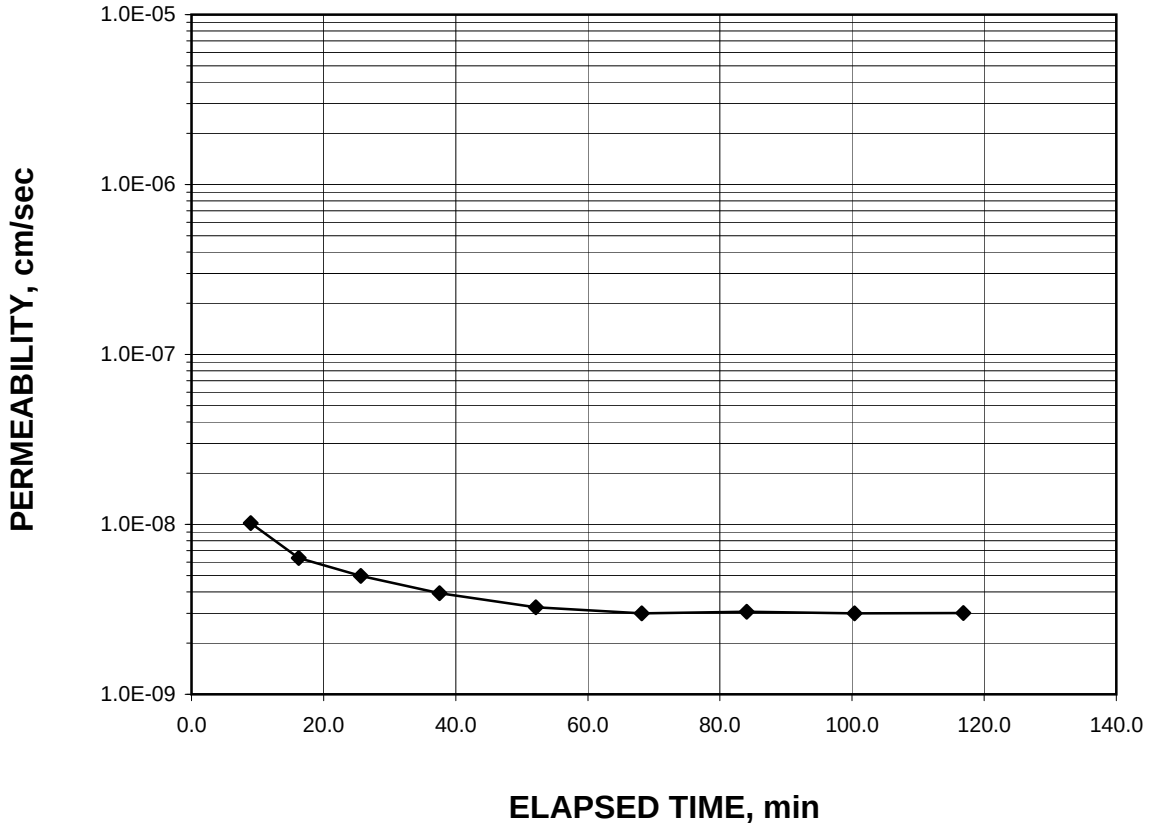
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A7-L1
Lab ID No.	2014-610-08-01		

Visual Description: LIGHT BROWN SANDY SILTY CLAY

AVERAGE PERMEABILITY = 3.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.0E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A7-L1
Lab ID No.	2014-610-08-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	809
Wt. of Tare & WS (gm.)	358.96	364.92
Wt. of Tare & DS (gm.)	302.45	313.83
Wt. of Tare (gm.)	93.87	112.75
Wt. of Water (gm.)	56.51	51.09
Wt. of DS (gm.)	208.58	201.08
Moisture Content (%)	**27.1**	**25.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	472.51	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	472.51	466.25
Length 1 (in.)	2.320	2.313
Length 2 (in.)	2.315	2.321
Length 3 (in.)	2.325	2.309
Top Diameter (in.)	2.848	2.882
Middle Diameter (in.)	2.848	2.881
Bottom Diameter (in.)	2.846	2.889
Average Length (in.)	2.32	2.31
Average Area (in.^{2})	6.37	6.53
Sample Volume (cm^3)	242.08	247.75
Unit Wet Wt. (gm./ cm^3)	1.952	1.882
Unit Wet Wt. (pcf)	121.8	117.5
Unit Dry Wt. (pcf)	95.9	93.7
Unit Dry Wt. (gm./ cm^3)	1.536	1.501
Void Ratio, e	0.758	0.799
Porosity, n	0.431	0.444
Pore Volume (cm^3)	104.4	110.0
Total Wt. Of Sample After Test		485.55

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A7-L1
Lab ID No.	2014-610-08-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.88
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.15
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.0E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/14/14	8	50	56	50.93	0.000	12.5	25.5	23.0	NA
5/14/14	8	59	55	59.92	8.983	12.3	25.1	23.0	1.0E-08
5/14/14	9	7	11	7.18	16.250	12.2	24.9	23.1	6.4E-09
5/14/14	9	16	33	16.55	25.617	12.1	24.7	23.1	5.0E-09
5/14/14	9	28	29	28.48	37.550	12.0	24.4	23.1	3.9E-09
5/14/14	9	43	4	43.07	52.133	11.9	24.2	23.1	3.3E-09
5/14/14	9	59	5	59.08	68.150	11.8	24.0	23.0	3.0E-09
5/14/14	10	14	58	14.97	84.033	11.7	23.8	22.9	3.1E-09
5/14/14	10	31	18	31.30	100.367	11.6	23.5	22.9	3.0E-09
5/14/14	10	47	46	47.77	116.833	11.5	23.3	22.9	3.0E-09

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

DCN: CT-22A DATE:2-25-2014 REVISION:5 J:\Google Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-08-01 Permometer.xls]Sheet1

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

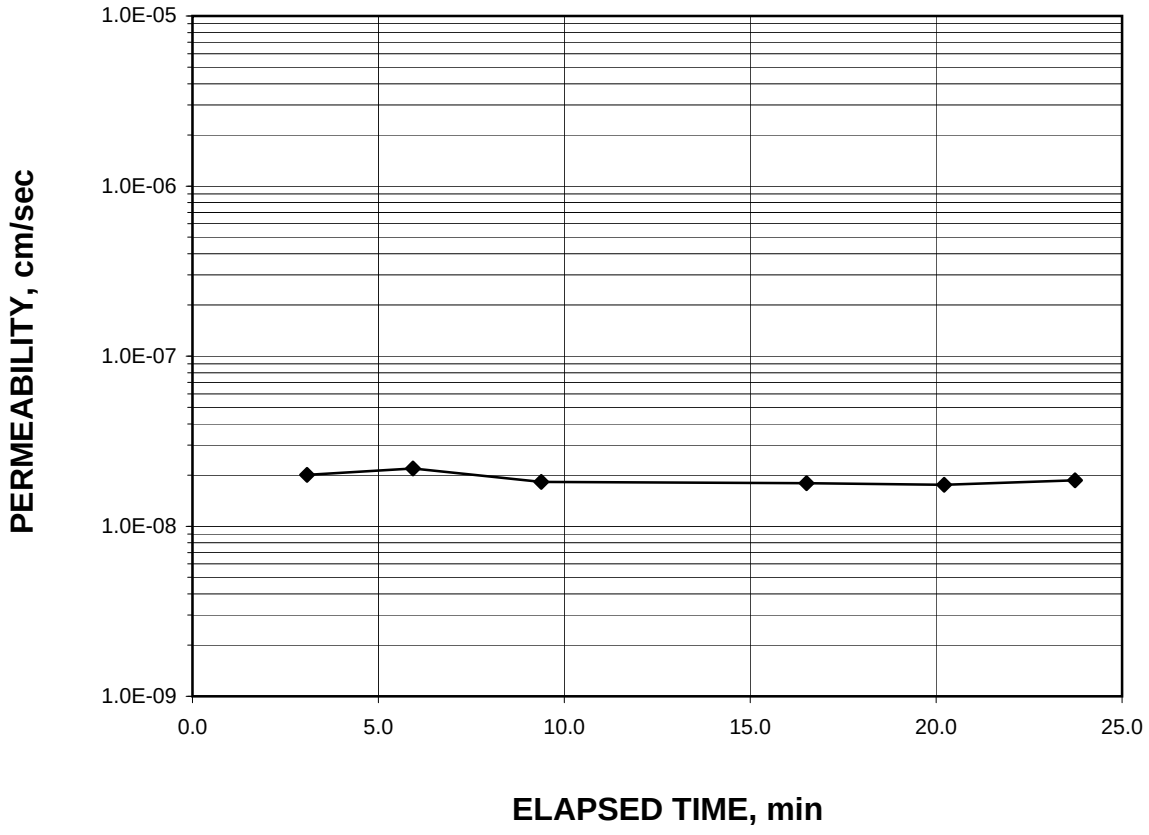
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A8-L1
Lab ID No.	2014-610-08-02		

Visual Description: TAN AN ORANGE SANDY SILTY CLAY

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A8-L1
Lab ID No.	2014-610-08-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: TAN AN ORANGE SANDY SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	375.78	419.55
Wt. of Tare & DS (gm.)	306.36	334.06
Wt. of Tare (gm.)	95.31	95.32
Wt. of Water (gm.)	69.42	85.49
Wt. of DS (gm.)	211.05	238.74
Moisture Content (%)	**32.9**	**35.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	586.73	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	586.73	599.60
Length 1 (in.)	3.040	3.028
Length 2 (in.)	3.045	3.025
Length 3 (in.)	3.030	3.013
Top Diameter (in.)	2.835	2.874
Middle Diameter (in.)	2.845	2.861
Bottom Diameter (in.)	2.838	2.857
Average Length (in.)	3.04	3.02
Average Area (in.^{2})	6.33	6.44
Sample Volume (cm^3)	315.25	319.03
Unit Wet Wt. (gm./ cm^3)	1.861	1.879
Unit Wet Wt. (pcf)	116.2	117.3
Unit Dry Wt. (pcf)	87.4	86.4
Unit Dry Wt. (gm./ cm^3)	1.400	1.384
Void Ratio, e	0.928	0.951
Porosity, n	0.481	0.487
Pore Volume (cm^3)	151.7	155.5
Total Wt. Of Sample After Test		598.41

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

DCN: CT-22A DATE:2-25-2014 REVISION:5 Z:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-08-02 Permometer.xls]Sheet1

FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A8-L1
Lab ID No.	2014-610-08-02		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.68
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.56
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/14/14	9	46	4	46.07	0.000	12.2	19.1	23.1	NA
5/14/14	9	49	9	49.15	3.083	12.1	18.9	23.0	2.0E-08
5/14/14	9	52	0	52.00	5.933	12.0	18.7	23.0	2.2E-08
5/14/14	9	55	27	55.45	9.383	11.9	18.5	23.0	1.8E-08
5/14/14	10	2	35	2.58	16.517	11.7	18.2	22.9	1.8E-08
5/14/14	10	6	17	6.28	20.217	11.6	18.0	22.9	1.8E-08
5/14/14	10	9	48	9.80	23.733	11.5	17.9	22.9	1.9E-08

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

DCN: CT-22A DATE:2-25-2014 REVISION:5 ...Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-08-02 Permometer.xls]Sheet1

FLEXIBLE WALL PERMEABILITY TEST

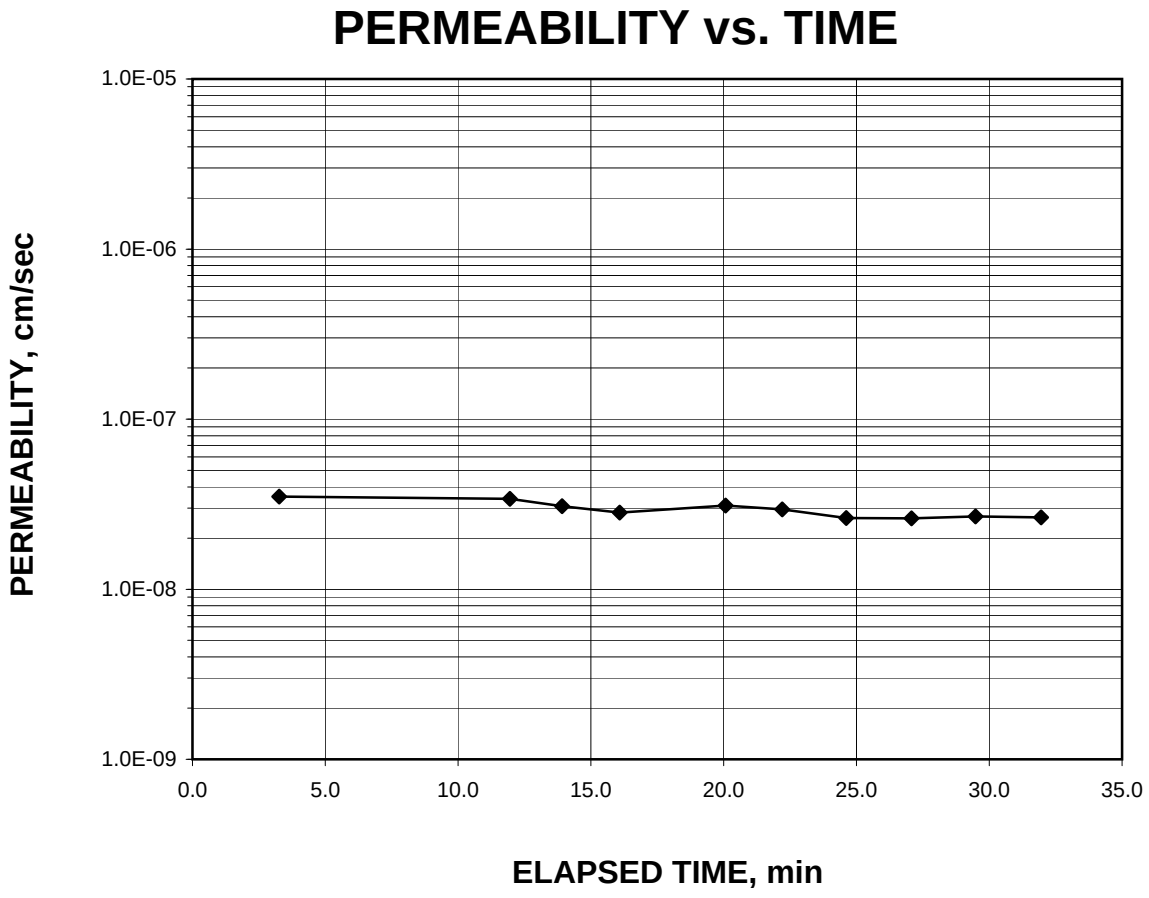
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A9-L1
Lab ID No.	2014-610-08-03		

Visual Description: LIGHT BROWN SILTY CLAY

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C



Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A9-L1
Lab ID No.	2014-610-08-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	Y-11
Wt. of Tare & WS (gm.)	407.68	344.75
Wt. of Tare & DS (gm.)	334.67	281
Wt. of Tare (gm.)	112.73	93.83
Wt. of Water (gm.)	73.01	63.75
Wt. of DS (gm.)	221.94	187.17
Moisture Content (%)	**32.9**	**34.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	562.43	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	562.43	567.35
Length 1 (in.)	2.906	2.857
Length 2 (in.)	2.902	2.874
Length 3 (in.)	2.915	2.864
Top Diameter (in.)	2.834	2.843
Middle Diameter (in.)	2.841	2.844
Bottom Diameter (in.)	2.839	2.838
Average Length (in.)	2.91	2.87
Average Area (in.^{2})	6.33	6.34
Sample Volume (cm^3)	301.41	297.76
Unit Wet Wt. (gm./ cm^3)	1.866	1.905
Unit Wet Wt. (pcf)	116.5	118.9
Unit Dry Wt. (pcf)	87.6	88.7
Unit Dry Wt. (gm./ cm^3)	1.404	1.421
Void Ratio, e	0.923	0.900
Porosity, n	0.480	0.474
Pore Volume (cm^3)	144.7	141.0
Total Wt. Of Sample After Test		566.51

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

DCN: CT-22A DATE:2-25-2014 REVISION:5 X:\Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-08-03 Permometer.xls]Sheet1

FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-08	Sample No.	ST-A9-L1
Lab ID No.	2014-610-08-03		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.28
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.92
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C

DATE	TIME				ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/14/14	8	48	56	48.93	0.000	12.7	21.0	23.0	NA
5/14/14	8	52	12	52.20	3.267	12.5	20.6	23.0	3.5E-08
5/14/14	9	0	53	0.88	11.950	12.0	19.7	23.0	3.4E-08
5/14/14	9	2	51	2.85	13.917	11.9	19.6	23.0	3.1E-08
5/14/14	9	5	1	5.02	16.083	11.8	19.4	23.1	2.8E-08
5/14/14	9	9	0	9.00	20.067	11.6	19.0	23.1	3.1E-08
5/14/14	9	11	8	11.13	22.200	11.5	18.8	23.1	2.9E-08
5/14/14	9	13	33	13.55	24.617	11.4	18.7	23.1	2.6E-08
5/14/14	9	16	0	16.00	27.067	11.3	18.5	23.1	2.6E-08
5/14/14	9	18	25	18.42	29.483	11.2	18.3	23.1	2.7E-08
5/14/14	9	20	53	20.88	31.950	11.1	18.1	23.1	2.6E-08

Tested By: SFS Date: 5/13/14 Checked By: MPS Date: 5/15/14

DCN: CT-22A DATE:2-2-2011 REVISION:5 J:\Google Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-08-03 Permometer.xls]Sheet1

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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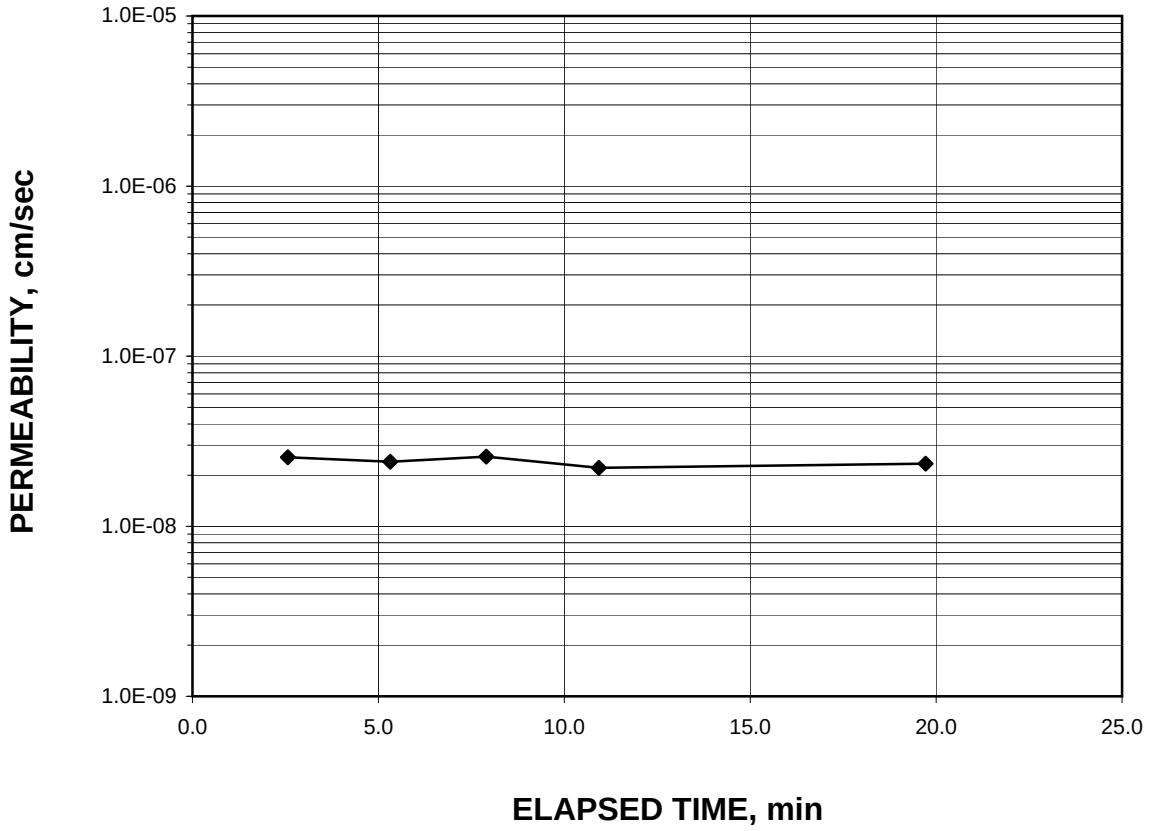
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A10-L1
Lab ID No.	2014-610-09-01		

Visual Description: ORANGE SILTY CLAY

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A10-L1
Lab ID No.	2014-610-09-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: ORANGE SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	804	804
Wt. of Tare & WS (gm.)	460.69	345.89
Wt. of Tare & DS (gm.)	369.13	282.92
Wt. of Tare (gm.)	105.31	105.34
Wt. of Water (gm.)	91.56	62.97
Wt. of DS (gm.)	263.82	177.58
Moisture Content (%)	**34.7**	**35.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	588.24	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	588.24	591.54
Length 1 (in.)	3.057	3.035
Length 2 (in.)	3.074	3.024
Length 3 (in.)	3.069	3.031
Top Diameter (in.)	2.850	2.856
Middle Diameter (in.)	2.854	2.866
Bottom Diameter (in.)	2.843	2.868
Average Length (in.)	3.07	3.03
Average Area (in.^{2})	6.37	6.44
Sample Volume (cm^3)	320.36	319.73
Unit Wet Wt. (gm./ cm^3)	1.836	1.850
Unit Wet Wt. (pcf)	114.6	115.5
Unit Dry Wt. (pcf)	85.1	85.3
Unit Dry Wt. (gm./ cm^3)	1.363	1.366
Void Ratio, e	0.981	0.977
Porosity, n	0.495	0.494
Pore Volume (cm^3)	158.6	158.0
Total Wt. Of Sample After Test		593.87

Tested By: SFS Date: 5/14/14 Checked By: MPS Date: 5/16/14

DCN: CT-22A DATE:2-3-11 REVISION:5 X:\SERVER\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-09-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A10-L1
Lab ID No.	2014-610-09-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.70
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.54
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/15/14	14	40	27	40.45	0.000	11.6	18.0	23.2	NA
5/15/14	14	43	1	43.02	2.567	11.5	17.8	23.2	2.5E-08
5/15/14	14	45	46	45.77	5.317	11.4	17.6	23.3	2.4E-08
5/15/14	14	48	21	48.35	7.900	11.3	17.5	23.3	2.6E-08
5/15/14	14	51	23	51.38	10.933	11.2	17.3	23.3	2.2E-08
5/15/14	15	0	10	0.17	19.717	10.9	16.8	23.3	2.3E-08

Tested By: SFS Date: 5/14/14 Checked By: MPS Date: 5/16/14

DCN: CT-22A DATE:2-25-2011 REVISION:5 G:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-09-01 Permometer.xls]Sheet1

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PERMOMETER METHOD

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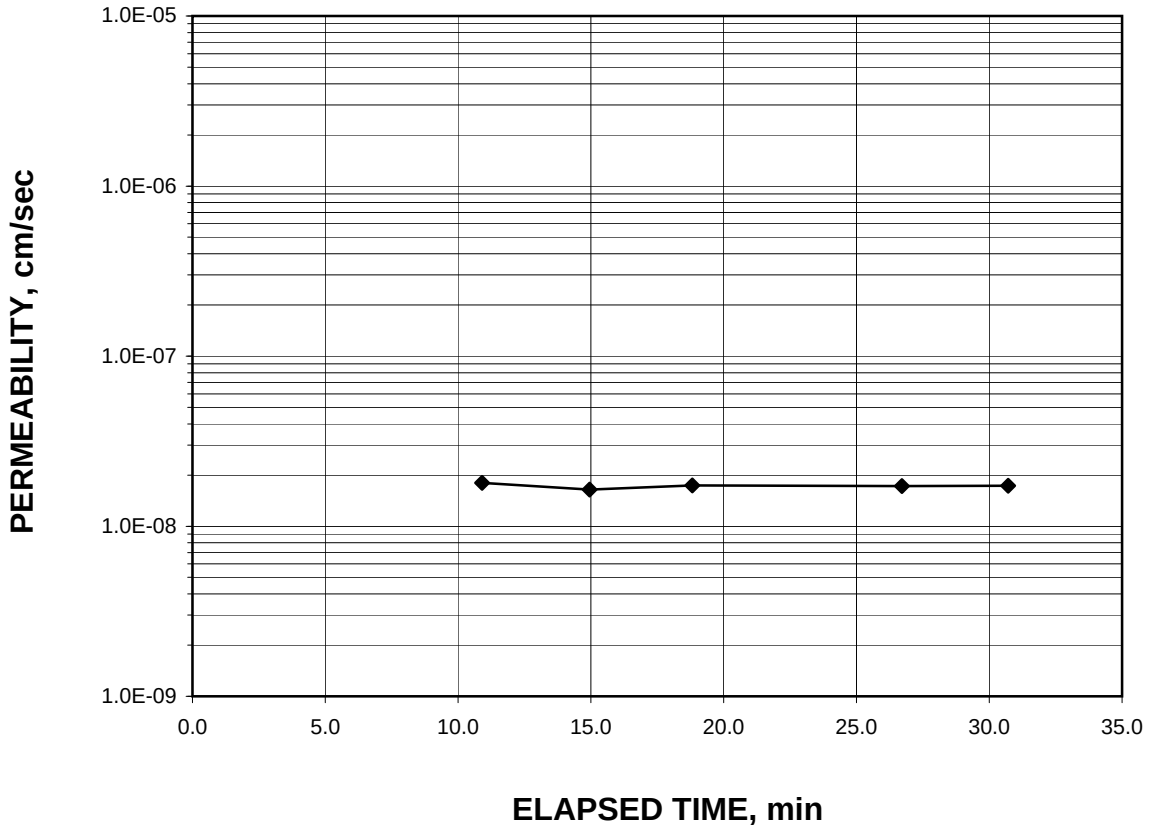
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A11-L1
Lab ID No.	2014-610-09-02		

Visual Description: LIGHT BROWN SILTY SANDY CLAY

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/14/14 Checked By: MPS Date: 5/16/14

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PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A11-L1
Lab ID No.	2014-610-09-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	6	802
Wt. of Tare & WS (gm.)	300.33	347.2
Wt. of Tare & DS (gm.)	245.27	294.86
Wt. of Tare (gm.)	36.83	104.1
Wt. of Water (gm.)	55.06	52.34
Wt. of DS (gm.)	208.44	190.76
Moisture Content (%)	**26.4**	**27.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	633.82	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	633.82	638.95
Length 1 (in.)	3.096	3.080
Length 2 (in.)	3.085	3.092
Length 3 (in.)	3.099	3.073
Top Diameter (in.)	2.832	2.845
Middle Diameter (in.)	2.844	2.852
Bottom Diameter (in.)	2.848	2.856
Average Length (in.)	3.09	3.08
Average Area (in.^{2})	6.34	6.38
Sample Volume (cm^3)	321.41	322.38
Unit Wet Wt. (gm./ cm^3)	1.972	1.982
Unit Wet Wt. (pcf)	123.1	123.7
Unit Dry Wt. (pcf)	97.4	97.1
Unit Dry Wt. (gm./ cm^3)	1.560	1.555
Void Ratio, e	0.731	0.736
Porosity, n	0.422	0.424
Pore Volume (cm^3)	135.7	136.7
Total Wt. Of Sample After Test		636.44

Tested By: SFS Date: 5/14/14 Checked By: MPS Date: 5/16/14

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PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-09	Sample No.	ST-A11-L1
Lab ID No.	2014-610-09-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.83
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.19
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/15/14	15	33	1	33.02	0.000	12.0	18.4	23.1	NA
5/15/14	15	43	55	43.92	10.900	11.7	17.9	23.1	1.8E-08
5/15/14	15	47	58	47.97	14.950	11.6	17.7	23.1	1.6E-08
5/15/14	15	51	50	51.83	18.817	11.5	17.5	23.1	1.7E-08
5/15/14	15	59	44	59.73	26.717	11.3	17.2	23.1	1.7E-08
5/15/14	16	3	44	3.73	30.717	11.2	17.0	23.1	1.7E-08

Tested By: SFS Date: 5/14/14 Checked By: MPS Date: 5/16/14

DCN: CT-22A DATE:2-25-14 REVISION:5 S:\ENGINEERING\Google Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-09-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

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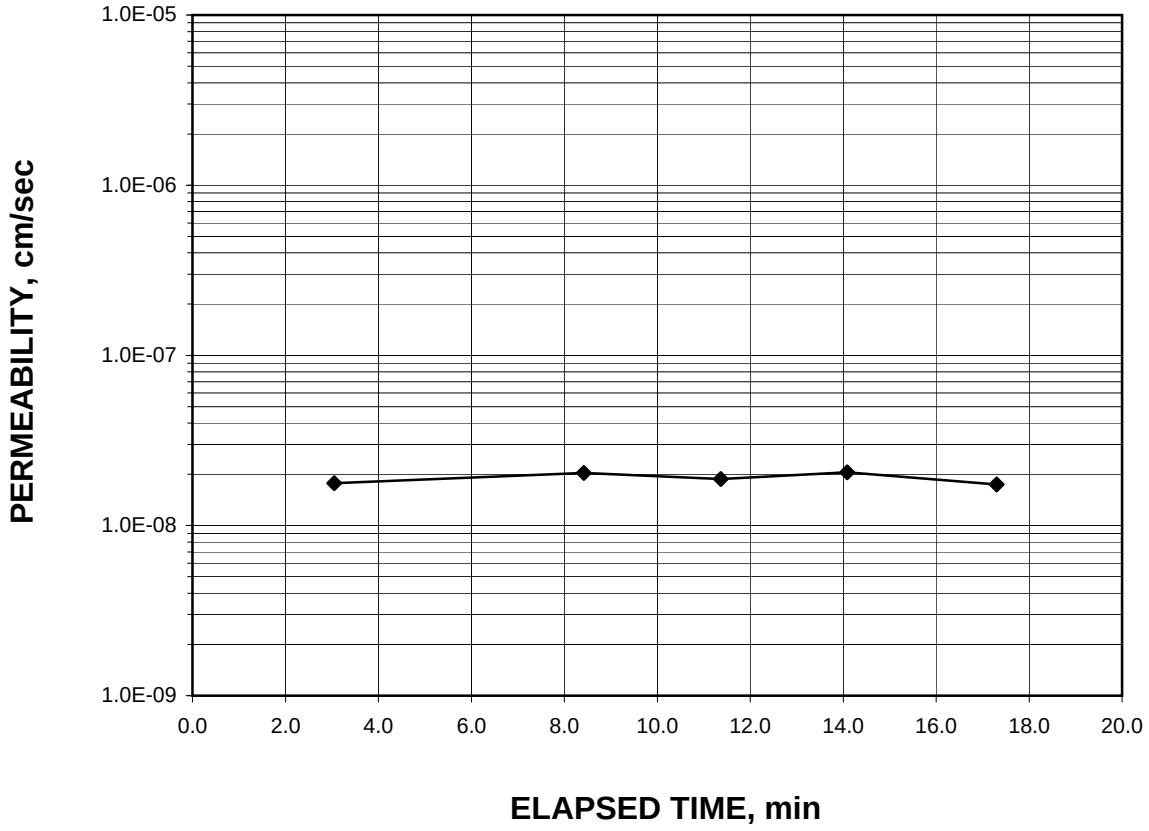
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A12-L1
Lab ID No.	2014-610-10-01		

Visual Description: LIGHT BROWN SANDY SILTY CLAY

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A12-L1
Lab ID No.	2014-610-10-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	814
Wt. of Tare & WS (gm.)	397.04	412.77
Wt. of Tare & DS (gm.)	339.27	355.71
Wt. of Tare (gm.)	94.64	111.51
Wt. of Water (gm.)	57.77	57.06
Wt. of DS (gm.)	244.63	244.20
Moisture Content (%)	**23.6**	**23.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	615.33	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	615.33	614.09
Length 1 (in.)	3.071	3.118
Length 2 (in.)	3.076	3.102
Length 3 (in.)	3.090	3.099
Top Diameter (in.)	2.856	2.927
Middle Diameter (in.)	2.825	2.889
Bottom Diameter (in.)	2.851	2.884
Average Length (in.)	3.08	3.11
Average Area (in.^{2})	6.35	6.61
Sample Volume (cm^3)	320.52	336.23
Unit Wet Wt. (gm./ cm^3)	1.920	1.826
Unit Wet Wt. (pcf)	119.8	114.0
Unit Dry Wt. (pcf)	96.9	92.4
Unit Dry Wt. (gm./ cm^3)	1.553	1.480
Void Ratio, e	0.739	0.824
Porosity, n	0.425	0.452
Pore Volume (cm^3)	136.2	151.9
Total Wt. Of Sample After Test		654.75

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A12-L1
Lab ID No.	2014-610-10-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.89
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.61
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/22/14	9	38	37	38.62	0.000	13.8	21.2	23.2	NA
5/22/14	9	41	40	41.67	3.050	13.7	21.0	23.2	1.8E-08
5/22/14	9	47	2	47.03	8.417	13.5	20.7	23.2	2.0E-08
5/22/14	9	49	59	49.98	11.367	13.4	20.5	23.2	1.9E-08
5/22/14	9	52	42	52.70	14.083	13.3	20.4	23.2	2.1E-08
5/22/14	9	55	55	55.92	17.300	13.2	20.2	23.2	1.7E-08

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

DCN: CT-22A DATE:2-25-14 REVISION:5 S:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

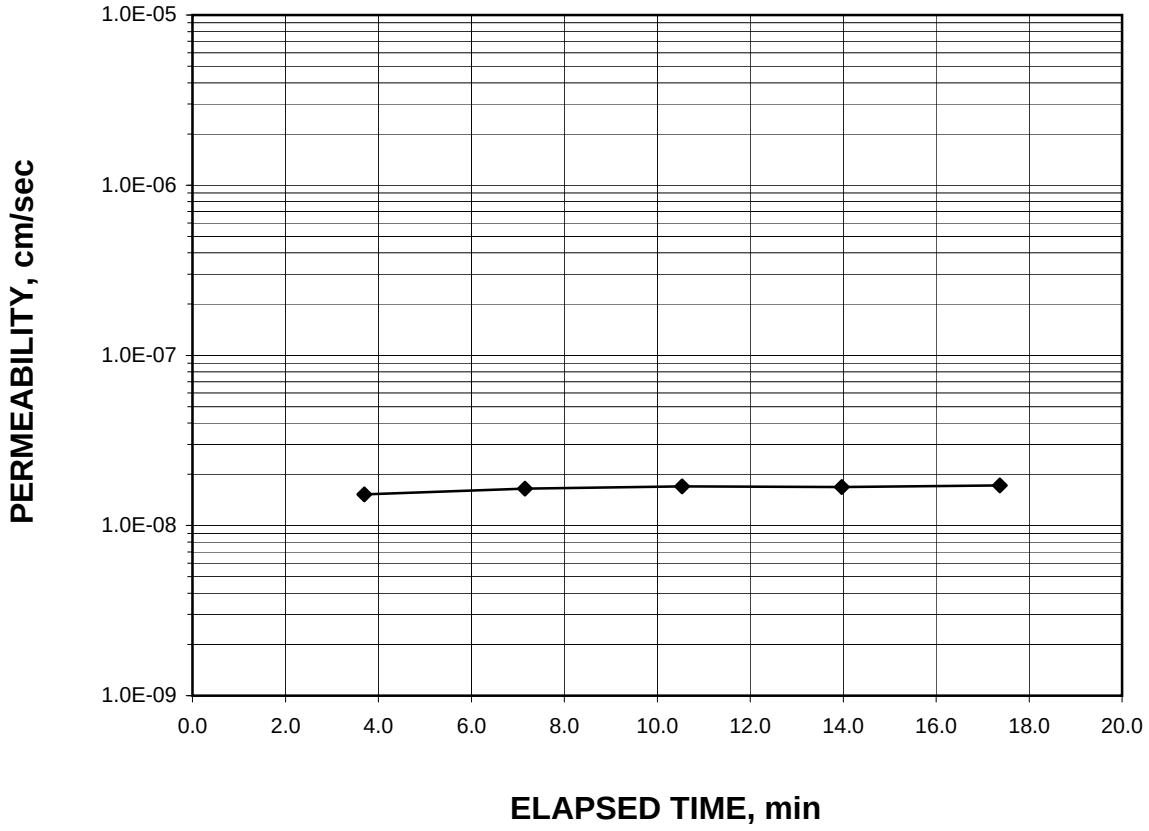
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A13-L1
Lab ID No.	2014-610-10-02		

Visual Description: LIGHT BROWN SANDY SILTY CLAY

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A13-L1
Lab ID No.	2014-610-10-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	804
Wt. of Tare & WS (gm.)	475.14	382.45
Wt. of Tare & DS (gm.)	396.49	319.59
Wt. of Tare (gm.)	107.06	105.36
Wt. of Water (gm.)	78.65	62.86
Wt. of DS (gm.)	289.43	214.23
Moisture Content (%)	**27.2**	**29.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	627.06	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	627.06	637.75
Length 1 (in.)	3.103	3.066
Length 2 (in.)	3.097	3.109
Length 3 (in.)	3.100	3.084
Top Diameter (in.)	2.845	2.864
Middle Diameter (in.)	2.847	2.860
Bottom Diameter (in.)	2.858	2.854
Average Length (in.)	3.10	3.09
Average Area (in.^{2})	6.38	6.42
Sample Volume (cm^3)	324.07	324.76
Unit Wet Wt. (gm./ cm^3)	1.935	1.964
Unit Wet Wt. (pcf)	120.8	122.6
Unit Dry Wt. (pcf)	95.0	94.8
Unit Dry Wt. (gm./ cm^3)	1.521	1.518
Void Ratio, e	0.775	0.778
Porosity, n	0.436	0.438
Pore Volume (cm^3)	141.5	142.1
Total Wt. Of Sample After Test		638.31

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	ST-A13-L1
Lab ID No.	2014-610-10-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.84
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.43
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.7E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/22/14	9	1	37	1.62	0.000	13.5	20.8	23.2	NA
5/22/14	9	5	19	5.32	3.700	13.4	20.7	23.2	1.5E-08
5/22/14	9	8	46	8.77	7.150	13.3	20.5	23.2	1.7E-08
5/22/14	9	12	9	12.15	10.533	13.2	20.3	23.2	1.7E-08
5/22/14	9	15	35	15.58	13.967	13.1	20.2	23.2	1.7E-08
5/22/14	9	18	59	18.98	17.367	13.0	20.0	23.2	1.7E-08

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 5/23/14

DCN: CT-22A DATE:2-25-14 REVISION:5 S:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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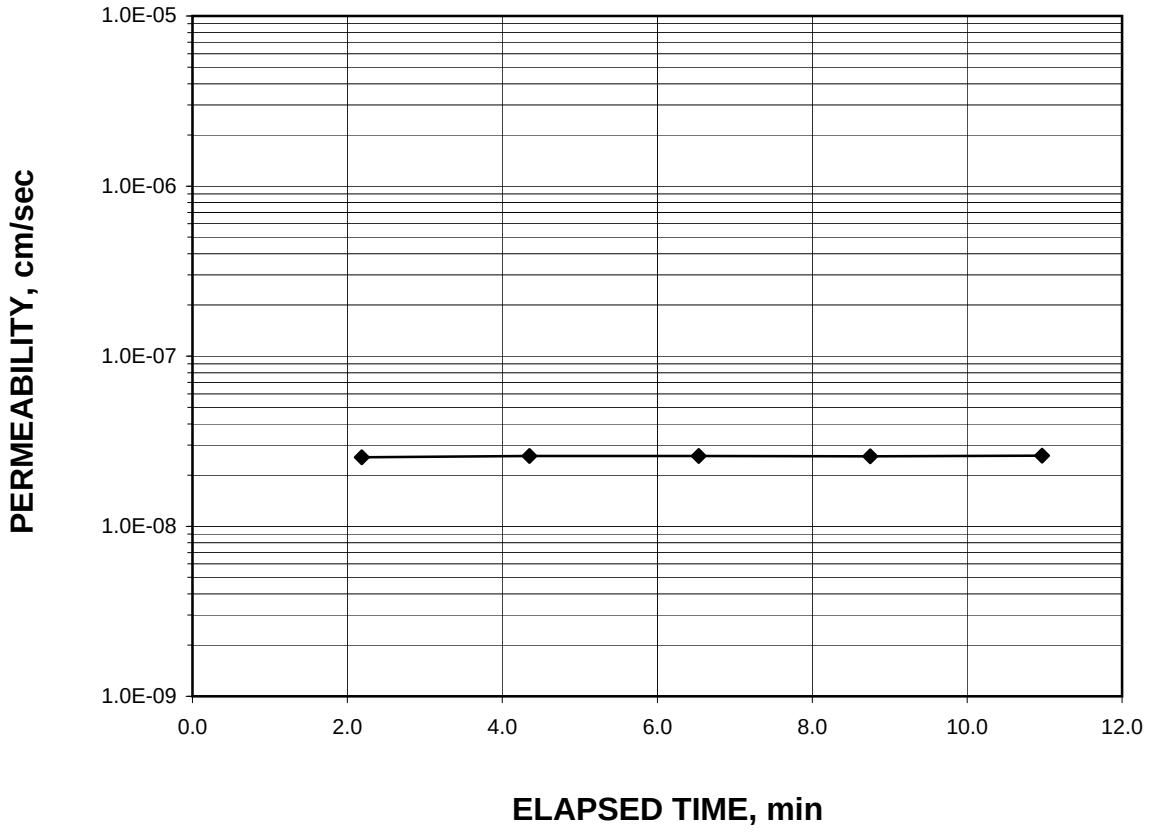
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A14-L1
Lab ID No.	2014-610-11-01		

Visual Description: LIGHT BROWN SILTY CLAY

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A14-L1
Lab ID No.	2014-610-11-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	390.97	350.84
Wt. of Tare & DS (gm.)	322.13	287.83
Wt. of Tare (gm.)	94.35	93.63
Wt. of Water (gm.)	68.84	63.01
Wt. of DS (gm.)	227.78	194.20
Moisture Content (%)	**30.2**	**32.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	601.52	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	601.52	611.79
Length 1 (in.)	3.028	2.987
Length 2 (in.)	3.024	2.987
Length 3 (in.)	3.029	2.972
Top Diameter (in.)	2.848	2.849
Middle Diameter (in.)	2.853	2.853
Bottom Diameter (in.)	2.851	2.848
Average Length (in.)	3.03	2.98
Average Area (in.^{2})	6.38	6.38
Sample Volume (cm^3)	316.59	311.74
Unit Wet Wt. (gm./ cm^3)	1.900	1.963
Unit Wet Wt. (pcf)	118.6	122.5
Unit Dry Wt. (pcf)	91.1	92.5
Unit Dry Wt. (gm./ cm^3)	1.459	1.482
Void Ratio, e	0.851	0.822
Porosity, n	0.460	0.451
Pore Volume (cm^3)	145.5	140.7
Total Wt. Of Sample After Test		606.08

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A14-L1
Lab ID No.	2014-610-11-01		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.57
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.16
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/22/14	16	23	45	23.75	0.000	13.2	21.0	23.7	NA
5/22/14	16	25	56	25.93	2.183	13.1	20.9	23.7	2.5E-08
5/22/14	16	28	6	28.10	4.350	13.0	20.7	23.7	2.6E-08
5/22/14	16	30	17	30.28	6.533	12.9	20.5	23.7	2.6E-08
5/22/14	16	32	30	32.50	8.750	12.8	20.3	23.7	2.6E-08
5/22/14	16	34	43	34.72	10.967	12.7	20.2	23.7	2.6E-08

Tested By: SFS Date: 5/20/14 Checked By: GEM Date: 1/14/14

DCN: CT-22A DATE:2-25-14 REVISION:5 S:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-11-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

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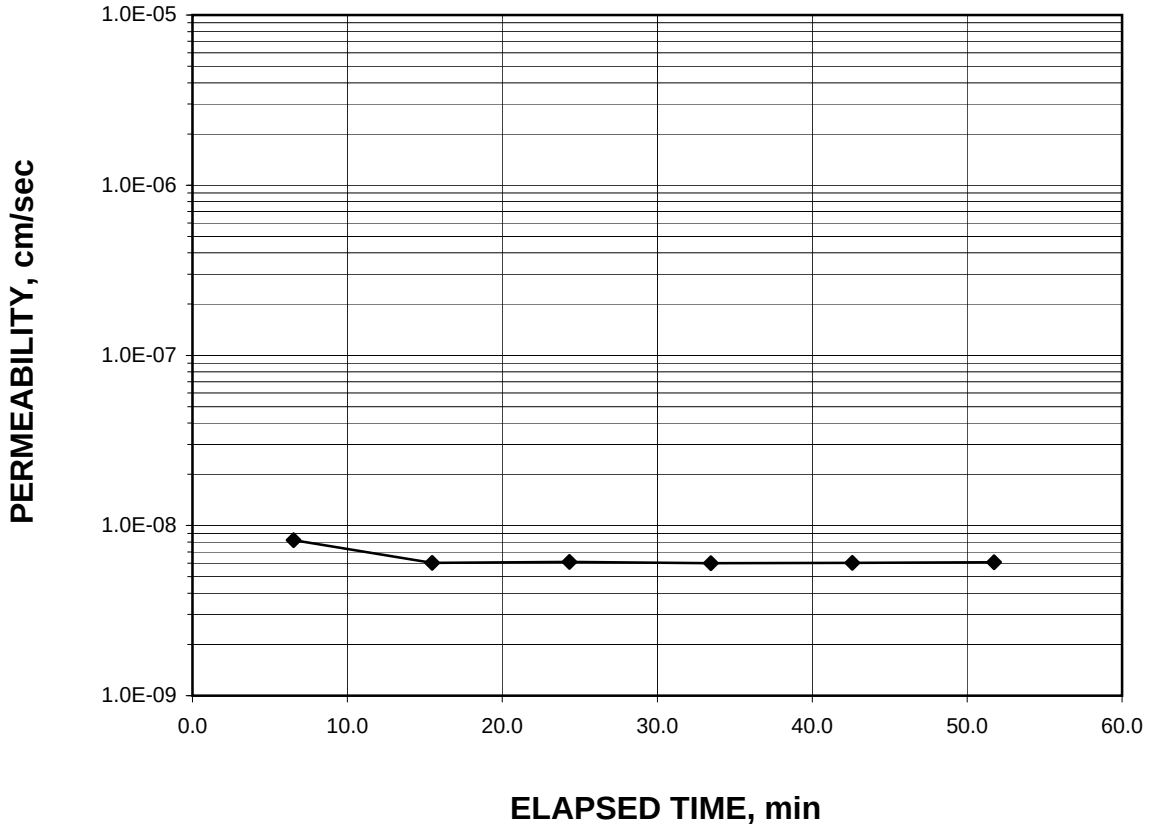
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A15-L1
Lab ID No.	2014-610-11-02		

Visual Description: LIGHT BROWN SILTY CLAY

AVERAGE PERMEABILITY = 6.1E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.1E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/21/14 Checked By: GEM Date: 1/14/14

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PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A15-L1
Lab ID No.	2014-610-11-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	811
Wt. of Tare & WS (gm.)	415.93	485.89
Wt. of Tare & DS (gm.)	349.51	399.47
Wt. of Tare (gm.)	106.11	106.15
Wt. of Water (gm.)	66.42	86.42
Wt. of DS (gm.)	243.40	293.32
Moisture Content (%)	**27.3**	**29.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	620.75	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	620.75	631.35
Length 1 (in.)	3.018	3.048
Length 2 (in.)	3.040	3.073
Length 3 (in.)	3.047	3.082
Top Diameter (in.)	2.849	2.884
Middle Diameter (in.)	2.849	2.892
Bottom Diameter (in.)	2.848	2.877
Average Length (in.)	3.04	3.07
Average Area (in.^{2})	6.37	6.53
Sample Volume (cm^3)	316.98	328.47
Unit Wet Wt. (gm./ cm^3)	1.958	1.922
Unit Wet Wt. (pcf)	122.2	120.0
Unit Dry Wt. (pcf)	96.0	92.7
Unit Dry Wt. (gm./ cm^3)	1.538	1.485
Void Ratio, e	0.755	0.819
Porosity, n	0.430	0.450
Pore Volume (cm^3)	136.4	147.8
Total Wt. Of Sample After Test		636.53

Tested By: SFS Date: 5/21/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-11	Sample No.	ST-A15-L1
Lab ID No.	2014-610-11-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.79
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.15
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.1E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.1E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/22/14	9	10	58	10.97	0.000	13.9	21.6	23.2	NA
5/22/14	9	17	29	17.48	6.517	13.8	21.5	23.2	8.2E-09
5/22/14	9	26	26	26.43	15.467	13.7	21.3	23.2	6.0E-09
5/22/14	9	35	18	35.30	24.333	13.6	21.1	23.2	6.1E-09
5/22/14	9	44	25	44.42	33.450	13.5	21.0	23.2	6.0E-09
5/22/14	9	53	33	53.55	42.583	13.4	20.8	23.2	6.0E-09
5/22/14	10	2	42	2.70	51.733	13.3	20.6	23.2	6.1E-09

Tested By: SFS Date: 5/21/14 Checked By: GEM Date: 1/14/14

DCN: CT-22A DATE:2-2-2011 REVISION:5 J:\Shared Drive\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-11-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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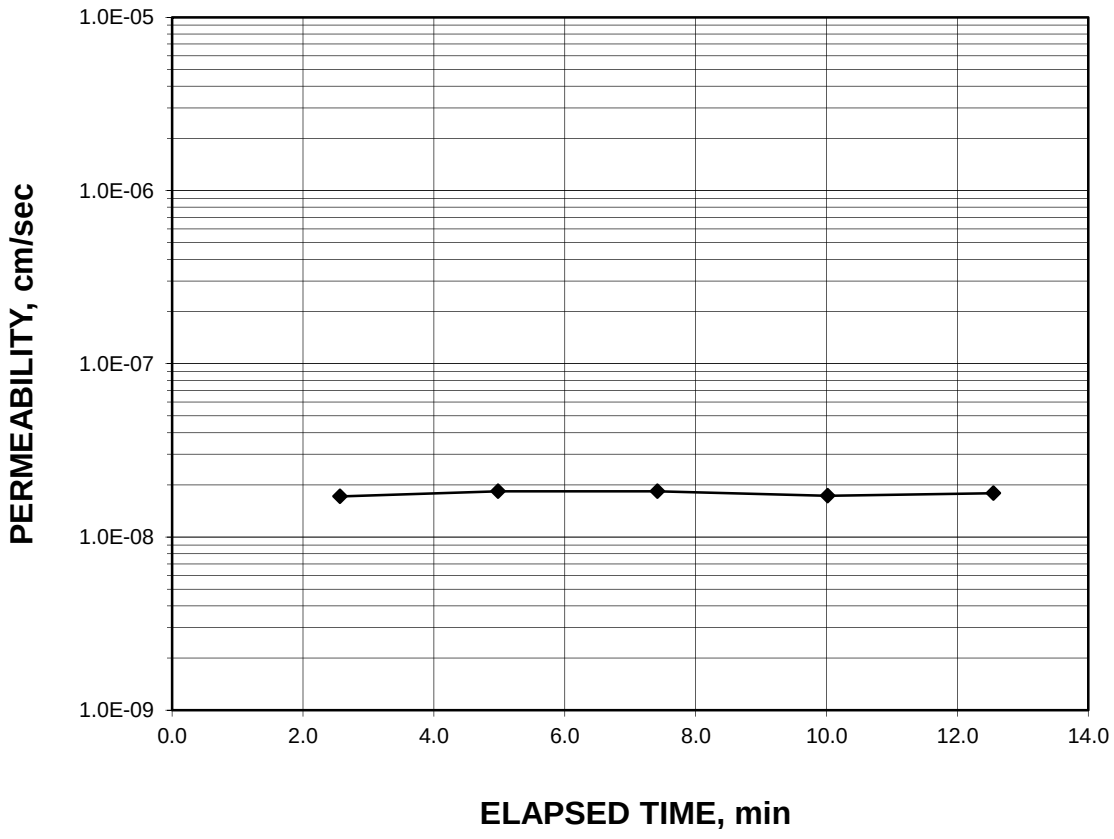
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A16-L1
Lab ID No.	2014-610-13-01		

Visual Description: LIGHT BROWN SILTY CLAY

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A16-L1
Lab ID No.	2014-610-13-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	374.25	373.04
Wt. of Tare & DS (gm.)	316.94	314.97
Wt. of Tare (gm.)	93.53	93.47
Wt. of Water (gm.)	57.31	58.07
Wt. of DS (gm.)	223.41	221.50
Moisture Content (%)	**25.7**	**26.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	586.13	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	586.13	588.76
Length 1 (in.)	2.849	2.878
Length 2 (in.)	2.866	2.841
Length 3 (in.)	2.855	2.843
Top Diameter (in.)	2.848	2.860
Middle Diameter (in.)	2.835	2.865
Bottom Diameter (in.)	2.839	2.873
Average Length (in.)	2.86	2.85
Average Area (in.^{2})	6.34	6.45
Sample Volume (cm^3)	296.68	301.72
Unit Wet Wt. (gm./ cm^3)	1.976	1.951
Unit Wet Wt. (pcf)	123.3	121.8
Unit Dry Wt. (pcf)	98.1	96.5
Unit Dry Wt. (gm./ cm^3)	1.572	1.546
Void Ratio, e	0.717	0.746
Porosity, n	0.418	0.427
Pore Volume (cm^3)	123.9	128.9
Total Wt. Of Sample After Test		595.24

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A16-L1
Lab ID No.	2014-610-13-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.25
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.62
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/28/14	16	50	18	50.30	0.000	15.4	25.9	24.2	NA
5/28/14	16	52	52	52.87	2.567	15.3	25.8	24.2	1.7E-08
5/28/14	16	55	17	55.28	4.983	15.2	25.6	24.2	1.8E-08
5/28/14	16	57	43	57.72	7.417	15.1	25.4	24.2	1.8E-08
5/28/14	17	0	19	0.32	10.017	15.0	25.2	24.2	1.7E-08
5/28/14	17	2	51	2.85	12.550	14.9	25.0	24.2	1.8E-08

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
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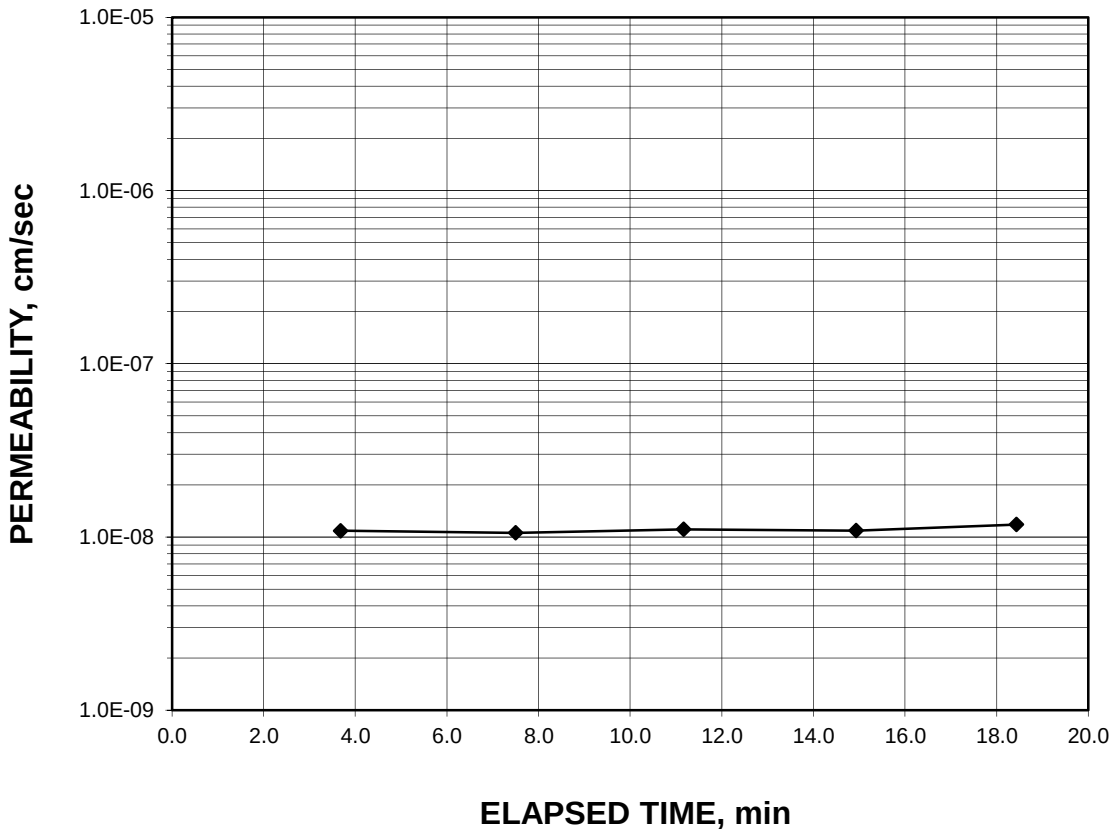
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A17-L1
Lab ID No.	2014-610-13-02		

Visual Description: LIGHT BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A17-L1
Lab ID No.	2014-610-13-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	810	804
Wt. of Tare & WS (gm.)	305.91	327.5
Wt. of Tare & DS (gm.)	267.52	277.84
Wt. of Tare (gm.)	114.51	105.54
Wt. of Water (gm.)	38.39	49.66
Wt. of DS (gm.)	153.01	172.30
Moisture Content (%)	**25.1**	**28.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	463.45	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	463.45	477.28
Length 1 (in.)	2.283	2.303
Length 2 (in.)	2.283	2.323
Length 3 (in.)	2.299	2.298
Top Diameter (in.)	2.859	2.894
Middle Diameter (in.)	2.843	2.869
Bottom Diameter (in.)	2.861	2.915
Average Length (in.)	2.29	2.31
Average Area (in.^{2})	6.40	6.57
Sample Volume (cm^3)	239.95	248.56
Unit Wet Wt. (gm./ cm^3)	1.931	1.920
Unit Wet Wt. (pcf)	120.6	119.9
Unit Dry Wt. (pcf)	96.4	93.0
Unit Dry Wt. (gm./ cm^3)	1.544	1.491
Void Ratio, e	0.749	0.811
Porosity, n	0.428	0.448
Pore Volume (cm^3)	102.7	111.3
Total Wt. Of Sample After Test		479.30

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A17-L1
Lab ID No.	2014-610-13-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.86
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.40
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/28/14	17	13	24	13.40	0.000	13.6	28.1	24.2	NA
5/28/14	17	17	5	17.08	3.683	13.5	27.8	24.2	1.1E-08
5/28/14	17	20	54	20.90	7.500	13.4	27.6	24.2	1.1E-08
5/28/14	17	24	34	24.57	11.167	13.3	27.4	24.2	1.1E-08
5/28/14	17	28	20	28.33	14.933	13.2	27.2	24.2	1.1E-08
5/28/14	17	31	50	31.83	18.433	13.1	27.0	24.2	1.2E-08

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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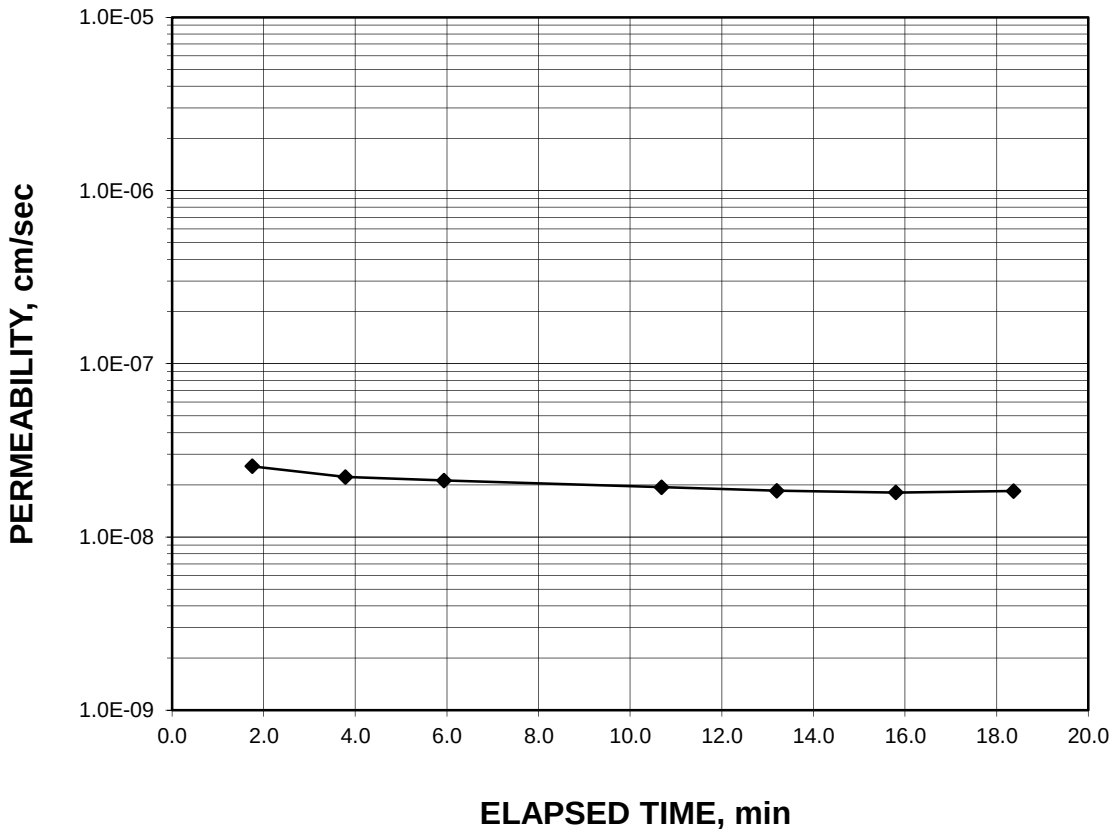
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A18-L1
Lab ID No.	2014-610-13-03		

Visual Description: ORANGE SILTY CLAY

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A18-L1
Lab ID No.	2014-610-13-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: ORANGE SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	812	810
Wt. of Tare & WS (gm.)	342.85	397.22
Wt. of Tare & DS (gm.)	285.10	326.31
Wt. of Tare (gm.)	107.01	114.46
Wt. of Water (gm.)	57.75	70.91
Wt. of DS (gm.)	178.09	211.85
Moisture Content (%)	**32.4**	**33.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	531.71	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	531.71	535.90
Length 1 (in.)	2.734	2.697
Length 2 (in.)	2.741	2.703
Length 3 (in.)	2.747	2.730
Top Diameter (in.)	2.827	2.861
Middle Diameter (in.)	2.835	2.863
Bottom Diameter (in.)	2.834	2.855
Average Length (in.)	2.74	2.71
Average Area (in.^{2})	6.30	6.42
Sample Volume (cm^3)	282.90	285.23
Unit Wet Wt. (gm./ cm^3)	1.879	1.879
Unit Wet Wt. (pcf)	117.3	117.3
Unit Dry Wt. (pcf)	88.6	87.9
Unit Dry Wt. (gm./ cm^3)	1.419	1.408
Void Ratio, e	0.902	0.918
Porosity, n	0.474	0.479
Pore Volume (cm^3)	134.2	136.5
Total Wt. Of Sample After Test		538.62

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-13	Sample No.	ST-A18-L1
Lab ID No.	2014-610-13-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	6.88
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.44
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/28/14	16	49	6	49.10	0.000	14.5	25.6	24.2	NA
5/28/14	16	50	51	50.85	1.750	14.4	25.4	24.2	2.6E-08
5/28/14	16	52	53	52.88	3.783	14.3	25.2	24.2	2.2E-08
5/28/14	16	55	2	55.03	5.933	14.2	25.0	24.2	2.1E-08
5/28/14	16	59	47	59.78	10.683	14.0	24.7	24.2	1.9E-08
5/28/14	17	2	18	2.30	13.200	13.9	24.5	24.2	1.9E-08
5/28/14	17	4	54	4.90	15.800	13.8	24.3	24.2	1.8E-08
5/28/14	17	7	28	7.47	18.367	13.7	24.1	24.2	1.8E-08

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-13-03 Permometer.xls]Sheet1

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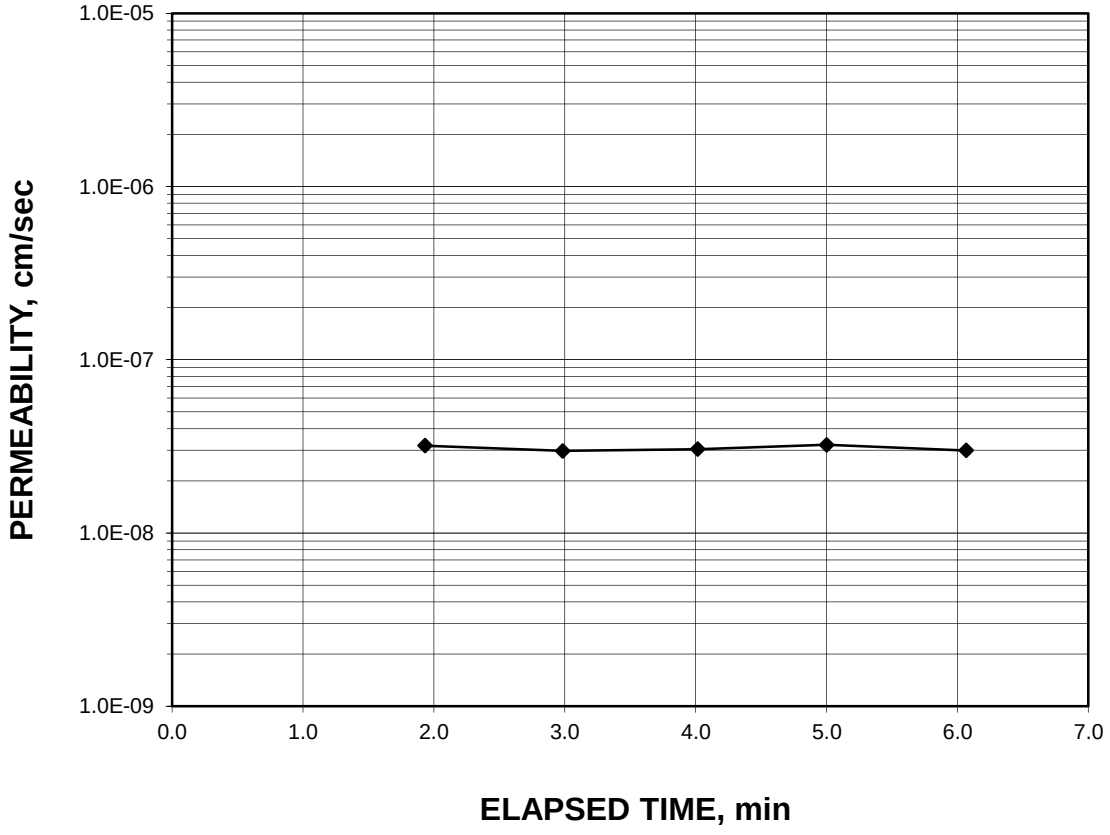
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A1-L2
Lab ID No.	2014-610-14-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A1-L2
Lab ID No.	2014-610-14-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	807	827
Wt. of Tare & WS (gm.)	259.87	347.35
Wt. of Tare & DS (gm.)	231.69	301.58
Wt. of Tare (gm.)	105.06	139.3
Wt. of Water (gm.)	28.18	45.77
Wt. of DS (gm.)	126.63	162.28
Moisture Content (%)	**22.3**	**28.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	369.95	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	369.95	387.96
Length 1 (in.)	1.825	1.819
Length 2 (in.)	1.838	1.832
Length 3 (in.)	1.804	1.843
Top Diameter (in.)	2.835	2.891
Middle Diameter (in.)	2.838	2.878
Bottom Diameter (in.)	2.836	2.873
Average Length (in.)	1.82	1.83
Average Area (in.^{2})	6.32	6.52
Sample Volume (cm^3)	188.68	195.59
Unit Wet Wt. (gm./ cm^3)	1.961	1.984
Unit Wet Wt. (pcf)	122.4	123.8
Unit Dry Wt. (pcf)	100.1	96.6
Unit Dry Wt. (gm./ cm^3)	1.604	1.547
Void Ratio, e	0.684	0.745
Porosity, n	0.406	0.427
Pore Volume (cm^3)	76.6	83.5
Total Wt. Of Sample After Test		385.54

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-14-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 1
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A1-L2
Lab ID No.	2014-610-14-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	4.65
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.05
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.1E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/29/14	16	11	48	11.80	0.000	14.5	37.9	22.9	NA
5/29/14	16	13	44	13.73	1.933	14.3	37.3	22.9	3.2E-08
5/29/14	16	14	47	14.78	2.983	14.2	37.1	22.9	3.0E-08
5/29/14	16	15	49	15.82	4.017	14.1	36.8	22.9	3.0E-08
5/29/14	16	16	48	16.80	5.000	14.0	36.5	22.9	3.2E-08
5/29/14	16	17	52	17.87	6.067	13.9	36.2	22.9	3.0E-08

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-14-01 Permometer.xls]Sheet1

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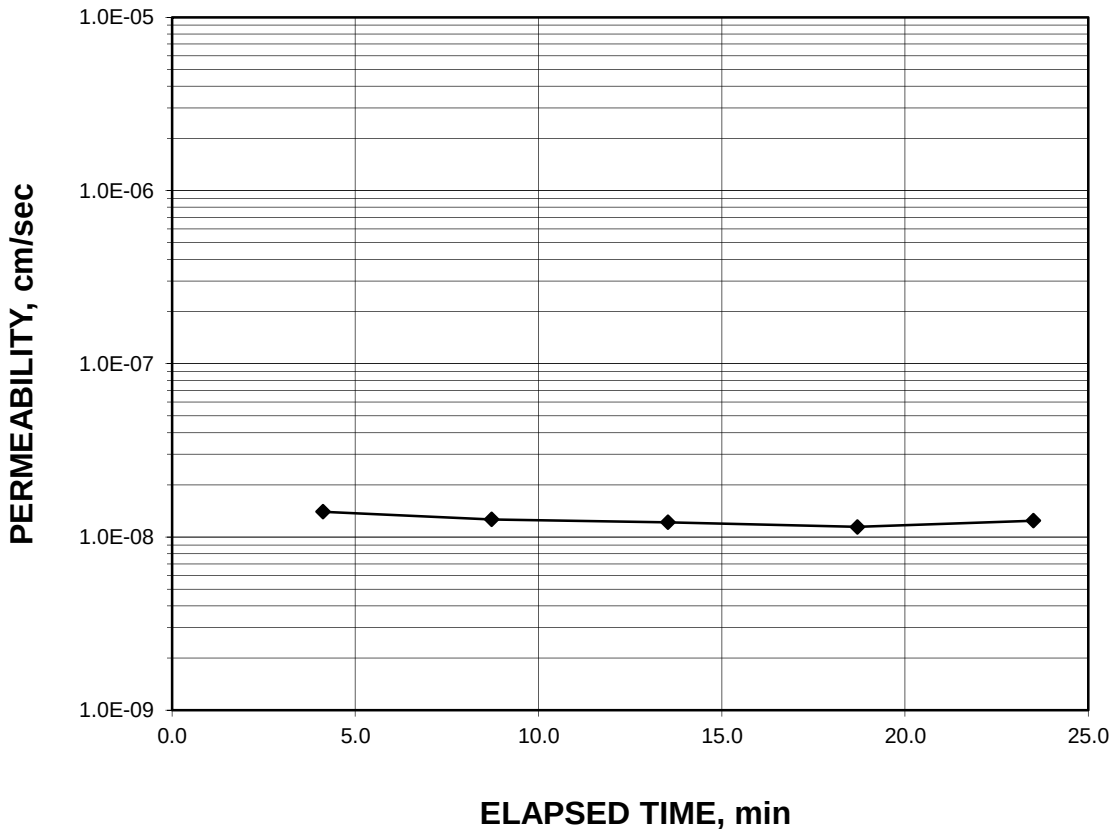
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A2-L2
Lab ID No.	2014-610-14-02		

Visual Description: BROWN SILTY CLAY

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A2-L2
Lab ID No.	2014-610-14-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SILTY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	801	805
Wt. of Tare & WS (gm.)	259.45	447.71
Wt. of Tare & DS (gm.)	228.17	373.55
Wt. of Tare (gm.)	100.28	104.64
Wt. of Water (gm.)	31.28	74.16
Wt. of DS (gm.)	127.89	268.91
Moisture Content (%)	**24.5**	**27.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	631.69	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	631.69	647.52
Length 1 (in.)	3.078	3.053
Length 2 (in.)	3.084	3.086
Length 3 (in.)	3.067	3.100
Top Diameter (in.)	2.848	2.878
Middle Diameter (in.)	2.842	2.874
Bottom Diameter (in.)	2.841	2.888
Average Length (in.)	3.08	3.08
Average Area (in.^{2})	6.35	6.51
Sample Volume (cm^3)	320.17	328.76
Unit Wet Wt. (gm./ cm^3)	1.973	1.970
Unit Wet Wt. (pcf)	123.2	122.9
Unit Dry Wt. (pcf)	99.0	96.4
Unit Dry Wt. (gm./ cm^3)	1.585	1.544
Void Ratio, e	0.703	0.749
Porosity, n	0.413	0.428
Pore Volume (cm^3)	132.2	140.8
Total Wt. Of Sample After Test		644.65

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-14-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 2
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-14	Sample No.	ST-A2-L2
Lab ID No.	2014-610-14-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.82
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.03
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/29/14	14	45	30	45.50	0.000	13.1	20.2	23.0	NA
5/29/14	14	49	37	49.62	4.117	13.0	20.0	23.0	1.4E-08
5/29/14	14	54	13	54.22	8.717	12.9	19.9	23.0	1.3E-08
5/29/14	14	59	2	59.03	13.533	12.8	19.7	23.0	1.2E-08
5/29/14	15	4	12	4.20	18.700	12.7	19.5	23.0	1.1E-08
5/29/14	15	9	0	9.00	23.500	12.6	19.4	23.0	1.2E-08

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-14-02 Permometer.xls]Sheet1

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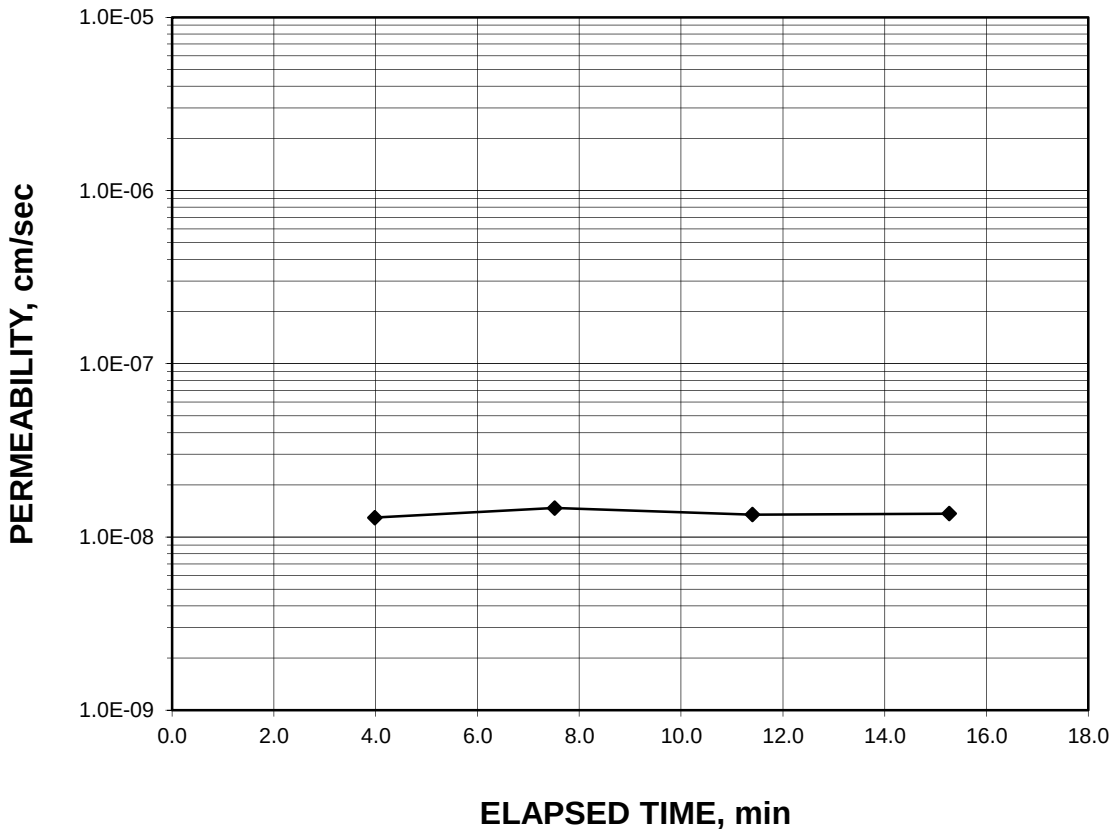
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A3-L2
Lab ID No.	2014-610-15-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A3-L2
Lab ID No.	2014-610-15-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	824	815
Wt. of Tare & WS (gm.)	423.68	749.25
Wt. of Tare & DS (gm.)	371.52	633.93
Wt. of Tare (gm.)	137.20	137.5
Wt. of Water (gm.)	52.16	115.32
Wt. of DS (gm.)	234.32	496.43
Moisture Content (%)	**22.3**	**23.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	595.63	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	595.63	600.35
Length 1 (in.)	2.866	2.893
Length 2 (in.)	2.872	2.889
Length 3 (in.)	2.879	2.874
Top Diameter (in.)	2.851	2.879
Middle Diameter (in.)	2.848	2.892
Bottom Diameter (in.)	2.848	2.859
Average Length (in.)	2.87	2.89
Average Area (in.^{2})	6.37	6.50
Sample Volume (cm^3)	300.06	307.30
Unit Wet Wt. (gm./ cm^3)	1.985	1.954
Unit Wet Wt. (pcf)	123.9	121.9
Unit Dry Wt. (pcf)	101.3	99.0
Unit Dry Wt. (gm./ cm^3)	1.624	1.585
Void Ratio, e	0.663	0.703
Porosity, n	0.399	0.413
Pore Volume (cm^3)	119.6	126.9
Total Wt. Of Sample After Test		614.81

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 3
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A3-L2
Lab ID No.	2014-610-15-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.33
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.93
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	10	48	44	48.73	0.000	13.6	22.5	23.4	NA
5/31/14	10	52	43	52.72	3.983	13.5	22.3	23.4	1.3E-08
5/31/14	10	56	15	56.25	7.517	13.4	22.1	23.4	1.5E-08
5/31/14	11	0	8	0.13	11.400	13.3	21.9	23.4	1.3E-08
5/31/14	11	4	0	4.00	15.267	13.2	21.7	23.4	1.4E-08

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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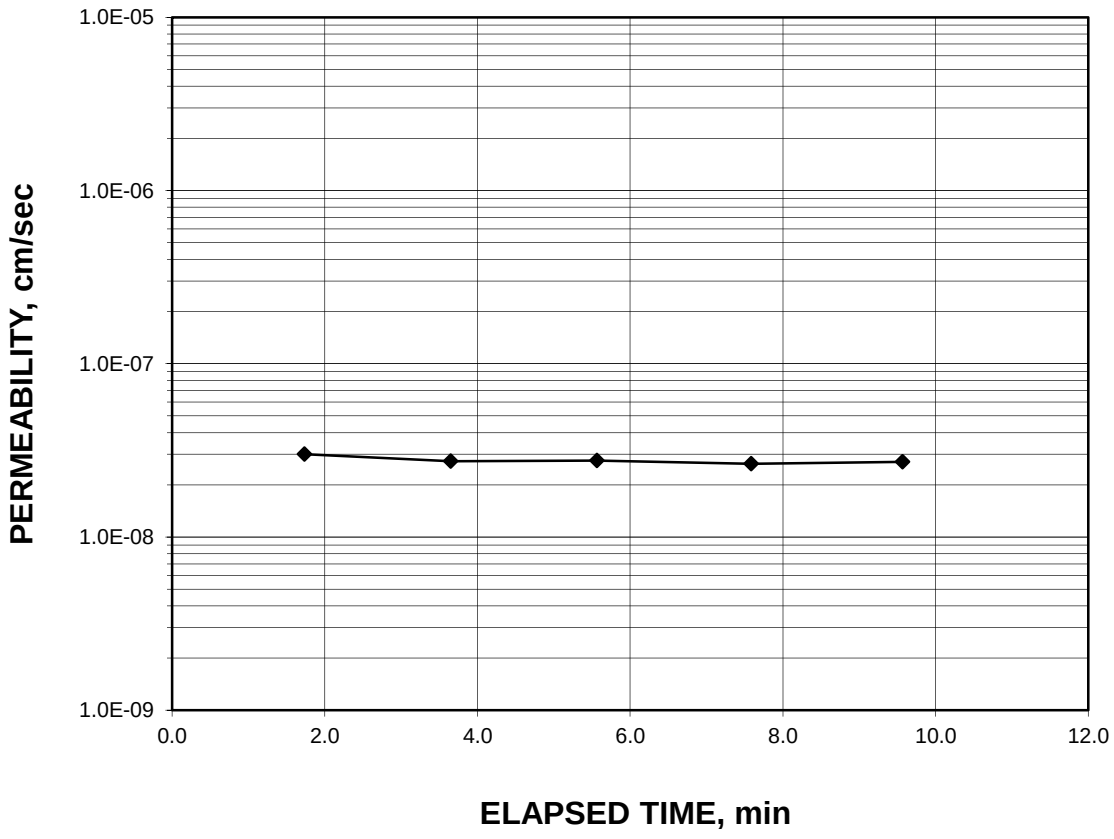
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A4-L2
Lab ID No.	2014-610-15-02		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A4-L2
Lab ID No.	2014-610-15-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	816	805
Wt. of Tare & WS (gm.)	498.88	384.16
Wt. of Tare & DS (gm.)	429.83	325.17
Wt. of Tare (gm.)	137.89	104.62
Wt. of Water (gm.)	69.05	58.99
Wt. of DS (gm.)	291.94	220.55
Moisture Content (%)	**23.7**	**26.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	590.23	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	590.23	605.00
Length 1 (in.)	2.856	2.827
Length 2 (in.)	2.843	2.854
Length 3 (in.)	2.848	2.847
Top Diameter (in.)	2.838	2.874
Middle Diameter (in.)	2.837	2.873
Bottom Diameter (in.)	2.842	2.872
Average Length (in.)	2.85	2.84
Average Area (in.^{2})	6.33	6.48
Sample Volume (cm^3)	295.54	301.99
Unit Wet Wt. (gm./ cm^3)	1.997	2.003
Unit Wet Wt. (pcf)	124.7	125.1
Unit Dry Wt. (pcf)	100.8	98.7
Unit Dry Wt. (gm./ cm^3)	1.615	1.581
Void Ratio, e	0.672	0.708
Porosity, n	0.402	0.415
Pore Volume (cm^3)	118.7	125.2
Total Wt. Of Sample After Test		597.66

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 4
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A4-L2
Lab ID No.	2014-610-15-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.22
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.82
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.7E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	11	7	32	7.53	0.000	13.3	22.2	23.4	NA
5/31/14	11	9	16	9.27	1.733	13.2	22.1	23.4	3.0E-08
5/31/14	11	11	11	11.18	3.650	13.1	21.9	23.4	2.7E-08
5/31/14	11	13	6	13.10	5.567	13.0	21.7	23.4	2.8E-08
5/31/14	11	15	7	15.12	7.583	12.9	21.5	23.4	2.6E-08
5/31/14	11	17	6	17.10	9.567	12.8	21.3	23.4	2.7E-08

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-02 Permometer.xls]Sheet1

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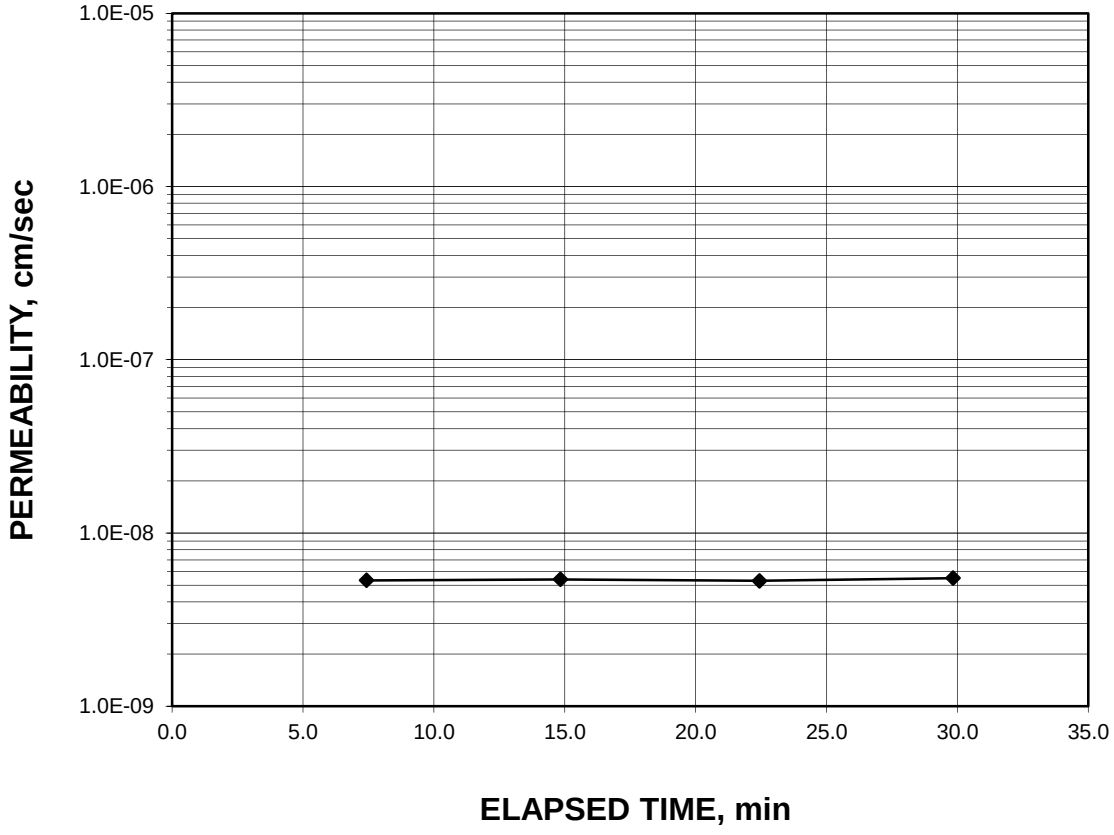
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A5-L2
Lab ID No.	2014-610-15-03		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 5.4E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.4E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION:5 G:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A5-L2
Lab ID No.	2014-610-15-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	803
Wt. of Tare & WS (gm.)	310.59	333.66
Wt. of Tare & DS (gm.)	275.08	286.2
Wt. of Tare (gm.)	93.47	105.1
Wt. of Water (gm.)	35.51	47.46
Wt. of DS (gm.)	181.61	181.10
Moisture Content (%)	**19.6**	**26.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	444.23	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	444.23	468.95
Length 1 (in.)	2.109	2.138
Length 2 (in.)	2.119	2.126
Length 3 (in.)	2.127	2.127
Top Diameter (in.)	2.854	2.871
Middle Diameter (in.)	2.856	2.885
Bottom Diameter (in.)	2.851	2.877
Average Length (in.)	2.12	2.13
Average Area (in.^{2})	6.40	6.50
Sample Volume (cm^3)	222.02	227.05
Unit Wet Wt. (gm./ cm^3)	2.001	2.065
Unit Wet Wt. (pcf)	124.9	128.9
Unit Dry Wt. (pcf)	104.5	102.2
Unit Dry Wt. (gm./ cm^3)	1.674	1.637
Void Ratio, e	0.613	0.650
Porosity, n	0.380	0.394
Pore Volume (cm^3)	84.4	89.4
Total Wt. Of Sample After Test		456.97

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 5
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A5-L2
Lab ID No.	2014-610-15-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.41
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.96
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 5.4E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.4E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	11	32	32	32.53	0.000	13.1	29.2	23.4	NA
5/31/14	11	39	58	39.97	7.433	13.0	29.0	23.4	5.3E-09
5/31/14	11	47	22	47.37	14.833	12.9	28.7	23.4	5.4E-09
5/31/14	11	54	58	54.97	22.433	12.8	28.5	23.4	5.3E-09
5/31/14	12	2	22	2.37	29.833	12.7	28.2	23.4	5.5E-09

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-03 Permometer.xls]Sheet1

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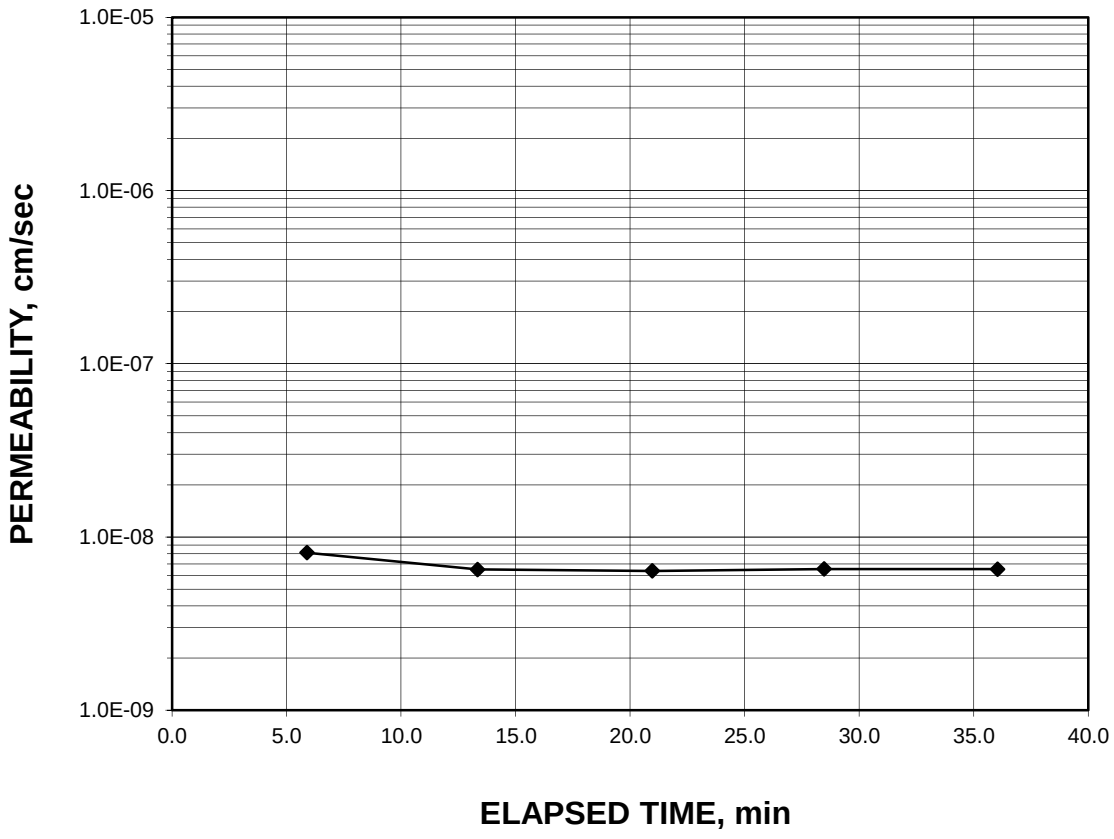
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A6-L2
Lab ID No.	2014-610-15-04		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 6.5E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.5E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A6-L2
Lab ID No.	2014-610-15-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	810	810
Wt. of Tare & WS (gm.)	351.57	383.47
Wt. of Tare & DS (gm.)	309.67	333.27
Wt. of Tare (gm.)	114.48	114.38
Wt. of Water (gm.)	41.90	50.20
Wt. of DS (gm.)	195.19	218.89
Moisture Content (%)	**21.5**	**22.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	586.90	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	586.90	593.99
Length 1 (in.)	2.760	2.778
Length 2 (in.)	2.758	2.769
Length 3 (in.)	2.754	2.780
Top Diameter (in.)	2.845	2.881
Middle Diameter (in.)	2.856	2.885
Bottom Diameter (in.)	2.841	2.877
Average Length (in.)	2.76	2.78
Average Area (in.^{2})	6.37	6.52
Sample Volume (cm^3)	287.71	296.51
Unit Wet Wt. (gm./ cm^3)	2.040	2.003
Unit Wet Wt. (pcf)	127.3	125.0
Unit Dry Wt. (pcf)	104.8	101.7
Unit Dry Wt. (gm./ cm^3)	1.679	1.630
Void Ratio, e	0.608	0.657
Porosity, n	0.378	0.396
Pore Volume (cm^3)	108.8	117.6
Total Wt. Of Sample After Test		605.22

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-04 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 6
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A6-L2
Lab ID No.	2014-610-15-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.05
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.06
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.5E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.5E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	11	26	54	26.90	0.000	14.0	24.1	23.4	NA
5/31/14	11	32	48	32.80	5.900	13.9	23.9	23.4	8.1E-09
5/31/14	11	40	14	40.23	13.333	13.8	23.7	23.4	6.5E-09
5/31/14	11	47	52	47.87	20.967	13.7	23.5	23.4	6.4E-09
5/31/14	11	55	22	55.37	28.467	13.6	23.3	23.4	6.5E-09
5/31/14	12	2	56	2.93	36.033	13.5	23.2	23.4	6.5E-09

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-04 Permometer.xls]Sheet1

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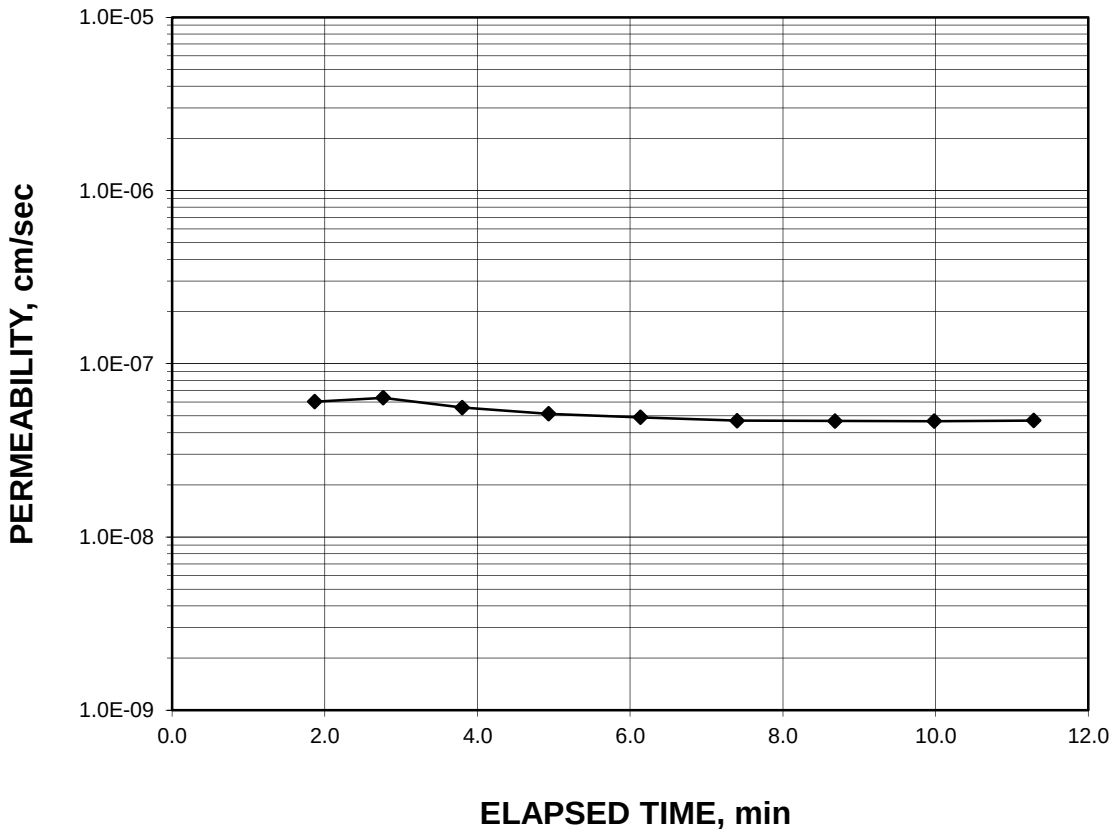
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A7-L2
Lab ID No.	2014-610-15-05		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 4.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A7-L2
Lab ID No.	2014-610-15-05		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	804	827
Wt. of Tare & WS (gm.)	512.72	343.42
Wt. of Tare & DS (gm.)	442.04	307.13
Wt. of Tare (gm.)	105.51	139.36
Wt. of Water (gm.)	70.68	36.29
Wt. of DS (gm.)	336.53	167.77
Moisture Content (%)	**21.0**	**21.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	590.81	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	590.81	593.88
Length 1 (in.)	2.735	2.761
Length 2 (in.)	2.730	2.733
Length 3 (in.)	2.742	2.741
Top Diameter (in.)	2.849	2.882
Middle Diameter (in.)	2.847	2.881
Bottom Diameter (in.)	2.844	2.868
Average Length (in.)	2.74	2.75
Average Area (in.^{2})	6.36	6.50
Sample Volume (cm^3)	285.32	292.42
Unit Wet Wt. (gm./ cm^3)	2.071	2.031
Unit Wet Wt. (pcf)	129.3	126.8
Unit Dry Wt. (pcf)	106.8	104.2
Unit Dry Wt. (gm./ cm^3)	1.711	1.670
Void Ratio, e	0.578	0.617
Porosity, n	0.366	0.382
Pore Volume (cm^3)	104.5	111.6
Total Wt. Of Sample After Test		607.57

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-05 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 7
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A7-L2
Lab ID No.	2014-610-15-05		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	6.97
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.94
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 4.7E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 4.7E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	11	8	25	8.42	0.000	12.0	20.6	23.4	NA
5/31/14	11	10	17	10.28	1.867	11.8	20.2	23.4	6.0E-08
5/31/14	11	11	11	11.18	2.767	11.7	20.0	23.4	6.4E-08
5/31/14	11	12	13	12.22	3.800	11.6	19.9	23.4	5.6E-08
5/31/14	11	13	21	13.35	4.933	11.5	19.7	23.4	5.1E-08
5/31/14	11	14	33	14.55	6.133	11.4	19.5	23.4	4.9E-08
5/31/14	11	15	49	15.82	7.400	11.3	19.3	23.4	4.7E-08
5/31/14	11	17	6	17.10	8.683	11.2	19.1	23.4	4.7E-08
5/31/14	11	18	24	18.40	9.983	11.1	18.9	23.4	4.7E-08
5/31/14	11	19	42	19.70	11.283	11.0	18.7	23.4	4.7E-08

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-05 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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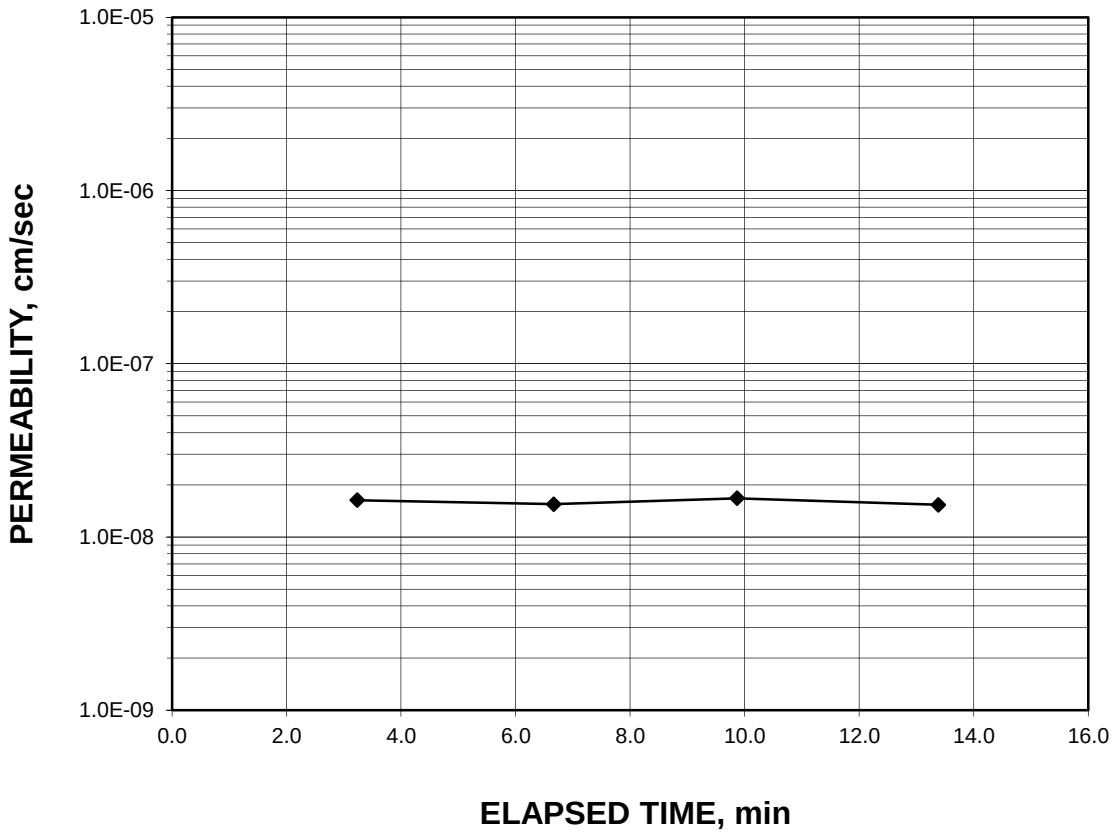
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A8-L2
Lab ID No.	2014-610-15-06		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A8-L2
Lab ID No.	2014-610-15-06		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	821
Wt. of Tare & WS (gm.)	404.08	382.45
Wt. of Tare & DS (gm.)	342.99	324.16
Wt. of Tare (gm.)	106.15	137.07
Wt. of Water (gm.)	61.09	58.29
Wt. of DS (gm.)	236.84	187.09
Moisture Content (%)	**25.8**	**31.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	611.97	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	611.97	638.06
Length 1 (in.)	3.051	3.018
Length 2 (in.)	3.059	3.011
Length 3 (in.)	3.048	3.014
Top Diameter (in.)	2.848	2.870
Middle Diameter (in.)	2.842	2.858
Bottom Diameter (in.)	2.860	2.858
Average Length (in.)	3.05	3.01
Average Area (in.^{2})	6.38	6.43
Sample Volume (cm^3)	319.12	317.78
Unit Wet Wt. (gm./ cm^3)	1.918	2.008
Unit Wet Wt. (pcf)	119.7	125.3
Unit Dry Wt. (pcf)	95.2	95.6
Unit Dry Wt. (gm./ cm^3)	1.524	1.531
Void Ratio, e	0.771	0.764
Porosity, n	0.435	0.433
Pore Volume (cm^3)	138.9	137.6
Total Wt. Of Sample After Test		617.16

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-06 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A8-L2
Lab ID No.	2014-610-15-06		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.66
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.50
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/31/14	10	47	21	47.35	0.000	14.0	22.2	23.4	NA
5/31/14	10	50	35	50.58	3.233	13.9	22.0	23.4	1.6E-08
5/31/14	10	54	1	54.02	6.667	13.8	21.8	23.4	1.5E-08
5/31/14	10	57	13	57.22	9.867	13.7	21.7	23.4	1.7E-08
5/31/14	11	0	44	0.73	13.383	13.6	21.5	23.4	1.5E-08

Tested By: SFS Date: 5/30/14 Checked By: GEM Date: 6/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-15-06 Permometer.xls]Sheet1

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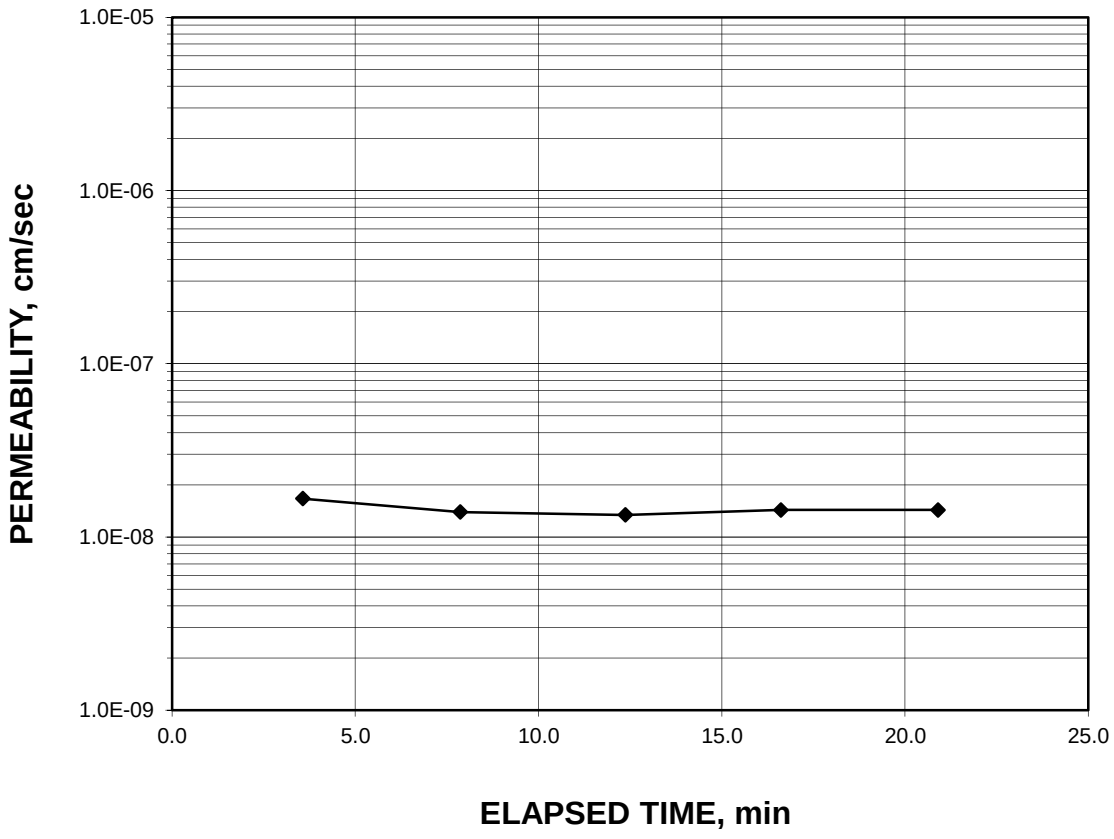
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A9-L2
Lab ID No.	2014-610-17-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION:5 S:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A9-L2
Lab ID No.	2014-610-17-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	6	827
Wt. of Tare & WS (gm.)	134.42	496.65
Wt. of Tare & DS (gm.)	112.07	427.12
Wt. of Tare (gm.)	36.83	139.29
Wt. of Water (gm.)	22.35	69.53
Wt. of DS (gm.)	75.24	287.83
Moisture Content (%)	**29.7**	**24.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	698.52	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	698.52	668.64
Length 1 (in.)	3.249	3.324
Length 2 (in.)	3.295	3.322
Length 3 (in.)	3.288	3.302
Top Diameter (in.)	2.845	2.885
Middle Diameter (in.)	2.847	2.863
Bottom Diameter (in.)	2.851	2.860
Average Length (in.)	3.28	3.32
Average Area (in.^{2})	6.37	6.47
Sample Volume (cm^3)	342.05	351.37
Unit Wet Wt. (gm./ cm^3)	2.042	1.903
Unit Wet Wt. (pcf)	127.5	118.8
Unit Dry Wt. (pcf)	98.3	95.7
Unit Dry Wt. (gm./ cm^3)	1.574	1.533
Void Ratio, e	0.715	0.762
Porosity, n	0.417	0.432
Pore Volume (cm^3)	142.6	151.9
Total Wt. Of Sample After Test		711.29

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A9-L2
Lab ID No.	2014-610-17-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	8.42
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.72
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/2/14	11	30	56	30.93	0.000	13.7	19.7	23.1	NA
6/2/14	11	34	30	34.50	3.567	13.6	19.5	23.1	1.7E-08
6/2/14	11	38	48	38.80	7.867	13.5	19.4	23.1	1.4E-08
6/2/14	11	43	18	43.30	12.367	13.4	19.2	23.1	1.3E-08
6/2/14	11	47	33	47.55	16.617	13.3	19.1	23.1	1.4E-08
6/2/14	11	51	50	51.83	20.900	13.2	18.9	23.1	1.4E-08

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-01 Permometer.xls]Sheet1

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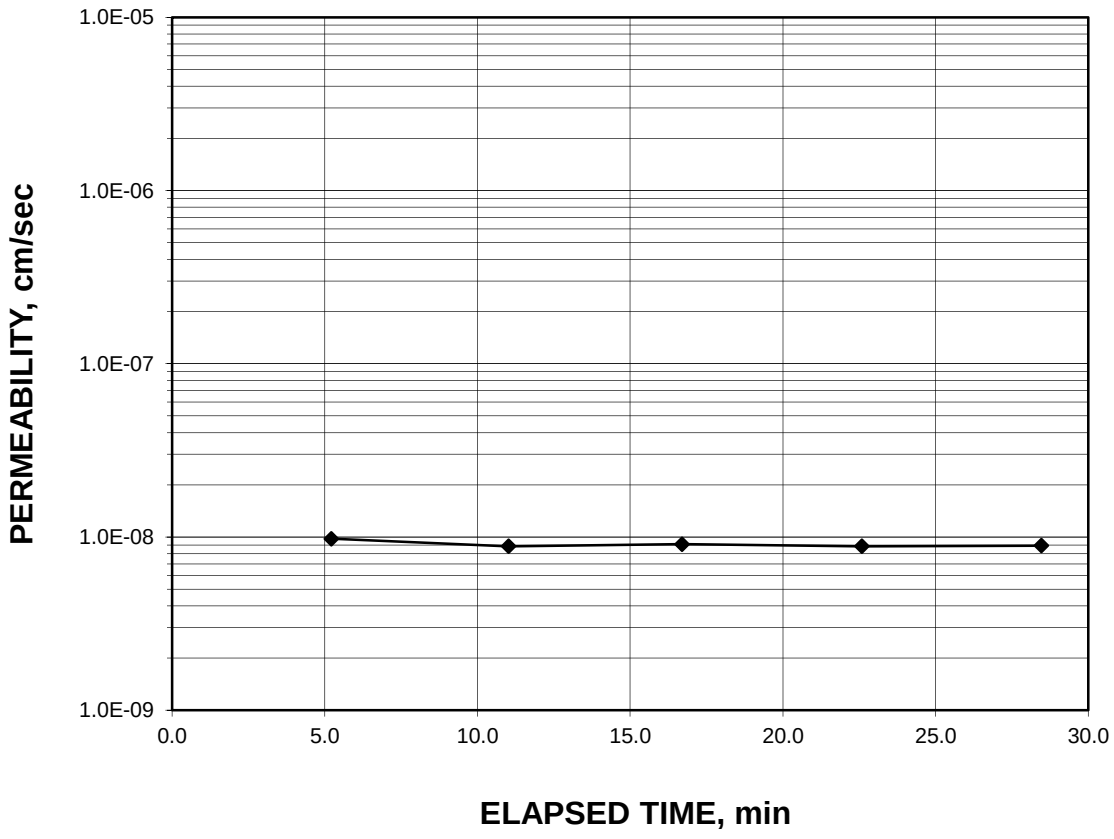
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A10-L2
Lab ID No.	2014-610-17-02		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 8.9E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 8.9E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION:5 I:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A10-L2
Lab ID No.	2014-610-17-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	117	806
Wt. of Tare & WS (gm.)	147.25	423.57
Wt. of Tare & DS (gm.)	124.16	354.6
Wt. of Tare (gm.)	37.76	100.56
Wt. of Water (gm.)	23.09	68.97
Wt. of DS (gm.)	86.40	254.04
Moisture Content (%)	**26.7**	**27.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	643.78	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	643.78	645.94
Length 1 (in.)	3.099	3.138
Length 2 (in.)	3.078	3.105
Length 3 (in.)	3.106	3.092
Top Diameter (in.)	2.853	2.860
Middle Diameter (in.)	2.838	2.854
Bottom Diameter (in.)	2.844	2.866
Average Length (in.)	3.09	3.11
Average Area (in.^{2})	6.36	6.42
Sample Volume (cm^3)	322.35	327.58
Unit Wet Wt. (gm./ cm^3)	1.997	1.972
Unit Wet Wt. (pcf)	124.7	123.1
Unit Dry Wt. (pcf)	98.4	96.8
Unit Dry Wt. (gm./ cm^3)	1.576	1.551
Void Ratio, e	0.713	0.741
Porosity, n	0.416	0.426
Pore Volume (cm^3)	134.2	139.4
Total Wt. Of Sample After Test		651.09

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 10
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A10-L2
Lab ID No.	2014-610-17-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.90
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.45
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 8.9E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 8.9E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/2/14	11	1	39	1.65	0.000	15.0	23.1	23.1	NA
6/2/14	11	6	52	6.87	5.217	14.9	23.0	23.1	9.8E-09
6/2/14	11	12	40	12.67	11.017	14.8	22.8	23.1	8.8E-09
6/2/14	11	18	21	18.35	16.700	14.7	22.6	23.1	9.1E-09
6/2/14	11	24	14	24.23	22.583	14.6	22.5	23.1	8.8E-09
6/2/14	11	30	7	30.12	28.467	14.5	22.3	23.1	8.9E-09

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-02 Permometer.xls]Sheet1

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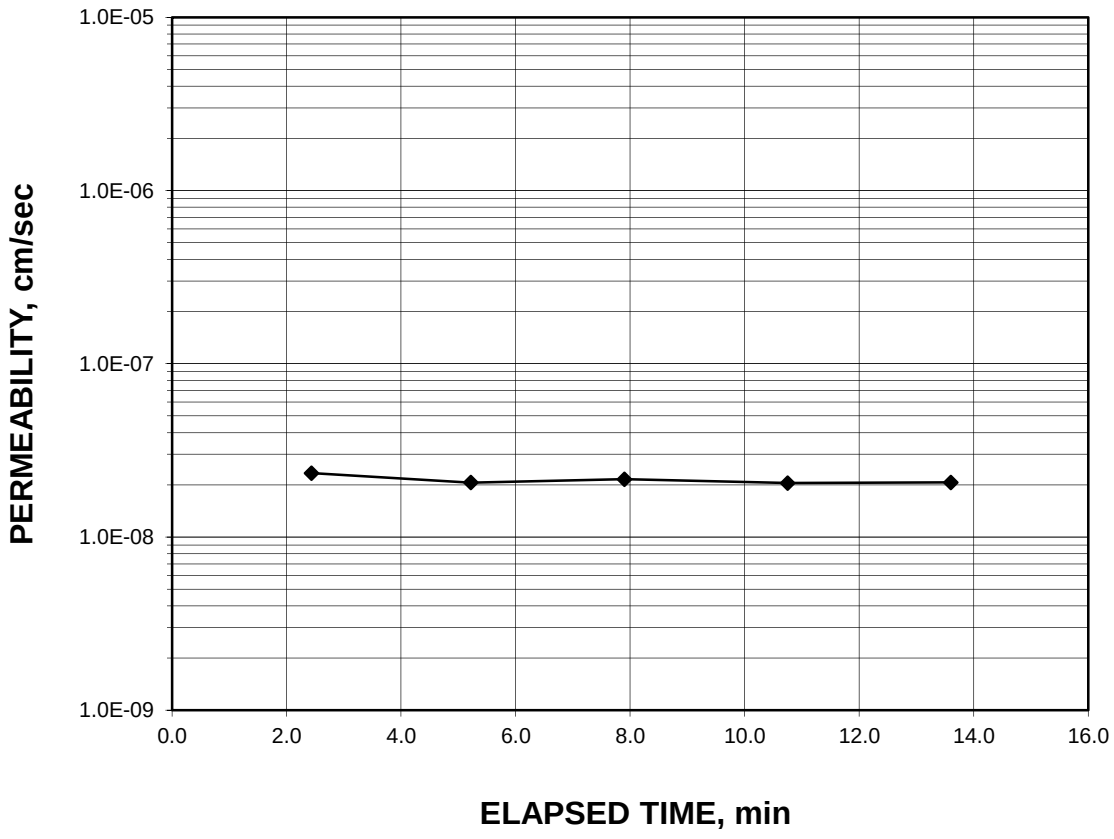
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A11-L2
Lab ID No.	2014-610-17-03		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A11-L2
Lab ID No.	2014-610-17-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	270	824
Wt. of Tare & WS (gm.)	190.17	463.19
Wt. of Tare & DS (gm.)	163.38	394.28
Wt. of Tare (gm.)	37.45	137.2
Wt. of Water (gm.)	26.79	68.91
Wt. of DS (gm.)	125.93	257.08
Moisture Content (%)	**21.3**	**26.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	614.46	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	614.46	642.48
Length 1 (in.)	2.947	2.957
Length 2 (in.)	2.943	2.934
Length 3 (in.)	2.944	2.948
Top Diameter (in.)	2.847	2.860
Middle Diameter (in.)	2.846	2.857
Bottom Diameter (in.)	2.852	2.857
Average Length (in.)	2.94	2.95
Average Area (in.^{2})	6.37	6.42
Sample Volume (cm^3)	307.47	309.74
Unit Wet Wt. (gm./ cm^3)	1.998	2.074
Unit Wet Wt. (pcf)	124.7	129.5
Unit Dry Wt. (pcf)	102.9	102.1
Unit Dry Wt. (gm./ cm^3)	1.648	1.636
Void Ratio, e	0.638	0.651
Porosity, n	0.390	0.394
Pore Volume (cm^3)	119.8	122.1
Total Wt. Of Sample After Test		624.70

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 11
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-17	Sample No.	ST-A11-L2
Lab ID No.	2014-610-17-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.48
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.39
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.1E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/2/14	10	39	34	39.57	0.000	12.9	20.8	23.1	NA
6/2/14	10	42	0	42.00	2.433	12.8	20.6	23.1	2.3E-08
6/2/14	10	44	47	44.78	5.217	12.7	20.4	23.1	2.1E-08
6/2/14	10	47	28	47.47	7.900	12.6	20.2	23.1	2.2E-08
6/2/14	10	50	19	50.32	10.750	12.5	20.1	23.1	2.0E-08
6/2/14	10	53	10	53.17	13.600	12.4	19.9	23.1	2.1E-08

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-03 Permometer.xls]Sheet1

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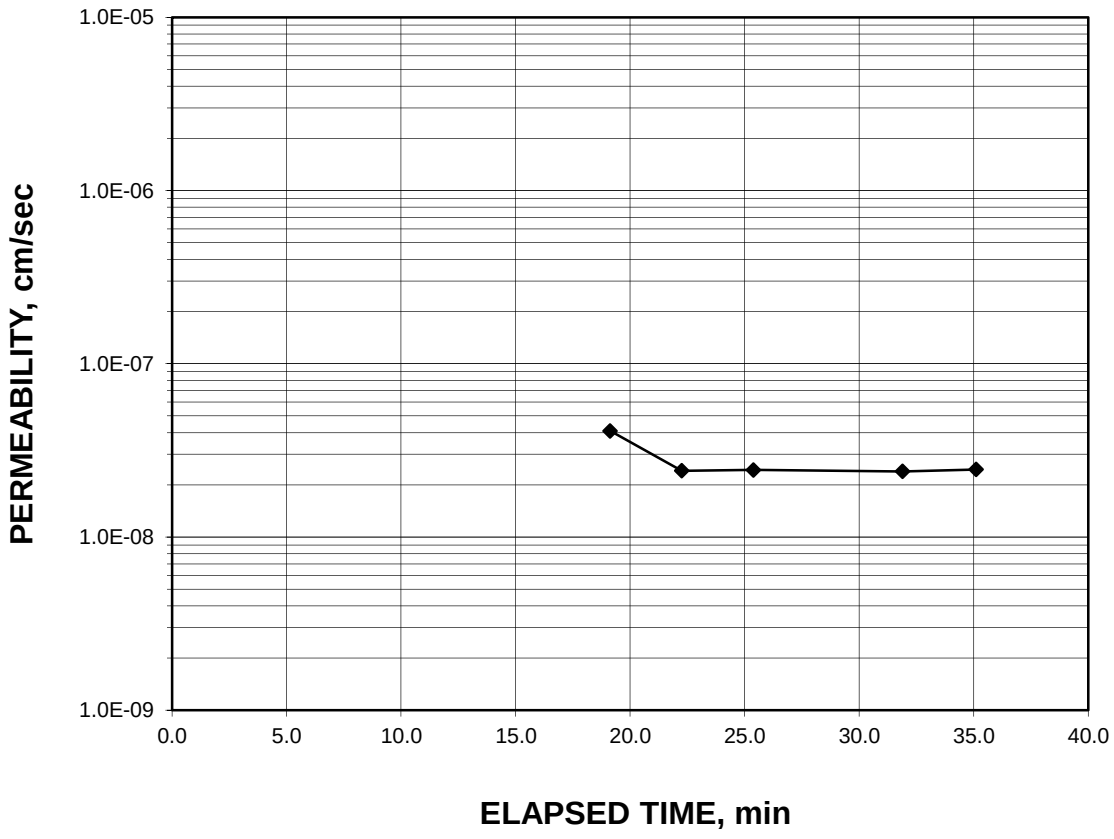
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A16-L2
Lab ID No.	2014-610-17-04		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION:5 S:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A16-L2
Lab ID No.	2014-610-17-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	807	805
Wt. of Tare & WS (gm.)	376.51	390.95
Wt. of Tare & DS (gm.)	327.84	331.8
Wt. of Tare (gm.)	105.23	104.57
Wt. of Water (gm.)	48.67	59.15
Wt. of DS (gm.)	222.61	227.23
Moisture Content (%)	**21.9**	**26.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	660.75	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	660.75	683.35
Length 1 (in.)	3.164	3.138
Length 2 (in.)	3.162	3.127
Length 3 (in.)	3.180	3.177
Top Diameter (in.)	2.851	2.883
Middle Diameter (in.)	2.849	2.872
Bottom Diameter (in.)	2.857	2.849
Average Length (in.)	3.17	3.15
Average Area (in.^{2})	6.39	6.46
Sample Volume (cm^3)	331.79	333.19
Unit Wet Wt. (gm./ cm^3)	1.991	2.051
Unit Wet Wt. (pcf)	124.3	128.0
Unit Dry Wt. (pcf)	102.0	101.6
Unit Dry Wt. (gm./ cm^3)	1.634	1.627
Void Ratio, e	0.652	0.659
Porosity, n	0.395	0.397
Pore Volume (cm^3)	131.0	132.4
Total Wt. Of Sample After Test		678.49

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-04 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 16
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A16-L2
Lab ID No.	2014-610-17-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.99
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.68
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/1/14	11	34	13	34.22	0.000	11.6	17.3	23.1	NA
6/1/14	11	53	20	53.33	19.117	10.5	15.5	23.1	4.1E-08
6/1/14	11	56	28	56.47	22.250	10.4	15.4	23.1	2.4E-08
6/1/14	11	59	36	59.60	25.383	10.3	15.2	23.1	2.4E-08
6/1/14	12	6	6	6.10	31.883	10.1	14.9	23.1	2.4E-08
6/1/14	12	9	19	9.32	35.100	10.0	14.7	23.1	2.5E-08

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-04 Permometer.xls]Sheet1

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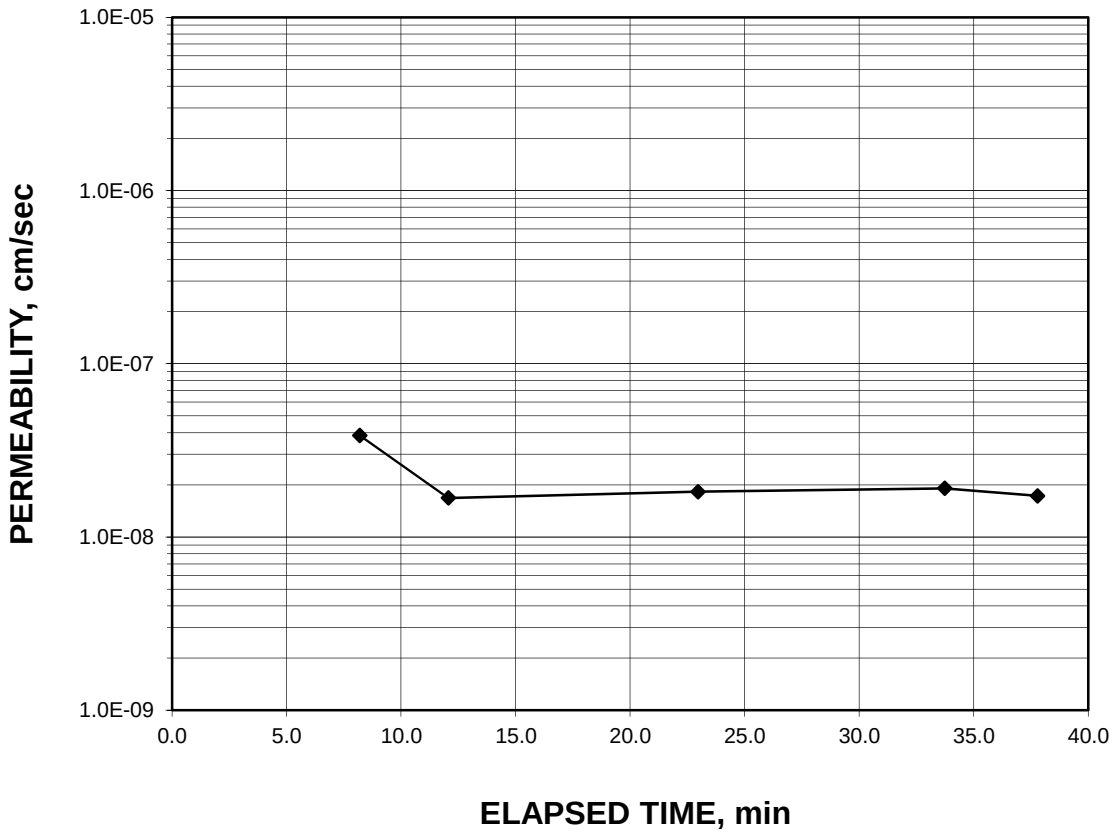
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A17-L2
Lab ID No.	2014-610-17-05		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION:5 S:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-05 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A17-L2
Lab ID No.	2014-610-17-05		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	809
Wt. of Tare & WS (gm.)	373.32	412.99
Wt. of Tare & DS (gm.)	324.99	354.15
Wt. of Tare (gm.)	112.50	112.42
Wt. of Water (gm.)	48.33	58.84
Wt. of DS (gm.)	212.49	241.73
Moisture Content (%)	**22.7**	**24.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	597.32	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	597.32	605.09
Length 1 (in.)	2.879	2.887
Length 2 (in.)	2.877	2.867
Length 3 (in.)	2.883	2.853
Top Diameter (in.)	2.860	2.866
Middle Diameter (in.)	2.853	2.879
Bottom Diameter (in.)	2.841	2.878
Average Length (in.)	2.88	2.87
Average Area (in.^{2})	6.39	6.49
Sample Volume (cm^3)	301.32	305.07
Unit Wet Wt. (gm./ cm^3)	1.982	1.983
Unit Wet Wt. (pcf)	123.7	123.8
Unit Dry Wt. (pcf)	100.8	99.6
Unit Dry Wt. (gm./ cm^3)	1.615	1.595
Void Ratio, e	0.672	0.693
Porosity, n	0.402	0.409
Pore Volume (cm^3)	121.1	124.8
Total Wt. Of Sample After Test		613.38

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 17
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A17-L2
Lab ID No.	2014-610-17-05		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.29
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.86
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/1/14	10	57	32	57.53	0.000	11.5	18.8	23.2	NA
6/1/14	11	5	44	5.73	8.200	11.0	17.9	23.2	3.8E-08
6/1/14	11	9	36	9.60	12.067	10.9	17.7	23.2	1.7E-08
6/1/14	11	20	30	20.50	22.967	10.6	17.2	23.2	1.8E-08
6/1/14	11	31	16	31.27	33.733	10.3	16.7	23.2	1.9E-08
6/1/14	11	35	19	35.32	37.783	10.2	16.5	23.2	1.7E-08

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-05 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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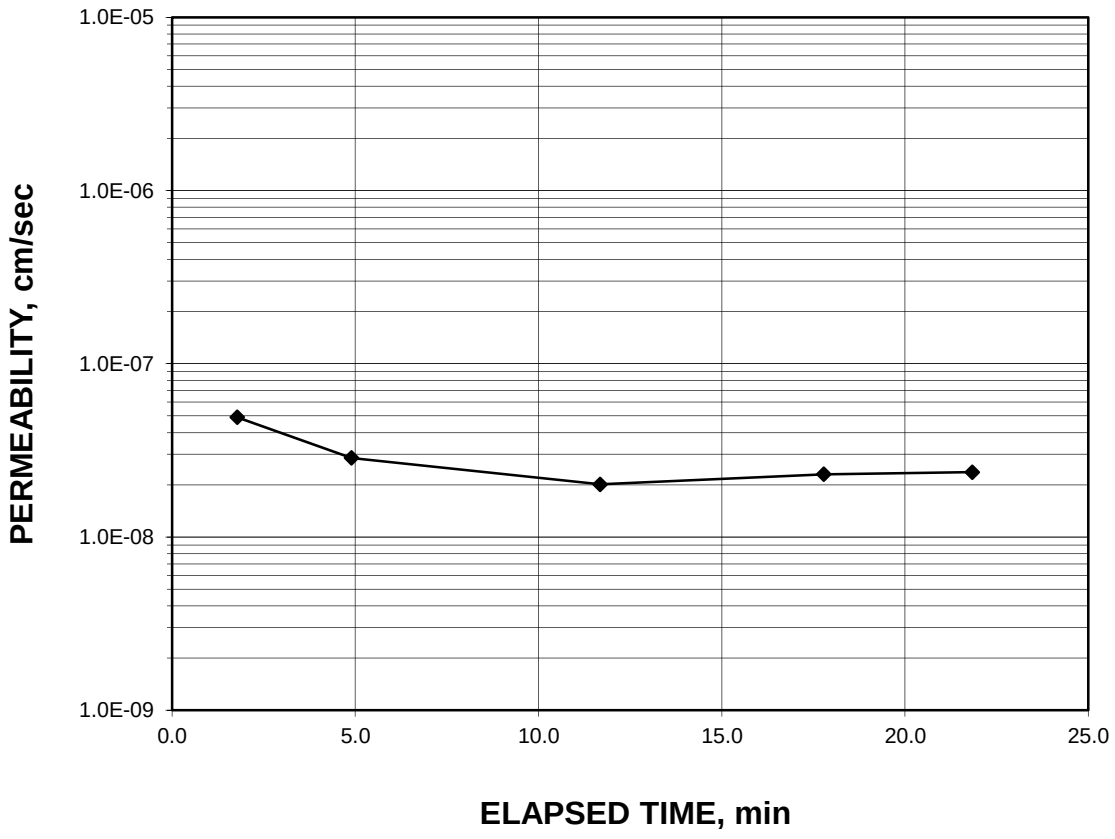
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A18-L2
Lab ID No.	2014-610-17-06		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A18-L2
Lab ID No.	2014-610-17-06		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	803	804
Wt. of Tare & WS (gm.)	372.83	322.14
Wt. of Tare & DS (gm.)	312.13	277.18
Wt. of Tare (gm.)	105.22	105.44
Wt. of Water (gm.)	60.70	44.96
Wt. of DS (gm.)	206.91	171.74
Moisture Content (%)	**29.3**	**26.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	464.02	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	464.02	452.69
Length 1 (in.)	2.252	2.239
Length 2 (in.)	2.243	2.273
Length 3 (in.)	2.241	2.265
Top Diameter (in.)	2.852	2.870
Middle Diameter (in.)	2.846	2.867
Bottom Diameter (in.)	2.851	2.850
Average Length (in.)	2.25	2.26
Average Area (in.^{2})	6.38	6.43
Sample Volume (cm^3)	234.67	238.20
Unit Wet Wt. (gm./ cm^3)	1.977	1.900
Unit Wet Wt. (pcf)	123.4	118.6
Unit Dry Wt. (pcf)	95.4	94.0
Unit Dry Wt. (gm./ cm^3)	1.529	1.506
Void Ratio, e	0.766	0.793
Porosity, n	0.434	0.442
Pore Volume (cm^3)	101.8	105.3
Total Wt. Of Sample After Test		472.99

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-06 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 18
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-15	Sample No.	ST-A18-L2
Lab ID No.	2014-610-17-06		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.74
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.51
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.4E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/1/14	10	35	31	35.52	0.000	12.8	26.9	23.3	NA
6/1/14	10	37	18	37.30	1.783	12.6	26.4	23.3	4.9E-08
6/1/14	10	40	25	40.42	4.900	12.4	25.9	23.3	2.9E-08
6/1/14	10	47	12	47.20	11.683	12.1	25.3	23.3	2.0E-08
6/1/14	10	53	18	53.30	17.783	11.8	24.6	23.3	2.3E-08
6/1/14	10	57	21	57.35	21.833	11.6	24.1	23.3	2.4E-08

Tested By: MPS Date: 6/1/14 Checked By: GEM Date: 6/3/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-17-06 Permometer.xls]Sheet1

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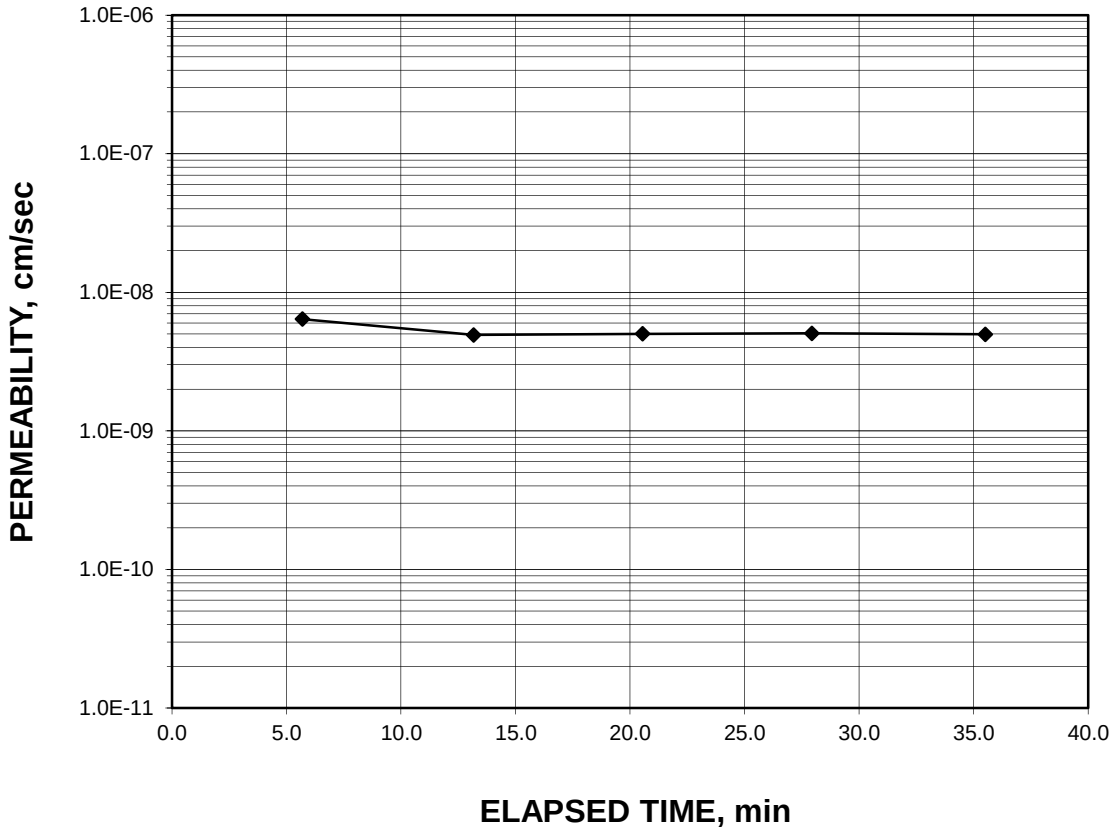
Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-20	Sample No.	ST-A19-L1
Lab ID No.	2014-610-20-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 5.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.0E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-20	Sample No.	ST-A19-L1
Lab ID No.	2014-610-20-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	243.48	302.58
Wt. of Tare & DS (gm.)	215.90	262.75
Wt. of Tare (gm.)	93.29	93.23
Wt. of Water (gm.)	27.58	39.83
Wt. of DS (gm.)	122.61	169.52
Moisture Content (%)	**22.5**	**23.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	418.77	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	418.77	422.19
Length 1 (in.)	2.015	2.023
Length 2 (in.)	2.015	2.023
Length 3 (in.)	2.032	1.968
Top Diameter (in.)	2.851	2.854
Middle Diameter (in.)	2.853	2.868
Bottom Diameter (in.)	2.838	2.855
Average Length (in.)	2.02	2.00
Average Area (in.^{2})	6.37	6.42
Sample Volume (cm^3)	210.84	210.89
Unit Wet Wt. (gm./ cm^3)	1.986	2.002
Unit Wet Wt. (pcf)	124.0	125.0
Unit Dry Wt. (pcf)	101.2	101.2
Unit Dry Wt. (gm./ cm^3)	1.621	1.621
Void Ratio, e	0.665	0.666
Porosity, n	0.399	0.400
Pore Volume (cm^3)	84.2	84.3
Total Wt. Of Sample After Test		425.01

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-20	Sample No.	ST-A19-L1
Lab ID No.	2014-610-20-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.09
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.42
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 5.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.0E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/7/14	15	28	0	28.00	0.000	13.5	32.1	23.5	NA
6/7/14	15	33	42	33.70	5.700	13.4	31.8	23.5	6.4E-09
6/7/14	15	41	10	41.17	13.167	13.3	31.5	23.5	4.9E-09
6/7/14	15	48	33	48.55	20.550	13.2	31.3	23.5	5.0E-09
6/7/14	15	55	56	55.93	27.933	13.1	31.0	23.5	5.1E-09
6/7/14	16	3	30	3.50	35.500	13.0	30.8	23.5	5.0E-09

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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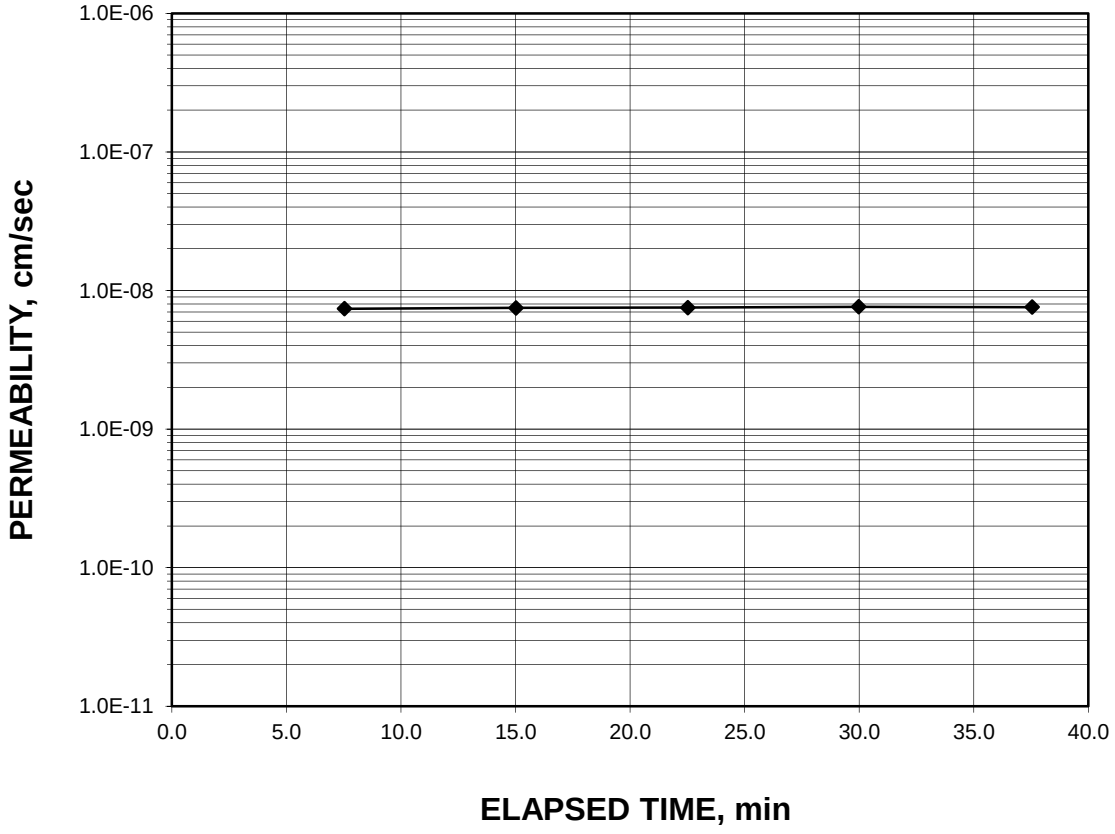
Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A19-L2
Lab ID No.	2014-610-20-02		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 7.6E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.6E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION:5 G:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A19-L2
Lab ID No.	2014-610-20-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	Y-11
Wt. of Tare & WS (gm.)	382.90	362.08
Wt. of Tare & DS (gm.)	331.63	315.95
Wt. of Tare (gm.)	93.75	93.74
Wt. of Water (gm.)	51.27	46.13
Wt. of DS (gm.)	237.88	222.21
Moisture Content (%)	**21.6**	**20.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	664.26	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	664.26	659.93
Length 1 (in.)	3.123	3.091
Length 2 (in.)	3.083	3.107
Length 3 (in.)	3.111	3.093
Top Diameter (in.)	2.841	2.812
Middle Diameter (in.)	2.841	2.853
Bottom Diameter (in.)	2.830	2.864
Average Length (in.)	3.11	3.10
Average Area (in.^{2})	6.32	6.35
Sample Volume (cm^3)	321.79	322.17
Unit Wet Wt. (gm./ cm^3)	2.064	2.048
Unit Wet Wt. (pcf)	128.9	127.9
Unit Dry Wt. (pcf)	106.0	105.9
Unit Dry Wt. (gm./ cm^3)	1.698	1.696
Void Ratio, e	0.590	0.592
Porosity, n	0.371	0.372
Pore Volume (cm^3)	119.4	119.8
Total Wt. Of Sample After Test		676.79

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 19
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A19-L2
Lab ID No.	2014-610-20-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.87
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.96
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 7.6E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.6E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/7/14	15	58	12	58.20	0.000	13.8	21.3	23.5	NA
6/7/14	16	5	44	5.73	7.533	13.7	21.1	23.5	7.4E-09
6/7/14	16	13	13	13.22	15.017	13.6	20.9	23.5	7.5E-09
6/7/14	16	20	43	20.72	22.517	13.5	20.8	23.5	7.5E-09
6/7/14	16	28	11	28.18	29.983	13.4	20.6	23.5	7.6E-09
6/7/14	16	35	45	35.75	37.550	13.3	20.4	23.5	7.6E-09

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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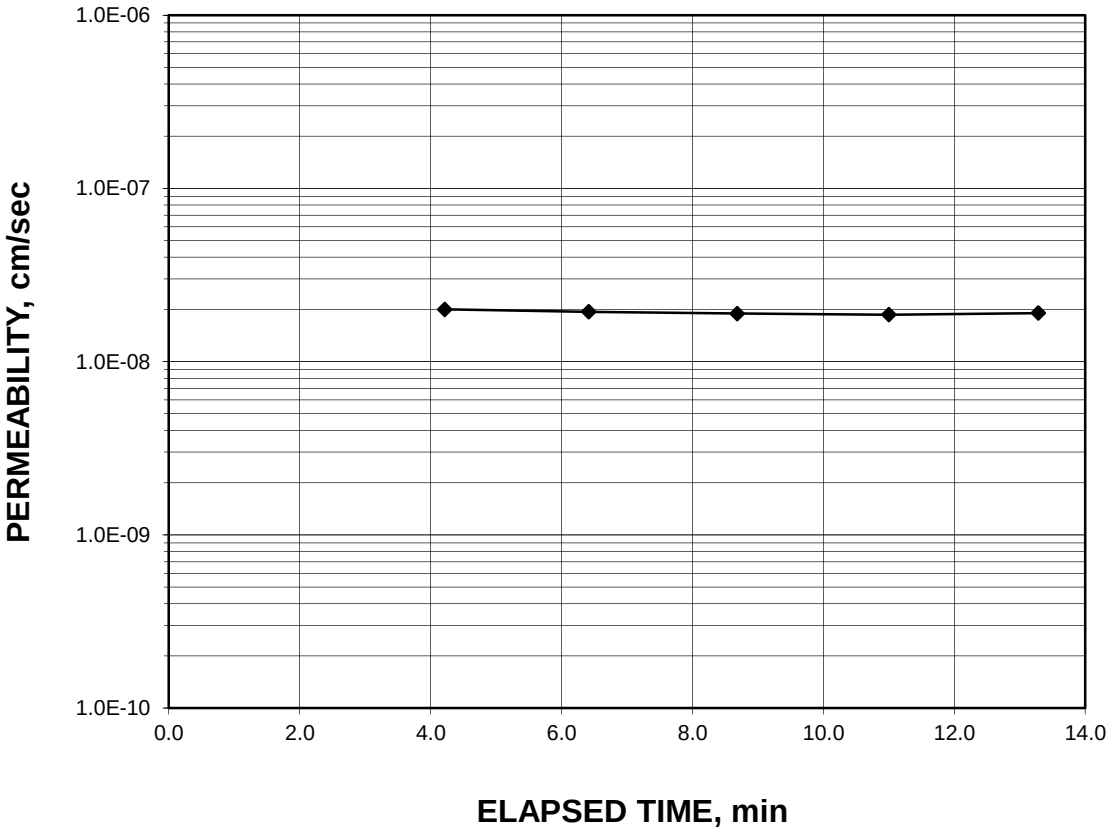
Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A12-L2
Lab ID No.	2014-610-20-03		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A12-L2
Lab ID No.	2014-610-20-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	809
Wt. of Tare & WS (gm.)	262.74	342.44
Wt. of Tare & DS (gm.)	234.88	293.27
Wt. of Tare (gm.)	112.33	112.28
Wt. of Water (gm.)	27.86	49.17
Wt. of DS (gm.)	122.55	180.99
Moisture Content (%)	**22.7**	**27.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	539.78	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	539.78	559.28
Length 1 (in.)	2.622	2.614
Length 2 (in.)	2.629	2.613
Length 3 (in.)	2.630	2.628
Top Diameter (in.)	2.860	2.860
Middle Diameter (in.)	2.866	2.847
Bottom Diameter (in.)	2.867	2.857
Average Length (in.)	2.63	2.62
Average Area (in.^{2})	6.44	6.40
Sample Volume (cm^3)	277.39	274.62
Unit Wet Wt. (gm./ cm^3)	1.946	2.037
Unit Wet Wt. (pcf)	121.5	127.1
Unit Dry Wt. (pcf)	99.0	100.0
Unit Dry Wt. (gm./ cm^3)	1.585	1.601
Void Ratio, e	0.703	0.686
Porosity, n	0.413	0.407
Pore Volume (cm^3)	114.5	111.7
Total Wt. Of Sample After Test		551.10

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 12
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A12-L2
Lab ID No.	2014-610-20-03		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	6.65
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.29
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	96	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/7/14	16	7	52	7.87	0.000	15.2	27.9	23.5	NA
6/7/14	16	12	5	12.08	4.217	15.0	27.5	23.5	2.0E-08
6/7/14	16	14	17	14.28	6.417	14.9	27.3	23.5	1.9E-08
6/7/14	16	16	33	16.55	8.683	14.8	27.1	23.5	1.9E-08
6/7/14	16	18	52	18.87	11.000	14.7	26.9	23.5	1.9E-08
6/7/14	16	21	9	21.15	13.283	14.6	26.7	23.5	1.9E-08

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
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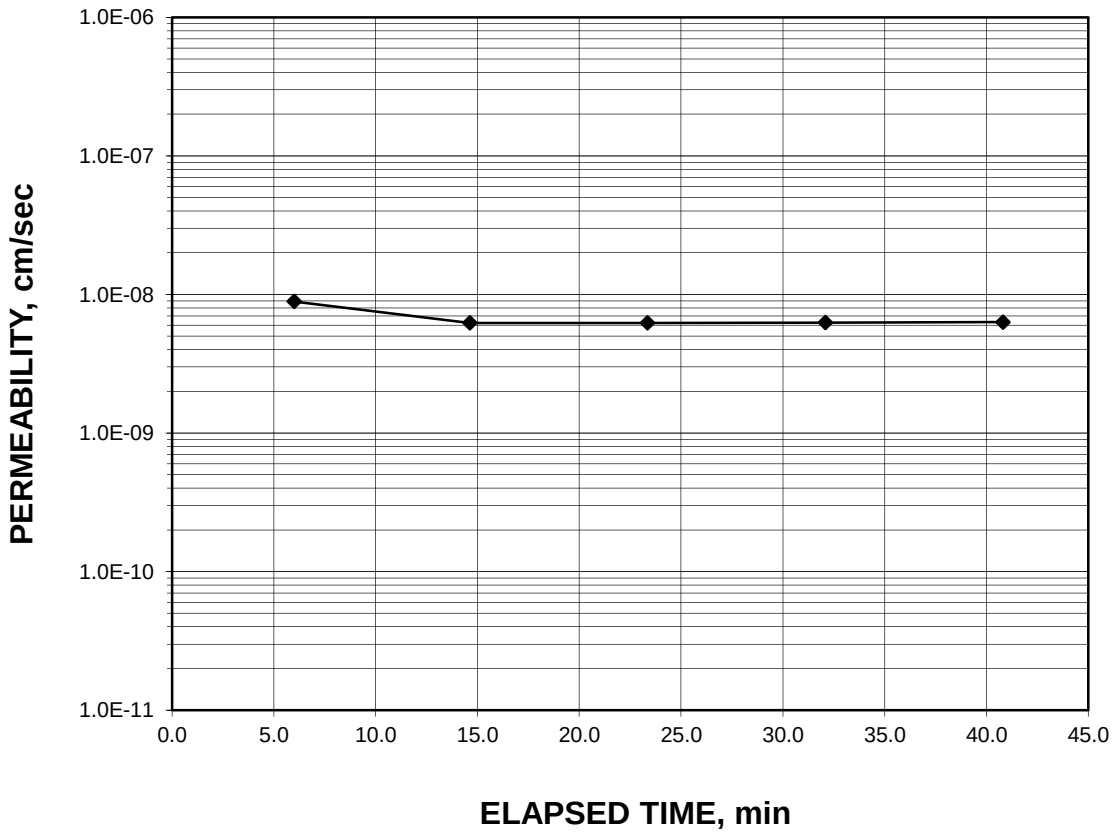
Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A13-L2
Lab ID No.	2014-610-20-04		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 6.3E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.3E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A13-L2
Lab ID No.	2014-610-20-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	801	813
Wt. of Tare & WS (gm.)	359.43	434.76
Wt. of Tare & DS (gm.)	312.24	368.11
Wt. of Tare (gm.)	100.21	111.07
Wt. of Water (gm.)	47.19	66.65
Wt. of DS (gm.)	212.03	257.04
Moisture Content (%)	**22.3**	**25.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	620.98	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	620.98	639.64
Length 1 (in.)	2.994	3.015
Length 2 (in.)	3.000	2.947
Length 3 (in.)	2.990	2.956
Top Diameter (in.)	2.851	2.868
Middle Diameter (in.)	2.850	2.866
Bottom Diameter (in.)	2.841	2.860
Average Length (in.)	2.99	2.97
Average Area (in.^{2})	6.37	6.45
Sample Volume (cm^3)	312.48	313.97
Unit Wet Wt. (gm./ cm^3)	1.987	2.037
Unit Wet Wt. (pcf)	124.1	127.2
Unit Dry Wt. (pcf)	101.5	101.0
Unit Dry Wt. (gm./ cm^3)	1.626	1.618
Void Ratio, e	0.661	0.669
Porosity, n	0.398	0.401
Pore Volume (cm^3)	124.4	125.8
Total Wt. Of Sample After Test		632.14

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-04 Permometer.xls]Sheet1

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PERMOMETER METHOD
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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 13
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A13-L2
Lab ID No.	2014-610-20-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.55
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.58
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	96	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.3E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.3E-11 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/7/14	16	37	7	37.12	0.000	13.6	21.8	23.5	NA
6/7/14	16	43	7	43.12	6.000	13.5	21.6	23.5	8.9E-09
6/7/14	16	51	45	51.75	14.633	13.4	21.4	23.5	6.2E-09
6/7/14	17	0	28	0.47	23.350	13.3	21.3	23.5	6.2E-09
6/7/14	17	9	12	9.20	32.083	13.2	21.1	23.5	6.3E-09
6/7/14	17	17	56	17.93	40.817	13.1	20.9	23.5	6.3E-09

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-04 Permometer.xls]Sheet1

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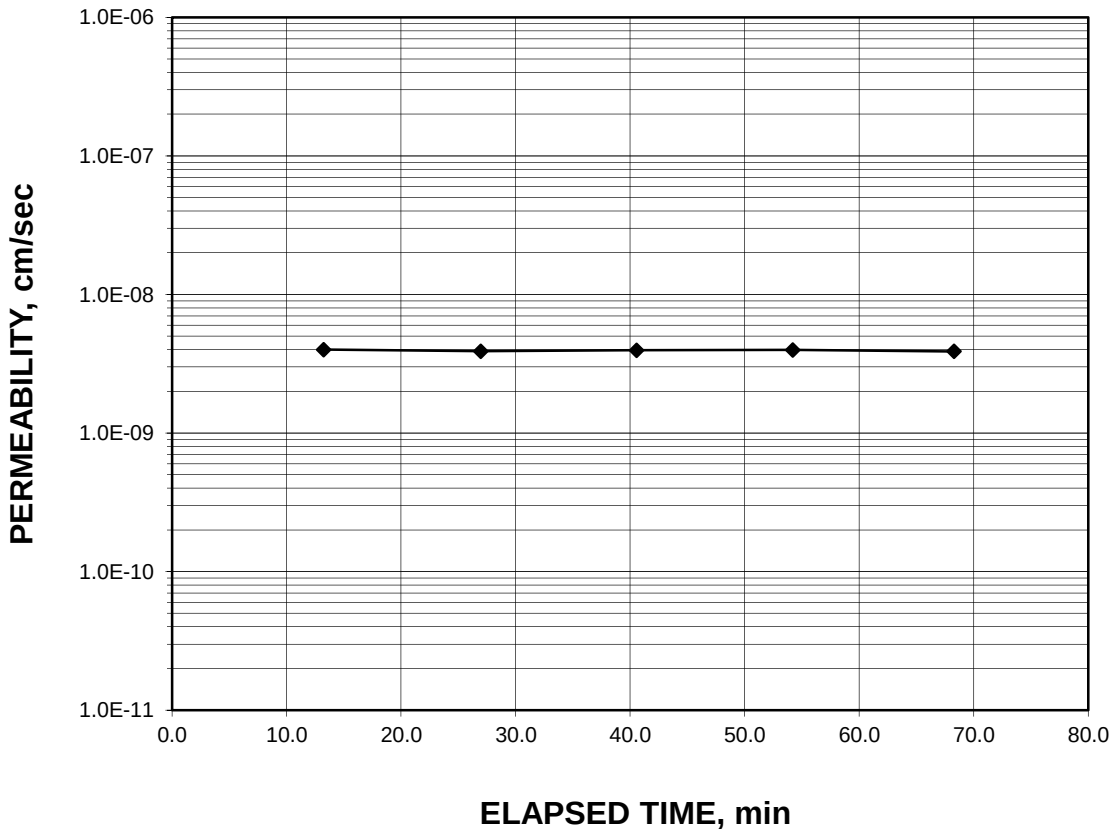
Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A14-L2
Lab ID No.	2014-610-20-05		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.9E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.9E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A14-L2
Lab ID No.	2014-610-20-05		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	813	801
Wt. of Tare & WS (gm.)	497.47	430.66
Wt. of Tare & DS (gm.)	413.71	362.69
Wt. of Tare (gm.)	111.13	100.2
Wt. of Water (gm.)	83.76	67.97
Wt. of DS (gm.)	302.58	262.49
Moisture Content (%)	**27.7**	**25.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	622.89	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	622.89	614.17
Length 1 (in.)	2.991	2.999
Length 2 (in.)	2.997	2.981
Length 3 (in.)	3.014	2.998
Top Diameter (in.)	2.851	2.861
Middle Diameter (in.)	2.848	2.851
Bottom Diameter (in.)	2.849	2.845
Average Length (in.)	3.00	2.99
Average Area (in.^{2})	6.38	6.39
Sample Volume (cm^3)	313.54	313.36
Unit Wet Wt. (gm./ cm^3)	1.987	1.960
Unit Wet Wt. (pcf)	124.0	122.3
Unit Dry Wt. (pcf)	97.1	97.2
Unit Dry Wt. (gm./ cm^3)	1.556	1.557
Void Ratio, e	0.735	0.734
Porosity, n	0.424	0.423
Pore Volume (cm^3)	132.9	132.7
Total Wt. Of Sample After Test		631.10

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-05 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	ACRE 14
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-20	Sample No.	ST-A14-L2
Lab ID No.	2014-610-20-05		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.60
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.22
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.9E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.9E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/7/14	15	41	35	41.58	0.000	13.9	22.2	23.5	NA
6/7/14	15	54	50	54.83	13.250	13.8	22.0	23.5	4.0E-09
6/7/14	16	8	33	8.55	26.967	13.7	21.8	23.5	3.9E-09
6/7/14	16	22	8	22.13	40.550	13.6	21.6	23.5	4.0E-09
6/7/14	16	35	46	35.77	54.183	13.5	21.5	23.5	4.0E-09
6/7/14	16	49	51	49.85	68.267	13.4	21.3	23.5	3.9E-09

Tested By: SFS Date: 6/6/14 Checked By: GEM Date: 6/10/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-20-05 Permometer.xls]Sheet1

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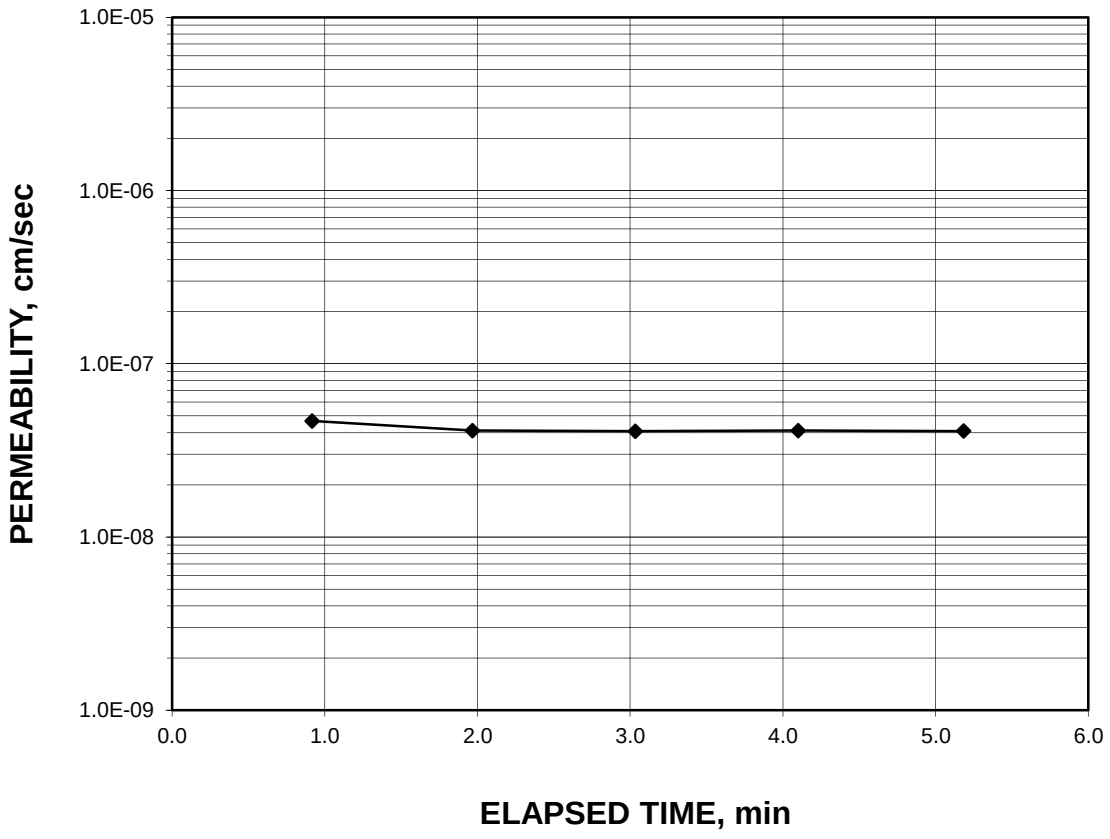
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A21-L1
Lab ID No.	2014-610-21-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 4.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A21-L1
Lab ID No.	2014-610-21-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	311.81	285.11
Wt. of Tare & DS (gm.)	265.99	244.02
Wt. of Tare (gm.)	93.25	93.15
Wt. of Water (gm.)	45.82	41.09
Wt. of DS (gm.)	172.74	150.87
Moisture Content (%)	**26.5**	**27.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	490.23	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	490.23	492.98
Length 1 (in.)	2.332	2.341
Length 2 (in.)	2.342	2.327
Length 3 (in.)	2.348	2.338
Top Diameter (in.)	2.865	2.852
Middle Diameter (in.)	2.849	2.861
Bottom Diameter (in.)	2.849	2.869
Average Length (in.)	2.34	2.34
Average Area (in.^{2})	6.40	6.43
Sample Volume (cm^3)	245.44	245.97
Unit Wet Wt. (gm./ cm^3)	1.997	2.004
Unit Wet Wt. (pcf)	124.7	125.1
Unit Dry Wt. (pcf)	98.5	98.3
Unit Dry Wt. (gm./ cm^3)	1.579	1.575
Void Ratio, e	0.710	0.714
Porosity, n	0.415	0.417
Pore Volume (cm^3)	101.9	102.5
Total Wt. Of Sample After Test		498.31

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A21-L1
Lab ID No.	2014-610-21-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.93
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.47
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 4.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.1E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/11/14	16	19	28	19.47	0.000	13.1	26.6	24.5	NA
6/11/14	16	20	23	20.38	0.917	13.0	26.4	24.5	4.7E-08
6/11/14	16	21	26	21.43	1.967	12.9	26.2	24.5	4.1E-08
6/11/14	16	22	30	22.50	3.033	12.8	26.0	24.5	4.1E-08
6/11/14	16	23	34	23.57	4.100	12.7	25.8	24.5	4.1E-08
6/11/14	16	24	39	24.65	5.183	12.6	25.5	24.5	4.1E-08

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-01 Permometer.xls]Sheet1

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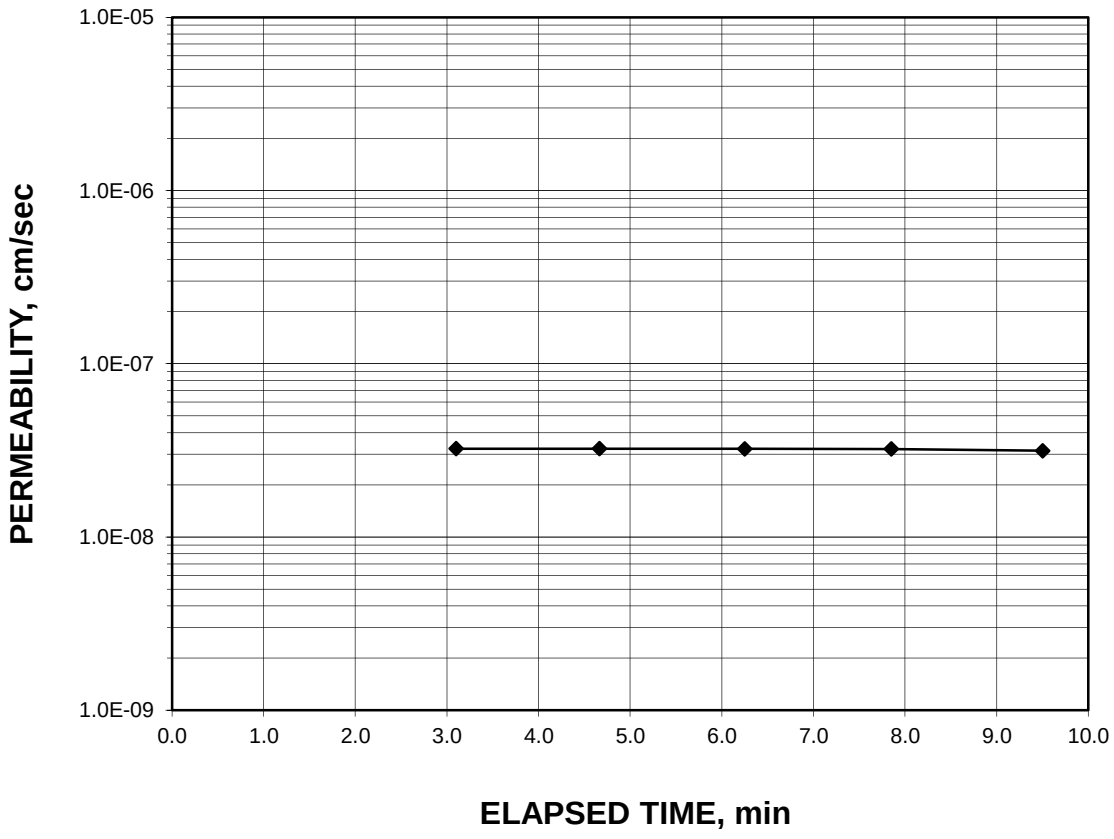
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A22-L1
Lab ID No.	2014-610-21-02		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A22-L1
Lab ID No.	2014-610-21-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	Y-11
Wt. of Tare & WS (gm.)	351.11	402.46
Wt. of Tare & DS (gm.)	299.92	329.7
Wt. of Tare (gm.)	112.27	93.71
Wt. of Water (gm.)	51.19	72.76
Wt. of DS (gm.)	187.65	235.99
Moisture Content (%)	**27.3**	**30.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	578.54	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	578.54	594.69
Length 1 (in.)	2.870	2.889
Length 2 (in.)	2.894	2.869
Length 3 (in.)	2.876	2.861
Top Diameter (in.)	2.838	2.858
Middle Diameter (in.)	2.837	2.851
Bottom Diameter (in.)	2.835	2.869
Average Length (in.)	2.88	2.87
Average Area (in.^{2})	6.32	6.42
Sample Volume (cm^3)	298.26	302.31
Unit Wet Wt. (gm./ cm^3)	1.940	1.967
Unit Wet Wt. (pcf)	121.1	122.8
Unit Dry Wt. (pcf)	95.1	93.9
Unit Dry Wt. (gm./ cm^3)	1.524	1.504
Void Ratio, e	0.772	0.796
Porosity, n	0.436	0.443
Pore Volume (cm^3)	129.9	134.0
Total Wt. Of Sample After Test		588.71

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-02 Permometer.xls]Sheet1

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PERMOMETER METHOD

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-21	Sample No.	ST-A22-L1
Lab ID No.	2014-610-21-02		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.30
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.43
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.2E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.2E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/11/14	16	29	8	29.13	0.000	13.8	22.9	24.4	NA
6/11/14	16	32	14	32.23	3.100	13.6	22.5	24.4	3.2E-08
6/11/14	16	33	48	33.80	4.667	13.5	22.4	24.4	3.2E-08
6/11/14	16	35	23	35.38	6.250	13.4	22.2	24.4	3.2E-08
6/11/14	16	36	59	36.98	7.850	13.3	22.0	24.4	3.2E-08
6/11/14	16	38	38	38.63	9.500	13.2	21.8	24.4	3.1E-08

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-02 Permometer.xls]Sheet1

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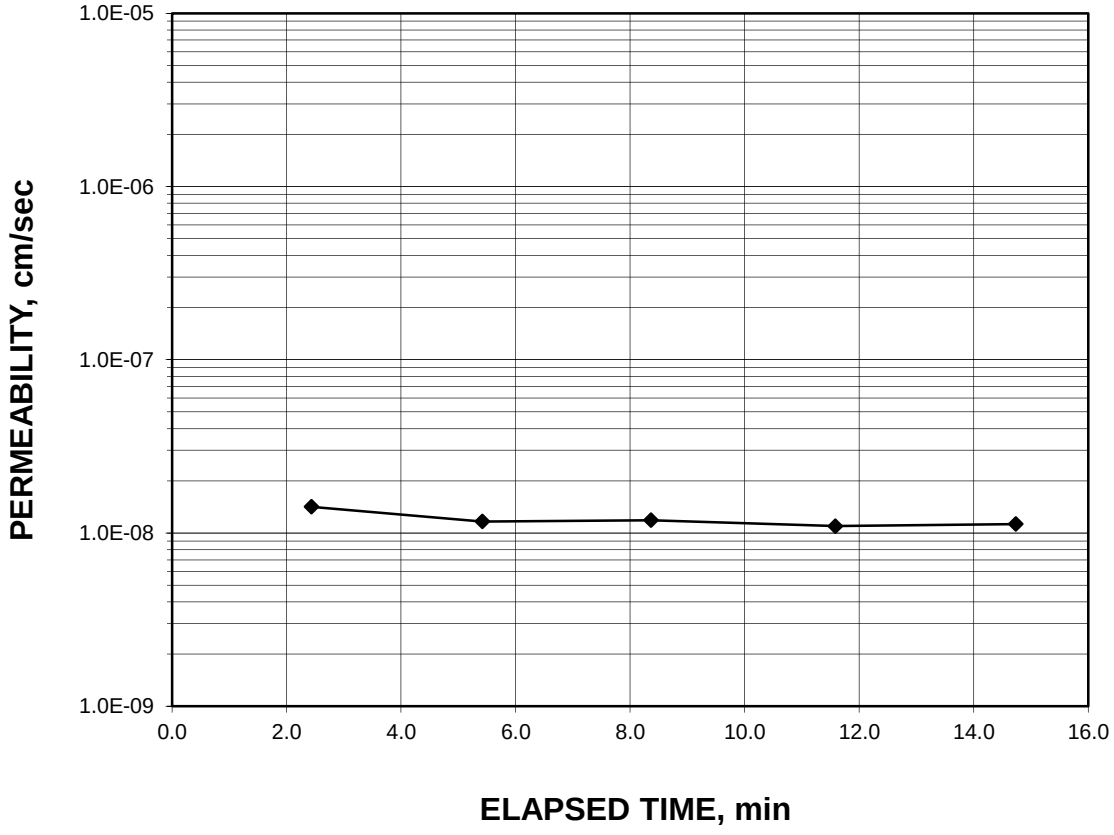
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A21-L2
Lab ID No.	2014-610-21-03		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A21-L2
Lab ID No.	2014-610-21-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	813	813
Wt. of Tare & WS (gm.)	332.27	321.34
Wt. of Tare & DS (gm.)	286.63	275.53
Wt. of Tare (gm.)	111.09	111.1
Wt. of Water (gm.)	45.64	45.81
Wt. of DS (gm.)	175.54	164.43
Moisture Content (%)	**26.0**	**27.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	432.84	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	432.84	439.23
Length 1 (in.)	2.174	2.135
Length 2 (in.)	2.169	2.142
Length 3 (in.)	2.157	2.132
Top Diameter (in.)	2.841	2.833
Middle Diameter (in.)	2.844	2.832
Bottom Diameter (in.)	2.848	2.842
Average Length (in.)	2.17	2.14
Average Area (in.^{2})	6.35	6.32
Sample Volume (cm^3)	225.60	221.09
Unit Wet Wt. (gm./ cm^3)	1.919	1.987
Unit Wet Wt. (pcf)	119.8	124.0
Unit Dry Wt. (pcf)	95.0	97.0
Unit Dry Wt. (gm./ cm^3)	1.523	1.554
Void Ratio, e	0.773	0.738
Porosity, n	0.436	0.425
Pore Volume (cm^3)	98.4	93.9
Total Wt. Of Sample After Test		434.58

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-03 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 21
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A21-L2
Lab ID No.	2014-610-21-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.43
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.74
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/11/14	16	38	36	38.60	0.000	15.0	33.7	24.4	NA
6/11/14	16	41	2	41.03	2.433	14.9	33.5	24.4	1.4E-08
6/11/14	16	44	1	44.02	5.417	14.8	33.2	24.4	1.2E-08
6/11/14	16	46	58	46.97	8.367	14.7	33.0	24.4	1.2E-08
6/11/14	16	50	11	50.18	11.583	14.6	32.7	24.4	1.1E-08
6/11/14	16	53	20	53.33	14.733	14.5	32.5	24.4	1.1E-08

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-03 Permometer.xls]Sheet1

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PERMOMETER METHOD
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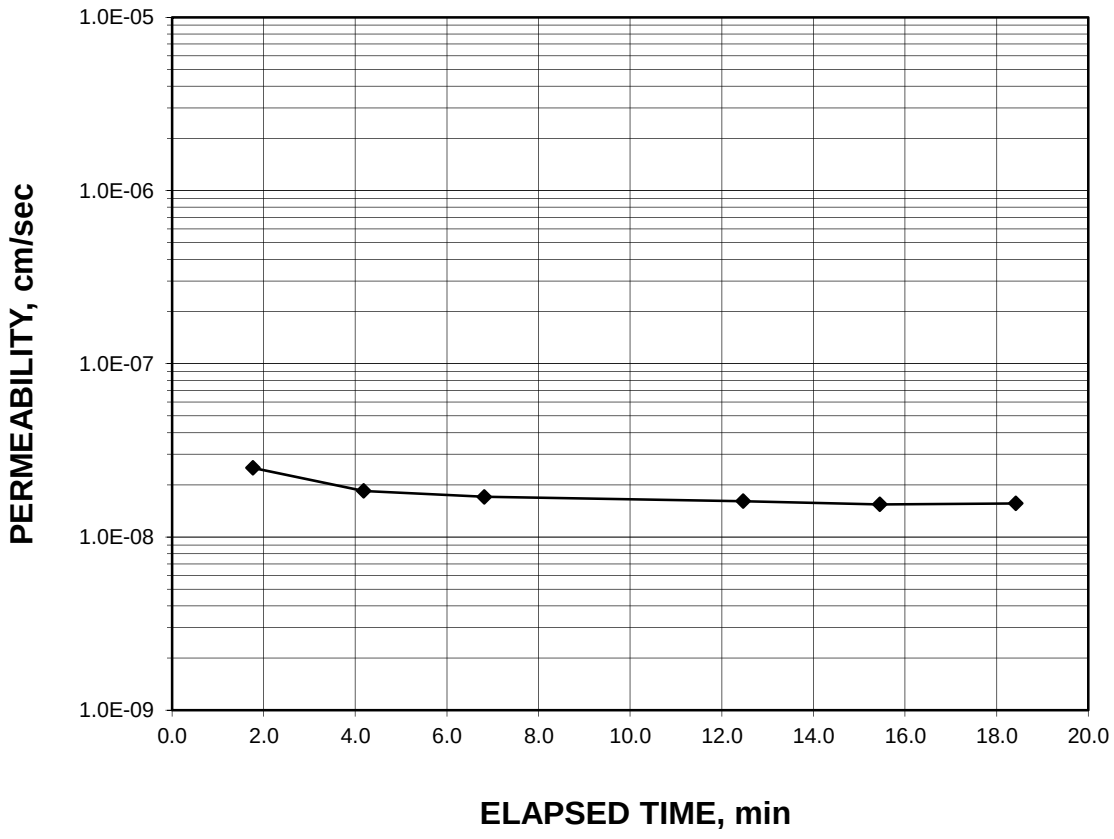
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A22-L2
Lab ID No.	2014-610-21-04		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



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PERMOMETER METHOD
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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A22-L2
Lab ID No.	2014-610-21-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	814	812
Wt. of Tare & WS (gm.)	420.37	342.31
Wt. of Tare & DS (gm.)	354.17	290.79
Wt. of Tare (gm.)	111.10	106.89
Wt. of Water (gm.)	66.20	51.52
Wt. of DS (gm.)	243.07	183.90
Moisture Content (%)	**27.2**	**28.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	539.74	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	539.74	543.05
Length 1 (in.)	2.628	2.624
Length 2 (in.)	2.648	2.604
Length 3 (in.)	2.656	2.661
Top Diameter (in.)	2.852	2.837
Middle Diameter (in.)	2.846	2.860
Bottom Diameter (in.)	2.848	2.863
Average Length (in.)	2.64	2.63
Average Area (in.^{2})	6.37	6.39
Sample Volume (cm^3)	276.14	275.55
Unit Wet Wt. (gm./ cm^3)	1.955	1.971
Unit Wet Wt. (pcf)	122.0	123.0
Unit Dry Wt. (pcf)	95.9	96.1
Unit Dry Wt. (gm./ cm^3)	1.536	1.540
Void Ratio, e	0.758	0.754
Porosity, n	0.431	0.430
Pore Volume (cm^3)	119.0	118.4
Total Wt. Of Sample After Test		547.20

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-04 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 22
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-21	Sample No.	ST-A22-L2
Lab ID No.	2014-610-21-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	6.68
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.25
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/11/14	16	49	2	49.03	0.000	14.3	26.0	24.3	NA
6/11/14	16	50	48	50.80	1.767	14.2	25.8	24.3	2.5E-08
6/11/14	16	53	13	53.22	4.183	14.1	25.6	24.3	1.8E-08
6/11/14	16	55	51	55.85	6.817	14.0	25.4	24.3	1.7E-08
6/11/14	17	1	30	1.50	12.467	13.8	25.0	24.3	1.6E-08
6/11/14	17	4	29	4.48	15.450	13.7	24.8	24.3	1.5E-08
6/11/14	17	7	27	7.45	18.417	13.6	24.6	24.3	1.6E-08

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-21-04 Permometer.xls]Sheet1

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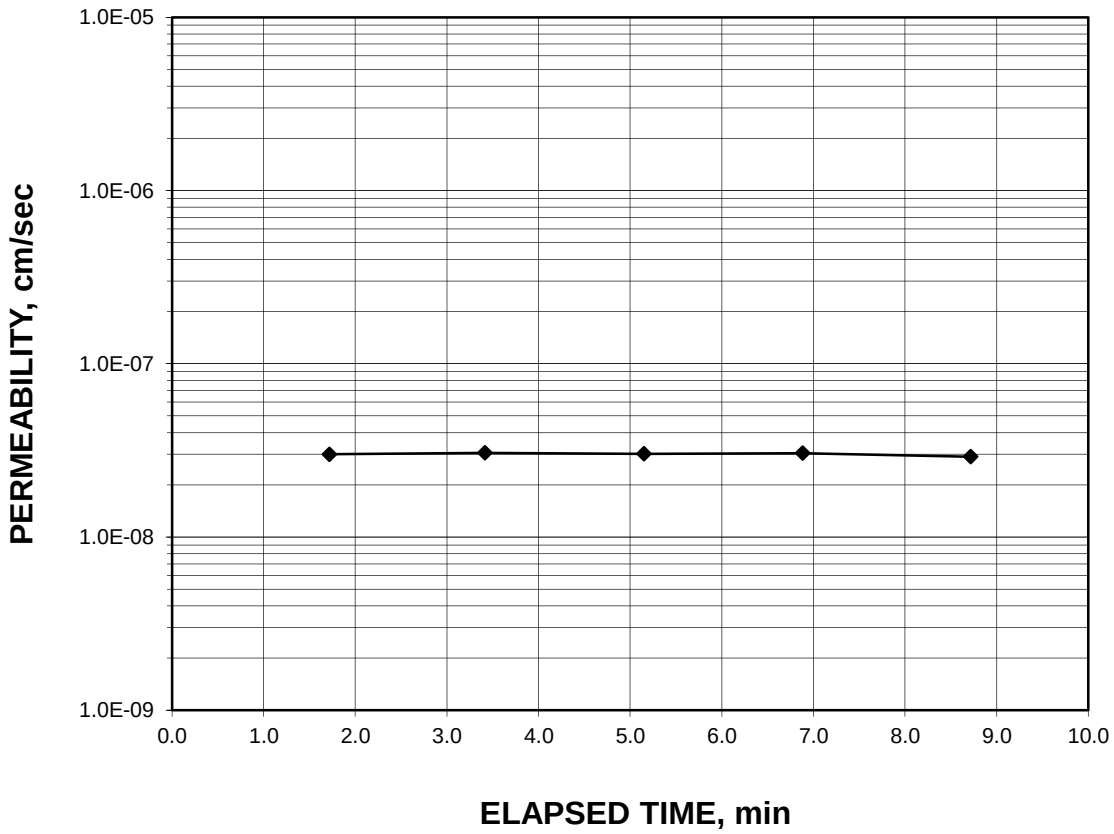
FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-22	Sample No.	ST-A20 -L1
Lab ID No.	2014-610-22-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.0E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.0E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/13/14 Checked By: GEM Date: 6/17/14

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FLEXIBLE WALL PERMEABILITY TEST
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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-22	Sample No.	ST-A20 -L1
Lab ID No.	2014-610-22-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	A-5
Wt. of Tare & WS (gm.)	285.99	387.35
Wt. of Tare & DS (gm.)	252.04	330.75
Wt. of Tare (gm.)	93.11	93.07
Wt. of Water (gm.)	33.95	56.60
Wt. of DS (gm.)	158.93	237.68
Moisture Content (%)	**21.4**	**23.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	618.89	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	618.89	631.39
Length 1 (in.)	2.907	2.890
Length 2 (in.)	2.919	2.890
Length 3 (in.)	2.913	2.916
Top Diameter (in.)	2.800	2.860
Middle Diameter (in.)	2.854	2.864
Bottom Diameter (in.)	2.843	2.865
Average Length (in.)	2.91	2.90
Average Area (in.^{2})	6.30	6.44
Sample Volume (cm^3)	300.76	305.80
Unit Wet Wt. (gm./ cm^3)	2.058	2.065
Unit Wet Wt. (pcf)	128.4	128.9
Unit Dry Wt. (pcf)	105.8	104.1
Unit Dry Wt. (gm./ cm^3)	1.696	1.668
Void Ratio, e	0.592	0.619
Porosity, n	0.372	0.382
Pore Volume (cm^3)	111.9	116.9
Total Wt. Of Sample After Test		629.05

Tested By: SFS Date: 6/13/14 Checked By: GEM Date: 6/17/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-22-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-22	Sample No.	ST-A20 -L1
Lab ID No.	2014-610-22-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.36
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.53
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.0E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.0E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/13/14	15	42	22	42.37	0.000	13.7	22.5	23.6	NA
6/13/14	15	44	5	44.08	1.717	13.6	22.3	23.6	3.0E-08
6/13/14	15	45	47	45.78	3.417	13.5	22.2	23.6	3.1E-08
6/13/14	15	47	31	47.52	5.150	13.4	22.0	23.6	3.0E-08
6/13/14	15	49	15	49.25	6.883	13.3	21.8	23.6	3.0E-08
6/13/14	15	51	5	51.08	8.717	13.2	21.6	23.6	2.9E-08

Tested By: SFS Date: 6/13/14 Checked By: GEM Date: 6/17/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-22-01 Permometer.xls]Sheet1

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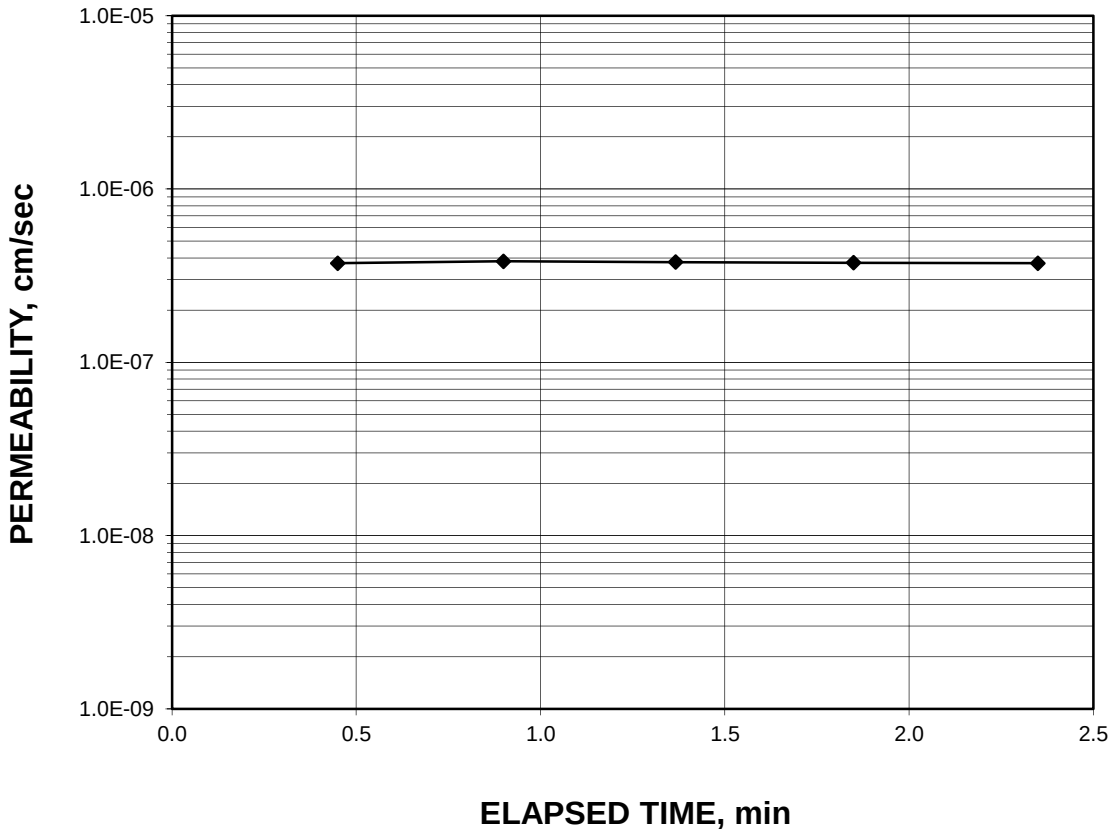
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A15-L2
Lab ID No.	2014-610-24-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

DCN: CT-22A DATE:2-2-10 REVISION:5 S:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-24-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A15-L2
Lab ID No.	2014-610-24-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	A-5
Wt. of Tare & WS (gm.)	270.21	306.53
Wt. of Tare & DS (gm.)	243.19	259.05
Wt. of Tare (gm.)	93.83	93
Wt. of Water (gm.)	27.02	47.48
Wt. of DS (gm.)	149.36	166.05
Moisture Content (%)	**18.1**	**28.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	573.55	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	573.55	624.56
Length 1 (in.)	2.951	2.976
Length 2 (in.)	2.932	2.983
Length 3 (in.)	2.961	2.999
Top Diameter (in.)	2.865	2.924
Middle Diameter (in.)	2.858	2.823
Bottom Diameter (in.)	2.853	2.823
Average Length (in.)	2.95	2.99
Average Area (in.^{2})	6.42	6.41
Sample Volume (cm^3)	310.06	313.62
Unit Wet Wt. (gm./ cm^3)	1.850	1.991
Unit Wet Wt. (pcf)	115.5	124.3
Unit Dry Wt. (pcf)	97.8	96.7
Unit Dry Wt. (gm./ cm^3)	1.566	1.549
Void Ratio, e	0.724	0.743
Porosity, n	0.420	0.426
Pore Volume (cm^3)	130.2	133.7
Total Wt. Of Sample After Test		620.59

Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-24-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A15-L2
Lab ID No.	2014-610-24-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.58
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.35
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.1

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/18/14	11	39	1	39.02	0.000	9.2	13.9	23.9	NA
6/18/14	11	39	28	39.47	0.450	9.0	13.6	23.9	3.7E-07
6/18/14	11	39	55	39.92	0.900	8.8	13.3	23.9	3.8E-07
6/18/14	11	40	23	40.38	1.367	8.6	12.9	23.9	3.8E-07
6/18/14	11	40	52	40.87	1.850	8.4	12.6	23.9	3.8E-07
6/18/14	11	41	22	41.37	2.350	8.2	12.2	23.9	3.7E-07

Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-24-01 Permometer.xls]Sheet1

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PERMOMETER METHOD
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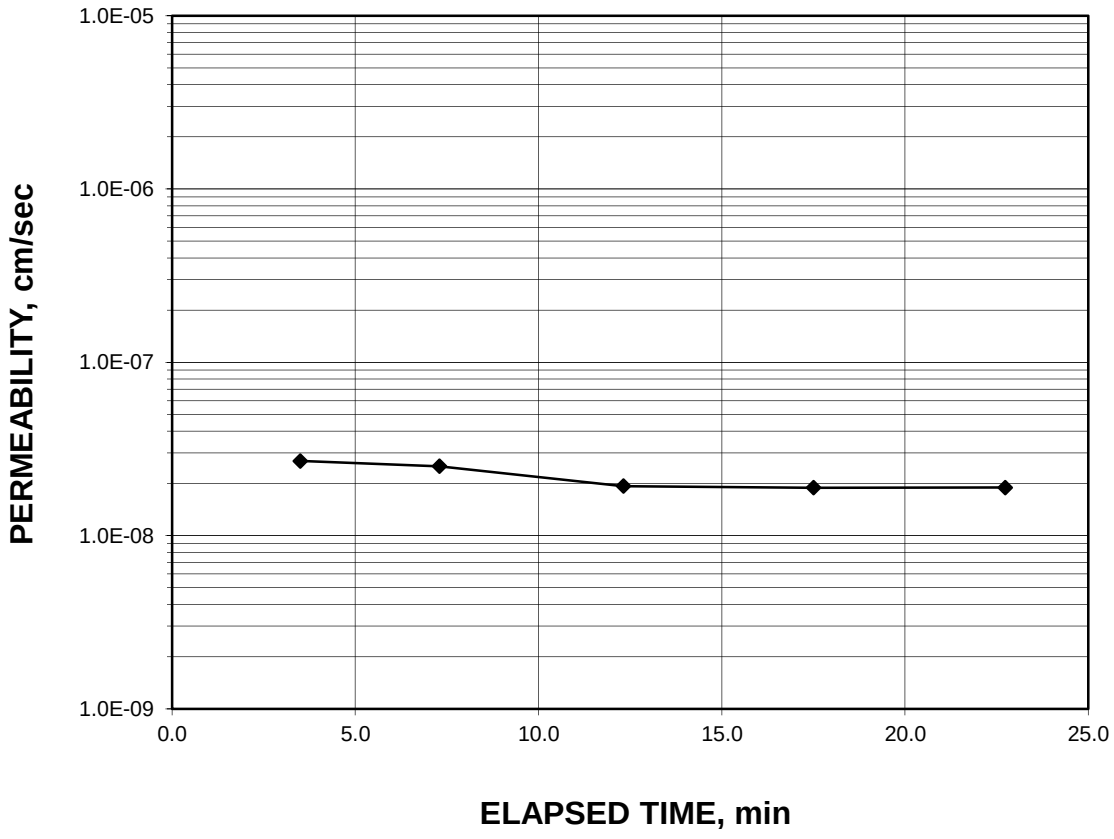
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A20-L2
Lab ID No.	2014-610-24-02		

Visual Description: BROWN CLAY

AVERAGE PERMEABILITY = 2.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A20-L2
Lab ID No.	2014-610-24-02		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	813	Y-11
Wt. of Tare & WS (gm.)	305.89	316.68
Wt. of Tare & DS (gm.)	270.53	269.92
Wt. of Tare (gm.)	111.12	94.03
Wt. of Water (gm.)	35.36	46.76
Wt. of DS (gm.)	159.41	175.89
Moisture Content (%)	**22.2**	**26.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	732.17	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	732.17	758.55
Length 1 (in.)	3.492	3.516
Length 2 (in.)	3.513	3.526
Length 3 (in.)	3.494	3.516
Top Diameter (in.)	2.870	2.887
Middle Diameter (in.)	2.865	2.886
Bottom Diameter (in.)	2.853	2.883
Average Length (in.)	3.50	3.52
Average Area (in.^{2})	6.44	6.54
Sample Volume (cm^3)	369.11	377.09
Unit Wet Wt. (gm./ cm^3)	1.984	2.012
Unit Wet Wt. (pcf)	123.8	125.6
Unit Dry Wt. (pcf)	101.3	99.2
Unit Dry Wt. (gm./ cm^3)	1.623	1.589
Void Ratio, e	0.663	0.699
Porosity, n	0.399	0.411
Pore Volume (cm^3)	147.2	155.1
Total Wt. Of Sample After Test		749.31

Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-24-02 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 20
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-24	Sample No.	ST-A20-L2
Lab ID No.	2014-610-24-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	8.94
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.18
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.1

AVERAGE PERMEABILITY = 2.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.1E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/18/14	10	10	30	10.50	0.000	9.5	12.3	23.2	NA
6/18/14	10	14	0	14.00	3.500	9.4	12.1	23.2	2.7E-08
6/18/14	10	17	48	17.80	7.300	9.3	12.0	23.2	2.5E-08
6/18/14	10	22	49	22.82	12.317	9.2	11.8	23.2	1.9E-08
6/18/14	10	28	0	28.00	17.500	9.1	11.7	23.2	1.9E-08
6/18/14	10	33	14	33.23	22.733	9.0	11.5	23.2	1.9E-08

Tested By: BW Date: 6/16/14 Checked By: GEM Date: 6/19/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-24-02 Permometer.xls]Sheet1

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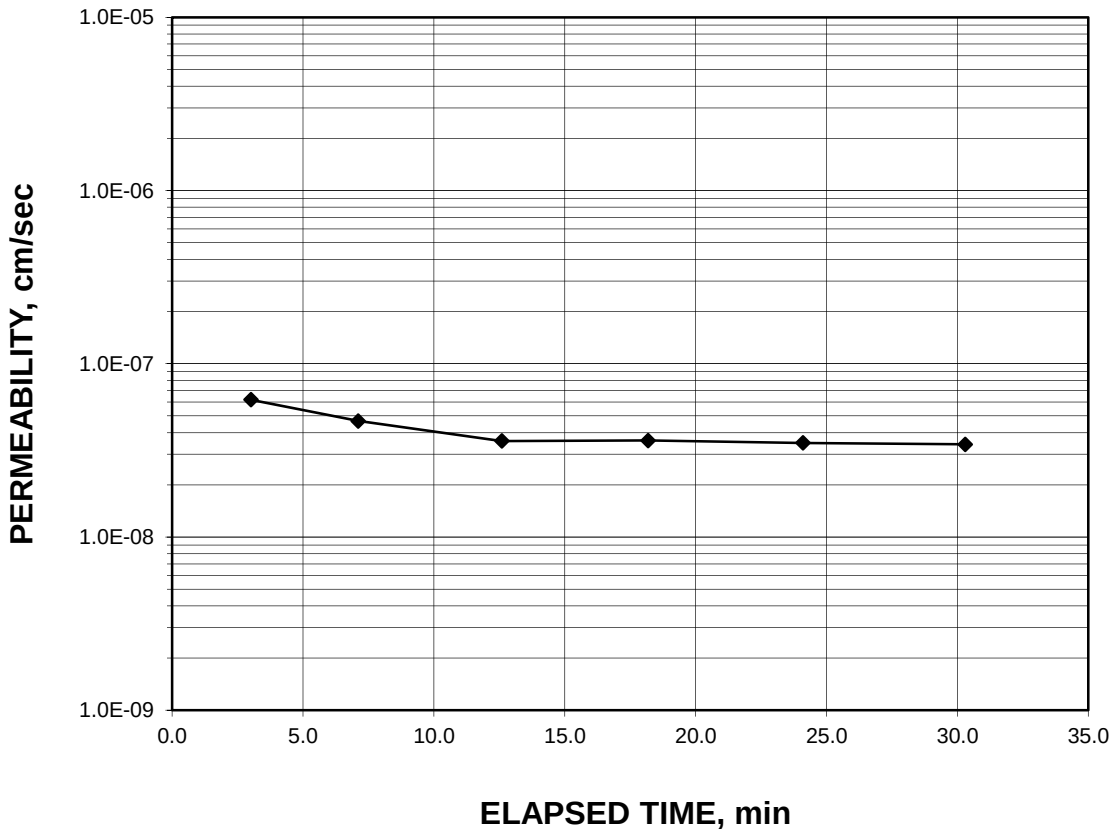
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15 RW
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-25	Sample No.	ST-A15-L2 RW
Lab ID No.	2014-610-25-01		

Visual Description: BROWN CLAY

AVERAGE PERMEABILITY = 3.5E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.5E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: BW Date: 6/20/14 Checked By: GEM Date: 6/23/14

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15 RW
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-25	Sample No.	ST-A15-L2 RW
Lab ID No.	2014-610-25-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	813	812
Wt. of Tare & WS (gm.)	399.45	354.69
Wt. of Tare & DS (gm.)	343.54	299.45
Wt. of Tare (gm.)	111.10	106.87
Wt. of Water (gm.)	55.91	55.24
Wt. of DS (gm.)	232.44	192.58
Moisture Content (%)	**24.1**	**28.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	694.34	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	694.34	720.26
Length 1 (in.)	3.364	3.376
Length 2 (in.)	3.383	3.344
Length 3 (in.)	3.382	3.36
Top Diameter (in.)	2.852	2.857
Middle Diameter (in.)	2.845	2.853
Bottom Diameter (in.)	2.842	2.853
Average Length (in.)	3.38	3.36
Average Area (in.^{2})	6.36	6.40
Sample Volume (cm^3)	352.05	352.32
Unit Wet Wt. (gm./ cm^3)	1.972	2.044
Unit Wet Wt. (pcf)	123.1	127.6
Unit Dry Wt. (pcf)	99.2	99.2
Unit Dry Wt. (gm./ cm^3)	1.590	1.589
Void Ratio, e	0.698	0.700
Porosity, n	0.411	0.412
Pore Volume (cm^3)	144.8	145.0
Total Wt. Of Sample After Test		701.33

Tested By: BW Date: 6/20/14 Checked By: GEM Date: 6/23/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-25-01 Permometer.xls]Sheet1

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 15 RW
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-25	Sample No.	ST-A15-L2 RW
Lab ID No.	2014-610-25-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	8.53
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.28
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.1

AVERAGE PERMEABILITY = 3.5E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.5E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/22/14	20	48	29	48.48	0.000	9.5	12.9	22.8	NA
6/22/14	20	51	30	51.50	3.017	9.3	12.5	22.8	6.2E-08
6/22/14	20	55	36	55.60	7.117	9.1	12.2	22.8	4.7E-08
6/22/14	21	1	5	1.08	12.600	8.9	11.9	22.8	3.6E-08
6/22/14	21	6	40	6.67	18.183	8.7	11.6	22.8	3.6E-08
6/22/14	21	12	35	12.58	24.100	8.5	11.3	22.8	3.5E-08
6/22/14	21	18	47	18.78	30.300	8.3	11.0	22.8	3.4E-08

Tested By: BW Date: 6/20/14 Checked By: GEM Date: 6/23/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-25-01 Permometer.xls]Sheet1

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Appendix D – Compacted Soil Liner (CSL)
Section 2 – CSL Field Density Reports

See Appendix C Section 3 for
Compacted Soil Liner (CSL) – CSL Field Density Reports

Appendix D – Compacted Soil Liner (CSL)
Section 3 – Test Pad Data

SUMMARY OF COMPACTED SOIL LINER (CSL) - TEST PAD LABORATORY TEST RESULTS

Duke Energy Progress - Roxboro Lined Ash Monofill - Phase 6A

McGehees Mill Rd Borrow Area - Roxboro, North Carolina

Test Pad	SAMPLE LOCATION	LABORATORY SAMPLE DESCRIPTION	MOISTURE (%)	INDEX TESTING RESULTS								PROCTOR AND PERMEABILITY TEST RESULTS					
				ATTERBERG LIMITS			GRAIN SIZE ANALYSIS			CLASSIFICATION		STANDARD PROCTOR		Undisturbed Permeability (cm/sec) (D.D. @ %M)	Remolded Permeability (cm/sec) (D.D. @ %M) [% Proctor @ ±%OM]	Remolded Permeability (cm/sec) (D.D. @ %M) [% Proctor @ ±%OM]	Remolded Permeability (cm/sec) (D.D. @ %M) [% Proctor @ ±%OM]
				LL	PL	PI	% Gravel	% Sand	% Silt/Clay	USCS	USDA	Max. Dry Density (pcf)	Opt. Moisture (%)				
Test Pad 1	CL-1 Lift 1	Dark Red Elastic Silt	--	87	41	46	1.1	47.0	51.9	MH	--	83.1	34.0	$2.7x10^{-8}$ (85.7 pcf @ 34.0 %)	**$2.5x10^{-6}$ (79.1 pcf @ 36.0 %) [95.2% Pr @ +2.0% OM]**	**$3.5x10^{-7}$ (79.1 pcf @ 37.6 %) [95.2% Pr @ +3.6% OM]**	**$2.6x10^{-7}$ (80.3 pcf @ 37.5 %) [96.6% Pr @ +3.5% OM]**
	CL-2 Lift 2	Brown Fat CLAY	--	58	26	32	1.4	47.4	51.2	CH	--	101.0	21.3	$4.9x10^{-8}$ (86.8 pcf @ 34.8 %)	**$3.8x10^{-7}$** (96.1 pcf @ 23.3%) [95.2% Pr @ +2.0% OM]	**$6.9x10^{-7}$** (96.1 pcf @ 24.9 %) [95.2% Pr @ +3.6% OM]	**$9.2x10^{-8}$** (97.8 pcf @ 24.8 %) [96.8% Pr @ +3.5% OM]
	CL-3 Lift 3	Brown Fat CLAY	--	55	24	31	2.4	43.3	54.3	CH	CLAY LOAM	97.8	23.5	$4.1x10^{-8}$ (95.4 pcf @ 28.2 %)	**$1.7x10^{-7}$** (94.8 pcf @ 25.6%) [96.9% Pr @ +2.1% OM]	**$8.0x10^{-8}$** (93.1 pcf @ 26.9 %) [95.2% Pr @ +3.4% OM]	$1.0x10^{-8}$ (94.9 pcf @ 27.0 %) [97.0% Pr @ +3.5% OM]
	CL-4 Lift 4	Red Brown Fat Clay	--	77	31	46	1.2	32.5	66.3	CH	CLAY LOAM	89.6	28.2	$9.0x10^{-9}$ (89.6 pcf @ 28.2 %)	**$2.5x10^{-7}$ (85.5 pcf @ 30.6 %) [95.4% Pr @ +2.4% OM]**	**$5.3x10^{-7}$ (85.2 pcf @ 31.5 %) [95.1% Pr @ +3.3% OM]**	**$1.0x10^{-7}$** (86.5 pcf @ 31.7 %) [96.5% Pr @ +3.5% OM]

NOTES:

1) All laboratory testing was performed by sub-consultant laboratory; Geotechnics.
2) "--" Indicates test not performed.
3) USCS classification based on grain size analysis, Atterberg Limits results and/or visual observations. USDA classification based on grain size analysis results.
4) % Silt/Clay indicates percent passing the no. 200 sieve.

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ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-1
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-1
Lab ID	2013-784-02-01	Soil Description	**DARK RED ELASTIC SILT**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

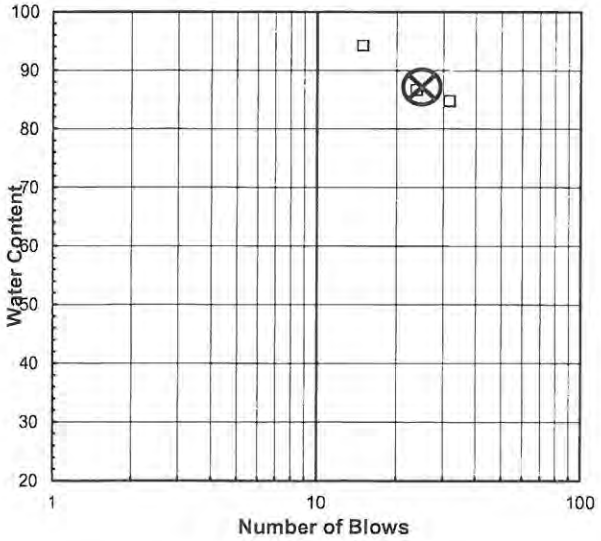
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	K-P	Y	T	MULTIPOINT
Wt. of Tare & WS (gm)	25.47	25.90	25.85	
Wt. of Tare & DS (gm)	20.90	21.14	20.70	
Wt. of Tare (gm)	15.50	15.64	15.23	
Wt. of Water (gm)	4.6	4.8	5.2	
Wt. of DS (gm)	5.4	5.5	5.5	
Moisture Content (%)	**84.6**	**86.5**	**94.1**	
Number of Blows	**32**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	3M	P	
Wt. of Tare & WS (gm)	22.32	22.26	
Wt. of Tare & DS (gm)	20.41	20.22	
Wt. of Tare (gm)	15.63	15.26	
Wt. of Water (gm)	1.9	2.0	
Wt. of DS (gm)	4.8	5.0	
Moisture Content (%)	**40.0**	**41.1**	**-1.2**

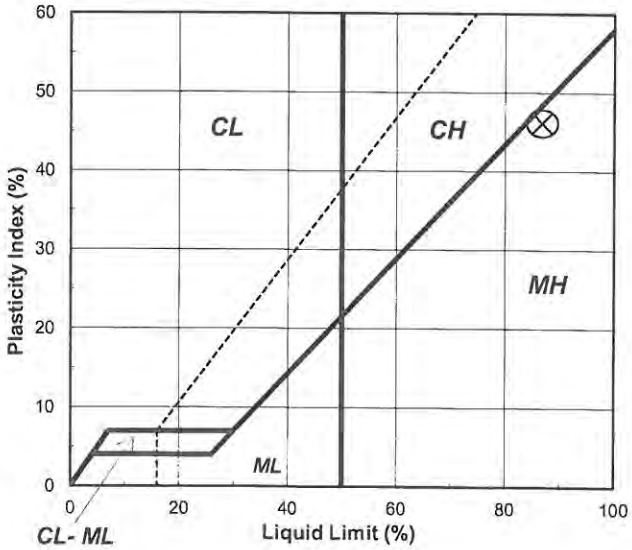
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**87**
Plastic Limit (%)	**41**
Plasticity Index (%)	**46**
USCS Symbol	**MH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *12/19/13* *Checked By* GEM *Date* 12-20-13

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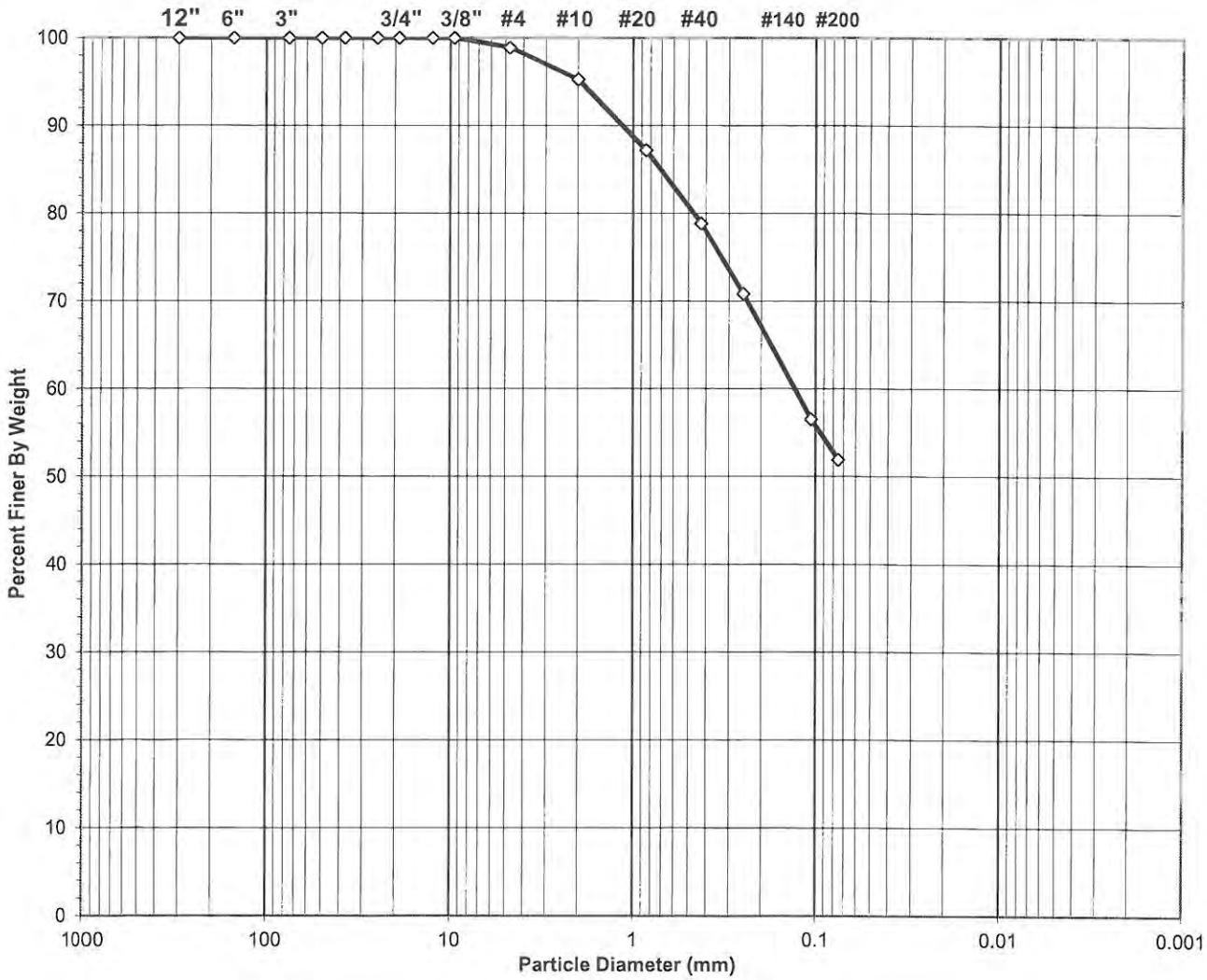
SIEVE ANALYSIS
ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS,INC.	Boring No.	CL-1
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-1
Lab ID	2013-784-02-01	Soil Color	**DARK RED**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	gravel	sand	silt and clay



USCS Symbol ***MH, TESTED***

USCS Classification ***SANDY ELASTIC SILT***

Tested By SS Date 12/18/13 Checked By GDM Date 12-20-13

DCN: CT-S3C DATE 6-25-98 REVISION 1 *F:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 SIEVON REV 4 wHeader.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS,INC.	Boring No.	CL-1
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-1
Lab ID	2013-784-02-01	Soil Color	**DARK RED**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	841	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	590.89	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	491.30	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	258.97	Weight of Tare (gm)	NA
Weight of Water (gm)	99.59	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	232.33	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**42.9**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	232.33
Dry Weight - 3/4" Sample (gm)	111.7	Weight of minus #200 material (gm)	120.66
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	111.67
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.50	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	2.54	1.1	1.1	98.9	**98.9**
#10	2.00	8.42	3.6	4.7	95.3	**95.3**
#20	0.850	18.74	8.1	12.8	87.2	**87.2**
#40	0.425	19.37	8.3	21.1	78.9	**78.9**
#60	0.250	18.62	8.0	29.1	70.9	**70.9**
#140	0.106	33.26	14.3	43.5	56.5	**56.5**
#200	0.075	10.72	4.6	48.1	51.9	**51.9**
Pan	-	120.66	51.9	100.0	-	-

Tested By SS Date 12/18/13 Checked By GJM Date 12-20-13

DCN: CT-S3C DATE 6-25-98 REVISION *N:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 SIEVON REV 4 wHeader.xls]Sheet1*

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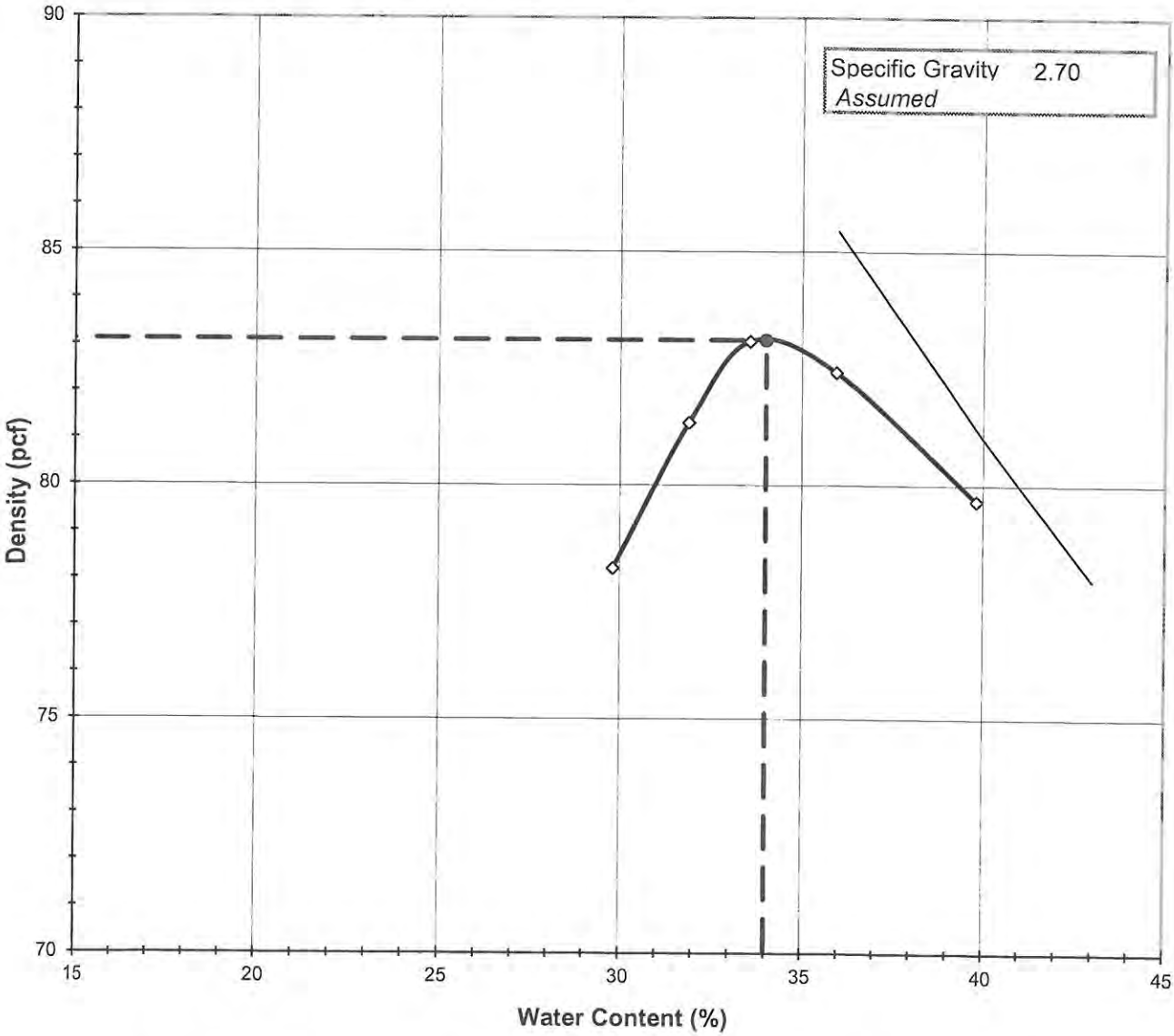
MOISTURE DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-1
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-1
Lab ID	2013-784-02-01	Test Method	**STANDARD**

Visual Description DARK RED SANDY ELASTIC SILT

Optimum Water Content **34.0**
Maximum Dry Density **83.1**



Tested By *AG* *Date* *12/16/13* *Checked By* GJM *Date* 12-20-13

 DCN:CT-S12 DATE:12/11/00 REVISION 5 *T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 Proctor wHeaders.xls]Sheet1*

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-1
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-1
Lab ID	2013-784-02-01		

Visual Description DARK RED SANDY ELASTIC SILT

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold		4188
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5713	5799	5855	5871	5861
Wt.of Mold (gm)	4188	4188	4188	4188	4188
Wt. of WS	1525	1611	1667	1683	1673
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	307	368	304	314	834
Wt. of Tare & WS (gm)	332.40	318.20	319.80	332.20	595.30
Wt. of Tare & DS (gm)	281.30	268.10	267.20	266.70	499.60
Wt. of Tare (gm)	109.90	111.00	110.50	84.50	259.30
Wt. of Water (gm)	51.10	50.10	52.60	65.50	95.70
Wt. of DS (gm)	171.40	157.10	156.70	182.20	240.30

Wet Density (gm/cc)	1.63	1.72	1.78	1.80	1.79
Wet Density (pcf)	101.5	107.3	111.0	112.0	111.4
Moisture Content (%)	**29.8**	**31.9**	**33.6**	**35.9**	**39.8**
Dry Density (pcf)	**78.2**	**81.3**	**83.1**	**82.4**	**79.7**

Zero Air Voids

Moisture Content (%)	36.0	40.0	43.0
Dry Unit Weight (pcf)	85.4	81.0	78.0

Tested By AG *Date* 12/16/13 *Checked By* GBM *Date* 12-20-13

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INTEGRITY IN TESTING

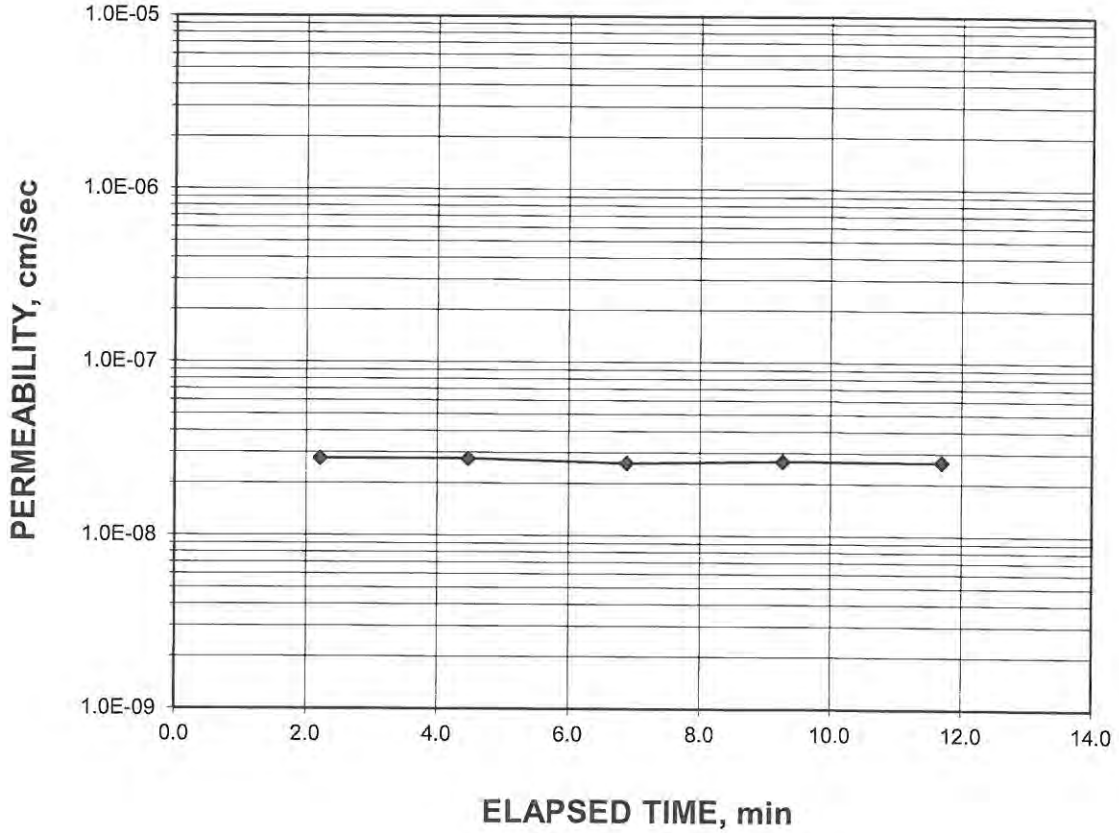
FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-03	Sample No.	ST-TP-01
Lab ID No.	2013-784-03-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.7E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 12/15/13 Checked By: GEM Date: 12-17-13

DCN: CT-22A DATE:2-2-10 REVISION:5 \\GTI-FS1\PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-03-01 Permometer wHeader.xls]Sheet1

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INTEGRITY IN TESTING

FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-03	Sample No.	ST-TP-01
Lab ID No.	2013-784-03-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	801	813
Wt. of Tare & WS (gm.)	287.74	278.03
Wt. of Tare & DS (gm.)	239.96	233.63
Wt. of Tare (gm.)	99.47	112.98
Wt. of Water (gm.)	47.78	44.40
Wt. of DS (gm.)	140.49	120.65
Moisture Content (%)	**34.0**	**36.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	389.64	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	389.64	397.76
Length 1 (in.)	2.033	2.024
Length 2 (in.)	1.993	1.988
Length 3 (in.)	2.014	2.012
Top Diameter (in.)	2.863	2.897
Middle Diameter (in.)	2.858	2.871
Bottom Diameter (in.)	2.855	2.868
Average Length (in.)	2.01	2.01
Average Area (in.^{2})	6.42	6.51
Sample Volume (cm^3)	211.76	214.16
Unit Wet Wt. (gm./ cm^3)	1.840	1.857
Unit Wet Wt. (pcf)	114.9	115.9
Unit Dry Wt. (pcf)	85.7	84.7
Unit Dry Wt. (gm./ cm^3)	1.373	1.358
Void Ratio, e	0.966	0.989
Porosity, n	0.491	0.497
Pore Volume (cm^3)	104.1	106.5
Total Wt. Of Sample After Test		396.26

Tested By: SFS Date: 12/15/13 Checked By: GEM Date: 12-17-13

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-03	Sample No.	ST-TP-01
Lab ID No.	2013-784-03-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	5.10
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.99
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.7E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.7E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
12/16/13	11	42	30	42.50	0.000	8.6	19.5	22.0	NA
12/16/13	11	44	43	44.72	2.217	8.5	19.2	22.0	2.8E-08
12/16/13	11	46	58	46.97	4.467	8.4	18.9	22.0	2.8E-08
12/16/13	11	49	23	49.38	6.883	8.3	18.7	22.0	2.6E-08
12/16/13	11	51	46	51.77	9.267	8.2	18.4	22.0	2.7E-08
12/16/13	11	54	12	54.20	11.700	8.1	18.2	22.0	2.7E-08

Tested By: SFS Date: 12/15/13 Checked By: GEM Date: 12-17-13

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PERMEABILITY TEST

ASTM D 5084-03

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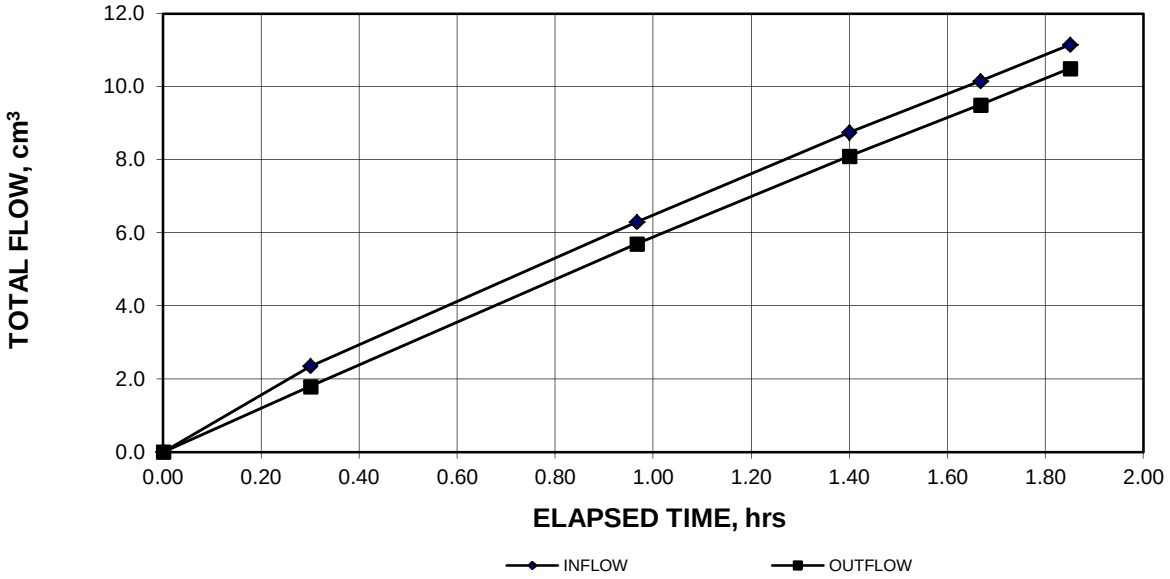
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-02	Sample No.	CL-1
Lab ID No.	2013-784-02-01		

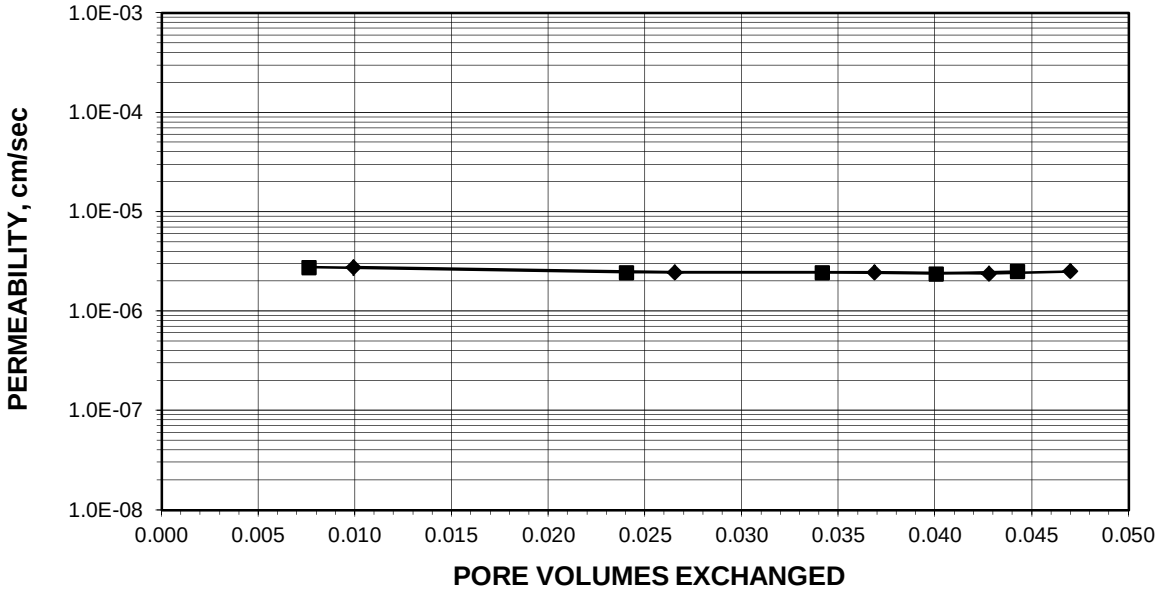
AVERAGE PERMEABILITY = 2.5E-06 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.5E-08 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22 DATE: 2/2/10 REVISION: 1 \\GEO-FS01\PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 PERMflow.xls]Sheet1

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PERMEABILITY TEST

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-02	Sample No.	CL-1
Lab ID No.	2013-784-02-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: DARK RED SANDY ELASTIC SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	809
Wt. of Tare & WS (gm.)	303.89	465.55
Wt. of Tare & DS (gm.)	254.01	359.65
Wt. of Tare (gm.)	115.50	115.50
Wt. of Water (gm.)	49.88	105.90
Wt. of DS (gm.)	138.51	244.15
Moisture Content (%)	**36.0**	**43.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2364.73	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.)(gm.)	731.68	771.29
Length 1 (in.)	4.009	4.049
Length 2 (in.)	4.009	4.053
Length 3 (in.)	4.009	4.032
Top Diameter (in.)	2.869	2.885
Middle Diameter (in.)	2.869	2.895
Bottom Diameter (in.)	2.869	2.908
Average Length (in.)	4.01	4.04
Average Area (in.^{2})	6.46	6.59
Sample Volume (cm^3)	424.71	436.59
Unit Wet Wt. (gm./ cm^3)	1.72	1.77
Unit Wet Wt. (pcf)	107.5	110.3
Unit Dry Wt. (pcf)	79.1	76.9
Unit Dry Wt. (gm./ cm^3)	1.27	1.23
Void Ratio, e	1.13	1.19
Porosity, n	0.53	0.54
Pore Volume (cm^3)	225.5	237.3
Total Wgt. Of Sample After Test		773.69

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22 DATE: 2/2/10 REVISION: 9 T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 PERMflow.xls]Sheet1

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PERMEABILITY TEST

ASTM D 5084-03

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 1
Project No.	2013-784-02	Sample No.	CL-1
Lab ID No.	2013-784-02-01		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	39.0	Sample Length (cm), L	10.27
Bottom Cap (psi)	41.0	Sample Diameter (cm)	7.36
Cell (psi)	45.0	Sample Area (cm^2), A	42.50
Total Pressure Head (cm)	140.6	Inflow Burette Area (cm^2), a-in	0.871
Hydraulic Gradient	13.69	Outflow Burette Area (cm^2), a-out	0.880
		B Parameter (%)	95

AVERAGE PERMEABILITY = 2.5E-06 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.5E-08 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME **t** (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD **h** (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
1/13/14	12	14	0.00	0.0	0.0	159.5	0	22.2	NA
1/13/14	12	32	0.30	2.4	1.8	154.8	0	22.2	2.8E-06
1/13/14	13	12	0.97	6.3	5.7	145.9	0	22.2	2.5E-06
1/13/14	13	38	1.40	8.8	8.1	140.4	0	22.2	2.5E-06
1/13/14	13	54	1.67	10.2	9.5	137.3	0	22.2	2.4E-06
1/13/14	14	5	1.85	11.2	10.5	135.0	1	22.2	2.5E-06

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22 DATE: 2/2/10 REVISION: 9 T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-01 PERMflow.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

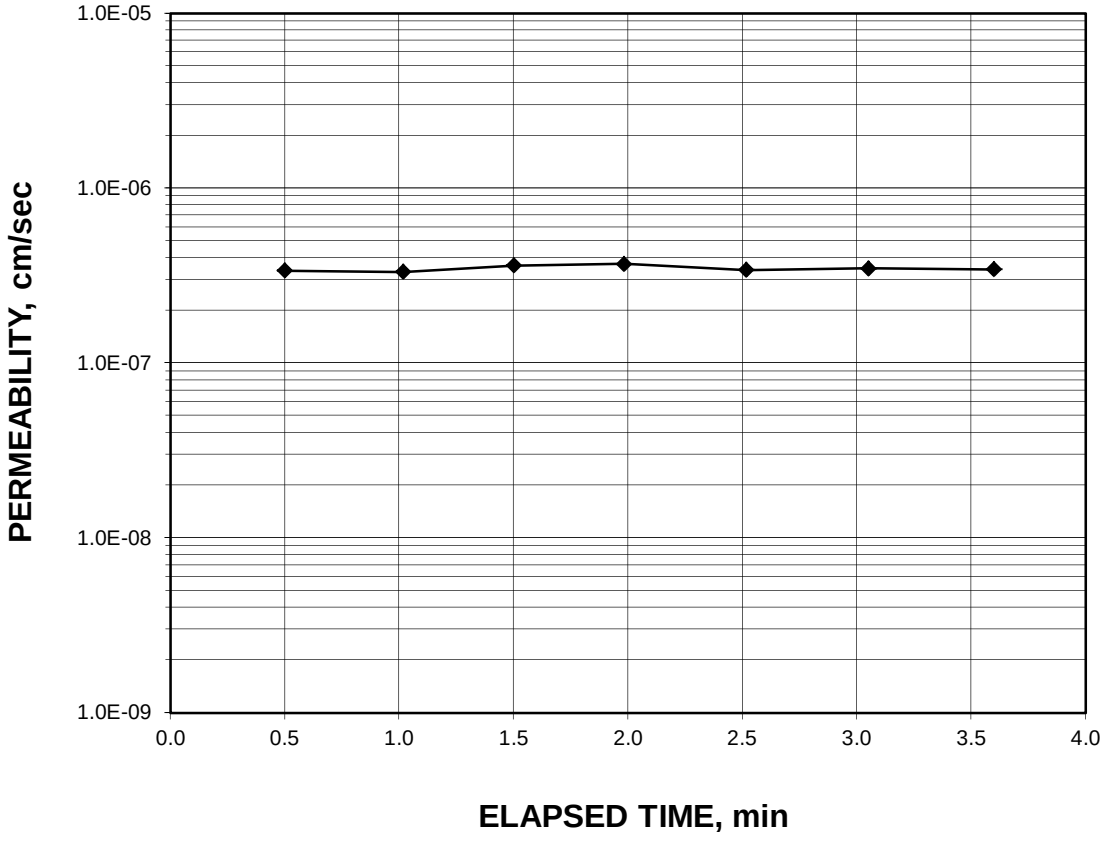
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1
Lab ID No.	2014-610-02-01		

Visual Description: DARK RED SANDY ELASTIC SILT

AVERAGE PERMEABILITY = 3.5E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.5E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION:T5\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1
Lab ID No.	2014-610-02-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: DARK RED SANDY ELASTIC SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	B-1	809
Wt. of Tare & WS (gm.)	325.25	399.07
Wt. of Tare & DS (gm.)	262.52	315.65
Wt. of Tare (gm.)	95.78	115.36
Wt. of Water (gm.)	62.73	83.42
Wt. of DS (gm.)	166.74	200.29
Moisture Content (%)	**37.6**	**41.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2374.02	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	740.97	762.66
Length 1 (in.)	4.009	4.010
Length 2 (in.)	4.009	4.013
Length 3 (in.)	4.009	4.016
Top Diameter (in.)	2.869	2.864
Middle Diameter (in.)	2.869	2.859
Bottom Diameter (in.)	2.869	2.857
Average Length (in.)	4.01	4.01
Average Area (in.^{2})	6.46	6.42
Sample Volume (cm^3)	424.71	422.47
Unit Wet Wt. (gm./ cm^3)	1.745	1.805
Unit Wet Wt. (pcf)	108.9	112.7
Unit Dry Wt. (pcf)	79.1	79.6
Unit Dry Wt. (gm./ cm^3)	1.268	1.274
Void Ratio, e	1.130	1.119
Porosity, n	0.530	0.528
Pore Volume (cm^3)	225.3	223.1
Total Wt. Of Sample After Test		767.35

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1
Lab ID No.	2014-610-02-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.19
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.45
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.5E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.5E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/19/14	17	21	50	21.83	0.000	6.6	7.2	22.2	NA
1/19/14	17	22	20	22.33	0.500	6.5	7.0	22.2	3.4E-07
1/19/14	17	22	51	22.85	1.017	6.4	6.9	22.2	3.3E-07
1/19/14	17	23	20	23.33	1.500	6.3	6.8	22.2	3.6E-07
1/19/14	17	23	49	23.82	1.983	6.2	6.7	22.2	3.7E-07
1/19/14	17	24	21	24.35	2.517	6.1	6.5	22.2	3.4E-07
1/19/14	17	24	53	24.88	3.050	6.0	6.4	22.2	3.5E-07
1/19/14	17	25	26	25.43	3.600	5.9	6.3	22.2	3.4E-07

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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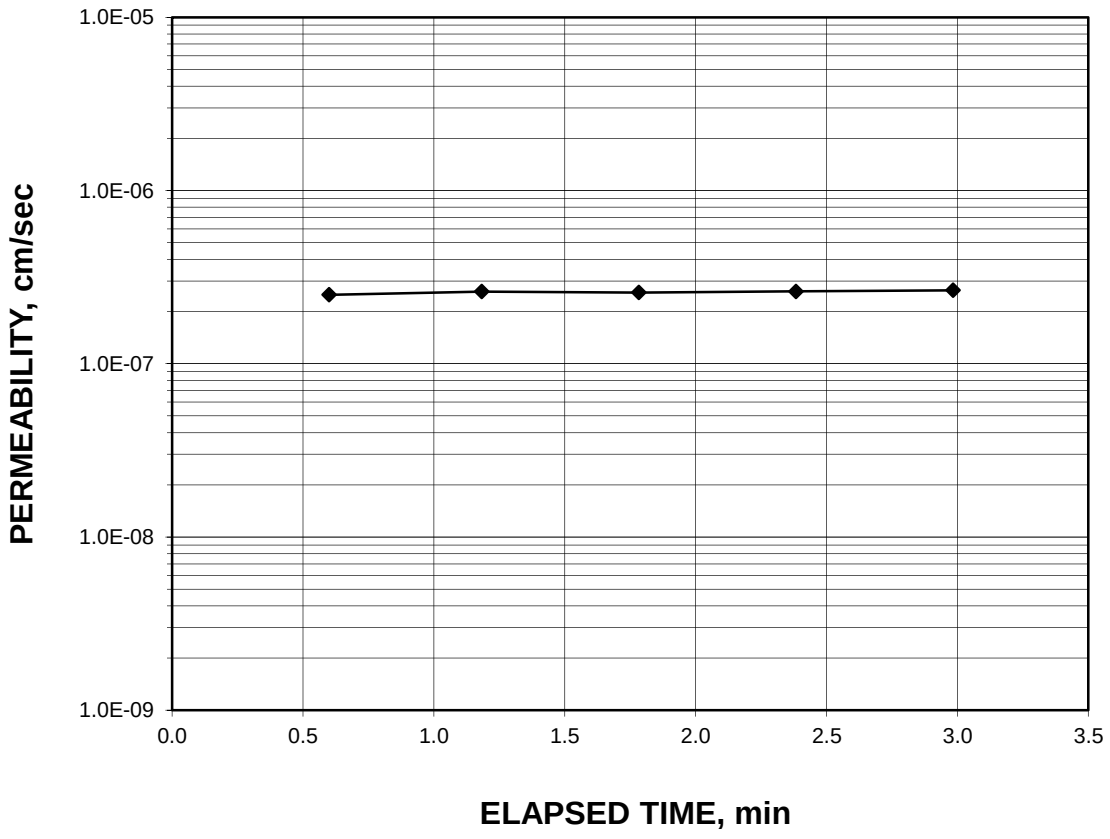
Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1 3.5%M 96.5%C
Lab ID No.	2014-610-02-01		

Visual Description: DARK RED SANDY ELASTIC SILT

AVERAGE PERMEABILITY = 2.6E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-7-2012 REVISION:5 I:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1 3.5%M 96.5%C
Lab ID No.	2014-610-02-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: DARK RED SANDY ELASTIC SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	812	803
Wt. of Tare & WS (gm.)	259.46	406.54
Wt. of Tare & DS (gm.)	217.85	317.86
Wt. of Tare (gm.)	106.85	104.37
Wt. of Water (gm.)	41.61	88.68
Wt. of DS (gm.)	111.00	213.49
Moisture Content (%)	**37.5**	**41.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2383.91	NA
Wt. of Tube (gm.)	1632.93	NA
Wt. of WS (calc.) (gm.)	750.98	773.11
Length 1 (in.)	4.009	4.028
Length 2 (in.)	4.009	4.048
Length 3 (in.)	4.009	4.015
Top Diameter (in.)	2.869	2.881
Middle Diameter (in.)	2.869	2.861
Bottom Diameter (in.)	2.869	2.878
Average Length (in.)	4.01	4.03
Average Area (in.^{2})	6.46	6.48
Sample Volume (cm^3)	424.71	428.26
Unit Wet Wt. (gm./ cm^3)	1.768	1.805
Unit Wet Wt. (pcf)	110.4	112.7
Unit Dry Wt. (pcf)	80.3	79.6
Unit Dry Wt. (gm./ cm^3)	1.286	1.275
Void Ratio, e	1.099	1.117
Porosity, n	0.524	0.528
Pore Volume (cm^3)	222.4	226.0
Total Wt. Of Sample After Test		770.97

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-2-10 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-02	Sample No.	CL-1 3.5%M 96.5%C
Lab ID No.	2014-610-02-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.24
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.83
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.6E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.6E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/23/14	8	43	54	43.90	0.000	7.8	8.7	18.7	NA
1/23/14	8	44	30	44.50	0.600	7.7	8.5	18.7	2.5E-07
1/23/14	8	45	5	45.08	1.183	7.6	8.4	18.7	2.6E-07
1/23/14	8	45	41	45.68	1.783	7.5	8.3	18.7	2.6E-07
1/23/14	8	46	17	46.28	2.383	7.4	8.2	18.7	2.6E-07
1/23/14	8	46	53	46.88	2.983	7.3	8.0	18.7	2.7E-07

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2014\PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-01 3.5%M 96.5%C Permometer.xls]Sheet1

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-2
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-2
Lab ID	2013-784-02-02	Soil Description	**BROWN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

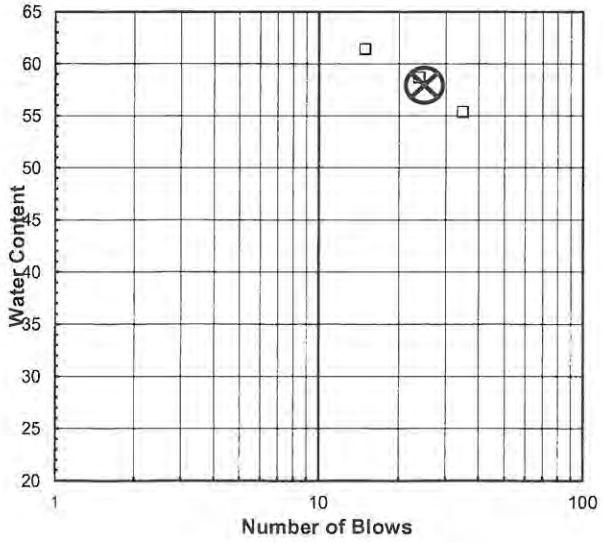
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	J	F	S	MULTIPOINT
Wt. of Tare & WS (gm)	29.63	29.63	28.08	
Wt. of Tare & DS (gm)	24.48	24.26	23.21	
Wt. of Tare (gm)	15.17	15.10	15.27	
Wt. of Water (gm)	5.2	5.4	4.9	
Wt. of DS (gm)	9.3	9.2	7.9	
Moisture Content (%)	**55.3**	**58.6**	**61.3**	
Number of Blows	**35**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-P	B	
Wt. of Tare & WS (gm)	23.58	22.73	
Wt. of Tare & DS (gm)	21.94	21.21	
Wt. of Tare (gm)	15.59	15.20	
Wt. of Water (gm)	1.6	1.5	
Wt. of DS (gm)	6.4	6.0	
Moisture Content (%)	**25.8**	**25.3**	**0.5**

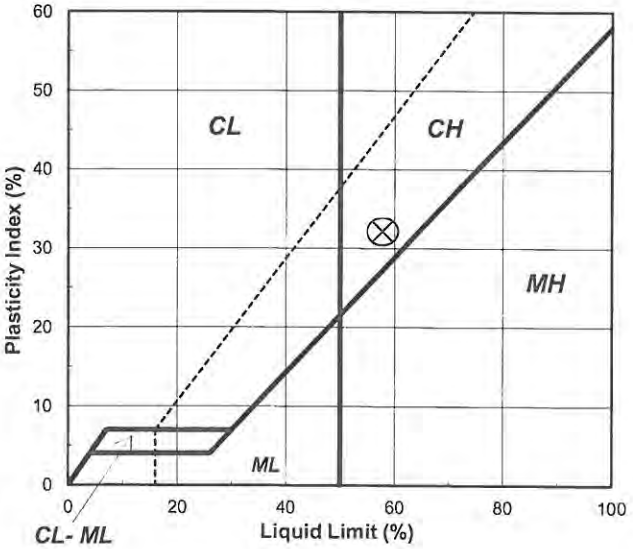
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**58**
Plastic Limit (%)	**26**
Plasticity Index (%)	**32**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By BW *Date* 12/19/13 *Checked By* GEM *Date* 12-20-13

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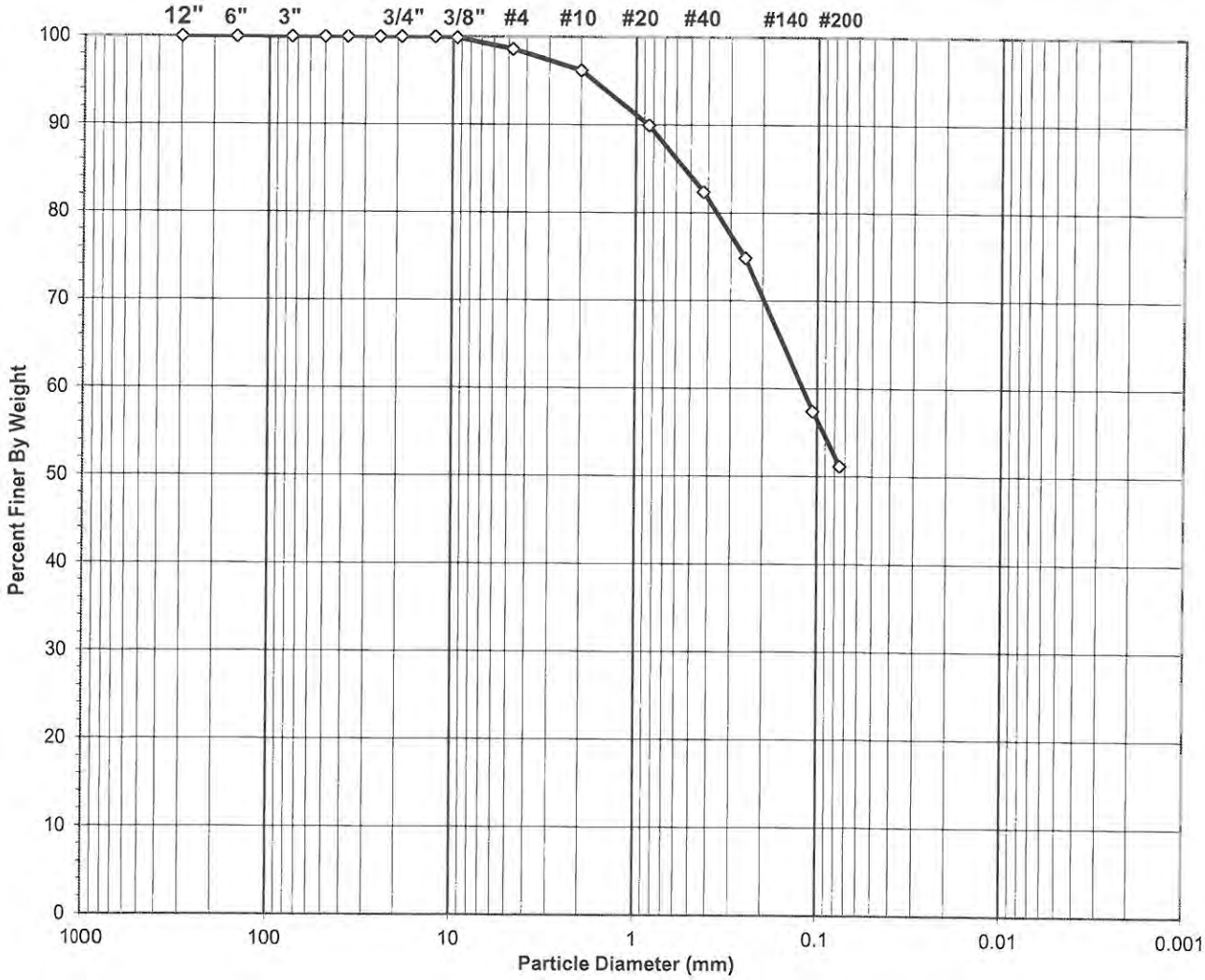
SIEVE ANALYSIS
ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS,INC.	Boring No.	CL-2
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-2
Lab ID	2013-784-02-02	Soil Color	**BROWN**

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

Tested By SS Date 12/17/13 Checked By GEM Date 12-20-13

DCN: CT-S3C DATE 6-25-98 REVISION: *\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-02 SIEVON REV 4 wHeader.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS,INC.	Boring No.	CL-2
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-2
Lab ID	2013-784-02-02	Soil Color	**BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	836	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	859.32	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	710.95	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	260.42	Weight of Tare (gm)	NA
Weight of Water (gm)	148.37	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	450.53	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**32.9**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	450.53
Dry Weight - 3/4" Sample (gm)	220.0	Weight of minus #200 material (gm)	230.57
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	219.96
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.50	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.47	0.1	0.1	99.9	**99.9**
#4	4.75	5.83	1.3	1.4	98.6	**98.6**
#10	2.00	10.87	2.4	3.8	96.2	**96.2**
#20	0.850	27.97	6.2	10.0	90.0	**90.0**
#40	0.425	34.13	7.6	17.6	82.4	**82.4**
#60	0.250	33.82	7.5	25.1	74.9	**74.9**
#140	0.106	78.63	17.5	42.6	57.4	**57.4**
#200	0.075	28.24	6.3	48.8	51.2	**51.2**
Pan	-	230.57	51.2	100.0	-	-

Tested By SS Date 12/17/13 Checked By GEM Date 12-20-13

DCN: CT-S3C DATE 6-25-98 REVISION: *I:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-02 SIEVON REV 4 wHeader.xls]Sheet1*

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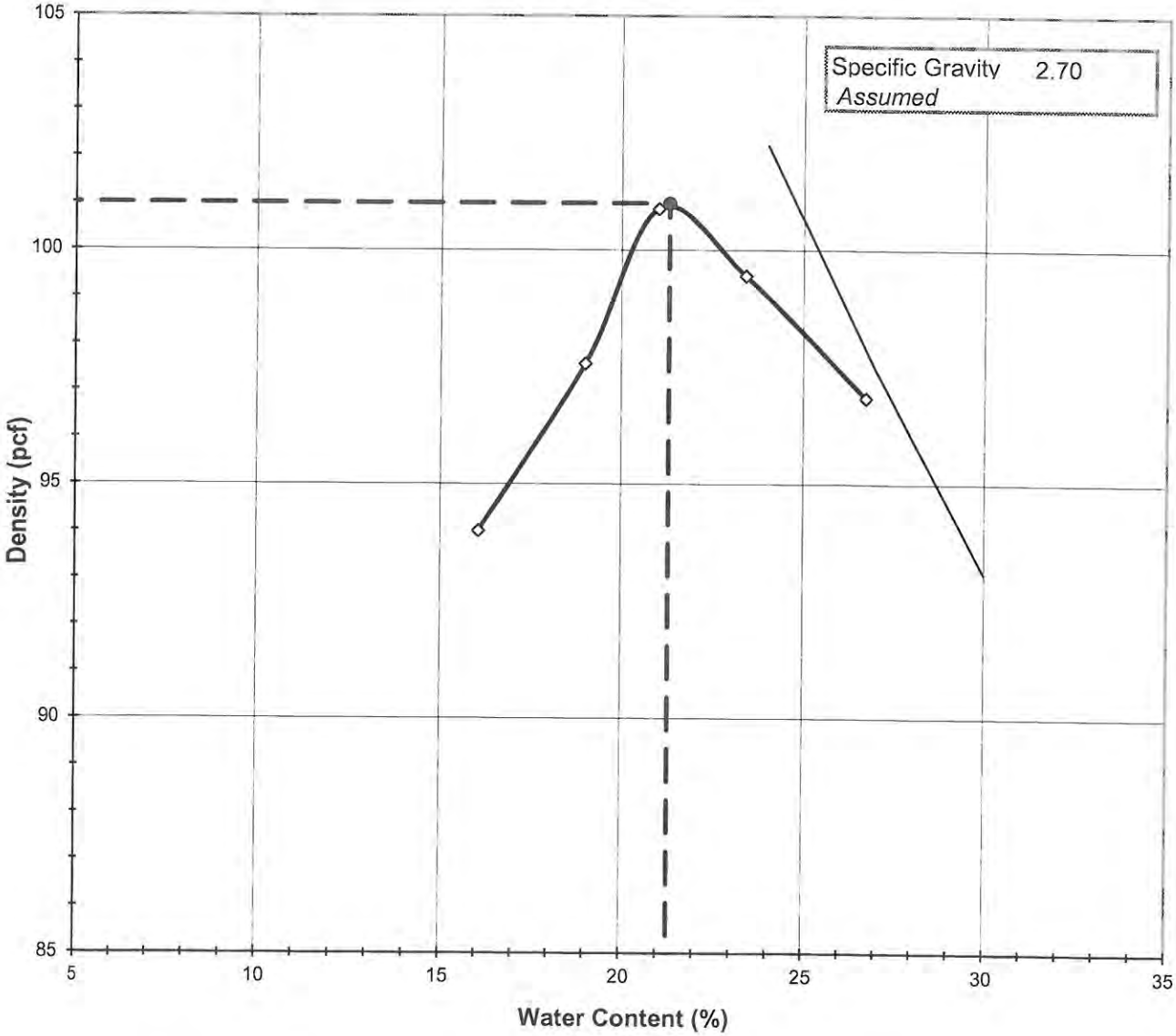
MOISTURE DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-2
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-2
Lab ID	2013-784-02-02	Test Method	**STANDARD**

Visual Description BROWN SANDY FAT CLAY

Optimum Water Content **21.3**
Maximum Dry Density **101.0**



Tested By *AG* *Date* *12/16/13* *Checked By* GM *Date* 12-20-13

 DCN:CT-S12 DATE:12/11/00 REVISION 5 *T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-02 Proctor wHeaders.xls]Sheet1*

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INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	CL-2
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	NA
Project No.	2013-784-02	Sample No.	BS-2
Lab ID	2013-784-02-02		

Visual Description BROWN SANDY FAT CLAY

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold		4188
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5827	5932	6022	6031	6032
Wt.of Mold (gm)	4188	4188	4188	4188	4188
Wt. of WS	1639	1744	1834	1843	1844
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	305	303	300	311	398
Wt. of Tare & WS (gm)	362.90	378.40	367.90	388.40	337.60
Wt. of Tare & DS (gm)	324.40	335.60	323.20	330.70	284.10
Wt. of Tare (gm)	84.60	110.50	110.40	84.20	84.00
Wt. of Water (gm)	38.50	42.80	44.70	57.70	53.50
Wt. of DS (gm)	239.80	225.10	212.80	246.50	200.10

Wet Density (gm/cc)	1.75	1.86	1.96	1.97	1.97
Wet Density (pcf)	109.1	116.1	122.1	122.7	122.7
Moisture Content (%)	**16.1**	**19.0**	**21.0**	**23.4**	**26.7**
Dry Density (pcf)	**94.0**	**97.6**	**100.9**	**99.4**	**96.8**

Zero Air Voids

Moisture Content (%)	24.0	27.0	30.0
Dry Unit Weight (pcf)	102.2	97.4	93.1

Tested By AG *Date* 12/16/13 *Checked By* GM *Date* 12-20-13

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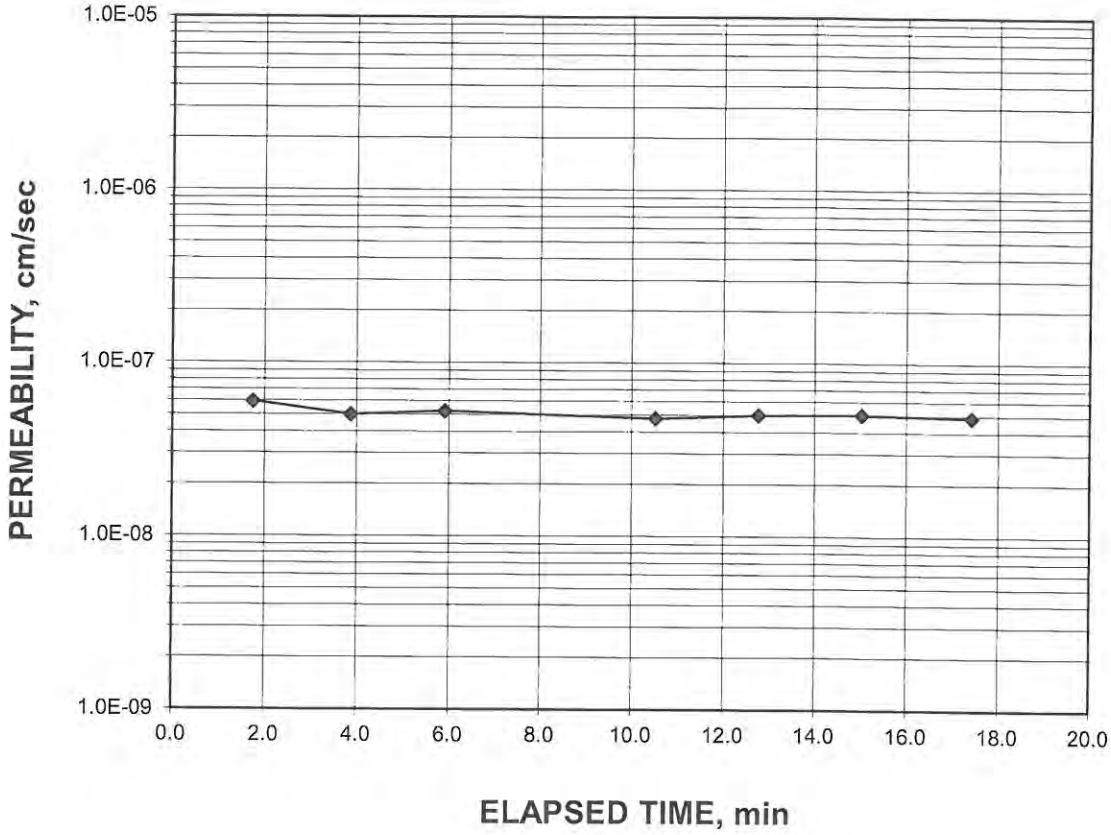
FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-04	Sample No.	ST-TP-02
Lab ID No.	2013-784-04-03		

Visual Description: BROWN CLAY WITH GRAVEL

AVERAGE PERMEABILITY = 4.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.9E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 12/23/13 Checked By: GM Date: 12-27-13

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PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-04	Sample No.	ST-TP-02
Lab ID No.	2013-784-04-03		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN CLAY WITH GRAVEL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	801	444
Wt. of Tare & WS (gm.)	334.75	192.57
Wt. of Tare & DS (gm.)	274.00	153.04
Wt. of Tare (gm.)	99.51	38
Wt. of Water (gm.)	60.75	39.53
Wt. of DS (gm.)	174.49	115.04
Moisture Content (%)	**34.8**	**34.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	576.32	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	576.32	574.38
Length 1 (in.)	2.957	2.952
Length 2 (in.)	2.949	2.953
Length 3 (in.)	2.946	2.940
Top Diameter (in.)	2.843	2.860
Middle Diameter (in.)	2.847	2.873
Bottom Diameter (in.)	2.845	2.863
Average Length (in.)	2.95	2.95
Average Area (in.^{2})	6.36	6.45
Sample Volume (cm^3)	307.38	311.54
Unit Wet Wt. (gm./ cm^3)	1.875	1.844
Unit Wet Wt. (pcf)	117.0	115.1
Unit Dry Wt. (pcf)	86.8	85.7
Unit Dry Wt. (gm./ cm^3)	1.391	1.372
Void Ratio, e	0.941	0.968
Porosity, n	0.485	0.492
Pore Volume (cm^3)	149.1	153.2
Total Wt. Of Sample After Test		585.77

Tested By: SFS Date: 12/23/13 Checked By: GEM Date: 12-27-13

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PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-04	Sample No.	ST-TP-02
Lab ID No.	2013-784-04-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.49
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.60
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 4.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.9E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
12/24/13	9	33	41	33.68	0.000	7.7	11.7	21.7	NA
12/24/13	9	35	26	35.43	1.750	7.6	11.5	21.7	6.0E-08
12/24/13	9	37	33	37.55	3.867	7.5	11.3	21.7	5.0E-08
12/24/13	9	39	36	39.60	5.917	7.4	11.2	21.7	5.2E-08
12/24/13	9	44	12	44.20	10.517	7.2	10.8	21.7	4.8E-08
12/24/13	9	46	27	46.45	12.767	7.1	10.6	21.7	5.0E-08
12/24/13	9	48	43	48.72	15.033	7.0	10.5	21.7	5.1E-08
12/24/13	9	51	6	51.10	17.417	6.9	10.3	21.7	4.9E-08

Tested By: SFS Date: 12/23/13 Checked By: GAM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

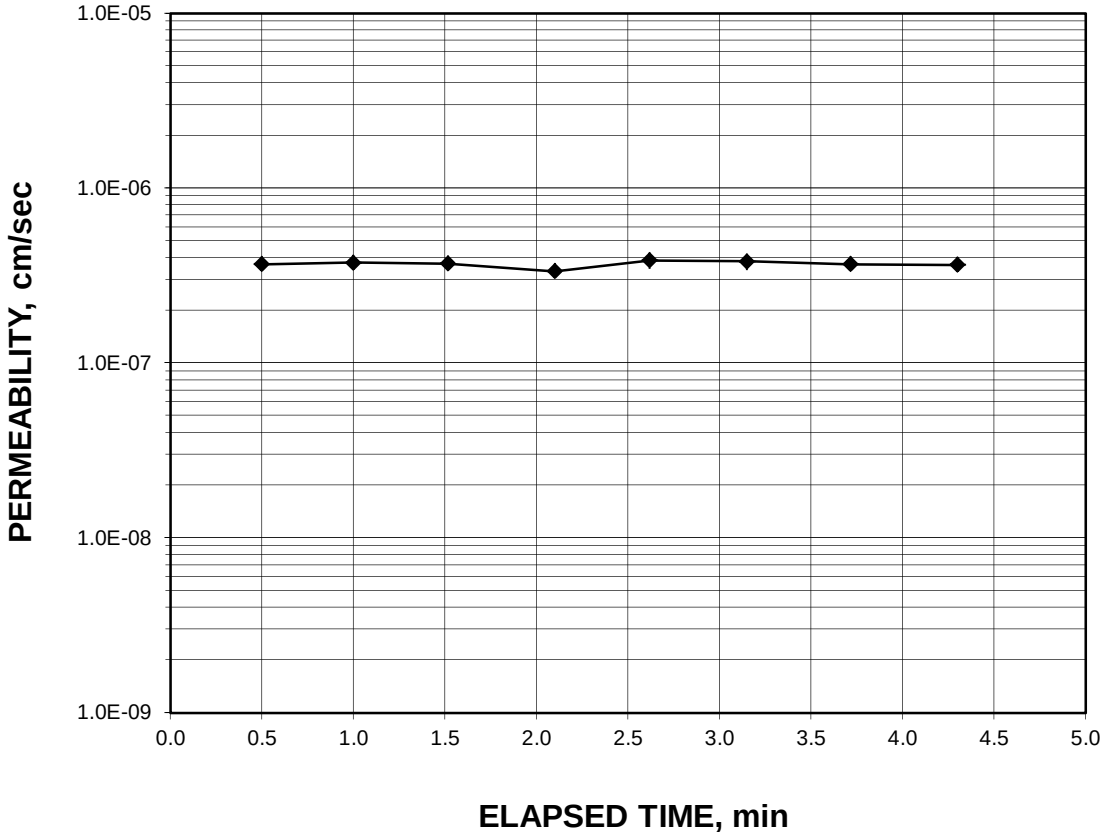
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-02	Sample No.	CL-2
Lab ID No.	2013-784-02-02		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22A DATE:2-2-10 REVISION:26 J:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-02	Sample No.	CL-2
Lab ID No.	2013-784-02-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	800	812
Wt. of Tare & WS (gm.)	270.54	509.7
Wt. of Tare & DS (gm.)	239.03	419.79
Wt. of Tare (gm.)	103.70	106.97
Wt. of Water (gm.)	31.51	89.91
Wt. of DS (gm.)	135.33	312.82
Moisture Content (%)	**23.3**	**28.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2439.12	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	806.07	841.76
Length 1 (in.)	4.009	4.017
Length 2 (in.)	4.009	4.040
Length 3 (in.)	4.009	4.044
Top Diameter (in.)	2.869	2.886
Middle Diameter (in.)	2.869	2.823
Bottom Diameter (in.)	2.869	2.839
Average Length (in.)	4.01	4.03
Average Area (in.^{2})	6.46	6.38
Sample Volume (cm^3)	424.71	421.48
Unit Wet Wt. (gm./ cm^3)	1.898	1.997
Unit Wet Wt. (pcf)	118.5	124.7
Unit Dry Wt. (pcf)	96.1	96.8
Unit Dry Wt. (gm./ cm^3)	1.539	1.551
Void Ratio, e	0.754	0.741
Porosity, n	0.430	0.425
Pore Volume (cm^3)	182.5	179.3
Total Wt. Of Sample After Test		846.19

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22A DATE:2-2-10 REVISION:5 J:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 2
Project No.	2013-784-02	Sample No.	CL-2
Lab ID No.	2013-784-02-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.25
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.14
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/13/14	12	14	35	14.58	0.000	6.2	6.6	22.2	NA
1/13/14	12	15	5	15.08	0.500	6.1	6.5	22.2	3.7E-07
1/13/14	12	15	35	15.58	1.000	6.0	6.4	22.2	3.8E-07
1/13/14	12	16	6	16.10	1.517	5.9	6.2	22.2	3.7E-07
1/13/14	12	16	41	16.68	2.100	5.8	6.1	22.2	3.3E-07
1/13/14	12	17	12	17.20	2.617	5.7	6.0	22.2	3.9E-07
1/13/14	12	17	44	17.73	3.150	5.6	5.9	22.2	3.8E-07
1/13/14	12	18	18	18.30	3.717	5.5	5.7	22.2	3.7E-07
1/13/14	12	18	53	18.88	4.300	5.4	5.6	22.2	3.7E-07

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

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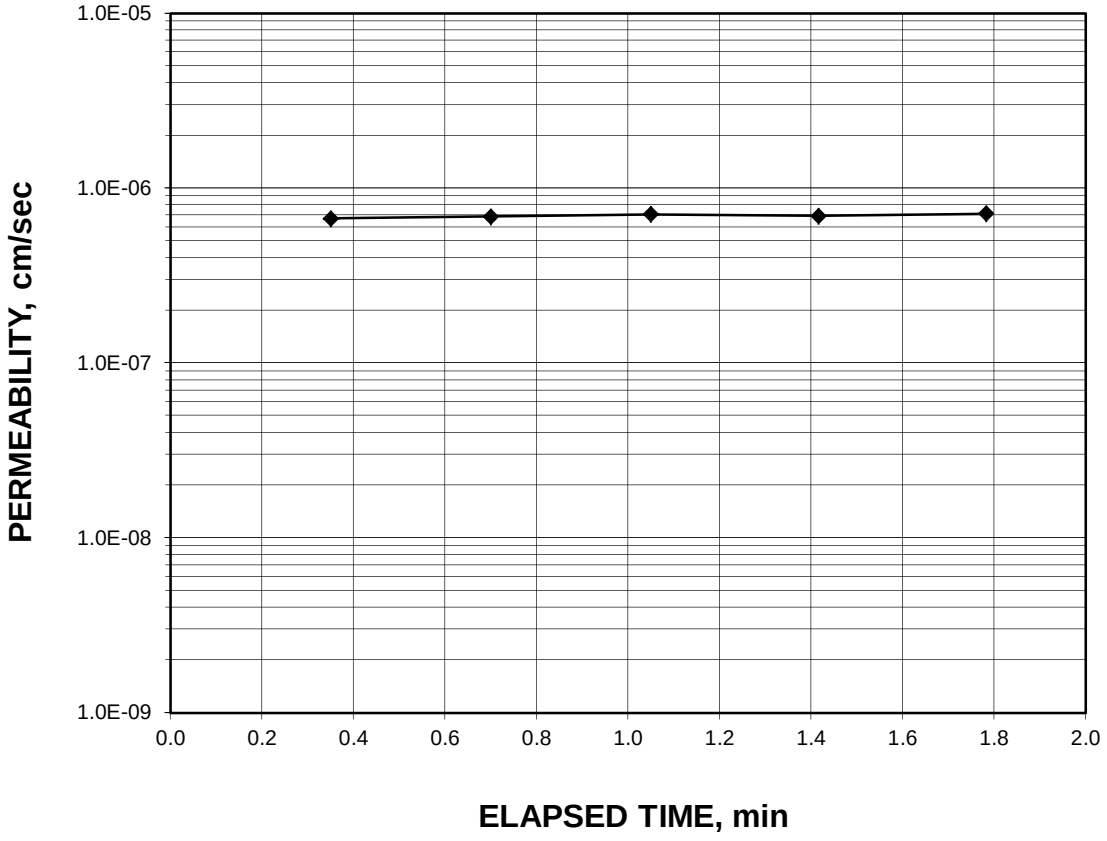
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2
Lab ID No.	2014-610-02-02		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 6.9E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 6.9E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/22/14

DCN: CT-22A DATE:2-2-10 REVISION:T5\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2
Lab ID No.	2014-610-02-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	Z-12
Wt. of Tare & WS (gm.)	278.75	549.57
Wt. of Tare & DS (gm.)	242.30	449.65
Wt. of Tare (gm.)	95.88	90
Wt. of Water (gm.)	36.45	99.92
Wt. of DS (gm.)	146.42	359.65
Moisture Content (%)	**24.9**	**27.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2449.75	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	816.70	835.59
Length 1 (in.)	4.009	4.002
Length 2 (in.)	4.009	3.985
Length 3 (in.)	4.009	4.015
Top Diameter (in.)	2.869	2.866
Middle Diameter (in.)	2.869	2.858
Bottom Diameter (in.)	2.869	2.853
Average Length (in.)	4.01	4.00
Average Area (in.^{2})	6.46	6.42
Sample Volume (cm^3)	424.71	420.87
Unit Wet Wt. (gm./ cm^3)	1.923	1.985
Unit Wet Wt. (pcf)	120.0	123.9
Unit Dry Wt. (pcf)	96.1	97.0
Unit Dry Wt. (gm./ cm^3)	1.540	1.554
Void Ratio, e	0.754	0.738
Porosity, n	0.430	0.425
Pore Volume (cm^3)	182.5	178.7
Total Wt. Of Sample After Test		837.62

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/22/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2
Lab ID No.	2014-610-02-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.16
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.42
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.9E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 6.9E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/20/14	12	41	8	41.13	0.000	9.0	10.3	22.4	NA
1/20/14	12	41	29	41.48	0.350	8.8	10.0	22.4	6.7E-07
1/20/14	12	41	50	41.83	0.700	8.6	9.8	22.4	6.9E-07
1/20/14	12	42	11	42.18	1.050	8.4	9.5	22.4	7.1E-07
1/20/14	12	42	33	42.55	1.417	8.2	9.3	22.4	6.9E-07
1/20/14	12	42	55	42.92	1.783	8.0	9.0	22.4	7.1E-07

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/22/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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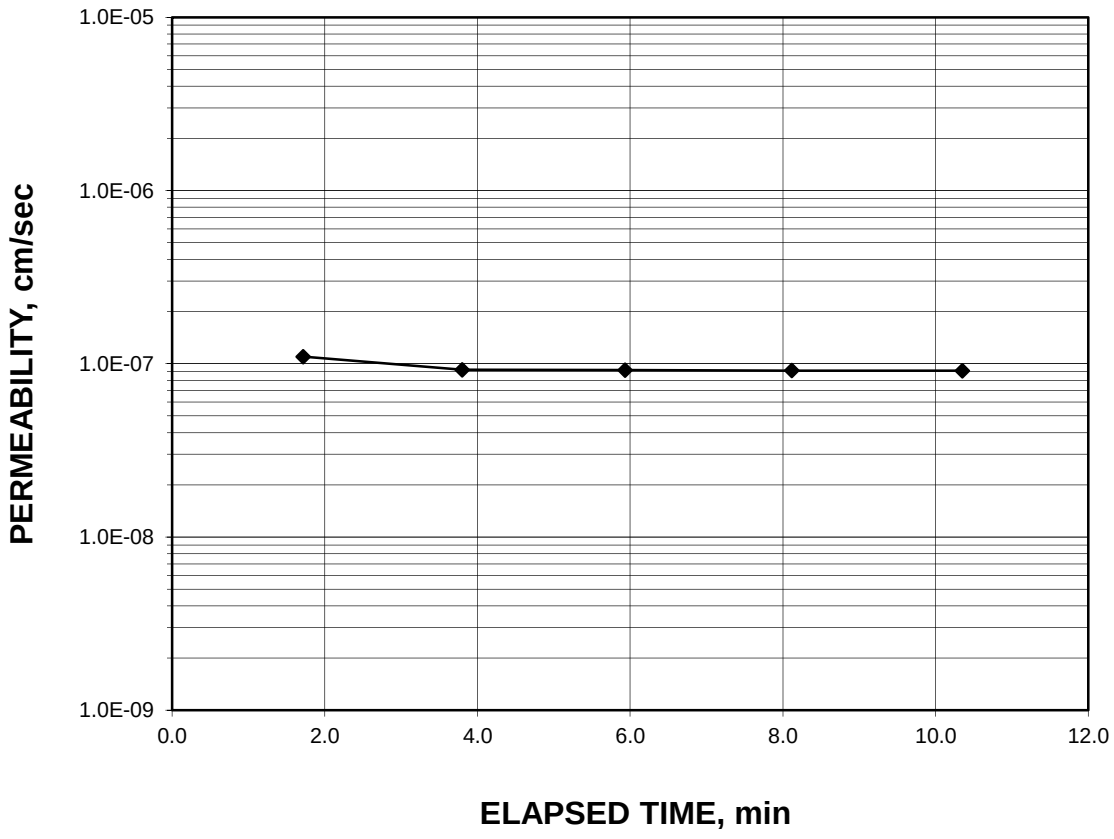
Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2 3.5%M 96.5%C
Lab ID No.	2014-610-02-02		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 9.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 9.2E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-21-2014 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2 3.5%M 96.5%C
Lab ID No.	2014-610-02-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	Z-12
Wt. of Tare & WS (gm.)	234.92	448.6
Wt. of Tare & DS (gm.)	211.13	371.71
Wt. of Tare (gm.)	115.34	89.97
Wt. of Water (gm.)	23.79	76.89
Wt. of DS (gm.)	95.79	281.74
Moisture Content (%)	**24.8**	**27.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2463.34	NA
Wt. of Tube (gm.)	1632.93	NA
Wt. of WS (calc.) (gm.)	830.41	846.74
Length 1 (in.)	4.009	4.003
Length 2 (in.)	4.009	4.007
Length 3 (in.)	4.009	4.017
Top Diameter (in.)	2.869	2.861
Middle Diameter (in.)	2.869	2.853
Bottom Diameter (in.)	2.869	2.851
Average Length (in.)	4.01	4.01
Average Area (in.^{2})	6.46	6.40
Sample Volume (cm^3)	424.71	420.57
Unit Wet Wt. (gm./ cm^3)	1.955	2.013
Unit Wet Wt. (pcf)	122.1	125.7
Unit Dry Wt. (pcf)	97.8	98.7
Unit Dry Wt. (gm./ cm^3)	1.566	1.582
Void Ratio, e	0.724	0.707
Porosity, n	0.420	0.414
Pore Volume (cm^3)	178.3	174.2
Total Wt. Of Sample After Test		843.78

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 2
Project No.	2014-610-02	Sample No.	CL-2 3.5%M 96.5%C
Lab ID No.	2014-610-02-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.18
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.30
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 9.2E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 9.2E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/23/14	9	24	40	24.67	0.000	6.4	6.9	19.1	NA
1/23/14	9	26	23	26.38	1.717	6.3	6.8	19.1	1.1E-07
1/23/14	9	28	28	28.47	3.800	6.2	6.7	19.1	9.2E-08
1/23/14	9	30	36	30.60	5.933	6.1	6.5	19.1	9.2E-08
1/23/14	9	32	47	32.78	8.117	6.0	6.4	19.2	9.1E-08
1/23/14	9	35	1	35.02	10.350	5.9	6.3	19.2	9.1E-08

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2014\PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-02 3.5%M 96.5%C Permometer.xls]Sheet1

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Soil Description	**BROWN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

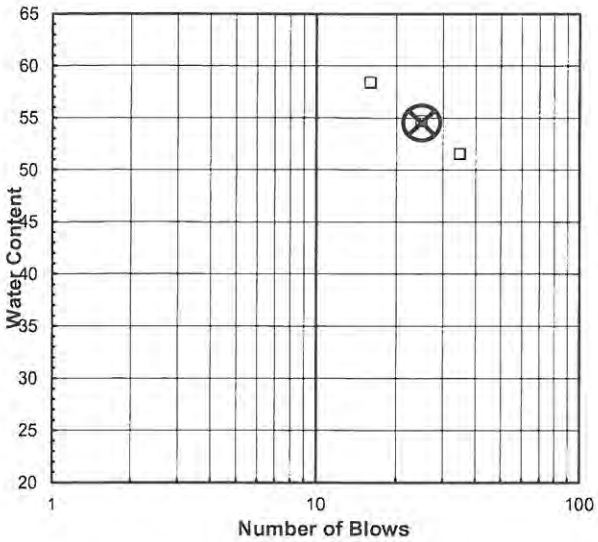
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	P	Y	K-P	MULTIPOINT
Wt. of Tare & WS (gm)	27.14	26.42	27.94	
Wt. of Tare & DS (gm)	23.10	22.61	23.36	
Wt. of Tare (gm)	15.25	15.64	15.51	
Wt. of Water (gm)	4.0	3.8	4.6	
Wt. of DS (gm)	7.9	7.0	7.9	
Moisture Content (%)	**51.5**	**54.7**	**58.3**	
Number of Blows	**35**	**25**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	3M	T	
Wt. of Tare & WS (gm)	22.16	22.92	
Wt. of Tare & DS (gm)	20.89	21.40	
Wt. of Tare (gm)	15.58	15.22	
Wt. of Water (gm)	1.3	1.5	
Wt. of DS (gm)	5.3	6.2	
Moisture Content (%)	**23.9**	**24.6**	**-0.7**

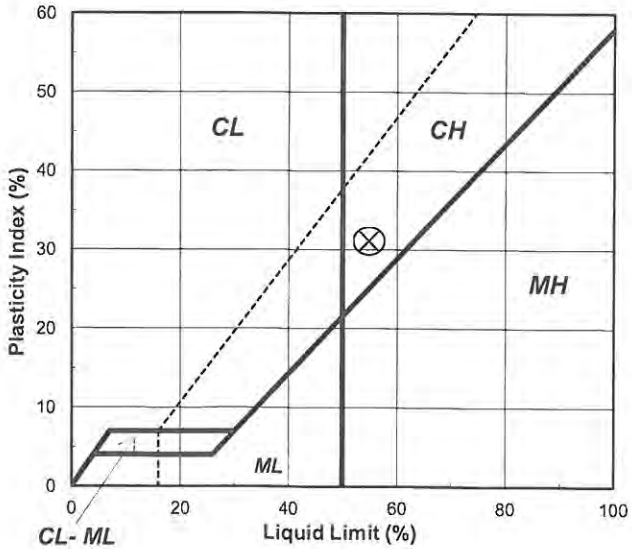
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**55**
Plastic Limit (%)	**24**
Plasticity Index (%)	**31**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *12/31/13* *Checked By* GEM *Date* 1-9-14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

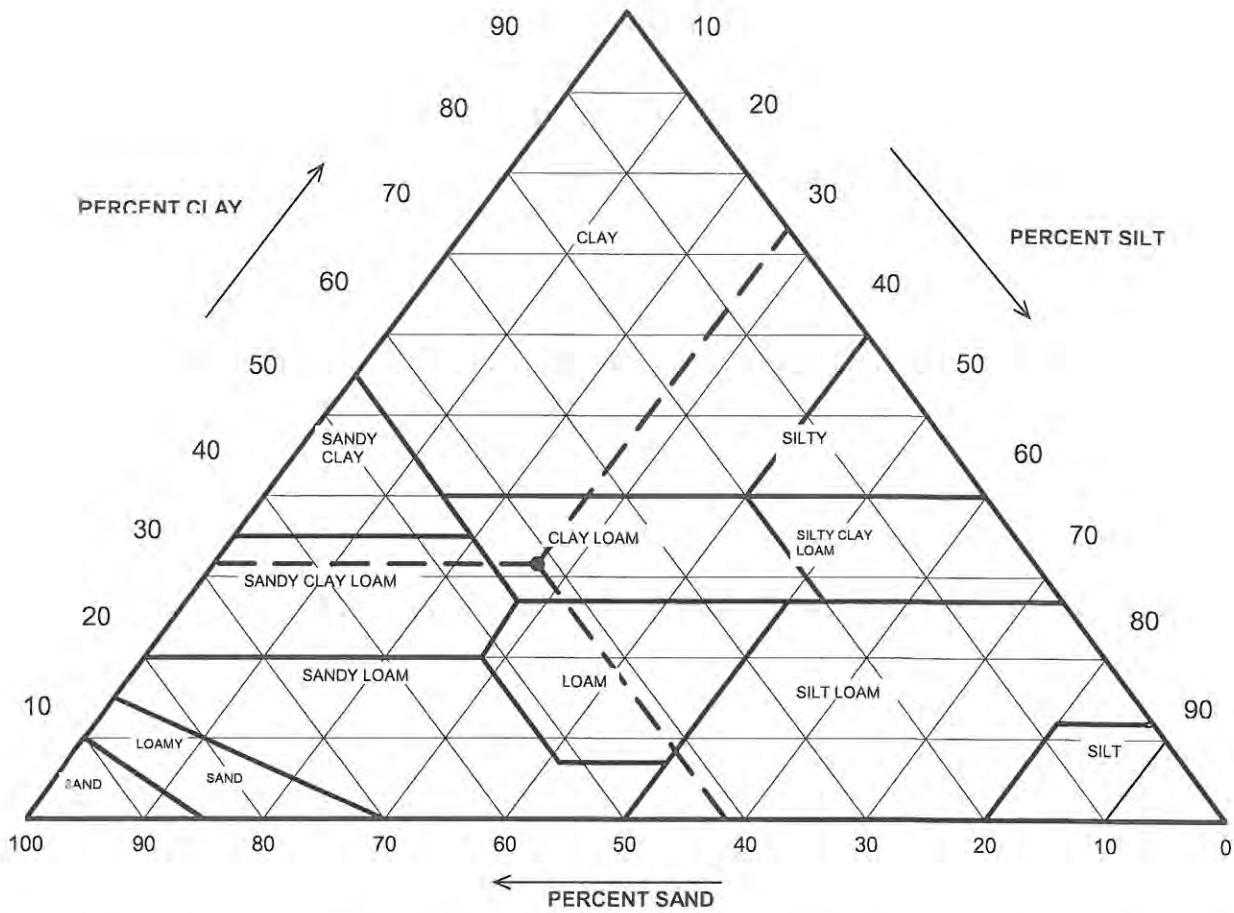
Sieve Sizes (mm)	USCS Summary	Percentage
Greater Than #4	*Gravel*	2.40
#4 To #200	*Sand*	43.32
Finer Than #200	*Silt & Clay*	54.28

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	6.34	**0.00**
2	93.66	*Sand*	38.95	**41.58**
0.05	54.71	*Silt*	25.12	**26.82**
0.002	29.59	*Clay*	29.59	**31.60**

USDA Classification ***CLAY LOAM***

WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Soil Color	BROWN

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	820	Tare No.	318
Wgt.Tare + Wet Specimen (gm)	927.94	Wgt.Tare + Wet Specimen (gm)	310.30
Wgt.Tare + Dry Specimen (gm)	888.03	Wgt.Tare + Dry Specimen (gm)	307.71
Weight of Tare (gm)	208.17	Weight of Tare (gm)	207.69
Weight of Water (gm)	39.91	Weight of Water (gm)	2.59
Weight of Dry Soil (gm)	679.86	Weight of Dry Soil (gm)	100.02
Moisture Content (%)	**5.9**	**Moisture Content (%)**	**2.6**

Wet Weight -3/4" Sample (gm)	20947.39	Weight of the Dry Specimen (gm)	679.86
Dry Weight - 3/4" Sample (gm)	19785.9	Weight of minus #200 material (gm)	370.64
Wet Weight +3/4" Sample (gm)	87.51	Weight of plus #200 material (gm)	309.22
Dry Weight + 3/4" Sample (gm)	85.30		
Total Dry Weight Sample (gm)	19871.2	**J - Factor (Percent Finer than 3/4")**	**0.9957**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.00**
6"	150	0.00		0.00	0.00	100.00	**100.00**
3"	75	0.00		0.00	0.00	100.00	**100.00**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100.00**
1"	25.0	63.79		0.31	0.31	99.69	**99.69**
3/4"	19.0	23.72		0.12	0.43	99.57	**99.57**
1/2"	12.5	0.00		0.00	0.00	100.00	**99.57**
3/8"	9.50	1.91		0.28	0.28	99.72	**99.29**
#4	4.75	11.55		1.70	1.98	98.02	**97.60**
#10	2.00	26.89		3.96	5.94	94.06	**93.66**
#20	0.85	48.13	(**)	7.08	13.01	86.99	**86.61**
#40	0.425	45.28		6.66	19.67	80.33	**79.98**
#60	0.250	45.07		6.63	26.30	73.70	**73.38**
#140	0.106	100.42		14.77	41.07	58.93	**58.67**
#200	0.075	29.97		4.41	45.48	54.52	**54.28**
Pan	-	370.64		54.52	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen*

Tested By SS Date 1/3/14 Checked By GCM Date 1-9-14

HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	33.0	22.1	4.97	28.0	98.3	0.01311	0.0306	**53.3**
5	31.0	22.1	4.97	26.0	91.3	0.01311	0.0196	**49.5**
15	29.5	22.2	4.95	24.6	86.1	0.01310	0.0114	**46.7**
30	26.5	22.1	4.97	21.5	75.5	0.01311	0.0083	**41.0**
60	25.5	22	4.99	20.5	71.9	0.01313	0.0059	**39.0**
250	21.0	22.1	4.97	16.0	56.2	0.01311	0.0030	**30.5**
1440	20.0	21.9	5.02	15.0	52.5	0.01314	0.0012	**28.5**

Soil Specimen Data		Other Corrections	
Tare No.	3		
Tare + Dry Material (gm)	346.79	a - Factor	0.99
Weight of Tare (gm)	313.55		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	54.28
Weight of Dry Material (gm)	28.24		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By SS Date 1/6/14 Checked By GEM Date 1-9-14

DCN: CT-S3B DATE:1/28/08 REVISION: 7 [illegible]CTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-01 JSievehyd 200 with Raleigh Comp Correct.xls]Sheet1

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INTEGRITY IN TESTING

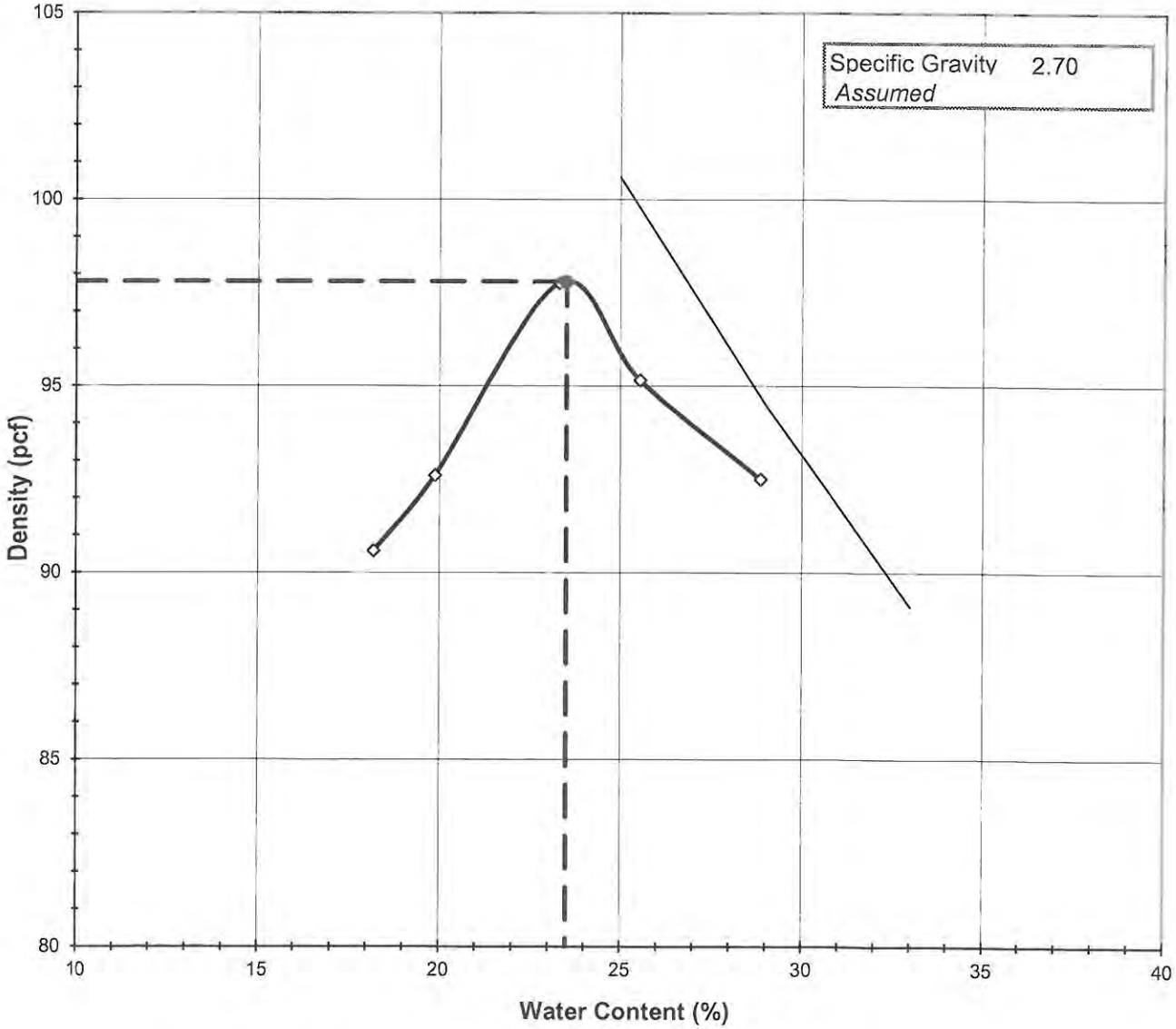
MOISTURE DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01	Test Method	**STANDARD**

Visual Description BROWN SANDY FAT CLAY

Optimum Water Content	**23.5**
Maximum Dry Density	**97.8**



Tested By CDS *Date* 1/2/14 *Checked By* GEM *Date* 1-9-14

 DCN:CT-S12 DATE:12/11/00 REVISION 5 *T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-01 Proctor wHeaders.xls]Sheet1*

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INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID	2013-784-04-01		

Visual Description BROWN SANDY FAT CLAY

Total Weight of the Sample (gm)	21050
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	1
Percent Retained on #4	4
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold		4188
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5796	5856	5999	5983	5979
Wt.of Mold (gm)	4188	4188	4188	4188	4188
Wt. of WS	1608	1668	1811	1794	1791
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	825	801	820	823	809
Wt. of Tare & WS (gm)	270.36	582.41	540.26	586.43	412.77
Wt. of Tare & DS (gm)	249.88	502.32	463.04	494.81	346.20
Wt. of Tare (gm)	137.34	99.46	131.71	136.09	115.56
Wt. of Water (gm)	20.48	80.09	77.22	91.62	66.57
Wt. of DS (gm)	112.54	402.86	331.33	358.72	230.64

Wet Density (gm/cc)	1.72	1.78	1.93	1.91	1.91
Wet Density (pcf)	107.1	111.0	120.5	119.5	119.2
Moisture Content (%)	**18.2**	**19.9**	**23.3**	**25.5**	**28.9**
Dry Density (pcf)	**90.6**	**92.6**	**97.8**	**95.2**	**92.5**

Zero Air Voids

Moisture Content (%)	25.0	29.0	33.0
Dry Unit Weight (pcf)	100.6	94.5	89.1

Tested By CDS *Date* 1/2/14 *Checked By* GEM *Date* 1-9-14

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INTEGRITY IN TESTING

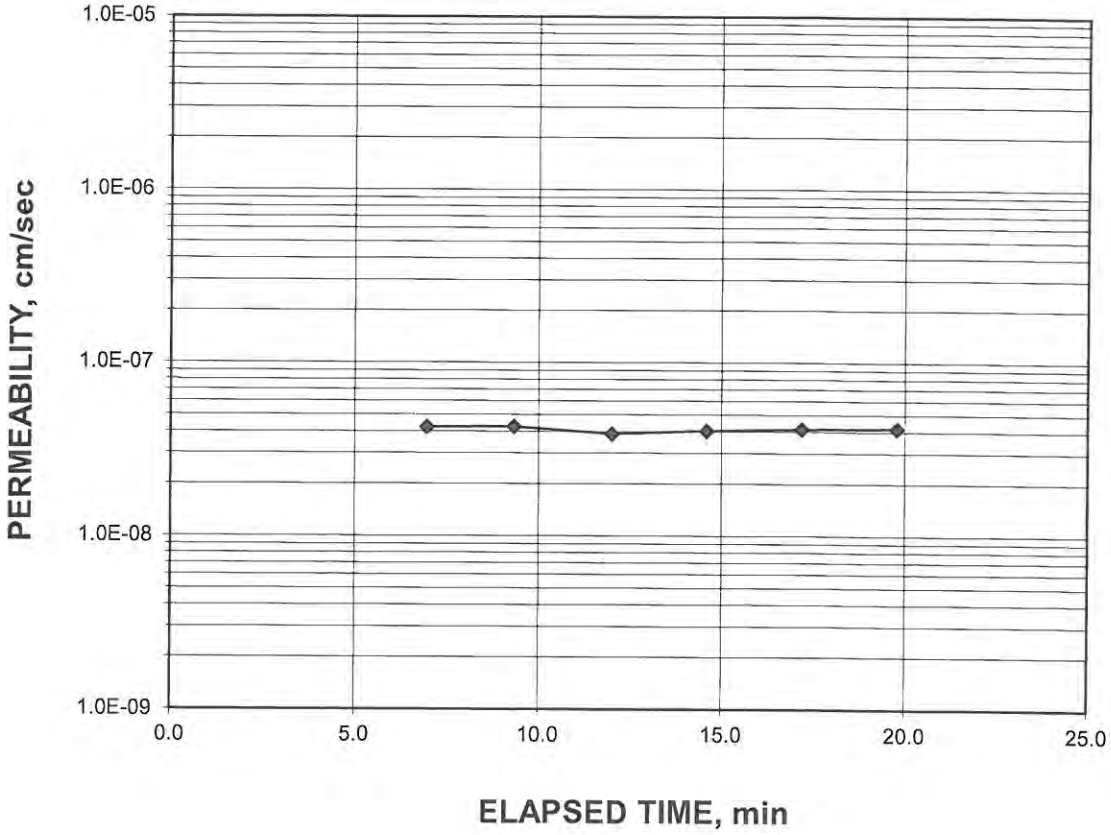
FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	ST-TP-03
Lab ID No.	2013-784-04-04		

Visual Description: BROWN CLAY WITH GRAVEL

AVERAGE PERMEABILITY = 4.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 12/23/13 Checked By: GBM Date: 12-27-13

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INTEGRITY IN TESTING

FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	ST-TP-03
Lab ID No.	2013-784-04-04		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN CLAY WITH GRAVEL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	806	33
Wt. of Tare & WS (gm.)	352.87	151.21
Wt. of Tare & DS (gm.)	297.38	125.88
Wt. of Tare (gm.)	100.46	36.88
Wt. of Water (gm.)	55.49	25.33
Wt. of DS (gm.)	196.92	89.00
Moisture Content (%)	**28.2**	**28.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	525.43	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	525.43	526.58
Length 1 (in.)	2.574	2.573
Length 2 (in.)	2.583	2.539
Length 3 (in.)	2.578	2.571
Top Diameter (in.)	2.851	2.861
Middle Diameter (in.)	2.840	2.861
Bottom Diameter (in.)	2.836	2.858
Average Length (in.)	2.58	2.56
Average Area (in.^{2})	6.35	6.42
Sample Volume (cm^3)	268.09	269.61
Unit Wet Wt. (gm./ cm^3)	1.960	1.953
Unit Wet Wt. (pcf)	122.3	121.9
Unit Dry Wt. (pcf)	95.4	94.9
Unit Dry Wt. (gm./ cm^3)	1.529	1.520
Void Ratio, e	0.766	0.776
Porosity, n	0.434	0.437
Pore Volume (cm^3)	116.3	117.8
Total Wt. Of Sample After Test		531.55

Tested By: SFS Date: 12/23/13 Checked By: GM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	ST-TP-03
Lab ID No.	2013-784-04-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	6.50
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.45
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 4.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.1E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
12/24/13	10	13	36	13.60	0.000	7.3	12.6	21.7	NA
12/24/13	10	20	33	20.55	6.950	7.0	12.0	21.7	4.2E-08
12/24/13	10	22	56	22.93	9.333	6.9	11.8	21.7	4.3E-08
12/24/13	10	25	36	25.60	12.000	6.8	11.6	21.7	3.9E-08
12/24/13	10	28	12	28.20	14.600	6.7	11.4	21.7	4.0E-08
12/24/13	10	30	47	30.78	17.183	6.6	11.2	21.7	4.1E-08
12/24/13	10	33	23	33.38	19.783	6.5	11.0	21.7	4.2E-08

Tested By: SFS Date: 12/23/13 Checked By: GEM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

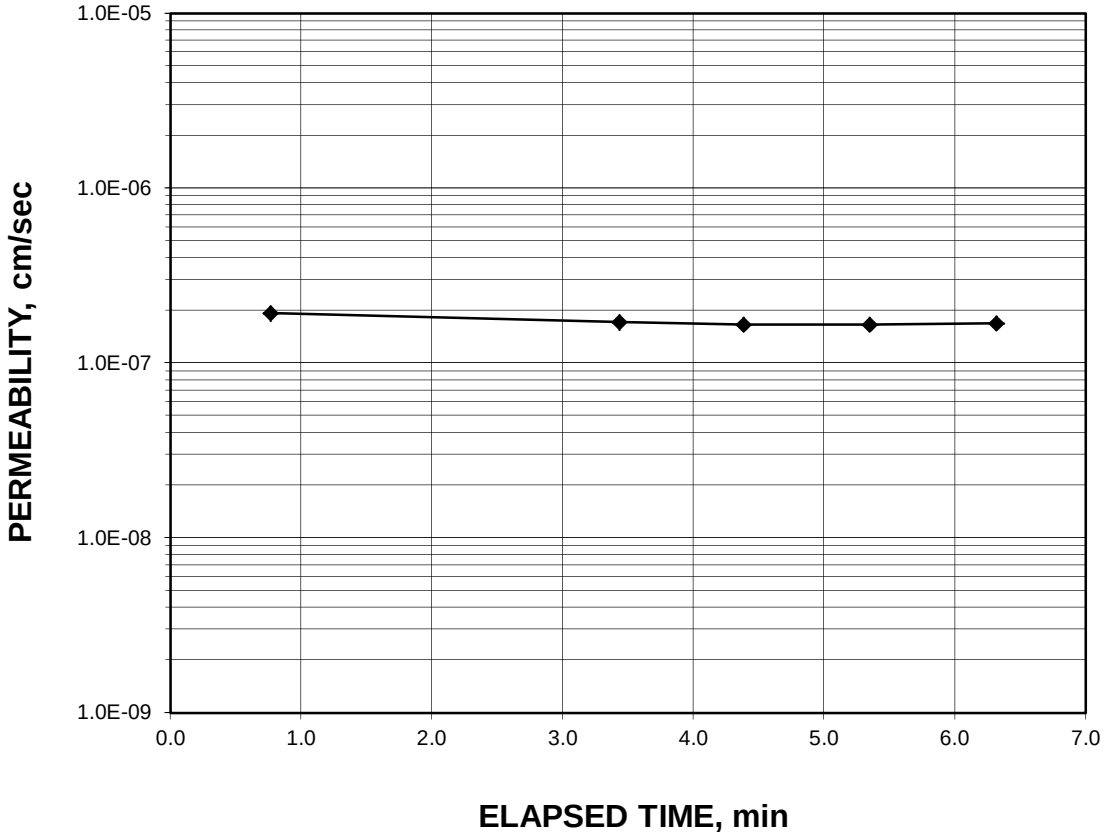
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID No.	2013-784-04-01		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 1.7E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: CDS Date: 1/9/14 Checked By: GEM Date: 1/15/14

DCN: CT-22A DATE:2-2-10 REVISION:26 J:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID No.	2013-784-04-01		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	809	B-1
Wt. of Tare & WS (gm.)	243.16	530.83
Wt. of Tare & DS (gm.)	217.16	428
Wt. of Tare (gm.)	155.44	95.83
Wt. of Water (gm.)	26.00	102.83
Wt. of DS (gm.)	61.72	332.17
Moisture Content (%)	**42.1**	**31.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2442.59	NA
Wt. of Tube (gm.)	1633.07	NA
Wt. of WS (calc.) (gm.)	809.52	745.91
Length 1 (in.)	4.009	4.070
Length 2 (in.)	4.009	4.056
Length 3 (in.)	4.009	4.054
Top Diameter (in.)	2.869	2.879
Middle Diameter (in.)	2.869	2.880
Bottom Diameter (in.)	2.869	2.896
Average Length (in.)	4.01	4.06
Average Area (in.^{2})	6.46	6.54
Sample Volume (cm^3)	424.71	434.92
Unit Wet Wt. (gm./ cm^3)	1.906	1.715
Unit Wet Wt. (pcf)	119.0	107.1
Unit Dry Wt. (pcf)	83.7	81.7
Unit Dry Wt. (gm./ cm^3)	1.341	1.310
Void Ratio, e	1.013	1.062
Porosity, n	0.503	0.515
Pore Volume (cm^3)	213.8	224.0
Total Wt. Of Sample After Test		848.48

Tested By: CDS Date: 1/9/14 Checked By: GEM Date: 1/15/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 3
Project No.	2013-784-04	Sample No.	CL-3
Lab ID No.	2013-784-04-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.31
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.17
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.7E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/14/14	13	47	39	47.65	0.000	7.4	8.1	21.9	NA
1/14/14	13	48	25	48.42	0.767	7.3	8.0	21.9	1.9E-07
1/14/14	13	51	5	51.08	3.433	7.0	7.6	21.9	1.7E-07
1/14/14	13	52	2	52.03	4.383	6.9	7.5	21.9	1.7E-07
1/14/14	13	53	0	53.00	5.350	6.8	7.3	21.9	1.7E-07
1/14/14	13	53	58	53.97	6.317	6.7	7.2	21.9	1.7E-07

Tested By: CDS Date: 1/9/14 Checked By: GEM Date: 1/15/14

DCN: CT-22A DATE:2-2-10 REVISION:5 I:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

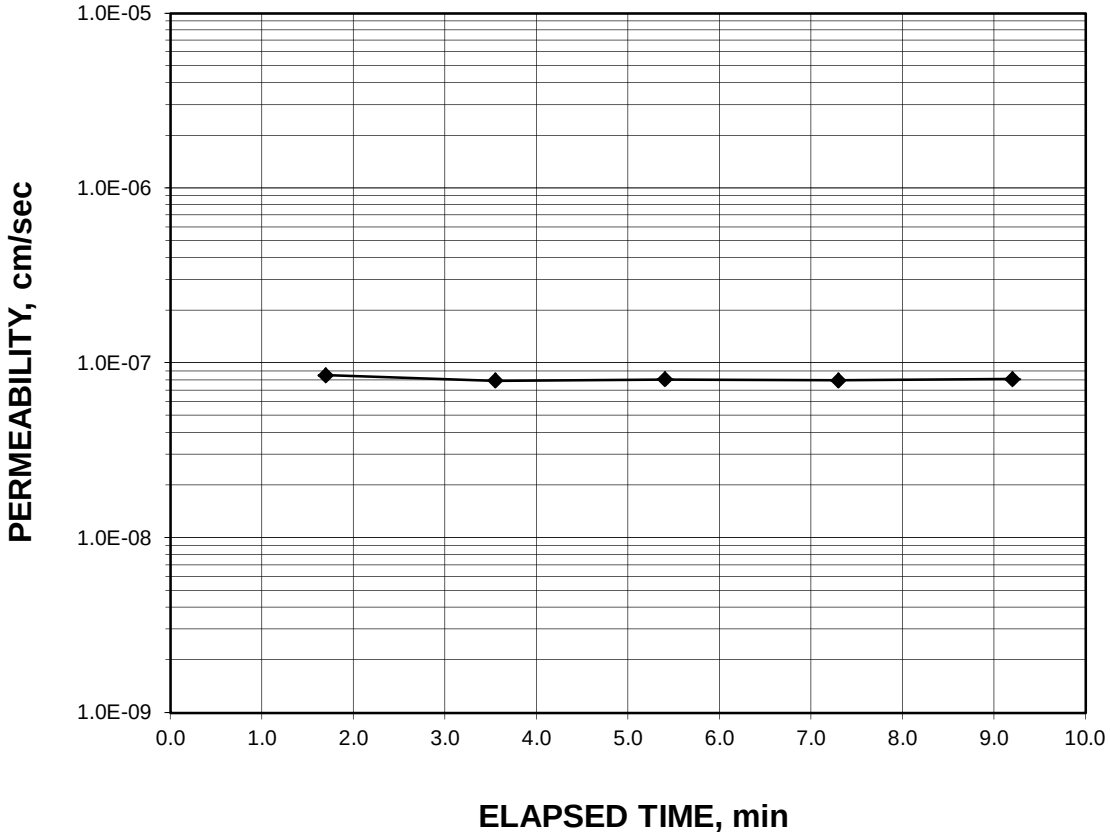
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3
Lab ID No.	2014-610-02-03		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 8.0E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 8.0E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3
Lab ID No.	2014-610-02-03		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	Y-11
Wt. of Tare & WS (gm.)	275.17	503.98
Wt. of Tare & DS (gm.)	236.72	410.39
Wt. of Tare (gm.)	93.56	93.51
Wt. of Water (gm.)	38.45	93.59
Wt. of DS (gm.)	143.16	316.88
Moisture Content (%)	**26.9**	**29.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2436.31	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	803.26	820.21
Length 1 (in.)	4.009	4.011
Length 2 (in.)	4.009	3.992
Length 3 (in.)	4.009	3.998
Top Diameter (in.)	2.869	2.865
Middle Diameter (in.)	2.869	2.847
Bottom Diameter (in.)	2.869	2.871
Average Length (in.)	4.01	4.00
Average Area (in.^{2})	6.46	6.43
Sample Volume (cm^3)	424.71	421.43
Unit Wet Wt. (gm./ cm^3)	1.891	1.946
Unit Wet Wt. (pcf)	118.1	121.5
Unit Dry Wt. (pcf)	93.1	93.8
Unit Dry Wt. (gm./ cm^3)	1.491	1.503
Void Ratio, e	0.811	0.797
Porosity, n	0.448	0.444
Pore Volume (cm^3)	190.2	186.9
Total Wt. Of Sample After Test		823.41

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3
Lab ID No.	2014-610-02-03		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.16
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.48
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 8.0E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 8.0E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/19/14	16	57	6	57.10	0.000	7.5	8.4	22.2	NA
1/19/14	16	58	48	58.80	1.700	7.4	8.2	22.2	8.5E-08
1/19/14	17	0	39	0.65	3.550	7.3	8.1	22.2	7.9E-08
1/19/14	17	2	30	2.50	5.400	7.2	8.0	22.2	8.1E-08
1/19/14	17	4	24	4.40	7.300	7.1	7.8	22.2	8.0E-08
1/19/14	17	6	18	6.30	9.200	7.0	7.7	22.2	8.1E-08

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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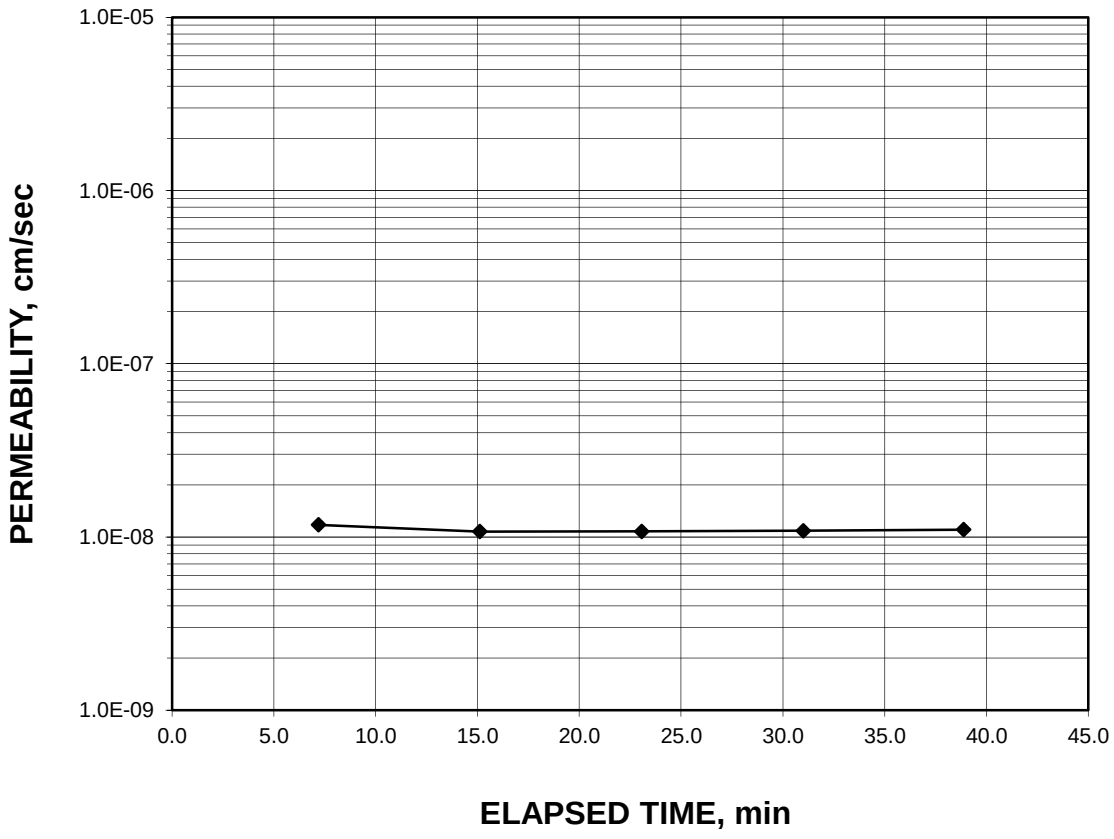
Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3 3.5%M 96.5%C
Lab ID No.	2014-610-02-03		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-27-2014 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-03 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3 3.5%M 96.5%C
Lab ID No.	2014-610-02-03		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	800	808
Wt. of Tare & WS (gm.)	323.59	442.3
Wt. of Tare & DS (gm.)	276.80	365.16
Wt. of Tare (gm.)	103.68	104.45
Wt. of Water (gm.)	46.79	77.14
Wt. of DS (gm.)	173.12	260.71
Moisture Content (%)	**27.0**	**29.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2453.32	NA
Wt. of Tube (gm.)	1632.93	NA
Wt. of WS (calc.) (gm.)	820.39	836.93
Length 1 (in.)	4.009	4.005
Length 2 (in.)	4.009	3.981
Length 3 (in.)	4.009	4.013
Top Diameter (in.)	2.869	2.873
Middle Diameter (in.)	2.869	2.873
Bottom Diameter (in.)	2.869	2.875
Average Length (in.)	4.01	4.00
Average Area (in.^{2})	6.46	6.49
Sample Volume (cm^3)	424.71	425.10
Unit Wet Wt. (gm./ cm^3)	1.932	1.969
Unit Wet Wt. (pcf)	120.6	122.9
Unit Dry Wt. (pcf)	94.9	94.8
Unit Dry Wt. (gm./ cm^3)	1.521	1.519
Void Ratio, e	0.776	0.777
Porosity, n	0.437	0.437
Pore Volume (cm^3)	185.5	185.9
Total Wt. Of Sample After Test		830.95

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-03 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 3
Project No.	2014-610-02	Sample No.	CL-3 3.5%M 96.5%C
Lab ID No.	2014-610-02-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.16
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.84
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.1E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/23/14	10	53	13	53.22	0.000	12.5	14.8	20.1	NA
1/23/14	11	0	25	0.42	7.200	12.4	14.7	20.2	1.2E-08
1/23/14	11	8	20	8.33	15.117	12.3	14.5	20.3	1.1E-08
1/23/14	11	16	17	16.28	23.067	12.2	14.4	20.4	1.1E-08
1/23/14	11	24	13	24.22	31.000	12.1	14.3	20.5	1.1E-08
1/23/14	11	32	6	32.10	38.883	12.0	14.1	20.5	1.1E-08

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/24/14

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Soil Description	**RED BROWN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

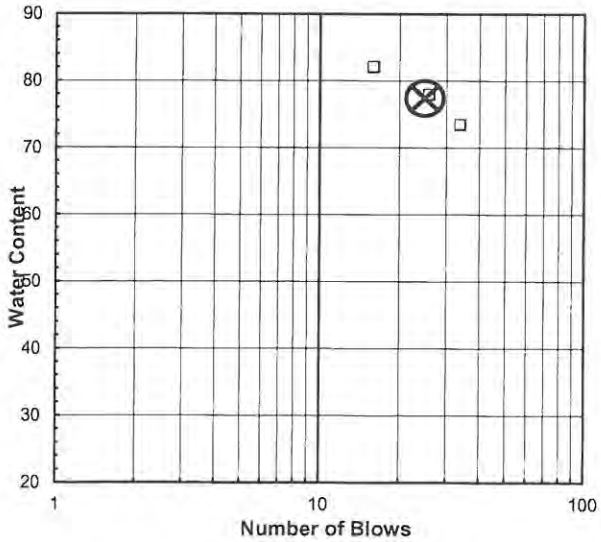
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	J	A-P	F	MULTIPOINT
Wt. of Tare & WS (gm)	27.94	27.82	27.48	
Wt. of Tare & DS (gm)	22.54	22.48	21.92	
Wt. of Tare (gm)	15.18	15.62	15.14	
Wt. of Water (gm)	5.4	5.3	5.6	
Wt. of DS (gm)	7.4	6.9	6.8	
Moisture Content (%)	**73.4**	**77.8**	**82.0**	
Number of Blows	**34**	**26**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	S	B	
Wt. of Tare & WS (gm)	23.91	22.66	
Wt. of Tare & DS (gm)	21.84	20.86	
Wt. of Tare (gm)	15.19	15.20	
Wt. of Water (gm)	2.1	1.8	
Wt. of DS (gm)	6.7	5.7	
Moisture Content (%)	**31.1**	**31.8**	**-0.7**

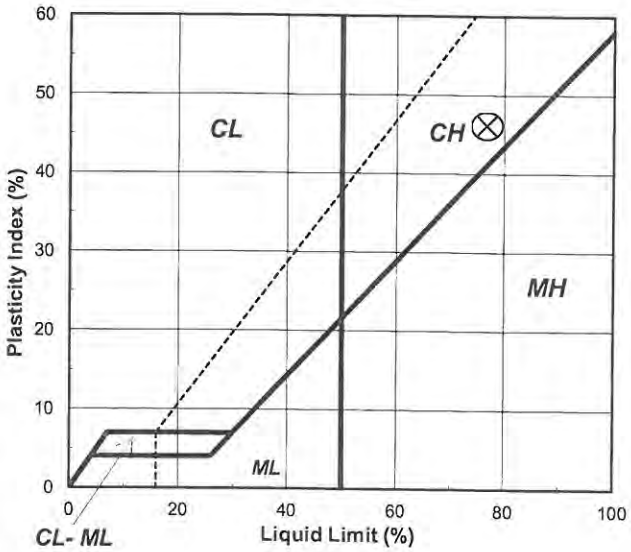
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**77**
Plastic Limit (%)	**31**
Plasticity Index (%)	**46**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *12/31/13* *Checked By* GEM *Date* 1-9-14

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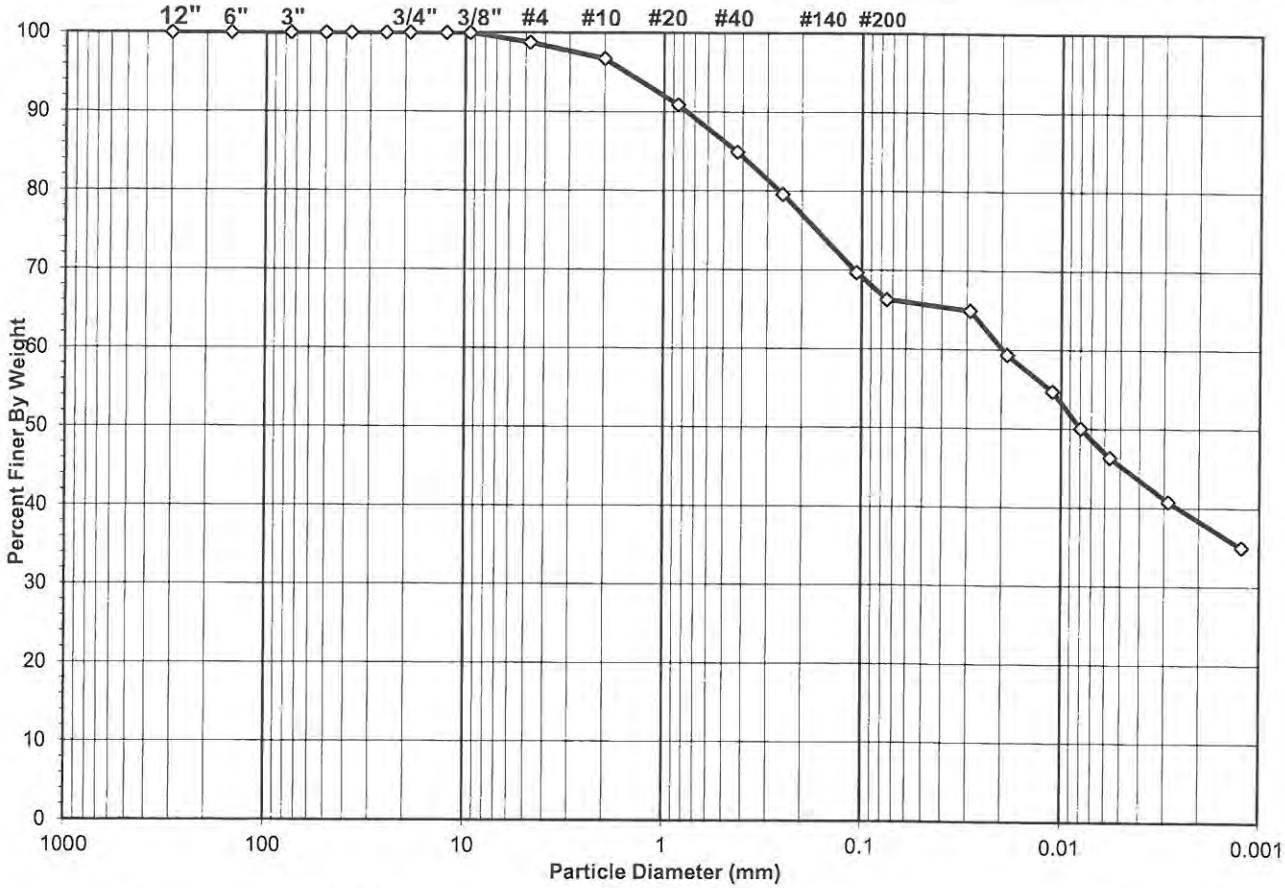
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Soil Color	**RED BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



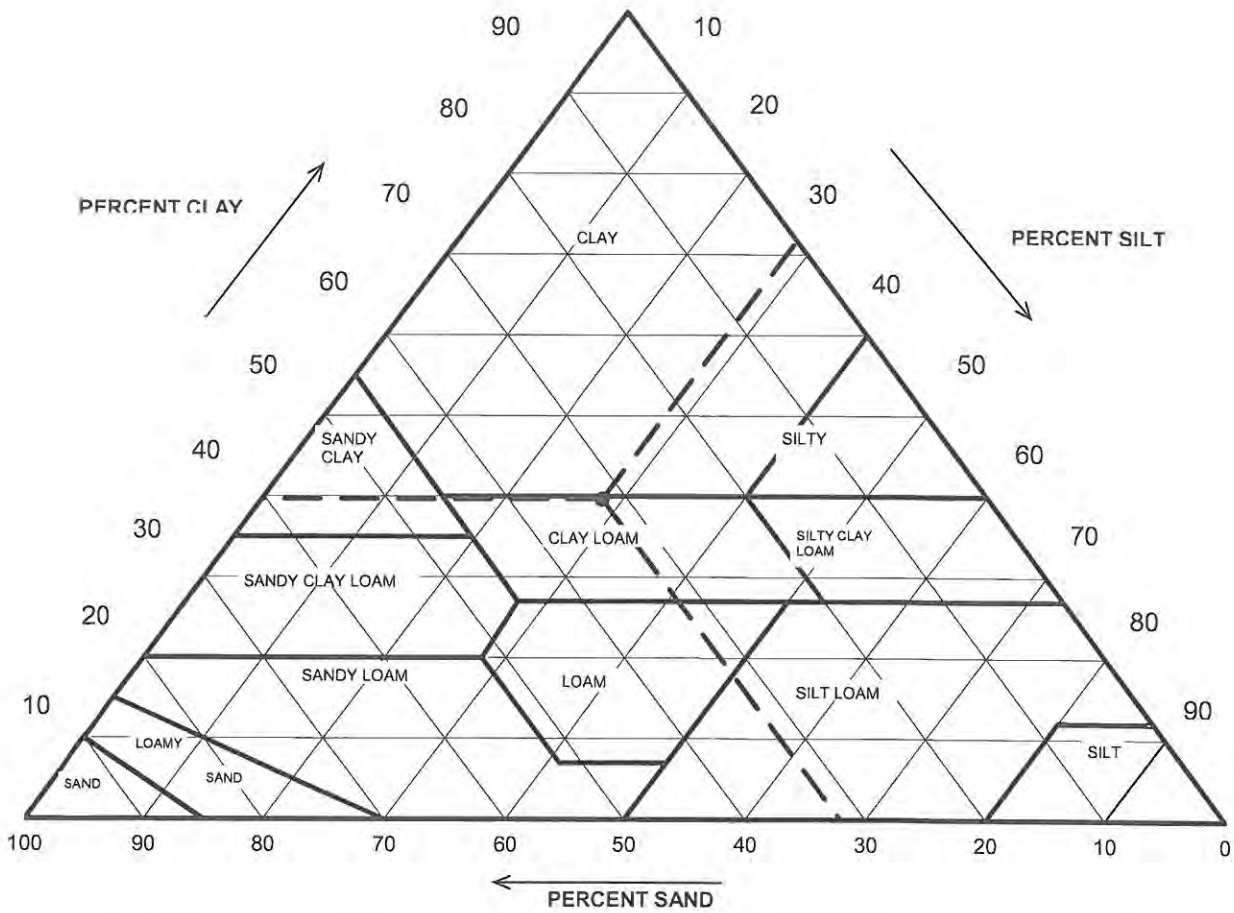
Sieve Sizes (mm)	USCS Summary	Percentage
Greater Than #4	*Gravel*	1.24
#4 To #200	*Sand*	32.47
Finer Than #200	*Silt & Clay*	66.29

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Soil Color	RED BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	3.27	**0.00**
2	96.73	*Sand*	31.03	**32.08**
0.05	65.71	*Silt*	27.35	**28.27**
0.002	38.36	*Clay*	38.36	**39.65**

USDA Classification ***CLAY LOAM***

WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Soil Color	RED BROWN

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	834	Tare No.	831
Wgt.Tare + Wet Specimen (gm)	826.26	Wgt.Tare + Wet Specimen (gm)	300.79
Wgt.Tare + Dry Specimen (gm)	774.41	Wgt.Tare + Dry Specimen (gm)	299.81
Weight of Tare (gm)	259.49	Weight of Tare (gm)	262.48
Weight of Water (gm)	51.85	Weight of Water (gm)	0.98
Weight of Dry Soil (gm)	514.92	Weight of Dry Soil (gm)	37.33
Moisture Content (%)	**10.1**	**Moisture Content (%)**	**2.6**

Wet Weight -3/4" Sample (gm)	20461.77	Weight of the Dry Specimen (gm)	514.92
Dry Weight - 3/4" Sample (gm)	18589.9	Weight of minus #200 material (gm)	341.33
Wet Weight +3/4" Sample (gm)	0.00	Weight of plus #200 material (gm)	173.59
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	18589.9	**J - Factor (Percent Finer than 3/4")**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.00**
6"	150	0.00		0.00	0.00	100.00	**100.00**
3"	75	0.00		0.00	0.00	100.00	**100.00**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100.00**
1"	25.0	0.00		0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00		0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00		0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00		0.00	0.00	100.00	**100.00**
#4	4.75	6.38		1.24	1.24	98.76	**98.76**
#10	2.00	10.44		2.03	3.27	96.73	**96.73**
#20	0.85	30.06	(**)	5.84	9.10	90.90	**90.90**
#40	0.425	30.72		5.97	15.07	84.93	**84.93**
#60	0.250	27.47		5.33	20.41	79.59	**79.59**
#140	0.106	51.12		9.93	30.33	69.67	**69.67**
#200	0.075	17.40		3.38	33.71	66.29	**66.29**
Pan	-	341.33		66.29	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen*

Tested By SS Date 1/3/14 Checked By GEM Date 1-9-14

HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Soil Color	**RED BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	40.0	22.1	4.97	35.0	97.9	0.01311	0.0289	**64.9**
5	37.0	22.1	4.97	32.0	89.5	0.01311	0.0188	**59.4**
15	34.5	22.1	4.97	29.5	82.6	0.01311	0.0110	**54.7**
30	32.0	22.1	4.97	27.0	75.6	0.01311	0.0080	**50.1**
61	30.0	22.1	4.97	25.0	70.0	0.01311	0.0057	**46.4**
250	27.0	22	4.99	22.0	61.5	0.01313	0.0029	**40.8**
1440	24.0	21.5	5.11	18.9	52.8	0.01321	0.0012	**35.0**

Soil Specimen Data		Other Corrections	
Tare No.	2		
Tare + Dry Material (gm)	354.09	a - Factor	0.99
Weight of Tare (gm)	313.68		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	66.29
Weight of Dry Material (gm)	35.41		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By SS Date 1/6/14 Checked By GEM Date 1-9-14

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INTEGRITY IN TESTING

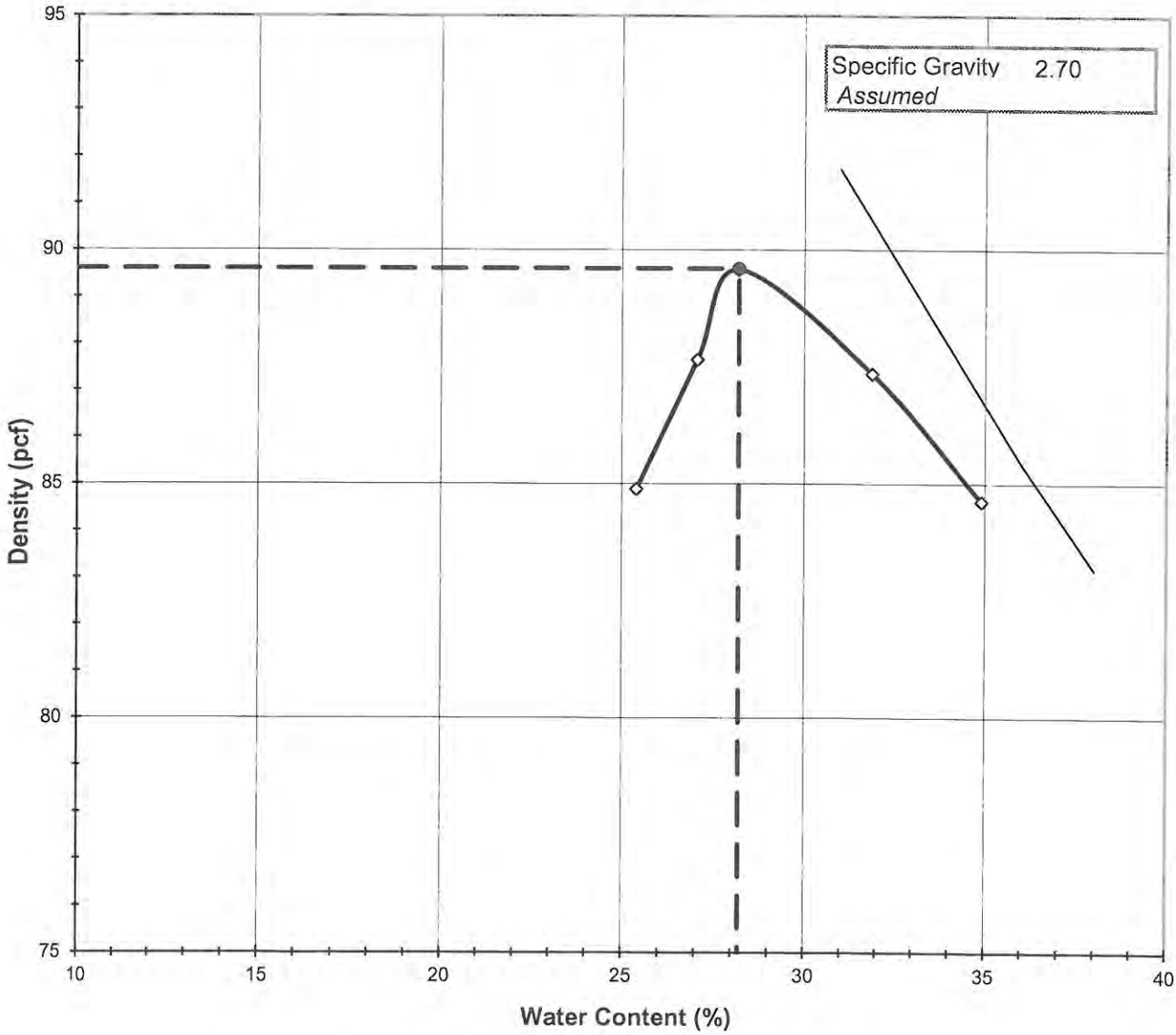
MOISTURE DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02	Test Method	**STANDARD**

Visual Description RED BROWN SANDY FAT CLAY

Optimum Water Content **28.2**
Maximum Dry Density **89.6**



Tested By CDS *Date* 1/2/14 *Checked By* GEM *Date* 1-9-14

 DCN:CT-S12 DATE:12/11/00 REVISION 5 *T:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH [2013-784-04-02 Proctor wHeaders.xls]Sheet1*

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-07e1

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Reference	ROXBORO P6A ASH LF	Depth (ft)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID	2013-784-04-02		

Visual Description RED BROWN SANDY FAT CLAY

Total Weight of the Sample (gm)	20500
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	0
Percent Retained on 3/8"	1
Percent Retained on #4	1
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold		4188
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5787	5861	5913	5919	5903
Wt.of Mold (gm)	4188	4188	4188	4188	4188
Wt. of WS	1599	1673	1725	1730	1715
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	826	827	317	307	300
Wt. of Tare & WS (gm)	333.89	412.54	565.37	583.49	374.07
Wt. of Tare & DS (gm)	294.22	354.23	459.47	468.94	305.86
Wt. of Tare (gm)	138.05	138.82	83.92	109.60	110.50
Wt. of Water (gm)	39.67	58.31	105.90	114.55	68.21
Wt. of DS (gm)	156.17	215.41	375.55	359.34	195.36

Wet Density (gm/cc)	1.71	1.78	1.84	1.85	1.83
Wet Density (pcf)	106.4	111.4	114.8	115.2	114.2
Moisture Content (%)	**25.4**	**27.1**	**28.2**	**31.9**	**34.9**
Dry Density (pcf)	**84.9**	**87.7**	**89.6**	**87.4**	**84.6**

Zero Air Voids

Moisture Content (%)	31.0	36.0	38.0
Dry Unit Weight (pcf)	91.7	85.4	83.2

Tested By CDS *Date* 1/2/14 *Checked By* GEM *Date* 1-9-14

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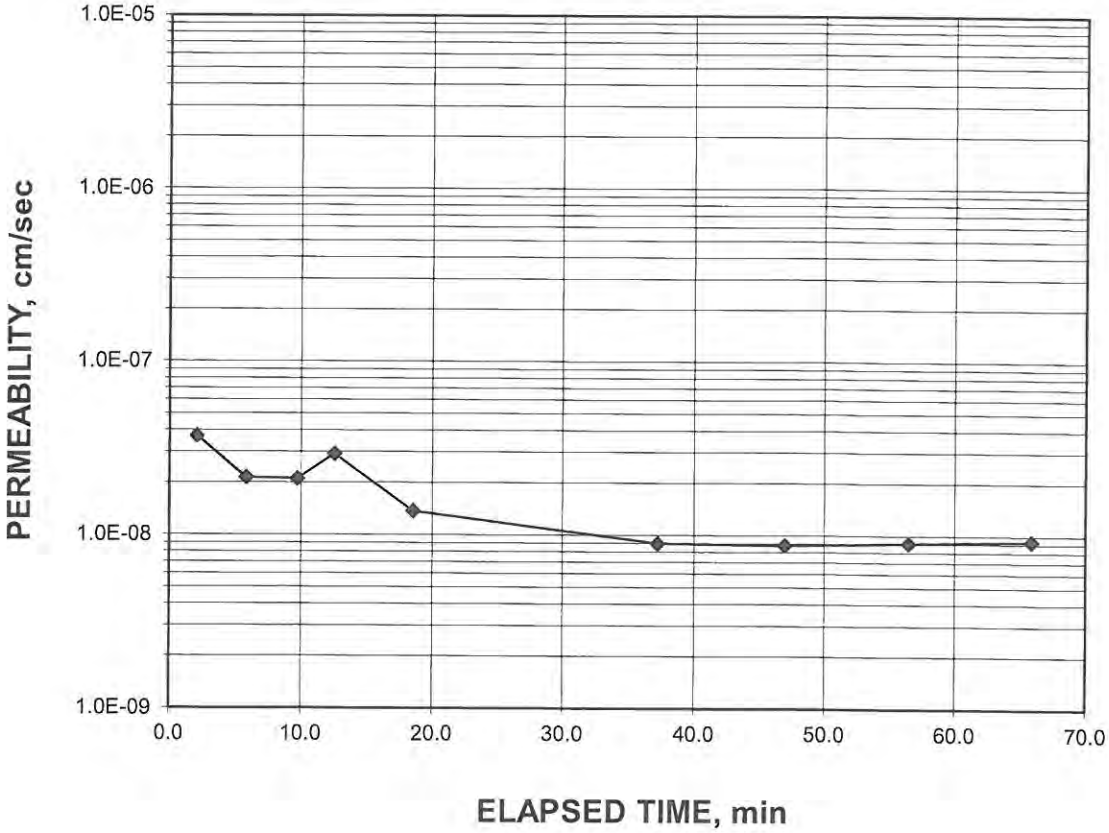
FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	ST-TP-04
Lab ID No.	2013-784-04-05		

Visual Description: BROWN CLAY WITH GRAVEL

AVERAGE PERMEABILITY = 9.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 9.0E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 12/23/13 Checked By: GBM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	ST-TP-04
Lab ID No.	2013-784-04-05		

Specific Gravity	2.70	Assumed
Sample Condition		Undisturbed

Visual Description: BROWN CLAY WITH GRAVEL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	8
Wt. of Tare & WS (gm.)	318.82	150.33
Wt. of Tare & DS (gm.)	272.33	120.22
Wt. of Tare (gm.)	107.28	36.51
Wt. of Water (gm.)	46.49	30.11
Wt. of DS (gm.)	165.05	83.71
Moisture Content (%)	**28.2**	**36.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	557.20	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	557.20	591.12
Length 1 (in.)	2.873	2.853
Length 2 (in.)	2.869	2.867
Length 3 (in.)	2.881	2.829
Top Diameter (in.)	2.863	2.869
Middle Diameter (in.)	2.860	2.871
Bottom Diameter (in.)	2.861	2.874
Average Length (in.)	2.87	2.85
Average Area (in.^{2})	6.43	6.48
Sample Volume (cm^3)	302.88	302.38
Unit Wet Wt. (gm./ cm^3)	1.840	1.955
Unit Wet Wt. (pcf)	114.8	122.0
Unit Dry Wt. (pcf)	89.6	89.7
Unit Dry Wt. (gm./ cm^3)	1.435	1.438
Void Ratio, e	0.881	0.878
Porosity, n	0.468	0.468
Pore Volume (cm^3)	141.9	141.4
Total Wt. Of Sample After Test		563.40

Tested By: SFS Date: 12/23/13 Checked By: BCM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	ST-TP-04
Lab ID No.	2013-784-04-05		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	7.24
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.78
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 9.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 9.0E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
12/24/13	9	30	28	30.47	0.000	9.5	15.3	21.7	NA
12/24/13	9	32	36	32.60	2.133	9.4	15.2	21.7	3.7E-08
12/24/13	9	36	21	36.35	5.883	9.3	15.0	21.7	2.1E-08
12/24/13	9	40	12	40.20	9.733	9.2	14.8	21.7	2.1E-08
12/24/13	9	43	0	43.00	12.533	9.1	14.6	21.7	2.9E-08
12/24/13	9	49	1	49.02	18.550	9.0	14.4	21.9	1.4E-08
12/24/13	10	7	41	7.68	37.217	8.8	14.1	22.0	9.0E-09
12/24/13	10	17	26	17.43	46.967	8.7	13.9	22.0	8.8E-09
12/24/13	10	26	58	26.97	56.500	8.6	13.7	22.1	9.1E-09
12/24/13	10	36	22	36.37	65.900	8.5	13.5	22.1	9.3E-09

Tested By: SFS Date: 12/23/13 Checked By: GPM Date: 12-27-13

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

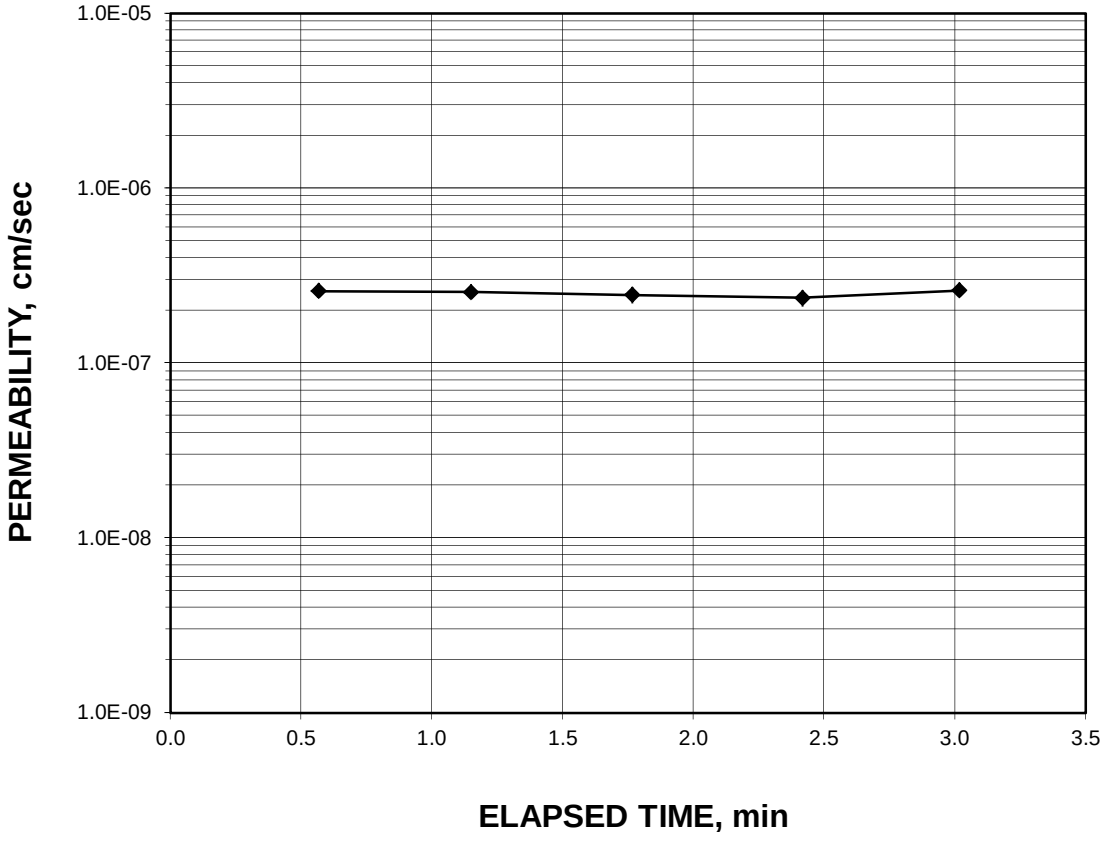
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID No.	2013-784-04-02		

Visual Description: RED AND BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

DCN: CT-22A DATE:2-2-10 REVISION:26 J:\2013 PROJECTS\2013-784 BLACKROCK P6A ASH\[2013-784-04-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID No.	2013-784-04-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: RED AND BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	802	z-12
Wt. of Tare & WS (gm.)	197.69	414.13
Wt. of Tare & DS (gm.)	175.78	326.43
Wt. of Tare (gm.)	104.09	90.28
Wt. of Water (gm.)	21.91	87.70
Wt. of DS (gm.)	71.69	236.15
Moisture Content (%)	**30.6**	**37.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2392.86	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	759.81	798.07
Length 1 (in.)	4.009	4.023
Length 2 (in.)	4.009	4.044
Length 3 (in.)	4.009	4.033
Top Diameter (in.)	2.869	2.856
Middle Diameter (in.)	2.869	2.889
Bottom Diameter (in.)	2.869	2.894
Average Length (in.)	4.01	4.03
Average Area (in.^{2})	6.46	6.51
Sample Volume (cm^3)	424.71	430.47
Unit Wet Wt. (gm./ cm^3)	1.789	1.854
Unit Wet Wt. (pcf)	111.7	115.7
Unit Dry Wt. (pcf)	85.5	84.4
Unit Dry Wt. (gm./ cm^3)	1.370	1.352
Void Ratio, e	0.970	0.997
Porosity, n	0.493	0.499
Pore Volume (cm^3)	209.2	214.9
Total Wt. Of Sample After Test		802.78

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO P6A ASH LF	Depth (ft.)	LIFT 4
Project No.	2013-784-04	Sample No.	CL-4
Lab ID No.	2013-784-04-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.24
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.02
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/13/14	11	39	44	39.73	0.000	7.4	8.2	22.1	NA
1/13/14	11	40	18	40.30	0.567	7.3	8.0	22.1	2.6E-07
1/13/14	11	40	53	40.88	1.150	7.2	7.9	22.1	2.6E-07
1/13/14	11	41	30	41.50	1.767	7.1	7.8	22.1	2.5E-07
1/13/14	11	42	9	42.15	2.417	7.0	7.6	22.1	2.4E-07
1/13/14	11	42	45	42.75	3.017	6.9	7.5	22.1	2.6E-07

Tested By: SFS Date: 1/10/14 Checked By: GEM Date: 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

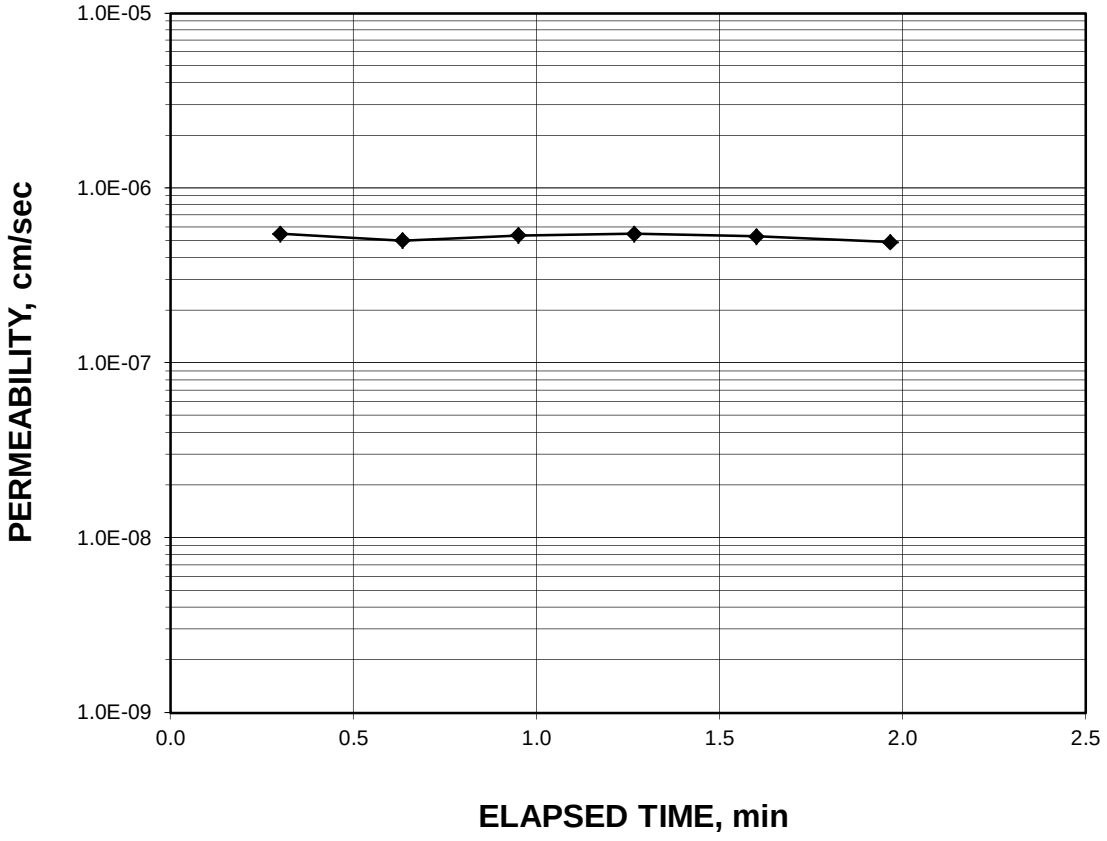
Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4
Lab ID No.	2014-610-02-04		

Visual Description: RED AND BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 5.3E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 5.3E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4
Lab ID No.	2014-610-02-04		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: RED AND BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	812	B-1
Wt. of Tare & WS (gm.)	296.75	464.04
Wt. of Tare & DS (gm.)	251.23	366.28
Wt. of Tare (gm.)	106.90	95.72
Wt. of Water (gm.)	45.52	97.76
Wt. of DS (gm.)	144.33	270.56
Moisture Content (%)	**31.5**	**36.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2395.98	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	762.93	789.57
Length 1 (in.)	4.009	4.027
Length 2 (in.)	4.009	4.043
Length 3 (in.)	4.009	4.053
Top Diameter (in.)	2.869	2.869
Middle Diameter (in.)	2.869	2.830
Bottom Diameter (in.)	2.869	2.870
Average Length (in.)	4.01	4.04
Average Area (in.^{2})	6.46	6.41
Sample Volume (cm^3)	424.71	424.32
Unit Wet Wt. (gm./ cm^3)	1.796	1.861
Unit Wet Wt. (pcf)	112.1	116.2
Unit Dry Wt. (pcf)	85.2	85.3
Unit Dry Wt. (gm./ cm^3)	1.366	1.367
Void Ratio, e	0.977	0.975
Porosity, n	0.494	0.494
Pore Volume (cm^3)	209.9	209.5
Total Wt. Of Sample After Test		794.31

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4
Lab ID No.	2014-610-02-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.26
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.34
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 5.3E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 5.3E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/19/14	16	59	14	59.23	0.000	6.8	7.4	22.2	NA
1/19/14	16	59	32	59.53	0.300	6.7	7.3	22.2	5.5E-07
1/19/14	16	59	52	59.87	0.633	6.6	7.1	22.2	5.0E-07
1/19/14	17	0	11	0.18	0.950	6.5	7.0	22.2	5.4E-07
1/19/14	17	0	30	0.50	1.267	6.4	6.9	22.2	5.5E-07
1/19/14	17	0	50	0.83	1.600	6.3	6.7	22.2	5.3E-07
1/19/14	17	1	12	1.20	1.967	6.2	6.6	22.2	4.9E-07

Tested By: SFS Date: 1/16/14 Checked By: GEM Date: 1/20/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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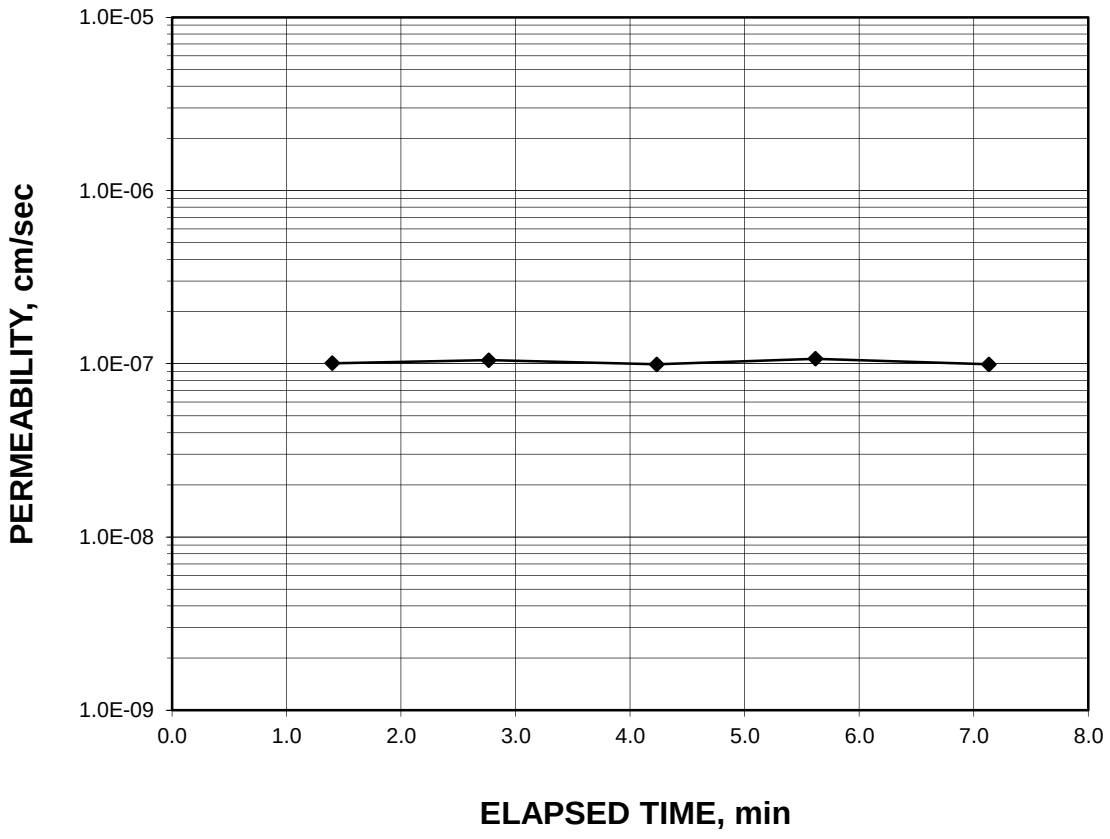
Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4 3.5%M 96.5%C
Lab ID No.	2014-610-02-04		

Visual Description: RED AND BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = 1.0E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.0E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/28/14

DCN: CT-22A DATE:2-27-2008 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-04 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4 3.5%M 96.5%C
Lab ID No.	2014-610-02-04		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: RED AND BROWN SANDY FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	814	806
Wt. of Tare & WS (gm.)	234.91	454.54
Wt. of Tare & DS (gm.)	205.09	360.65
Wt. of Tare (gm.)	111.15	100.53
Wt. of Water (gm.)	29.82	93.89
Wt. of DS (gm.)	93.94	260.12
Moisture Content (%)	**31.7**	**36.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2408.01	NA
Wt. of Tube (gm.)	1632.93	NA
Wt. of WS (calc.) (gm.)	775.08	800.68
Length 1 (in.)	4.009	4.018
Length 2 (in.)	4.009	3.994
Length 3 (in.)	4.009	4.000
Top Diameter (in.)	2.869	2.874
Middle Diameter (in.)	2.869	2.864
Bottom Diameter (in.)	2.869	2.874
Average Length (in.)	4.01	4.00
Average Area (in.^{2})	6.46	6.47
Sample Volume (cm^3)	424.71	424.67
Unit Wet Wt. (gm./ cm^3)	1.825	1.885
Unit Wet Wt. (pcf)	113.9	117.7
Unit Dry Wt. (pcf)	86.5	86.5
Unit Dry Wt. (gm./ cm^3)	1.385	1.385
Void Ratio, e	0.949	0.949
Porosity, n	0.487	0.487
Pore Volume (cm^3)	206.8	206.8
Total Wt. Of Sample After Test		798.22

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/28/14

DCN: CT-22A DATE:2-2-10 REVISION:5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-02-04 3.5%M 96.5%C Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	TEST PAD
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 4
Project No.	2014-610-02	Sample No.	CL-4 3.5%M 96.5%C
Lab ID No.	2014-610-02-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.17
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.76
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	96	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.0E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.0E-09 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	(min)	(sec)	(min)	ELAPSED TIME t (min)	PIPETTE READI NG R_p (cm)	INCREMENT GRADIENT i (cm/cm)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
1/27/14	11	36	31	36.52	0.000	7.5	8.3	23.0	NA
1/27/14	11	37	55	37.92	1.400	7.4	8.2	23.0	1.0E-07
1/27/14	11	39	17	39.28	2.767	7.3	8.1	23.0	1.0E-07
1/27/14	11	40	45	40.75	4.233	7.2	8.0	23.0	9.9E-08
1/27/14	11	42	8	42.13	5.617	7.1	7.8	23.0	1.1E-07
1/27/14	11	43	39	43.65	7.133	7.0	7.7	23.0	9.9E-08

Tested By: SFS Date: 1/22/14 Checked By: GEM Date: 1/28/14

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Appendix D – Compacted Soil Liner (CSL)
Section 4 – Summary of CSL Laboratory Test Results, CSL Laboratory Test Data

SUMMARY OF COMPACTED SOIL LINER (CSL) - LABORATORY CONFORMANCE TEST RESULTS

Duke Energy Progress - Roxboro Lined Ash Monofill - Phase 6A

McGehees Mill Rd Borrow Area - Roxboro, North Carolina

SAMPLE I.D.	SAMPLE LOCATION	LABORATORY SAMPLE DESCRIPTION	MOISTURE (%)	INDEX TESTING RESULTS								PROCTOR, TRIAXIAL COMPRESSION, INTERFACE FRICTION AND REMOLDED PERMEABILITY TEST RESULTS					
				ATTERBERG LIMITS			GRAIN SIZE ANALYSIS			CLASSIFICATION		STANDARD PROCTOR		TRIAXIAL COMPRESSION (CU)[1] or INTERFACE FRICTION[2]		Remolded Permeability (cm/sec) (D.D. @ %M) [% Proctor @ ±%OM]	Remolded Permeability (cm/sec) (D.D. @ %M) [% Proctor @ ±%OM]
				LL	PL	PI	% Gravel	% Sand	% Silt/Clay	USCS	USDA	Max. Dry Density (pcf)	Opt. Moisture (%)	Cohesion (psi)	Phi (degerees)		
CL-5	MMB-Area A 0.5 - 1.0	Light Brown Fat CLAY	31.9	64	19	45	0.4	30.9	68.8	CH	CLAY	101.6	21.6	--	--	$3.1x10^{-8}$ (97.4 pcf @ 23.6 %) [95.8% Pr @ +2.0% OM]	--
CL-6	MMB-Area B 0.5 - 1.0	Light Brown Fat CLAY	31.1	56	16	40	2.4	37.5	60.1	CH	CLAY	101.7	21.2	--	--	**$1.7x10^{-7}$** (96.4 pcf @ 23.4 %) [94.7% Pr @ +2.2% OM]	$1.9x10^{-8}$ (96.7 pcf @ 24.7%) [95.0% Pr @ +3.5% OM]
CL-7	MMB Area A	Brown Lean CLAY	25.7	38	19	19	0.1	31.7	68.2	CL	--	106.8	17.9	--	--	$2.2x10^{-8}$ (103.6 pcf @ 21.8 %) [97.0% Pr @ +3.9% OM]	--
CL-8	P6A	Orange Brown Fat Clay	29.5	59	28	31	0.2	39.0	60.8	CH	LOAM	--	--	--	--	--	--
CL-9	P6A	Tan Fat Clay	31.7	71	22	49	0.0	24.8	75.2	CH	CLAY	98.3	22.1	Peak= 14.0 [2] Res. =11.0 [2]	Peak =537 [2] Res. =286 [2]	$5.5x10^{-9}$ (96.0 pcf @ 24.5 %) [97.6% Pr @ +2.4% OM]	--
CL-10	P6A Acre 8 & 9	Orange Fat Clay	--	73	28	45	0.0	23.8	76.2	CH	CLAY	93.8	25.8	1.61 [1]	27.1 [1]	**$6.8x10^{-8}$** (91.9 pcf @ 27.9 %) [97.9% Pr @ +2.1% OM]	--
CL-11	P6A	Brown Sandy Clay w/Gravel	15.6	38	17	21	6.4	51.8	41.9	SC	SANDY LOAM	109.8	17.8	--	--	$3.2x10^{-9}$ (103.1 pcf @ 21.0 %) [97.0% Pr @ +3.9% OM]	--
CL-12	P6A	Brown Clayey Sand	17.7	38	19	19	3.4	54.1	42.6	SC	SANDY LOAM	--	--	--	--	--	--
CL-13	P6A	Brown Lean CLAY	--	44	20	24	7.9	53.2	38.9	SC	SANDY LOAM	--	--	--	--	--	--
CL-14	P6A	Brown Lean CLAY	--	39	21	18	3.8	55.3	40.8	SC	SANDY LOAM	111.3	17.7	--	--	1.5x10-8 (108.0 pcf @ 19.9 %) [97.0% Pr @ +2.2% OM]	--
CL-15	P6A	Brown Fat CLAY	14.1	60	19	41	3.1	42.7	54.2	CH	SANDY CLAY LOAM	--	--	--	--	--	--

NOTES:

1) All laboratory testing was performed by sub-consultant laboratory; Geotechnics.
2) "--" Indicates test not performed.
3) USCS classification based on grain size analysis, Atterberg Limits results and/or visual observations. USDA classification based on grain size analysis results.
4) % Silt/Clay indicates percent passing the no. 200 sieve.

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ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB- AREA A
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID	2014-610-01-01	Soil Description	**LIGHT BROWN FAT CLAY**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.** (Minus No. 40 sieve material, Airdried)

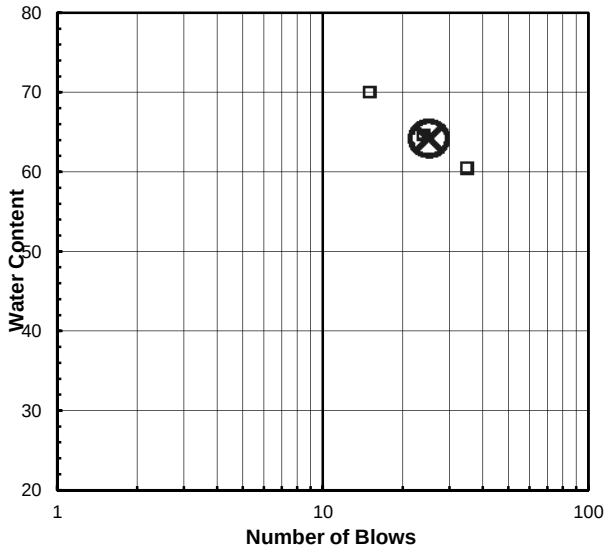
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	I	E	2M	**MULTIPOINT**
Wt. of Tare & WS (gm)	28.47	28.04	27.23	
Wt. of Tare & DS (gm)	23.49	23.08	22.45	
Wt. of Tare (gm)	15.23	15.40	15.62	
Wt. of Water (gm)	5.0	5.0	4.8	
Wt. of DS (gm)	8.3	7.7	6.8	
Moisture Content (%)	**60.3**	**64.6**	**70.0**	
Number of Blows	**35**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-C	U	
Wt. of Tare & WS (gm)	22.29	22.10	
Wt. of Tare & DS (gm)	21.22	21.03	
Wt. of Tare (gm)	15.59	15.17	
Wt. of Water (gm)	1.1	1.1	
Wt. of DS (gm)	5.6	5.9	
Moisture Content (%)	**19.0**	**18.3**	**0.7**

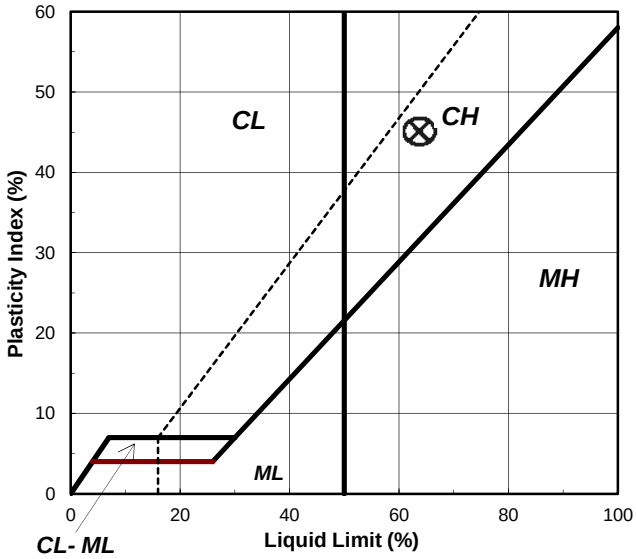
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**64**
Plastic Limit (%)	**19**
Plasticity Index (%)	**45**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *1/13/14* *Checked By* *GEM* *Date* 1/14/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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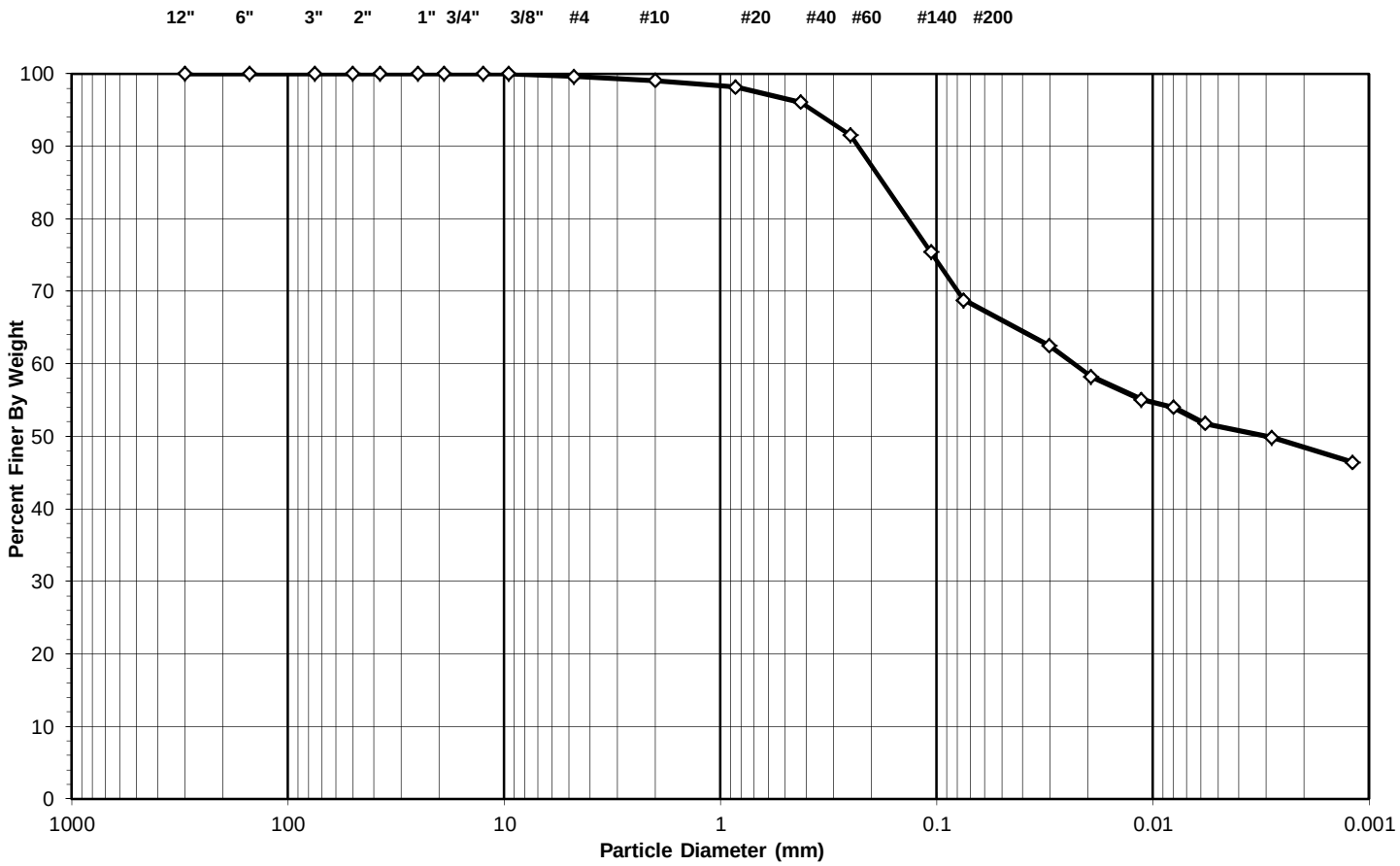
Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA A
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID	2014-610-01-01	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.38
#4 To #200	*Sand*	30.87
Finer Than #200	*Silt & Clay*	68.75

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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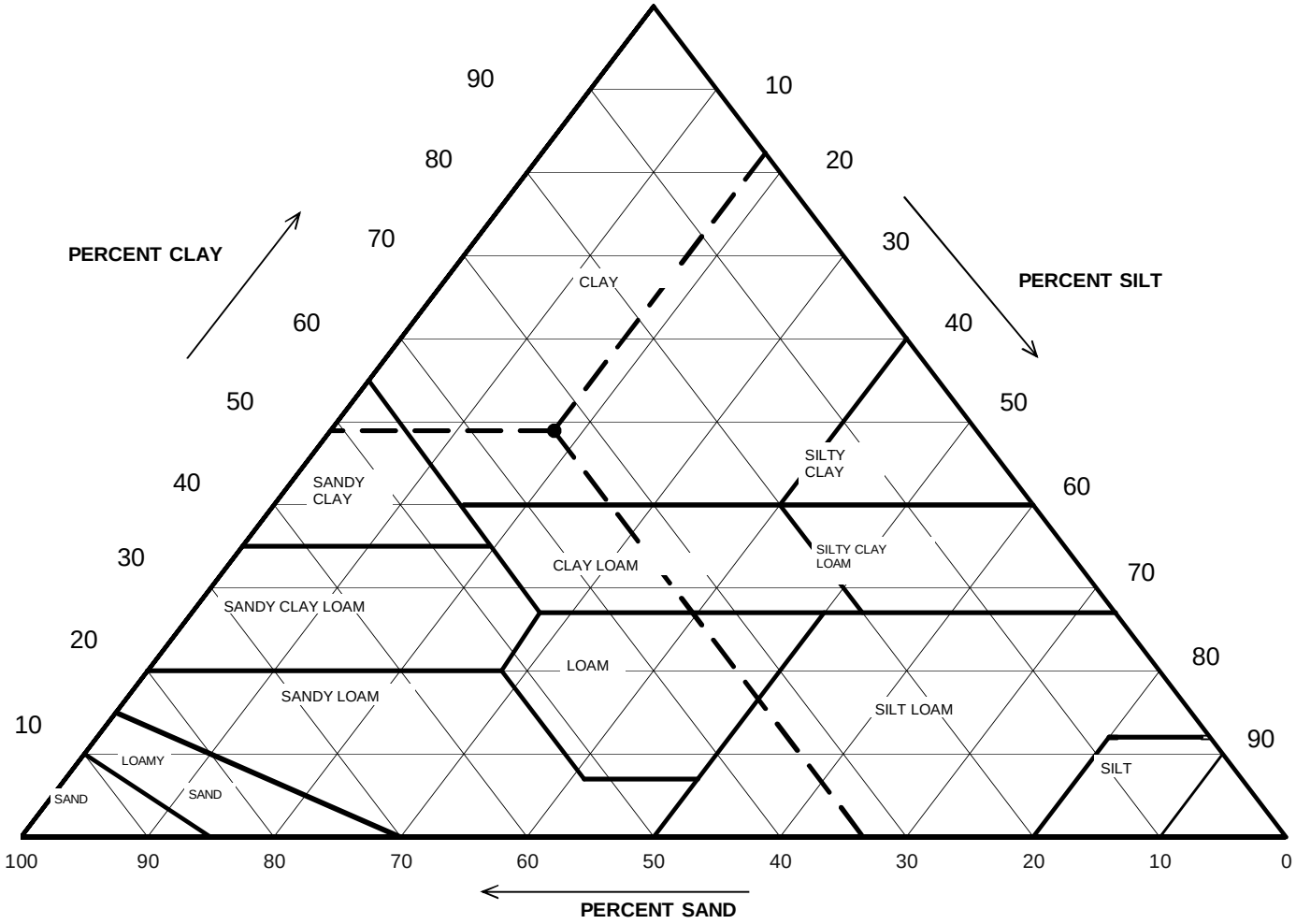
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA A
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID	2014-610-01-01	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.95	**0.00**
2	99.05	*Sand*	33.09	**33.41**
0.05	65.95	*Silt*	17.48	**17.65**
0.002	48.47	*Clay*	48.47	**48.94**

USDA Classification: ***CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA A
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID	2014-610-01-01	Soil Color	**LIGHT BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	U-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	33.49	Corrected Dry Wt. of - #10 Material (g)	46.69
Wgt.Tare + Dry Soil (g)	32.73		
Weight of Tare (g)	22.02	Weight of - #200 Material (g)	32.41
Weight of Water (g)	0.76	Weight of - #10 ; + #200 Material (g)	14.28
Weight of Dry Soil (g)	10.71		
Moisture Content (%)	**7.1**	**J-FACTOR (%FINER THAN #10)**	**0.9905**
Soil Specimen Data			
Tare No.	160		
Wgt.Tare + Air Dry Soil (g)	884.56		
Weight of Tare (g)	238.97		
Air Dried Wgt. Total Sample (g)	645.59	Dry Weight of Material Retained on #10 (g)	5.75
Total Dry Sample Weight (g)	603.19	Corrected Dry Sample Wt - #10 (g)	597.44

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	2.27	0.4	0.4	99.6	**99.6**
#10	2.00	3.48	0.6	1.0	99.0	**99.0**
#20	0.85	0.42	0.9	0.9	99.1	**98.2**
#40	0.425	0.98	2.1	3.0	97.0	**96.1**
#60	0.250	2.14	4.6	7.6	92.4	**91.5**
#140	0.106	7.61	16.3	23.9	76.1	**75.4**
#200	0.075	3.13	6.7	30.6	69.4	**68.8**
Pan	-	32.41	69.4	100.0	-	**-**

Notes :

Tested By SS Date 1/17/14 Checked By GEM Date 1/20/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA A
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID	2014-610-01-01	Soil Color	**LIGHT BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	35.0	22.1	5.26	29.7	63.1	0.01311	0.0301	**62.5**
5	33.0	22.1	5.26	27.7	58.8	0.01311	0.0193	**58.3**
15	31.5	22	5.29	26.2	55.6	0.01313	0.0113	**55.0**
30	31.0	22	5.29	25.7	54.5	0.01313	0.0080	**54.0**
60	30.0	21.8	5.35	24.6	52.3	0.01316	0.0057	**51.8**
250	29.0	22.1	5.26	23.7	50.3	0.01311	0.0028	**49.9**
1440	27.5	21.6	5.41	22.1	46.8	0.01319	0.0012	**46.4**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	46.69	Hygroscopic Moisture Factor	0.934	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	99.05	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 1/15/14 Checked By GEM Date 1/20/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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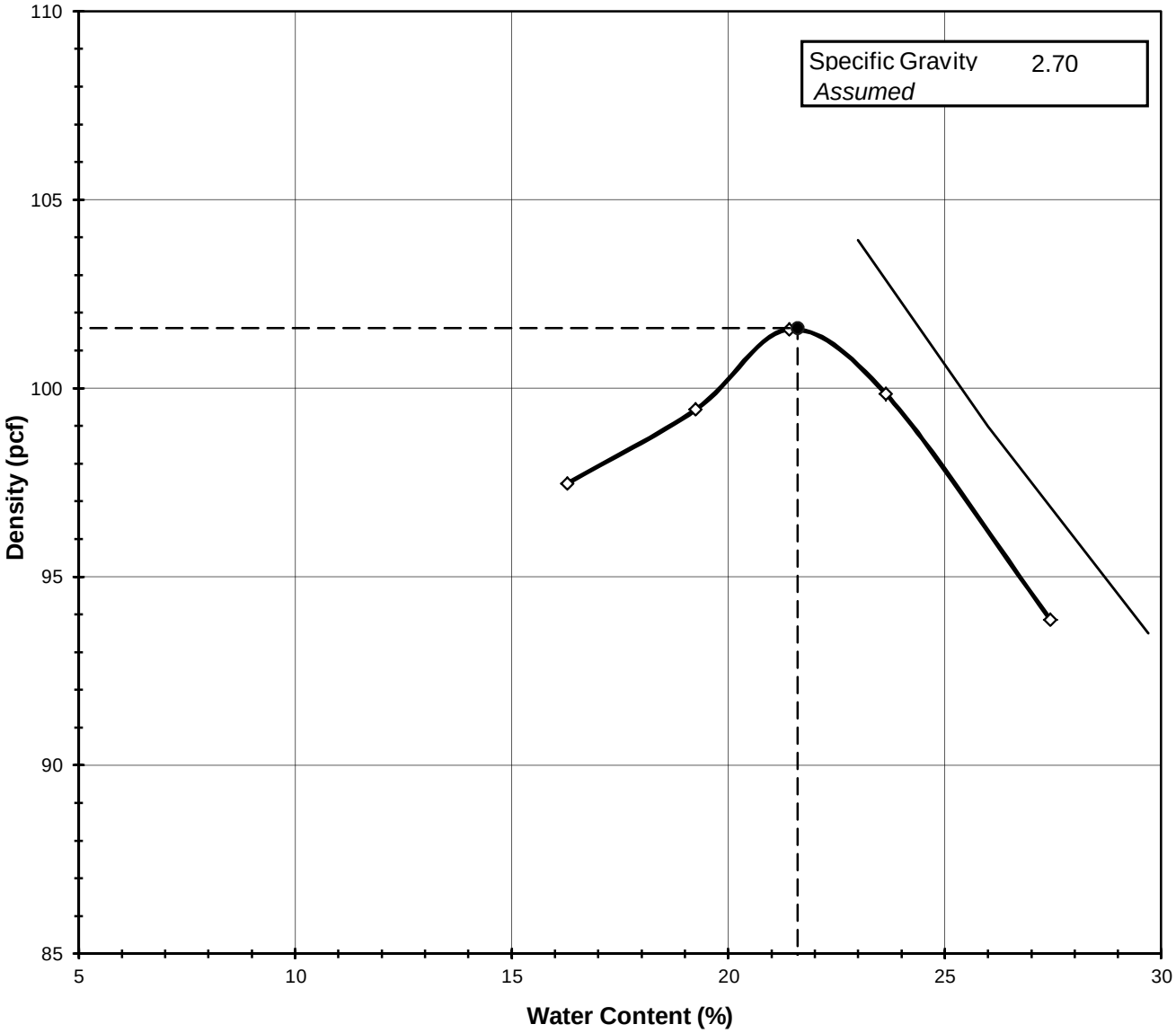
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-5
Lab ID:	2014-610-01-01	Test Method	**STANDARD**

Visual Description: LIGHT BROWN SANDY FAT CLAY

Optimum Water Content	**21.6**
Maximum Dry Density	**101.6**



Tested By *AG* *Date* *1/10/14* *Checked By* *GEM* *Date* 1/14/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-5
Lab ID:	2014-610-01-01		

Visual Description: LIGHT BROWN SANDY FAT CLAY

Total Weight of the Sample (g)	16750
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4187
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5889	5968	6039	6041	5984
Wt.of Mold (g)	4187	4187	4187	4187	4187
Wt. of Wet Sample (g)	1702	1781	1852	1854	1797
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	815	819	817	821	828
Wt. of Tare & Wet Sample (g)	405.30	400.90	421.70	420.80	433.30
Wt. of Tare & Dry Sample (g)	367.68	358.14	371.36	366.93	369.42
Wt. of Tare (g)	136.60	136.00	136.20	139.10	136.60
Wt. of Water (g)	37.62	42.76	50.34	53.87	63.88
Wt. of Dry Sample (g)	231.08	222.14	235.16	227.83	232.82

Wet Density (g/cm^3)	1.82	1.90	1.98	1.98	1.92
Wet Density (pcf)	113.3	118.6	123.3	123.5	119.6
Moisture Content (%)	**16.3**	**19.2**	**21.4**	**23.6**	**27.4**
Dry Density (pcf)	**97.5**	**99.4**	**101.6**	**99.8**	**93.9**

Zero Air Voids

Moisture Content (%)	23.0	26.0	29.7
Dry Unit Weight (pcf)	103.9	99.0	93.5

Tested By *AG* *Date* *1/10/14* *Checked By* *GEM* *Date* 1/14/14

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MOISTURE CONTENT

ASTM D 2216-10

Client: BLACKROCK ENGINEERS, INC.
Client Reference: ROXBORO LAM - PH 6A
Project No.: 2014-610-01

Lab ID:	001	002
Boring No.:	MMB-AREA A	MMB-AREA B
Depth (ft):	0.5-1.0	0.5-1.0
Sample No.:	CL-5	CL-6
Tare Number	817	8010
Wt. of Tare & Wet Sample (g)	413.27	502.12
Wt. of Tare & Dry Sample (g)	346.25	414.61
Weight of Tare (g)	136.32	132.90
Weight of Water (g)	67.02	87.51
Weight of Dry Sample (g)	209.93	281.71
Water Content (%)	**31.9**	**31.1**

Notes :

Tested By *SFS* *Date* *1/10/14* *Checked By* *GEM* *Date* *1/16/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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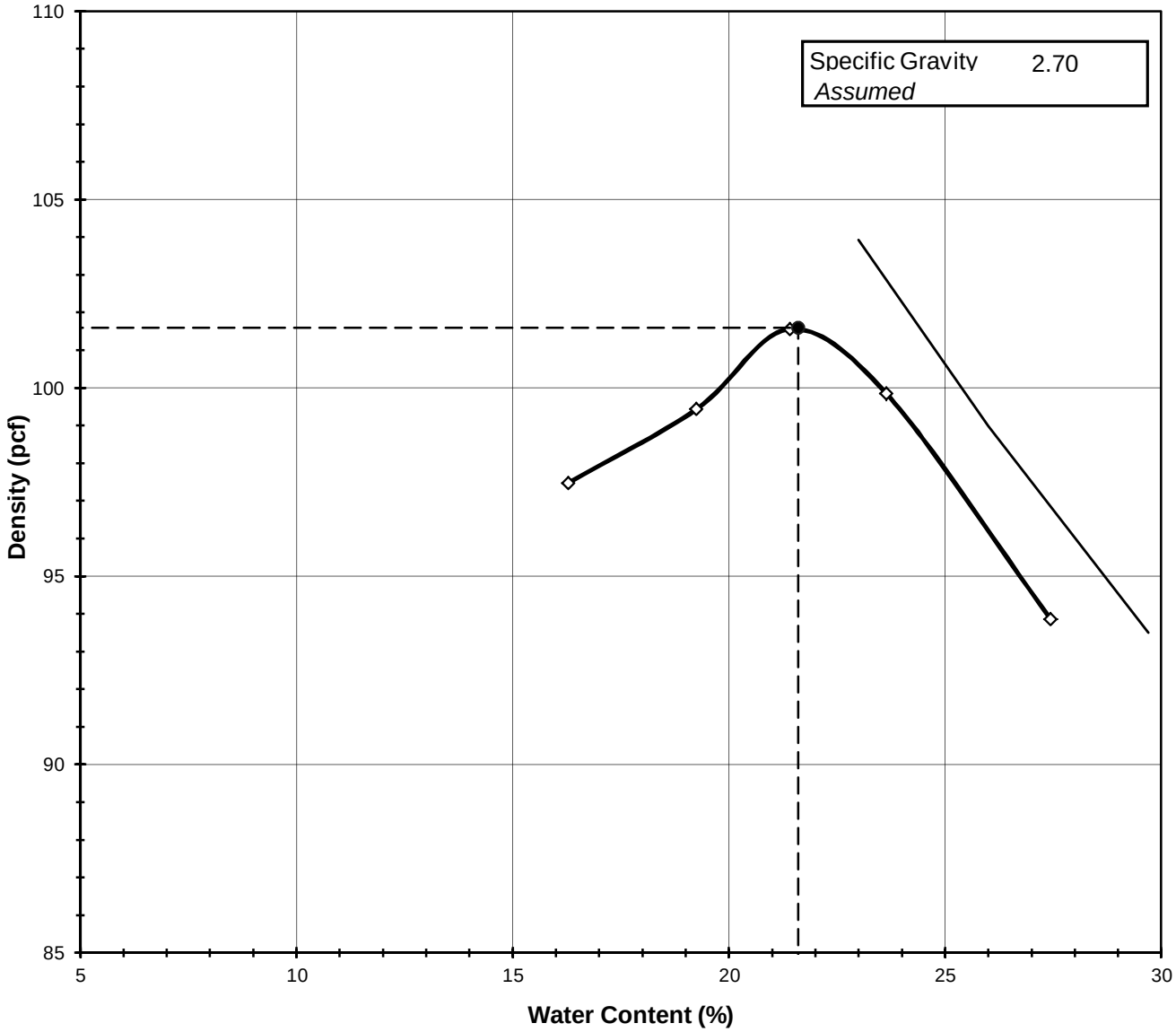
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-5
Lab ID:	2014-610-01-01	Test Method	**STANDARD**

Visual Description: LIGHT BROWN ……

Optimum Water Content	**21.6**
Maximum Dry Density	**101.6**



Tested By *AG* *Date* *1/10/14* *Checked By* *GEM* *Date* 1/14/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-5
Lab ID:	2014-610-01-01		

Visual Description: LIGHT BROWN ……

Total Weight of the Sample (g)	16750
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4187
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5889	5968	6039	6041	5984
Wt.of Mold (g)	4187	4187	4187	4187	4187
Wt. of Wet Sample (g)	1702	1781	1852	1854	1797
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	815	819	817	821	828
Wt. of Tare & Wet Sample (g)	405.30	400.90	421.70	420.80	433.30
Wt. of Tare & Dry Sample (g)	367.68	358.14	371.36	366.93	369.42
Wt. of Tare (g)	136.60	136.00	136.20	139.10	136.60
Wt. of Water (g)	37.62	42.76	50.34	53.87	63.88
Wt. of Dry Sample (g)	231.08	222.14	235.16	227.83	232.82

Wet Density (g/cm^3)	1.82	1.90	1.98	1.98	1.92
Wet Density (pcf)	113.3	118.6	123.3	123.5	119.6
Moisture Content (%)	**16.3**	**19.2**	**21.4**	**23.6**	**27.4**
Dry Density (pcf)	**97.5**	**99.4**	**101.6**	**99.8**	**93.9**

Zero Air Voids

Moisture Content (%)	23.0	26.0	29.7
Dry Unit Weight (pcf)	103.9	99.0	93.5

Tested By *AG* *Date* *1/10/14* *Checked By* *GEM* *Date* 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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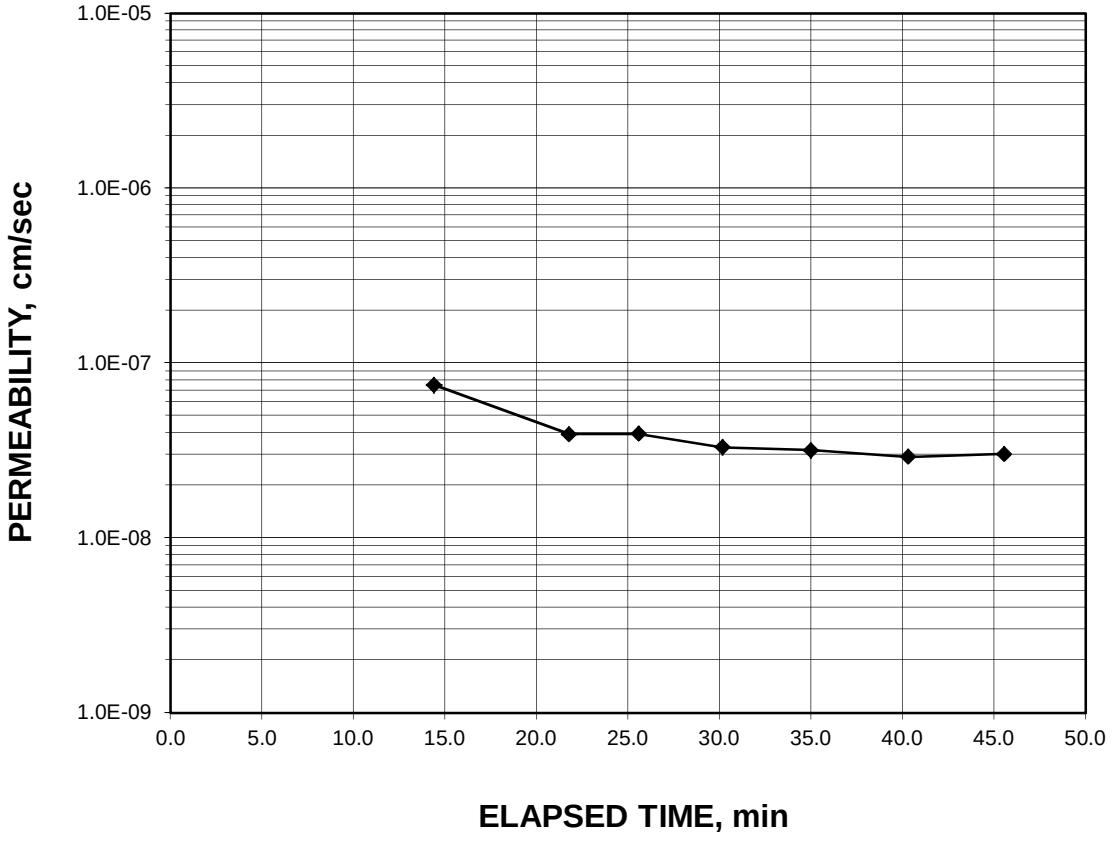
Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID No.	2014-610-01-01		

Visual Description: LIGHT BROWN CLAY

AVERAGE PERMEABILITY = 3.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/14/14 Checked By: GEM Date: 1/16/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID No.	2014-610-01-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: LIGHT BROWN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Y-11	Y-11
Wt. of Tare & WS (gm.)	283.24	554.25
Wt. of Tare & DS (gm.)	247.03	457.4
Wt. of Tare (gm.)	93.61	93.54
Wt. of Water (gm.)	36.21	96.85
Wt. of DS (gm.)	153.42	363.86
Moisture Content (%)	**23.6**	**26.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2451.76	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	818.71	838.68
Length 1 (in.)	4.009	4.061
Length 2 (in.)	4.009	4.028
Length 3 (in.)	4.009	4.037
Top Diameter (in.)	2.869	2.861
Middle Diameter (in.)	2.869	2.872
Bottom Diameter (in.)	2.869	2.878
Average Length (in.)	4.01	4.04
Average Area (in.^{2})	6.46	6.47
Sample Volume (cm^3)	424.71	428.60
Unit Wet Wt. (gm./ cm^3)	1.928	1.957
Unit Wet Wt. (pcf)	120.3	122.1
Unit Dry Wt. (pcf)	97.4	96.5
Unit Dry Wt. (gm./ cm^3)	1.560	1.545
Void Ratio, e	0.731	0.747
Porosity, n	0.422	0.428
Pore Volume (cm^3)	179.4	183.3
Total Wt. Of Sample After Test		842.74

Tested By: SFS Date: 1/14/14 Checked By: GEM Date: 1/16/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC	Boring No.	MMB - AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-5
Lab ID No.	2014-610-01-01		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.27
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.75
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.1E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/15/14	11	21	57	21.95	0.000	8.4	9.4	21.7	NA
1/15/14	11	36	20	36.33	14.383	7.6	8.4	21.8	7.5E-08
1/15/14	11	43	44	43.73	21.783	7.4	8.1	21.8	3.9E-08
1/15/14	11	47	31	47.52	25.567	7.3	8.0	21.8	3.9E-08
1/15/14	11	52	6	52.10	30.150	7.2	7.9	21.8	3.3E-08
1/15/14	11	56	56	56.93	34.983	7.1	7.8	21.8	3.2E-08
1/15/14	12	2	16	2.27	40.317	7.0	7.6	22.0	2.9E-08
1/15/14	12	7	30	7.50	45.550	6.9	7.5	22.0	3.0E-08

Tested By: SFS Date: 1/14/14 Checked By: GEM Date: 1/16/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-01 Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB- AREA B
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID	2014-610-01-02	Soil Description	**LIGHT BROWN FAT CLAY**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.** (Minus No. 40 sieve material, Airdried)

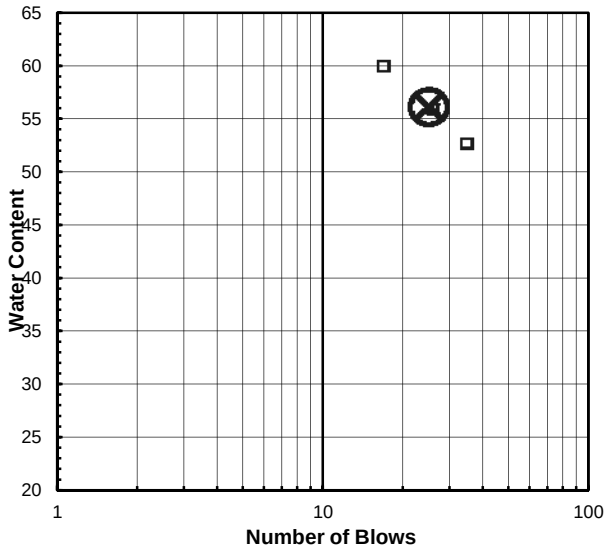
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	W	M	T	**MULTIPOINT**
Wt. of Tare & WS (gm)	26.35	29.23	26.90	
Wt. of Tare & DS (gm)	22.49	24.18	22.52	
Wt. of Tare (gm)	15.15	15.14	15.21	
Wt. of Water (gm)	3.9	5.1	4.4	
Wt. of DS (gm)	7.3	9.0	7.3	
Moisture Content (%)	**52.6**	**55.9**	**59.9**	
Number of Blows	**35**	**26**	**17**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-N	A-K	
Wt. of Tare & WS (gm)	22.52	22.74	
Wt. of Tare & DS (gm)	21.56	21.77	
Wt. of Tare (gm)	15.43	15.52	
Wt. of Water (gm)	1.0	1.0	
Wt. of DS (gm)	6.1	6.3	
Moisture Content (%)	**15.7**	**15.5**	**0.1**

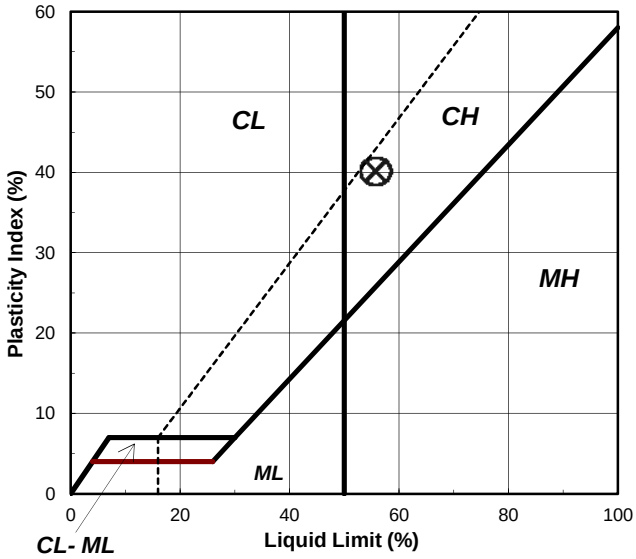
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**56**
Plastic Limit (%)	**16**
Plasticity Index (%)	**40**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *1/13/14* *Checked By* *GEM* *Date* 1/14/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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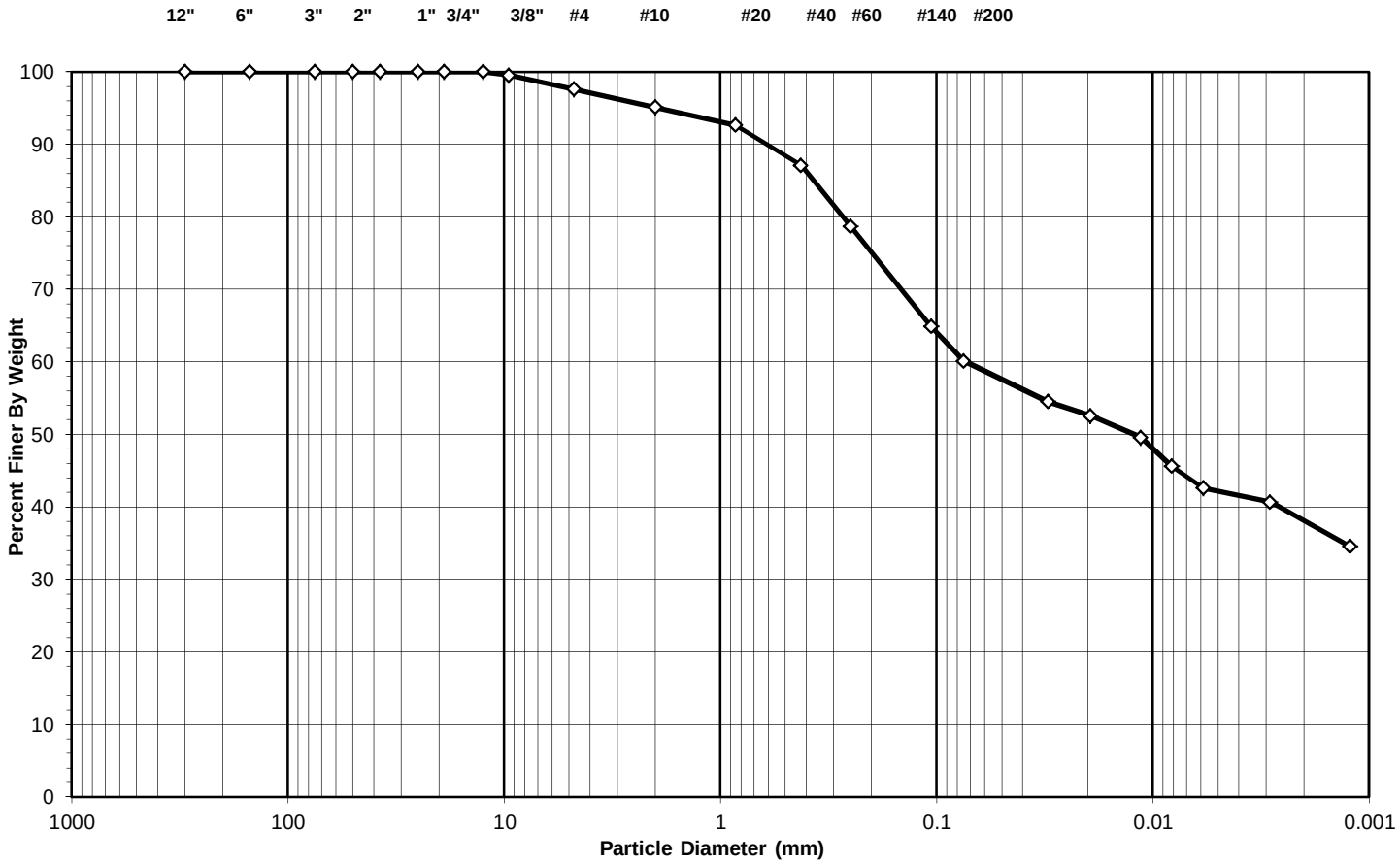
Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA B
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID	2014-610-01-02	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	2.39
#4 To #200	*Sand*	37.48
Finer Than #200	*Silt & Clay*	60.14

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 SIEVEHYD10 JAN 14.xls]Sheet1

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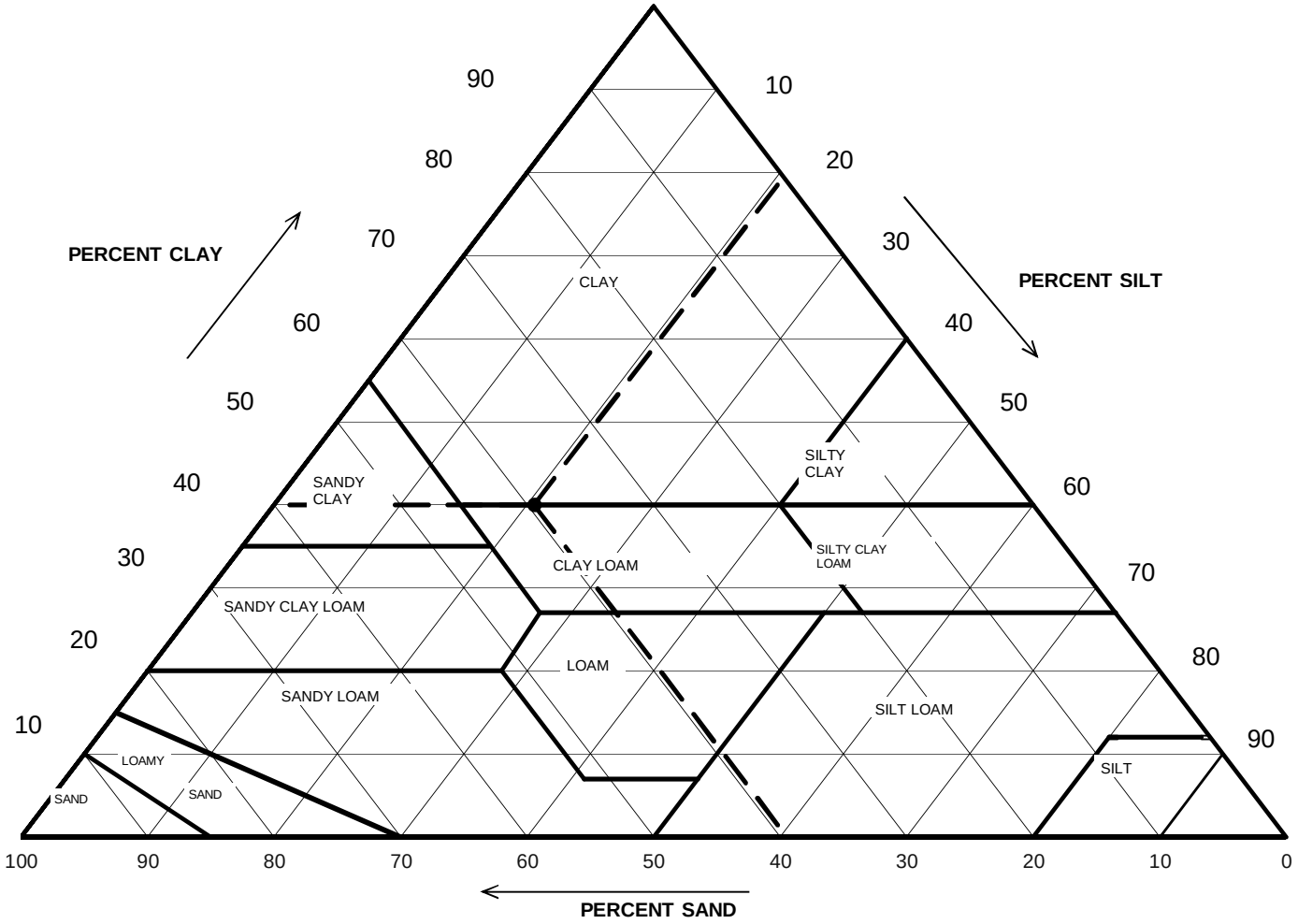
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA B
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID	2014-610-01-02	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	4.89	**0.00**
2	95.11	*Sand*	37.50	**39.43**
0.05	57.60	*Silt*	19.54	**20.55**
0.002	38.06	*Clay*	38.06	**40.02**

USDA Classification: ***CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA B
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID	2014-610-01-02	Soil Color	**LIGHT BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	V-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	34.68	Corrected Dry Wt. of - #10 Material (g)	48.00
Wgt.Tare + Dry Soil (g)	34.17		
Weight of Tare (g)	21.93	Weight of - #200 Material (g)	30.35
Weight of Water (g)	0.51	Weight of - #10 ; + #200 Material (g)	17.65
Weight of Dry Soil (g)	12.24		
Moisture Content (%)	**4.2**	**J-FACTOR (%FINER THAN #10)**	**0.9511**
Soil Specimen Data			
Tare No.	165		
Wgt.Tare + Air Dry Soil (g)	922.08		
Weight of Tare (g)	236.95		
Air Dried Wgt. Total Sample (g)	685.13	Dry Weight of Material Retained on #10 (g)	32.23
Total Dry Sample Weight (g)	659.01	Corrected Dry Sample Wt - #10 (g)	626.78

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	3.24	0.5	0.5	99.5	**99.5**
#4	4.75	12.48	1.9	2.4	97.6	**97.6**
#10	2.00	16.51	2.5	4.9	95.1	**95.1**
#20	0.85	1.25	2.6	2.6	97.4	**92.6**
#40	0.425	2.80	5.8	8.4	91.6	**87.1**
#60	0.250	4.26	8.9	17.3	82.7	**78.6**
#140	0.106	6.95	14.5	31.8	68.2	**64.9**
#200	0.075	2.39	5.0	36.8	63.2	**60.1**
Pan	-	30.35	63.2	100.0	-	**-**

Notes :

Tested By SS Date 1/17/14 Checked By GEM Date 1/20/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	SITE G - AREA B
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID	2014-610-01-02	Soil Color	**LIGHT BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	33.0	22.3	5.21	27.8	57.3	0.01308	0.0305	**54.5**
5	32.0	22.3	5.21	26.8	55.3	0.01308	0.0194	**52.6**
15	30.5	22.2	5.24	25.3	52.1	0.01310	0.0114	**49.6**
30	28.5	22.1	5.26	23.2	47.9	0.01311	0.0082	**45.6**
60	27.0	22	5.29	21.7	44.8	0.01313	0.0058	**42.6**
250	26.0	22.1	5.26	20.7	42.8	0.01311	0.0029	**40.7**
1440	23.0	21.7	5.38	17.6	36.3	0.01317	0.0012	**34.6**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.00	Hygroscopic Moisture Factor	0.960	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	95.11	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 1/15/14 Checked By GEM Date 1/20/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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MOISTURE CONTENT

ASTM D 2216-10

Client: BLACKROCK ENGINEERS, INC.
Client Reference: ROXBORO LAM - PH 6A
Project No.: 2014-610-01

Lab ID:	001	002
Boring No.:	MMB-AREA A	MMB-AREA B
Depth (ft):	0.5-1.0	0.5-1.0
Sample No.:	CL-5	CL-6
Tare Number	817	8010
Wt. of Tare & Wet Sample (g)	413.27	502.12
Wt. of Tare & Dry Sample (g)	346.25	414.61
Weight of Tare (g)	136.32	132.90
Weight of Water (g)	67.02	87.51
Weight of Dry Sample (g)	209.93	281.71
Water Content (%)	**31.9**	**31.1**

Notes :

Tested By *SFS* *Date* *1/10/14* *Checked By* *GEM* *Date* *1/16/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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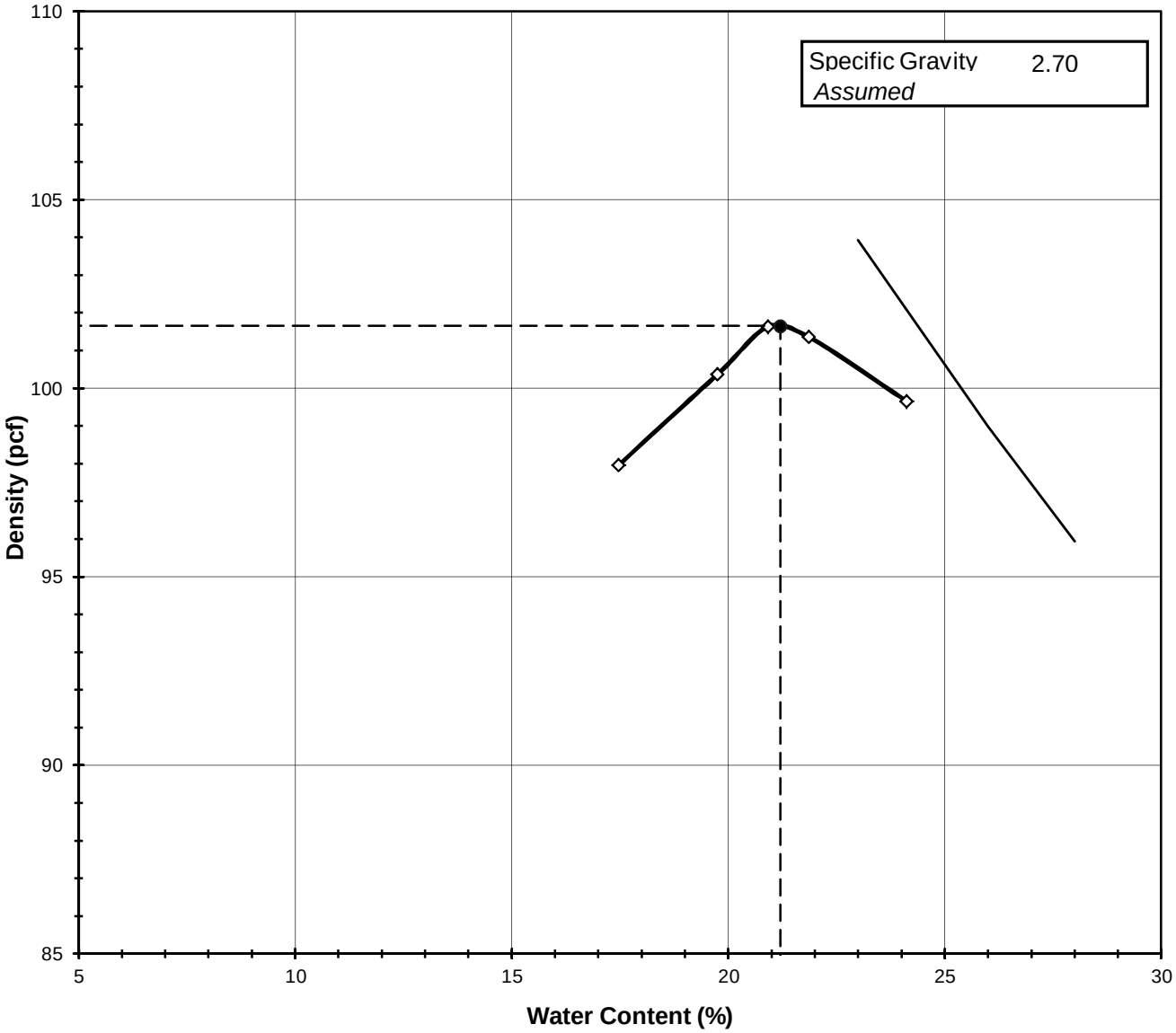
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA B
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-6
Lab ID:	2014-610-01-02	Test Method	**STANDARD**

Visual Description: LIGHT BROWN SANDY FAT CLAY

Optimum Water Content	**21.2**
Maximum Dry Density	**101.7**



Tested By	*AG*	*Date*	*1/10/14*	*Checked By*	*GEM*	*Date*	1/14/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	MMB-AREA B
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	0.5-1.0
Project No.:	2014-610-01	Sample No.:	CL-6
Lab ID:	2014-610-01-02		

Visual Description: LIGHT BROWN SANDY FAT CLAY

Total Weight of the Sample (g)	21150
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4187
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5915	5992	6033	6042	6045
Wt.of Mold (g)	4187	4187	4187	4187	4187
Wt. of Wet Sample (g)	1728	1805	1846	1855	1858
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	822	308	310	398	816
Wt. of Tare & Wet Sample (g)	400.00	379.00	405.80	396.00	414.20
Wt. of Tare & Dry Sample (g)	361.09	331.05	354.52	340.01	360.41
Wt. of Tare (g)	138.30	88.30	109.40	83.90	137.40
Wt. of Water (g)	38.91	47.95	51.28	55.99	53.79
Wt. of Dry Sample (g)	222.79	242.75	245.12	256.11	223.01

Wet Density (g/cm^3)	1.84	1.93	1.97	1.98	1.98
Wet Density (pcf)	115.1	120.2	122.9	123.5	123.7
Moisture Content (%)	**17.5**	**19.8**	**20.9**	**21.9**	**24.1**
Dry Density (pcf)	**98.0**	**100.4**	**101.6**	**101.4**	**99.7**

Zero Air Voids

Moisture Content (%)	23.0	26.0	28.0
Dry Unit Weight (pcf)	103.9	99.0	95.9

Tested By *AG* *Date* *1/10/14* *Checked By* *GEM* *Date* 1/14/14

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

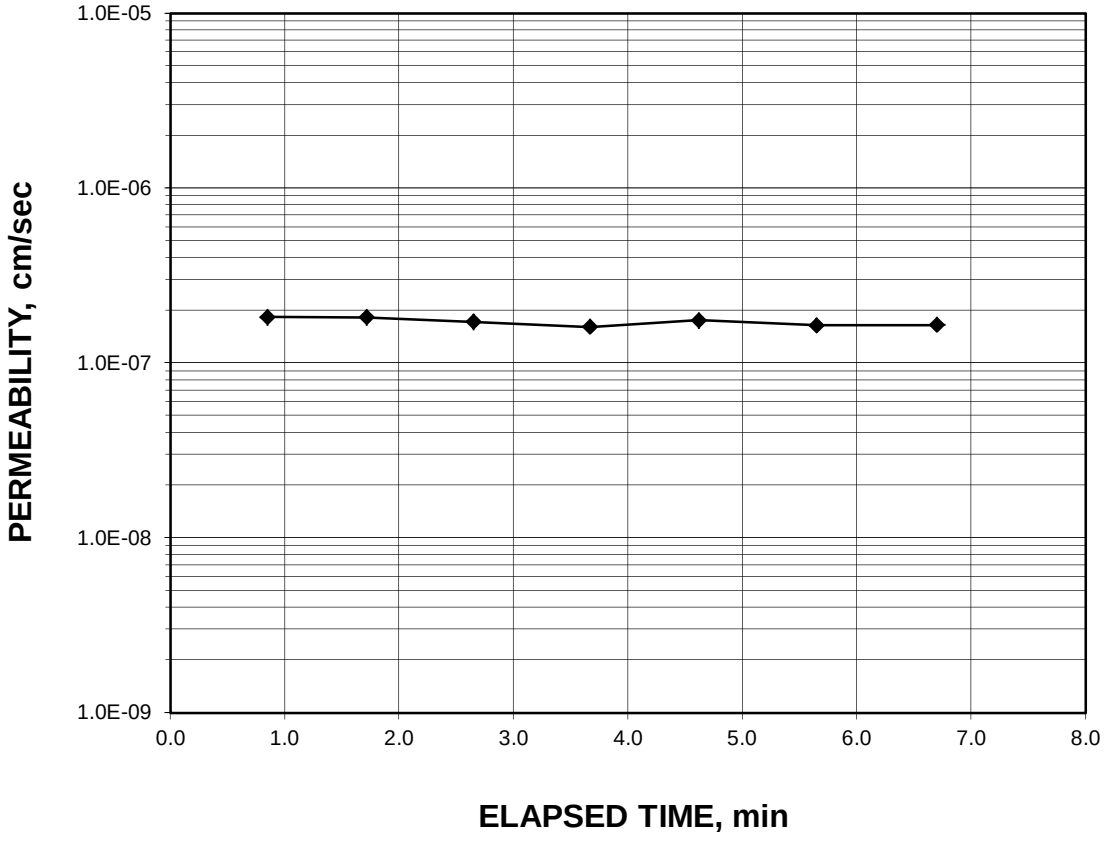
Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID No.	2014-610-01-02		

Visual Description: LIGHT BROWN CLAY

AVERAGE PERMEABILITY = 1.7E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/14/14 Checked By: Date:

DCN: CT-22A DATE:2-2-10 REVISION:T5\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID No.	2014-610-01-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: LIGHT BROWN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	B-1
Wt. of Tare & WS (gm.)	366.86	534.07
Wt. of Tare & DS (gm.)	315.43	443.9
Wt. of Tare (gm.)	95.93	95.84
Wt. of Water (gm.)	51.43	90.17
Wt. of DS (gm.)	219.50	348.06
Moisture Content (%)	**23.4**	**25.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2442.97	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	809.92	826.17
Length 1 (in.)	4.009	3.957
Length 2 (in.)	4.009	3.974
Length 3 (in.)	4.009	3.956
Top Diameter (in.)	2.869	2.880
Middle Diameter (in.)	2.869	2.873
Bottom Diameter (in.)	2.869	2.861
Average Length (in.)	4.01	3.96
Average Area (in.^{2})	6.46	6.48
Sample Volume (cm^3)	424.71	420.45
Unit Wet Wt. (gm./ cm^3)	1.907	1.965
Unit Wet Wt. (pcf)	119.0	122.7
Unit Dry Wt. (pcf)	96.4	97.4
Unit Dry Wt. (gm./ cm^3)	1.545	1.561
Void Ratio, e	0.748	0.730
Porosity, n	0.428	0.422
Pore Volume (cm^3)	181.7	177.4
Total Wt. Of Sample After Test		826.50

Tested By: SFS Date: 1/14/14 Checked By: Date:

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6
Lab ID No.	2014-610-01-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.06
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.78
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	96	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.7E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.7E-09 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/15/14	11	29	22	29.37	0.000	7.0	7.8	21.8	NA
1/15/14	11	30	13	30.22	0.850	6.9	7.7	21.8	1.8E-07
1/15/14	11	31	5	31.08	1.717	6.8	7.5	21.8	1.8E-07
1/15/14	11	32	1	32.02	2.650	6.7	7.4	21.8	1.7E-07
1/15/14	11	33	2	33.03	3.667	6.6	7.3	21.8	1.6E-07
1/15/14	11	33	59	33.98	4.617	6.5	7.1	21.8	1.8E-07
1/15/14	11	35	1	35.02	5.650	6.4	7.0	21.8	1.6E-07
1/15/14	11	36	4	36.07	6.700	6.3	6.9	21.8	1.6E-07

Tested By: SFS Date: 1/14/14 Checked By: Date:

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

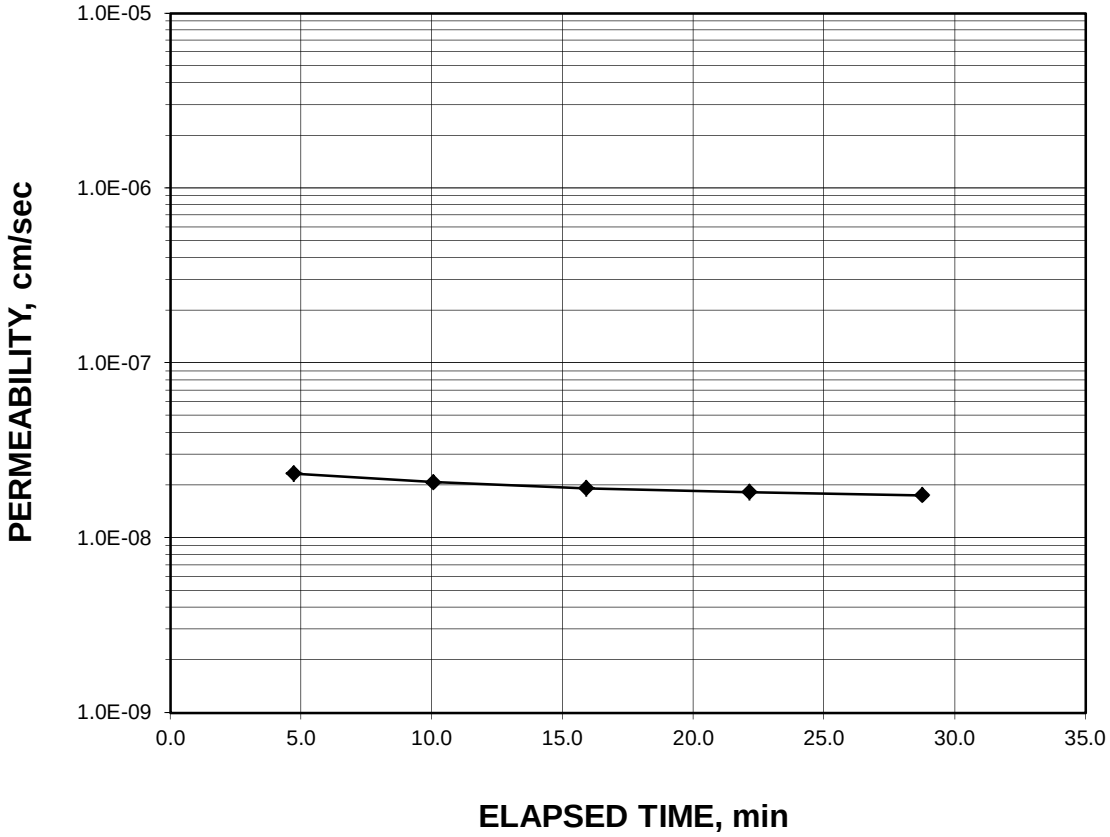
Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6 + 3.5%M
Lab ID No.	2014-610-01-02		

Visual Description: LIGHT BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 1/18/14 Checked By: GEM Date: 1/21/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 TITLE: PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 3.5%M Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6 + 3.5%M
Lab ID No.	2014-610-01-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: LIGHT BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	B-1	800
Wt. of Tare & WS (gm.)	415.57	390.75
Wt. of Tare & DS (gm.)	352.13	332.1
Wt. of Tare (gm.)	95.71	103.7
Wt. of Water (gm.)	63.44	58.65
Wt. of DS (gm.)	256.42	228.40
Moisture Content (%)	**24.7**	**25.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2454.11	NA
Wt. of Tube (gm.)	1633.05	NA
Wt. of WS (calc.) (gm.)	821.06	827.23
Length 1 (in.)	4.009	3.943
Length 2 (in.)	4.009	3.972
Length 3 (in.)	4.009	3.966
Top Diameter (in.)	2.869	2.873
Middle Diameter (in.)	2.869	2.872
Bottom Diameter (in.)	2.869	2.867
Average Length (in.)	4.01	3.96
Average Area (in.^{2})	6.46	6.47
Sample Volume (cm^3)	424.71	420.04
Unit Wet Wt. (gm./ cm^3)	1.933	1.969
Unit Wet Wt. (pcf)	120.7	122.9
Unit Dry Wt. (pcf)	96.7	97.8
Unit Dry Wt. (gm./ cm^3)	1.550	1.567
Void Ratio, e	0.742	0.723
Porosity, n	0.426	0.420
Pore Volume (cm^3)	180.9	176.3
Total Wt. Of Sample After Test		839.05

Tested By: SFS Date: 1/18/14 Checked By: GEM Date: 1/21/14

DCN: CT-22A DATE:2-2-10 REVISION:14 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 3.5%M Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

Client	BLACKROCK ENGINEERS, INC.	Boring No.	MMB - AREA B
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	0.5-1.0
Project No.	2014-610-01	Sample No.	CL-6 + 3.5%M
Lab ID No.	2014-610-01-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.06
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.76
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	99	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
1/20/14	14	12	14	12.23	0.000	9.3	10.8	22.6	NA
1/20/14	14	16	57	16.95	4.717	9.2	10.6	22.6	2.3E-08
1/20/14	14	22	17	22.28	10.050	9.1	10.5	22.6	2.1E-08
1/20/14	14	28	8	28.13	15.900	9.0	10.4	22.6	1.9E-08
1/20/14	14	34	23	34.38	22.150	8.9	10.3	22.6	1.8E-08
1/20/14	14	40	59	40.98	28.750	8.8	10.1	22.6	1.8E-08

Tested By: SFS Date: 1/18/14 Checked By: GEM Date: 1/21/14

DCN: CT-22A DATE:2-2-10 REVISION:14 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-01-02 3.5%M Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	AREA A
Client Reference:	ROXBORO LAM -PH 6A	Depth (ft):	NA
Project No.:	2014-610-04	Sample No.:	CL-7
Lab ID:	2014-610-04-01	Soil Description:	**BROWN LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

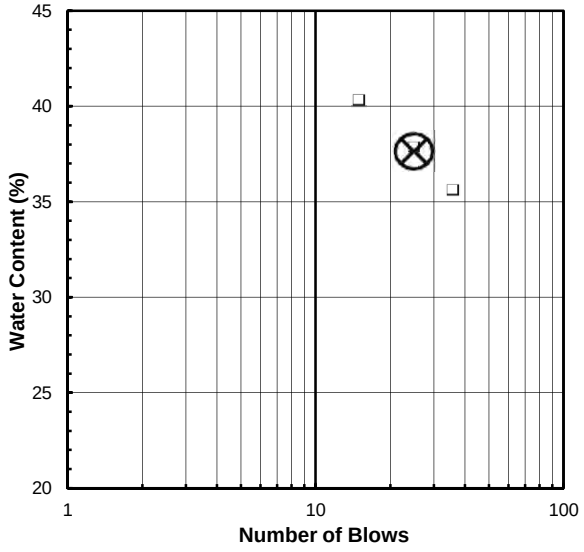
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	4M	A-K	T	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	29.86	29.58	29.73	
Wt. of Tare & Dry Sample (g)	26.14	25.73	25.57	
Wt. of Tare (g)	15.68	15.55	15.24	
Wt. of Water (g)	3.7	3.9	4.2	
Wt. of Dry Sample (g)	10.5	10.2	10.3	
Moisture Content (%)	**35.6**	**37.8**	**40.3**	
Number of Blows	**36**	**25**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	Y	A-U	
Wt. of Tare & Wet Sample (g)	27.68	24.61	
Wt. of Tare & Dry Sample (g)	25.70	23.12	
Wt. of Tare (g)	15.65	15.27	
Wt. of Water (g)	2.0	1.5	
Wt. of Dry Sample (g)	10.1	7.9	
Moisture Content (%)	**19.7**	**19.0**	**0.7**

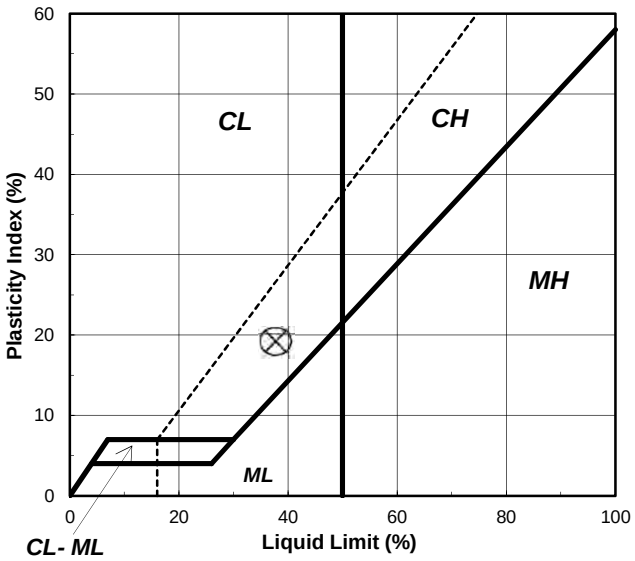
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**38**
Plastic Limit (%)	**19**
Plasticity Index (%)	**19**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*SS*	*Date*	*4/28/14*	*Checked By*	*GEM*	*Date*	4/29/14

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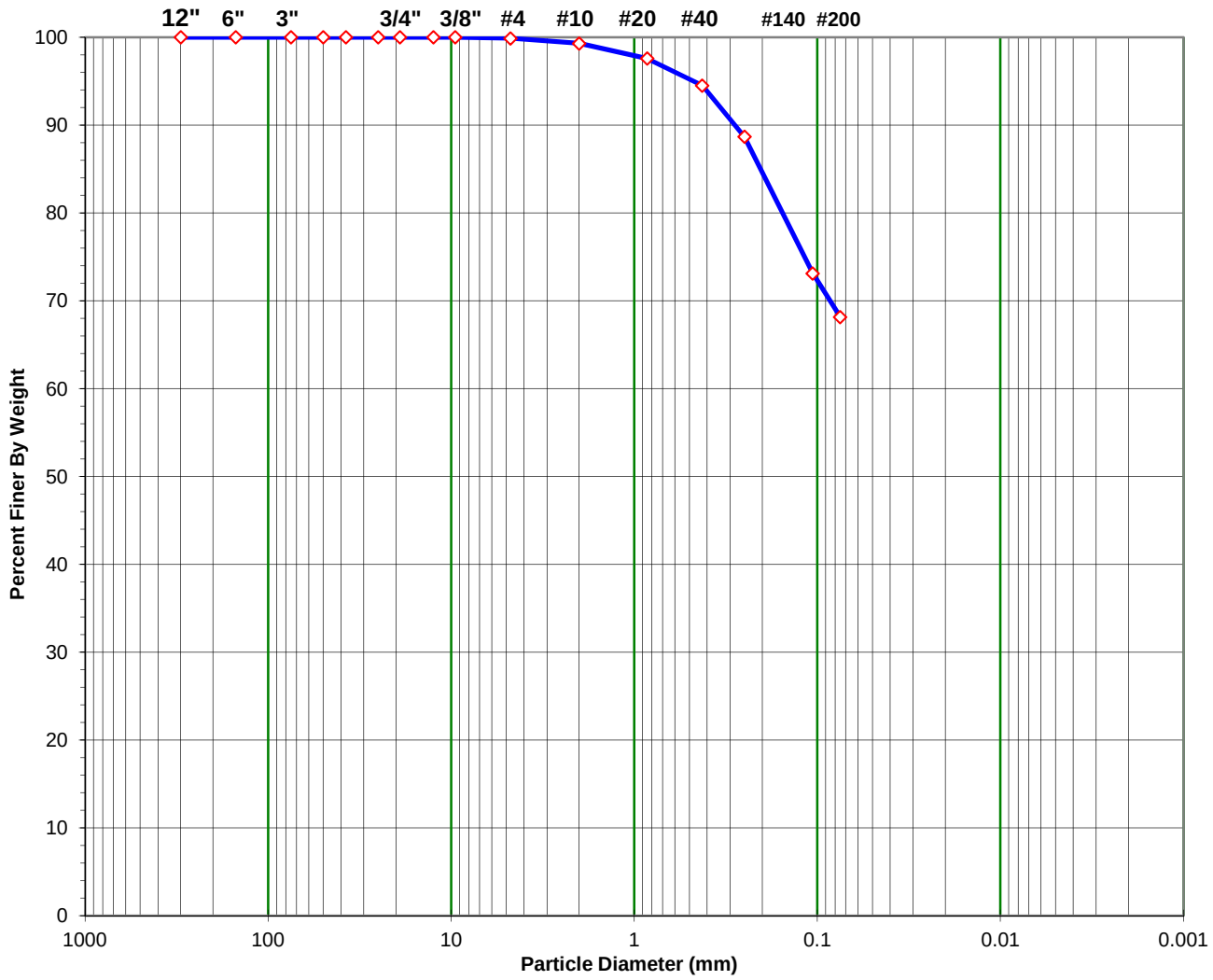
SIEVE ANALYSIS
ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	AREA A
Client Reference	ROXBORO LAM -PH 6A	Depth (ft)	NA
Project No.	2014-610-04	Sample No.	CL-7
Lab ID	2014-610-04-01	Soil Color	**BROWN**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol ***CL, TESTED***

USCS Classification SANDY LEAN CLAY

Tested By	SS	Date	4/28/14	Checked By	GEM	Date	4/29/14

 DCN: CT-S3C DATE 6-25-98 REVISION: 2 *T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-04-01 SIEVON REV 4.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	AREA A
Client Reference	ROXBORO LAM -PH 6A	Depth (ft)	NA
Project No.	2014-610-04	Sample No.	CL-7
Lab ID	2014-610-04-01	Soil Color	**BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	807	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	309.30	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	267.54	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	105.30	Weight of Tare (gm)	NA
Weight of Water (gm)	41.76	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	162.24	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**25.7**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	162.24
Dry Weight - 3/4" Sample (gm)	51.7	Weight of minus #200 material (gm)	110.59
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	51.65
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.50	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.20	0.1	0.1	99.9	**99.9**
#10	2.00	0.93	0.6	0.7	99.3	**99.3**
#20	0.850	2.78	1.7	2.4	97.6	**97.6**
#40	0.425	4.98	3.1	5.5	94.5	**94.5**
#60	0.250	9.48	5.8	11.3	88.7	**88.7**
#140	0.106	25.23	15.6	26.9	73.1	**73.1**
#200	0.075	8.05	5.0	31.8	68.2	**68.2**
Pan	-	110.59	68.2	100.0	-	**-**

Tested By SS Date 4/28/14 Checked By GEM Date 4/28/14

DCN: CT-S3C DATE 6-25-98 REVISION: 2 *T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-04-01 SIEVON REV 4.xls]Sheet1*

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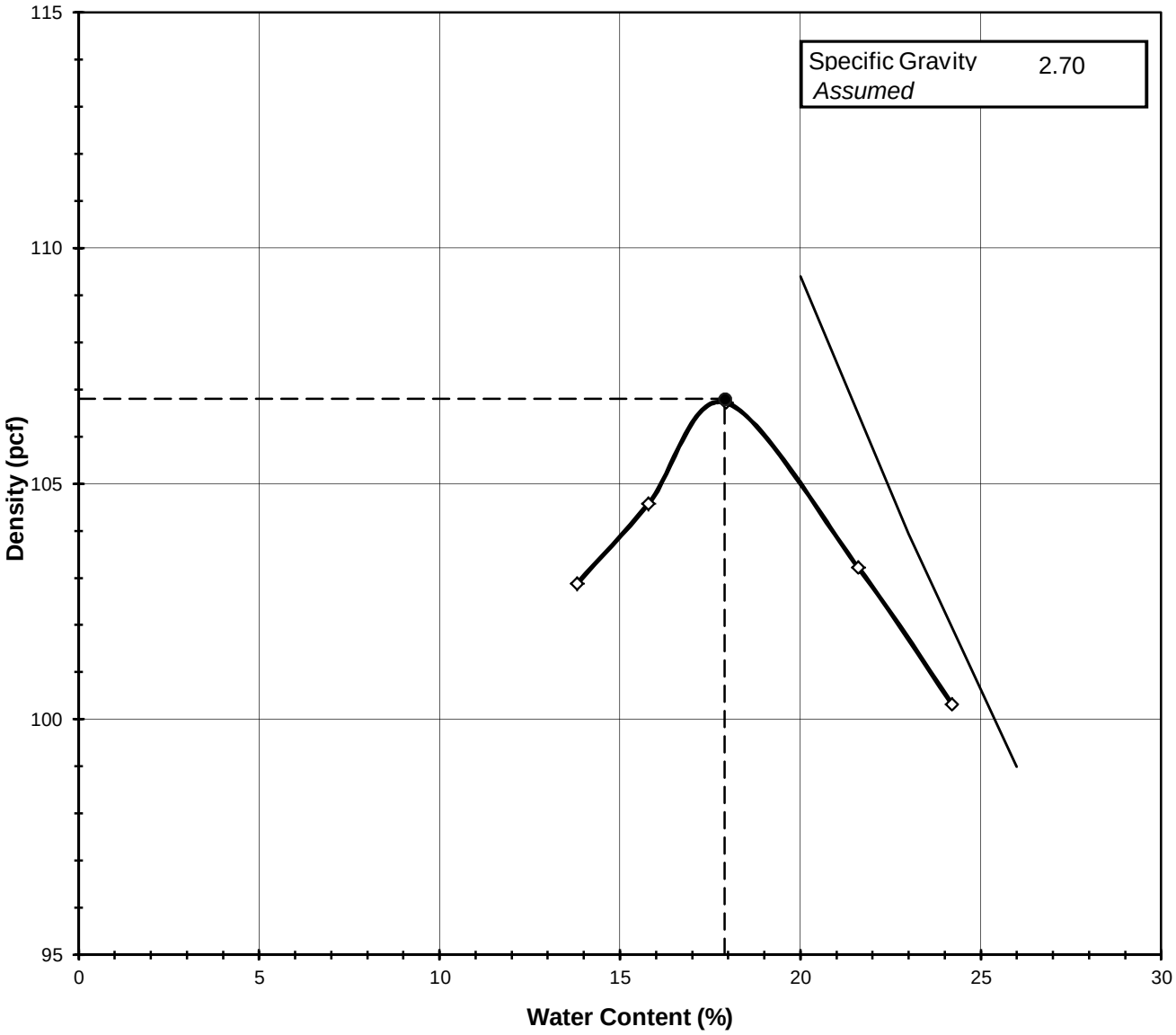
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-04	Sample No.:	CL-7
Lab ID:	2014-610-04-01	Test Method	**STANDARD**

Visual Description: BROWN SANDY CLAY

Optimum Water Content	**17.9**
Maximum Dry Density	**106.8**



Tested By ag *Date* *4/25/14* *Checked By* GEM *Date* 4/28/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	AREA A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-04	Sample No.:	CL-7
Lab ID:	2014-610-04-01		

Visual Description: BROWN SANDY CLAY

Total Weight of the Sample (g)	22000
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4183
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5942	6002	6074	6068	6055
Wt.of Mold (g)	4183	4183	4183	4183	4183
Wt. of Wet Sample (g)	1759	1819	1891	1885	1872
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	818	825	823	826	827
Wt. of Tare & Wet Sample (g)	388.20	386.50	422.20	412.00	437.10
Wt. of Tare & Dry Sample (g)	357.68	352.52	378.81	363.41	379.05
Wt. of Tare (g)	136.80	137.30	136.90	138.50	139.20
Wt. of Water (g)	30.52	33.98	43.39	48.59	58.05
Wt. of Dry Sample (g)	220.88	215.22	241.91	224.91	239.85

Wet Density (g/cm^3)	1.88	1.94	2.02	2.01	2.00
Wet Density (pcf)	117.1	121.1	125.9	125.5	124.6
Moisture Content (%)	**13.8**	**15.8**	**17.9**	**21.6**	**24.2**
Dry Density (pcf)	**102.9**	**104.6**	**106.7**	**103.2**	**100.3**

Zero Air Voids

Moisture Content (%)	20.0	23.0	26.0
Dry Unit Weight (pcf)	109.4	103.9	99.0

Tested By *ag* *Date* *4/25/14* *Checked By* *GEM* *Date* 4/28/14

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERS, INC.
Client Reference:	ROXBORO LAM -PH 6A
Project No.:	2014-610-04

Lab ID:	001
Boring No.:	AREA A
Depth (ft):	NA
Sample No.:	CL-7
Tare Number	807
Wt. of Tare & Wet Sample (g)	309.30
Wt. of Tare & Dry Sample (g)	267.54
Weight of Tare (g)	105.30
Weight of Water (g)	41.76
Weight of Dry Sample (g)	162.24
Water Content (%)	**25.7**

Notes :

Tested By	*SS*	*Date*	*4/28/14*	*Checked By*	*GEM*	*Date*	*4/28/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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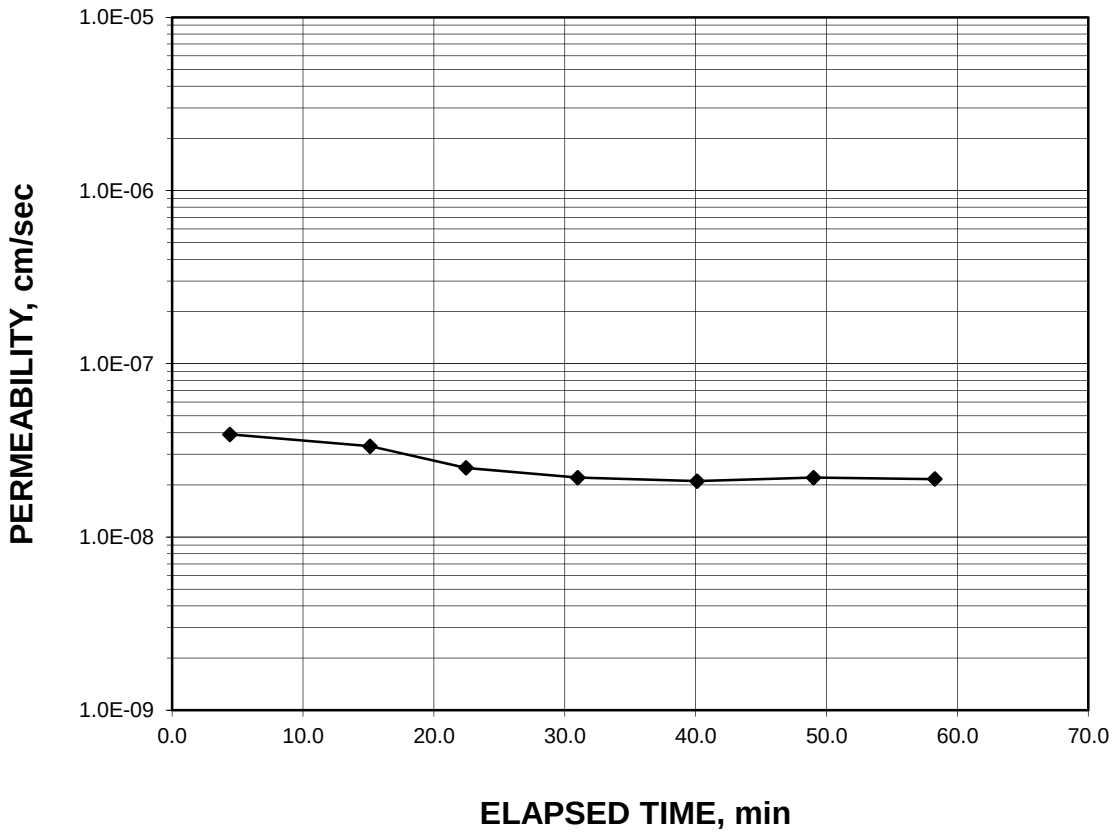
Client	BLACKROCK ENGINEERS, INC.	Boring No.	AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-04	Sample No.	CL-7
Lab ID No.	2014-610-04-01		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 2.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.2E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 4/29/14 Checked By: GEM Date: 5/2/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-04	Sample No.	CL-7
Lab ID No.	2014-610-04-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	Z-12	Z-12
Wt. of Tare & WS (gm.)	374.09	557.05
Wt. of Tare & DS (gm.)	323.32	468.57
Wt. of Tare (gm.)	90.16	89.79
Wt. of Water (gm.)	50.77	88.48
Wt. of DS (gm.)	233.16	378.78
Moisture Content (%)	**21.8**	**23.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2489.21	NA
Wt. of Tube (gm.)	1632.78	NA
Wt. of WS (calc.) (gm.)	856.43	867.57
Length 1 (in.)	4.005	4.008
Length 2 (in.)	4.005	4.032
Length 3 (in.)	4.005	4.044
Top Diameter (in.)	2.867	2.881
Middle Diameter (in.)	2.867	2.882
Bottom Diameter (in.)	2.867	2.881
Average Length (in.)	4.01	4.03
Average Area (in.^{2})	6.46	6.52
Sample Volume (cm^3)	423.69	430.40
Unit Wet Wt. (gm./ cm^3)	2.021	2.016
Unit Wet Wt. (pcf)	126.2	125.8
Unit Dry Wt. (pcf)	103.6	102.0
Unit Dry Wt. (gm./ cm^3)	1.660	1.634
Void Ratio, e	0.627	0.652
Porosity, n	0.385	0.395
Pore Volume (cm^3)	163.2	169.9
Total Wt. Of Sample After Test		875.20

Tested By: SFS Date: 4/29/14 Checked By: GEM Date: 5/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-04-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	AREA A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-04	Sample No.	CL-7
Lab ID No.	2014-610-04-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	45.0	Sample Length (cm), L	10.23
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.07
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 2.2E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 2.2E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/1/14	8	39	28	39.47	0.000	6.3	6.8	22.9	NA
5/1/14	8	43	54	43.90	4.433	6.2	6.6	22.9	3.9E-08
5/1/14	8	54	36	54.60	15.133	6.0	6.4	22.9	3.3E-08
5/1/14	9	1	56	1.93	22.467	5.9	6.3	22.9	2.5E-08
5/1/14	9	10	27	10.45	30.983	5.8	6.1	22.9	2.2E-08
5/1/14	9	19	34	19.57	40.100	5.7	6.0	22.9	2.1E-08
5/1/14	9	28	28	28.47	49.000	5.6	5.9	22.9	2.2E-08
5/1/14	9	37	44	37.73	58.267	5.5	5.7	22.9	2.2E-08

Tested By: SFS Date: 4/29/14 Checked By: GEM Date: 5/2/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-04-01 Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-08	Sample No.:	CL-8
Lab ID:	2014-610-08-04	Soil Description:	**ORANGE FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .

(Minus No. 40 sieve material, Airdried)

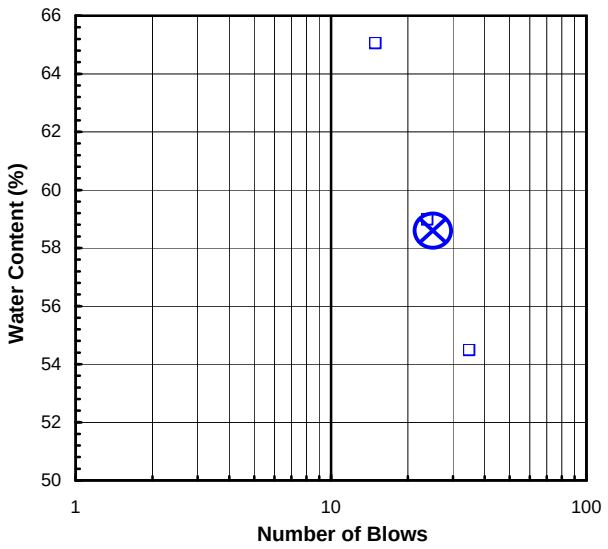
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	WS	AM	G	**U**
Wt. of Tare & Wet Sample (g)	28.99	27.33	29.24	**L**
Wt. of Tare & Dry Sample (g)	24.29	22.89	23.66	**T**
Wt. of Tare (g)	15.66	15.36	15.08	**I**
Wt. of Water (g)	4.7	4.4	5.6	**P**
Wt. of Dry Sample (g)	8.6	7.5	8.6	**O**
				I
Moisture Content (%)	**54.5**	**59.0**	**65.0**	**N**
Number of Blows	**35**	**24**	**15**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	X-9	Q	
Wt. of Tare & Wet Sample (g)	22.19	23.30	
Wt. of Tare & Dry Sample (g)	20.77	21.51	
Wt. of Tare (g)	15.73	15.16	
Wt. of Water (g)	1.4	1.8	
Wt. of Dry Sample (g)	5.0	6.4	
Moisture Content (%)	**28.2**	**28.2**	**0.0**

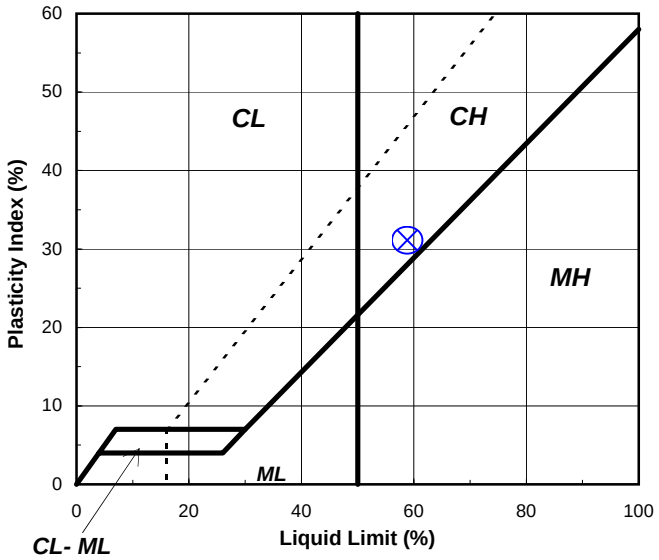
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**59**
Plastic Limit (%)	**28**
Plasticity Index (%)	**31**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/13/14*	*Checked By*	*MPS*	*Date*	5/15/14

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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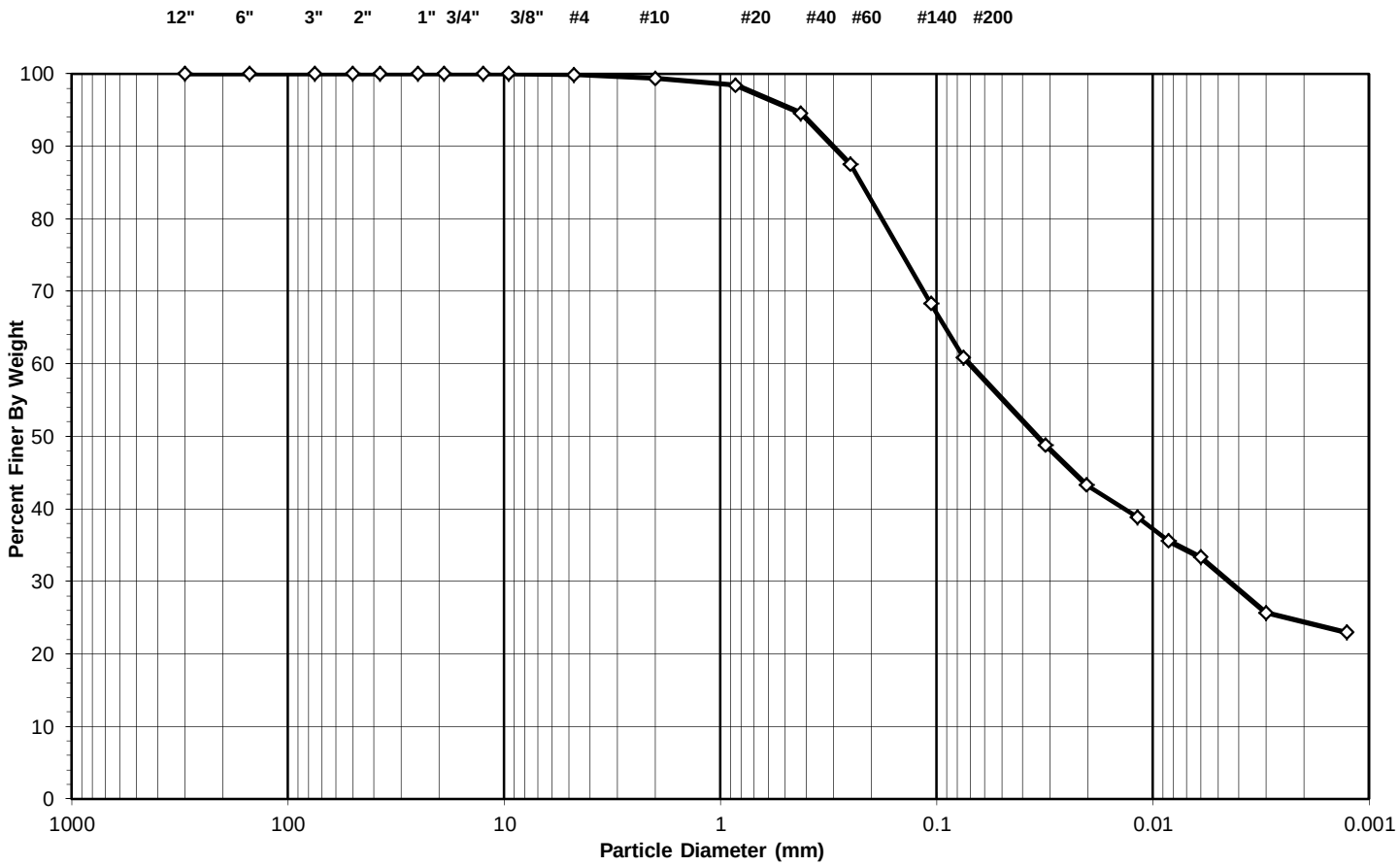
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-08	Sample No.	CL-8
Lab ID	2014-610-08-04	Soil Color	**ORANGE**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.15
#4 To #200	*Sand*	39.03
Finer Than #200	*Silt & Clay*	60.82

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-08	Sample No.	CL-8
Lab ID	2014-610-08-04	Soil Color	**ORANGE**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	B-2	Air Dried - #10 Hydrometer Material (g)	50.02
Wgt.Tare + Wet Soil (g)	34.76	Corrected Dry Wt. of - #10 Material (g)	44.49
Wgt.Tare + Dry Soil (g)	33.36		
Weight of Tare (g)	22.09	Weight of - #200 Material (g)	27.23
Weight of Water (g)	1.40	Weight of - #10 ; + #200 Material (g)	17.26
Weight of Dry Soil (g)	11.27		
Moisture Content (%)	**12.4**	**J-FACTOR (%FINER THAN #10)**	**0.9937**
Soil Specimen Data			
Tare No.	162		
Wgt.Tare + Air Dry Soil (g)	848.97		
Weight of Tare (g)	237.40		
Air Dried Wgt. Total Sample (g)	611.57	Dry Weight of Material Retained on #10 (g)	3.41
Total Dry Sample Weight (g)	544.37	Corrected Dry Sample Wt - #10 (g)	540.96

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.79	0.1	0.1	99.9	**99.9**
#10	2.00	2.62	0.5	0.6	99.4	**99.4**
#20	0.85	0.43	1.0	1.0	99.0	**98.4**
#40	0.425	1.73	3.9	4.9	95.1	**94.5**
#60	0.250	3.17	7.1	12.0	88.0	**87.5**
#140	0.106	8.58	19.3	31.3	68.7	**68.3**
#200	0.075	3.35	7.5	38.8	61.2	**60.8**
Pan	-	27.23	61.2	100.0	-	**-**

Notes :

Tested By BW Date 5/15/14 Checked By GEM Date 5/19/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-08	Sample No.	CL-8
Lab ID	2014-610-08-04	Soil Color	**ORANGE**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	26.0	24.1	3.92	22.1	49.1	0.01281	0.0314	**48.8**
5	23.5	24.1	3.92	19.6	43.6	0.01281	0.0202	**43.3**
15	21.5	24.1	3.92	17.6	39.1	0.01281	0.0118	**38.9**
30	20.0	24.1	3.92	16.1	35.8	0.01281	0.0084	**35.6**
60	19.0	24.1	3.92	15.1	33.6	0.01281	0.0060	**33.3**
250	15.5	24.2	3.89	11.6	25.8	0.01279	0.0030	**25.7**
1440	14.5	23.5	4.10	10.4	23.1	0.01290	0.0013	**23.0**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	44.49	Hygroscopic Moisture Factor	0.890	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	99.37	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 5/16/14 Checked By GEM Date 5/19/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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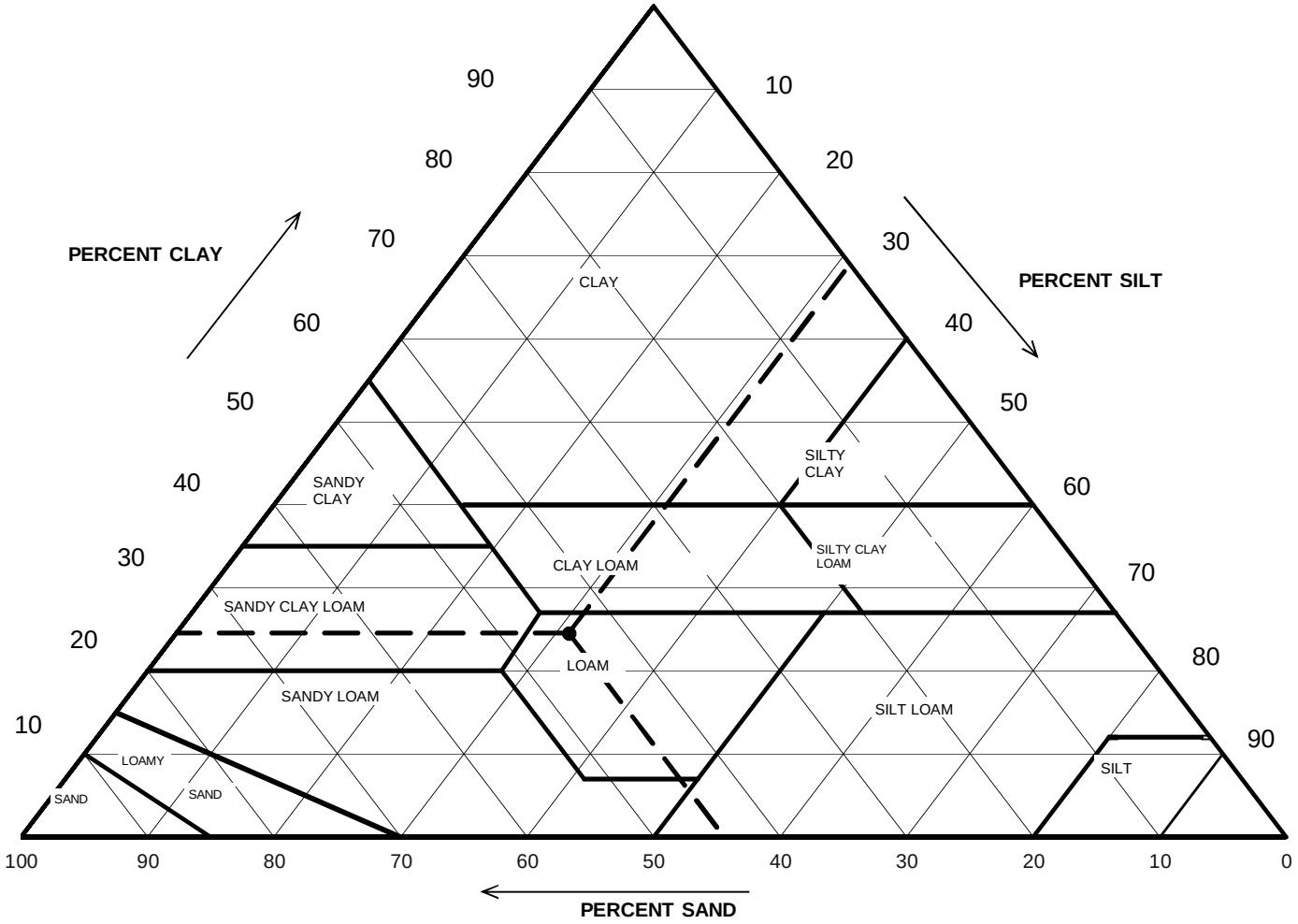
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-08	Sample No.	CL-8
Lab ID	2014-610-08-04	Soil Color	ORANGE



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.63	**0.00**
2	99.37	*Sand*	44.14	**44.42**
0.05	55.23	*Silt*	30.82	**31.02**
0.002	24.41	*Clay*	24.41	**24.56**

USDA Classification: ***LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERS, INC.
Client Reference:	ROXBORO LAM - PH 6A
Project No.:	2014-610-08

Lab ID:	004
Boring No.:	NA
Depth (ft):	NA
Sample No.:	CL-8
Tare Number	821
Wt. of Tare & Wet Sample (g)	406.06
Wt. of Tare & Dry Sample (g)	344.88
Weight of Tare (g)	137.56
Weight of Water (g)	61.18
Weight of Dry Sample (g)	207.32
Water Content (%)	**29.5**

Notes :

Tested By	*BW*	*Date*	*5/13/14*	*Checked By*	*GEM*	*Date*	*5/14/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	DRAINAGE AR.8
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-10	Sample No.:	CL-9
Lab ID:	2014-610-10-03	Soil Description:	**TAN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

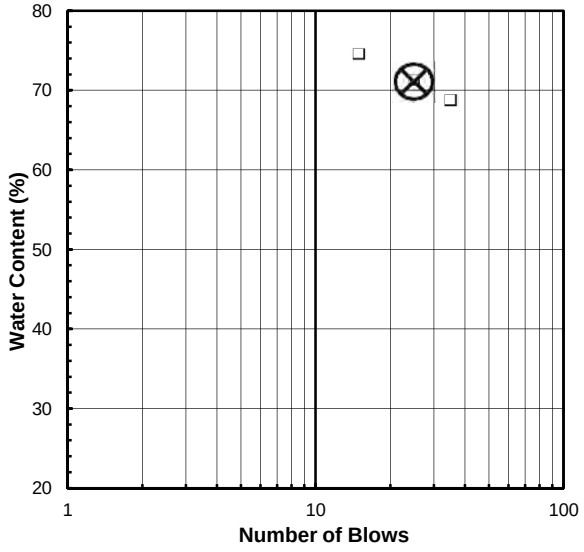
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	A-T	A-D	A-H	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	28.73	29.92	27.53	
Wt. of Tare & Dry Sample (g)	23.40	23.89	22.42	
Wt. of Tare (g)	15.64	15.42	15.56	
Wt. of Water (g)	5.3	6.0	5.1	
Wt. of Dry Sample (g)	7.8	8.5	6.9	
Moisture Content (%)	**68.7**	**71.2**	**74.5**	
Number of Blows	**35**	**25**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	AQ	K	
Wt. of Tare & Wet Sample (g)	22.12	22.25	
Wt. of Tare & Dry Sample (g)	20.94	20.99	
Wt. of Tare (g)	15.47	15.24	
Wt. of Water (g)	1.2	1.3	
Wt. of Dry Sample (g)	5.5	5.8	
Moisture Content (%)	**21.6**	**21.9**	**-0.3**

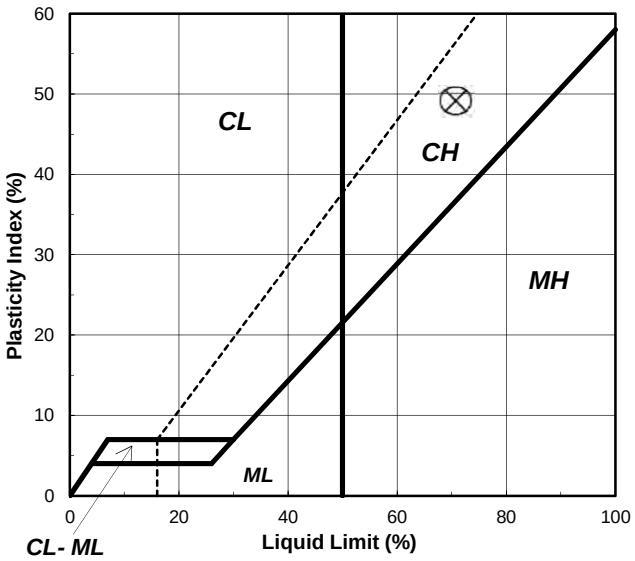
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**71**
Plastic Limit (%)	**22**
Plasticity Index (%)	**49**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *5/30/14* *Checked By* *GEM* *Date* 6/2/14

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SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

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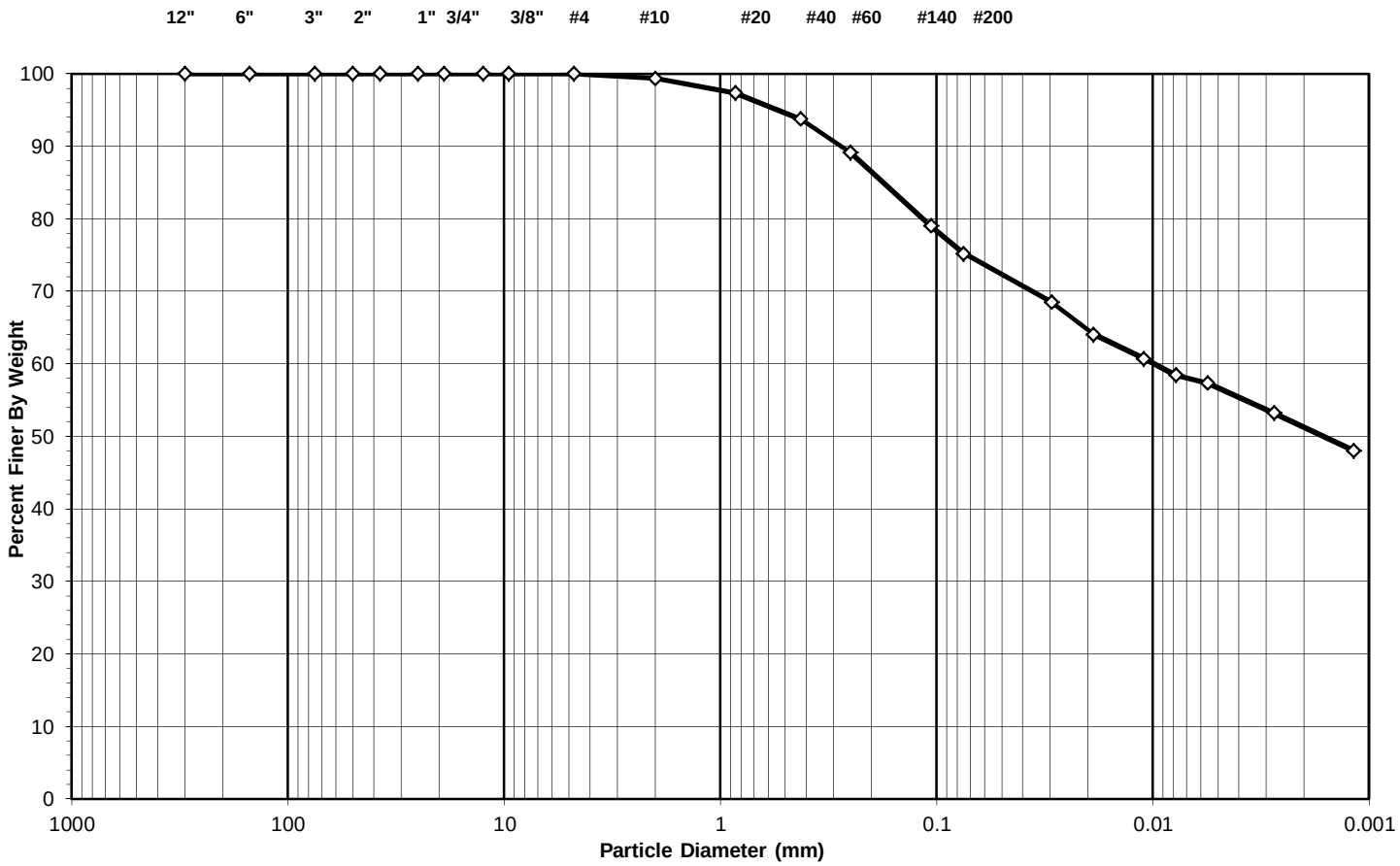
Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-10	Sample No.	CL-9
Lab ID	2014-610-10-03	Soil Color	**TAN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	24.81
Finer Than #200	*Silt & Clay*	75.19

USCS Symbol ***CH, TESTED***

USCS Classification ***FAT CLAY WITH SAND***

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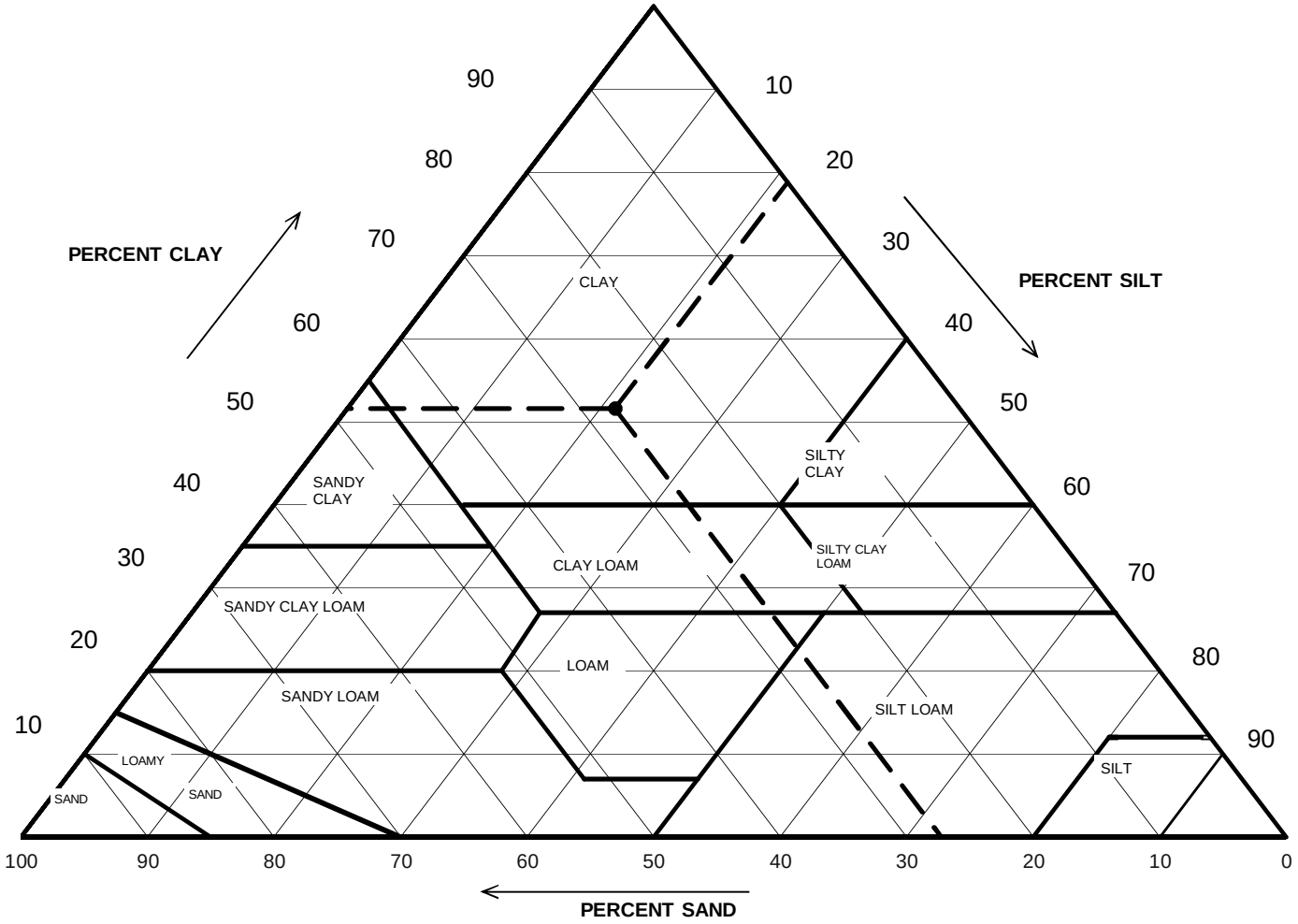
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-10	Sample No.	CL-9
Lab ID	2014-610-10-03	Soil Color	TAN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.64	**0.00**
2	99.36	*Sand*	27.08	**27.25**
0.05	72.28	*Silt*	21.01	**21.15**
0.002	51.27	*Clay*	51.27	**51.60**

USDA Classification: ***CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-03 SIEVEHYD10.xls]Sheet1

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-10	Sample No.	CL-9
Lab ID	2014-610-10-03	Soil Color	**TAN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	M-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	26.96	Corrected Dry Wt. of - #10 Material (g)	44.84
Wgt.Tare + Dry Soil (g)	25.84		
Weight of Tare (g)	16.10	Weight of - #200 Material (g)	33.93
Weight of Water (g)	1.12	Weight of - #10 ; + #200 Material (g)	10.91
Weight of Dry Soil (g)	9.74		
Moisture Content (%)	**11.5**	**J-FACTOR (%FINER THAN #10)**	**0.9936**
Soil Specimen Data			
Tare No.	158		
Wgt.Tare + Air Dry Soil (g)	546.46		
Weight of Tare (g)	238.80		
Air Dried Wgt. Total Sample (g)	307.66	Dry Weight of Material Retained on #10 (g)	1.76
Total Dry Sample Weight (g)	276.11	Corrected Dry Sample Wt - #10 (g)	274.35

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	1.76	0.6	0.6	99.4	**99.4**
#20	0.85	0.92	2.1	2.1	97.9	**97.3**
#40	0.425	1.62	3.6	5.7	94.3	**93.7**
#60	0.250	2.09	4.7	10.3	89.7	**89.1**
#140	0.106	4.56	10.2	20.5	79.5	**79.0**
#200	0.075	1.72	3.8	24.3	75.7	**75.2**
Pan	-	33.93	75.7	100.0	-	**-**

Notes :

Tested By BW Date 5/28/14 Checked By GEM Date 6/2/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-10	Sample No.	CL-9
Lab ID	2014-610-10-03	Soil Color	**TAN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	35.0	24.5	3.80	31.2	68.9	0.01275	0.0293	**68.5**
5	33.0	24.5	3.80	29.2	64.5	0.01275	0.0188	**64.1**
15	31.5	24.4	3.83	27.7	61.1	0.01276	0.0110	**60.7**
30	30.5	24.3	3.86	26.6	58.8	0.01278	0.0078	**58.4**
60	30.0	24.3	3.86	26.1	57.7	0.01278	0.0056	**57.3**
250	28.0	24.7	3.73	24.3	53.6	0.01272	0.0028	**53.2**
1440	26.0	23.5	4.10	21.9	48.3	0.01290	0.0012	**48.0**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	44.84	Hygroscopic Moisture Factor	0.897	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	99.36	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 5/29/14 Checked By GEM Date 6/2/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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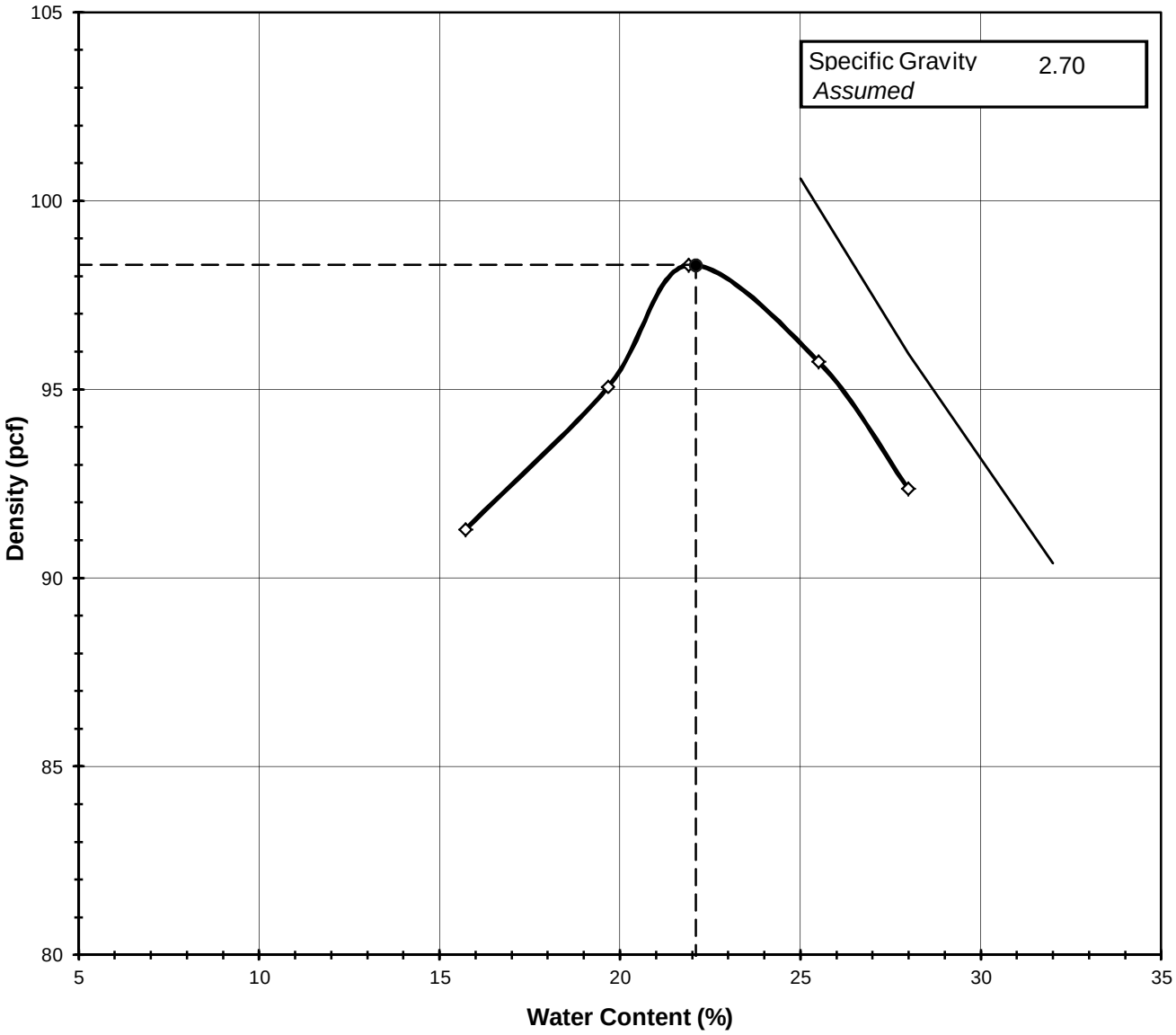
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	DRAINAGE AR.8
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-10	Sample No.:	CL-9
Lab ID:	2014-610-10-03	Test Method	**STANDARD**

Visual Description: TAN FAT CLAY WITH SAND

Optimum Water Content	**22.1**
Maximum Dry Density	**98.3**



Tested By SFS *Date* 5/27/14 *Checked By* GEM *Date* 5/27/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	DRAINAGE AR.8
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-10	Sample No.:	CL-9
Lab ID:	2014-610-10-03		

Visual Description: TAN FAT CLAY WITH SAND

Total Weight of the Sample (g)	22900
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4182
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5769	5891	5982	5987	5958
Wt.of Mold (g)	4182	4182	4182	4182	4182
Wt. of Wet Sample (g)	1587	1709	1800	1805	1776
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	307	317	305	312	303
Wt. of Tare & Wet Sample (g)	356.85	409.18	400.27	533.80	413.64
Wt. of Tare & Dry Sample (g)	323.29	355.81	343.62	442.46	347.40
Wt. of Tare (g)	109.80	84.50	84.90	84.30	110.80
Wt. of Water (g)	33.56	53.37	56.65	91.34	66.24
Wt. of Dry Sample (g)	213.49	271.31	258.72	358.16	236.60

Wet Density (g/cm^3)	1.69	1.82	1.92	1.93	1.89
Wet Density (pcf)	105.6	113.8	119.8	120.1	118.2
Moisture Content (%)	**15.7**	**19.7**	**21.9**	**25.5**	**28.0**
Dry Density (pcf)	**91.3**	**95.1**	**98.3**	**95.7**	**92.4**

Zero Air Voids

Moisture Content (%)	25.0	28.0	32.0
Dry Unit Weight (pcf)	100.6	95.9	90.4

Tested By *SFS* *Date* *5/27/14* *Checked By* *GEM* *Date* 5/27/14

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERS, INC.
Client Reference:	ROXBORO LAM - PH 6A
Project No.:	2014-610-10

Lab ID:	003
Boring No.:	DRAINAGE AR.8
Depth (ft):	NA
Sample No.:	CL-9
Tare Number	803
Wt. of Tare & Wet Sample (g)	531.89
Wt. of Tare & Dry Sample (g)	429.22
Weight of Tare (g)	105.13
Weight of Water (g)	102.67
Weight of Dry Sample (g)	324.09
Water Content (%)	**31.7**

Notes :

Tested By	*SFS*	*Date*	*5/27/14*	*Checked By*	*GEM*	*Date*	*5/28/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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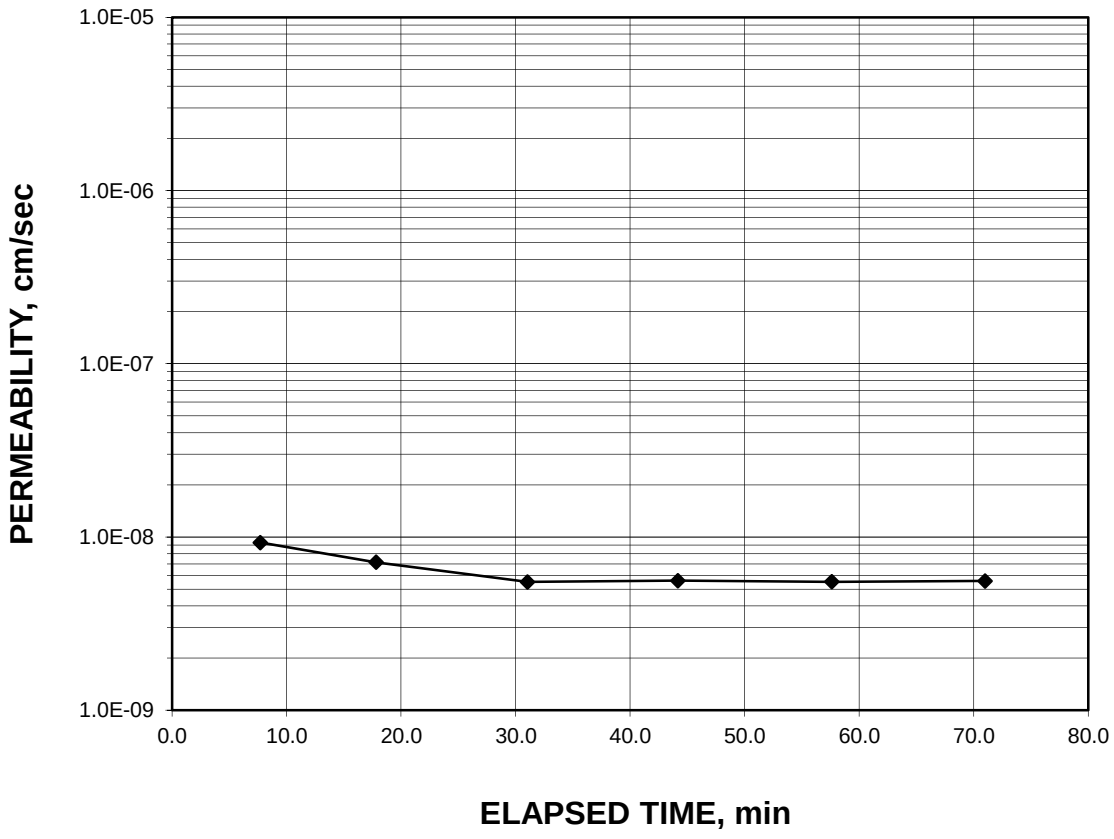
Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-10	Sample No.	CL-9
Lab ID No.	2014-610-10-03		

Visual Description: TAN FAT CLAY

AVERAGE PERMEABILITY = 5.5E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.5E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-10	Sample No.	CL-9
Lab ID No.	2014-610-10-03		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: TAN FAT CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	811	814
Wt. of Tare & WS (gm.)	345.04	489.23
Wt. of Tare & DS (gm.)	297.95	409.98
Wt. of Tare (gm.)	105.91	111.27
Wt. of Water (gm.)	47.09	79.25
Wt. of DS (gm.)	192.04	298.71
Moisture Content (%)	**24.5**	**26.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2444.27	NA
Wt. of Tube (gm.)	1632.74	NA
Wt. of WS (calc.) (gm.)	811.53	824.63
Length 1 (in.)	4.005	3.975
Length 2 (in.)	4.005	3.968
Length 3 (in.)	4.005	3.983
Top Diameter (in.)	2.867	2.876
Middle Diameter (in.)	2.867	2.862
Bottom Diameter (in.)	2.867	2.881
Average Length (in.)	4.01	3.98
Average Area (in.^{2})	6.46	6.48
Sample Volume (cm^3)	423.69	422.31
Unit Wet Wt. (gm./ cm^3)	1.915	1.953
Unit Wet Wt. (pcf)	119.6	121.9
Unit Dry Wt. (pcf)	96.0	96.3
Unit Dry Wt. (gm./ cm^3)	1.538	1.543
Void Ratio, e	0.755	0.750
Porosity, n	0.430	0.428
Pore Volume (cm^3)	182.3	180.9
Total Wt. Of Sample After Test		824.15

Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	DRAINAGE AR. 8
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-10	Sample No.	CL-9
Lab ID No.	2014-610-10-03		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.10
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.82
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 5.5E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.5E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/3/14	14	35	23	35.38	0.000	13.4	16.0	23.8	NA
6/3/14	14	43	6	43.10	7.717	13.3	15.9	23.8	9.3E-09
6/3/14	14	53	12	53.20	17.817	13.2	15.8	23.8	7.2E-09
6/3/14	15	6	26	6.43	31.050	13.1	15.7	23.8	5.5E-09
6/3/14	15	19	33	19.55	44.167	13.0	15.5	23.8	5.6E-09
6/3/14	15	32	59	32.98	57.600	12.9	15.4	23.8	5.5E-09
6/3/14	15	46	22	46.37	70.983	12.8	15.3	23.8	5.6E-09

Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-03 Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04	Soil Description:	**ORANGE FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

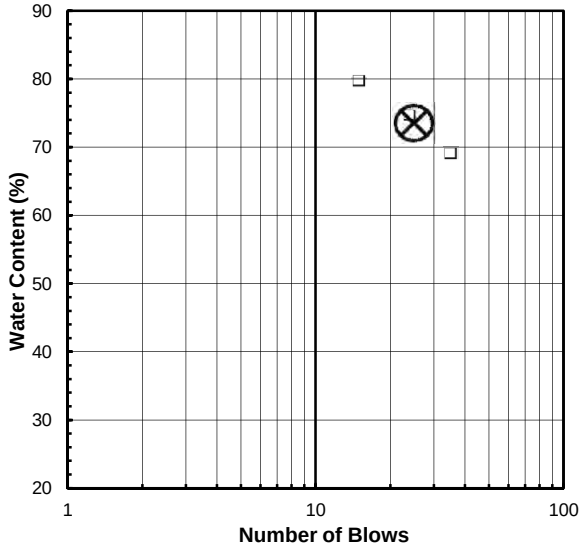
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	B-3	A-I	1M	**M U L T I P O I N T**
Wt. of Tare & Wet Sample (g)	27.46	28.91	28.24	
Wt. of Tare & Dry Sample (g)	22.72	23.17	22.78	
Wt. of Tare (g)	15.85	15.47	15.92	
Wt. of Water (g)	4.7	5.7	5.5	
Wt. of Dry Sample (g)	6.9	7.7	6.9	
Moisture Content (%)	**69.0**	**74.5**	**79.6**	
Number of Blows	**35**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	V-2	B4	
Wt. of Tare & Wet Sample (g)	22.86	23.46	
Wt. of Tare & Dry Sample (g)	21.30	21.71	
Wt. of Tare (g)	15.65	15.46	
Wt. of Water (g)	1.6	1.8	
Wt. of Dry Sample (g)	5.7	6.3	
Moisture Content (%)	**27.6**	**28.0**	**-0.4**

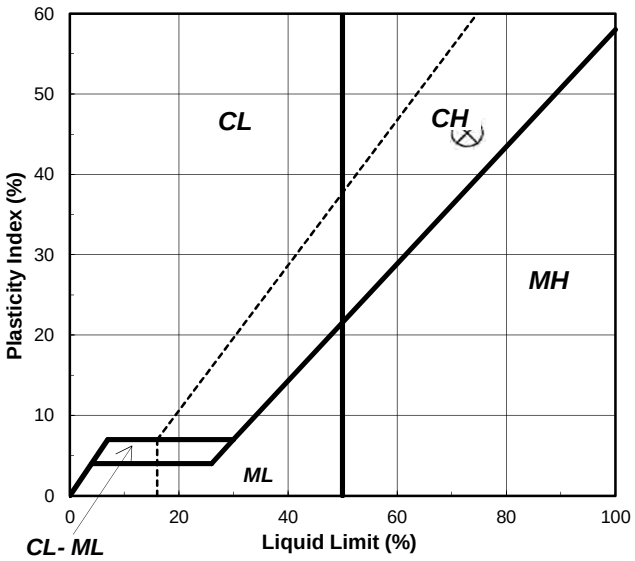
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**73**
Plastic Limit (%)	**28**
Plasticity Index (%)	**45**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/29/14*	*Checked By*	*GEM*	*Date*	5/30/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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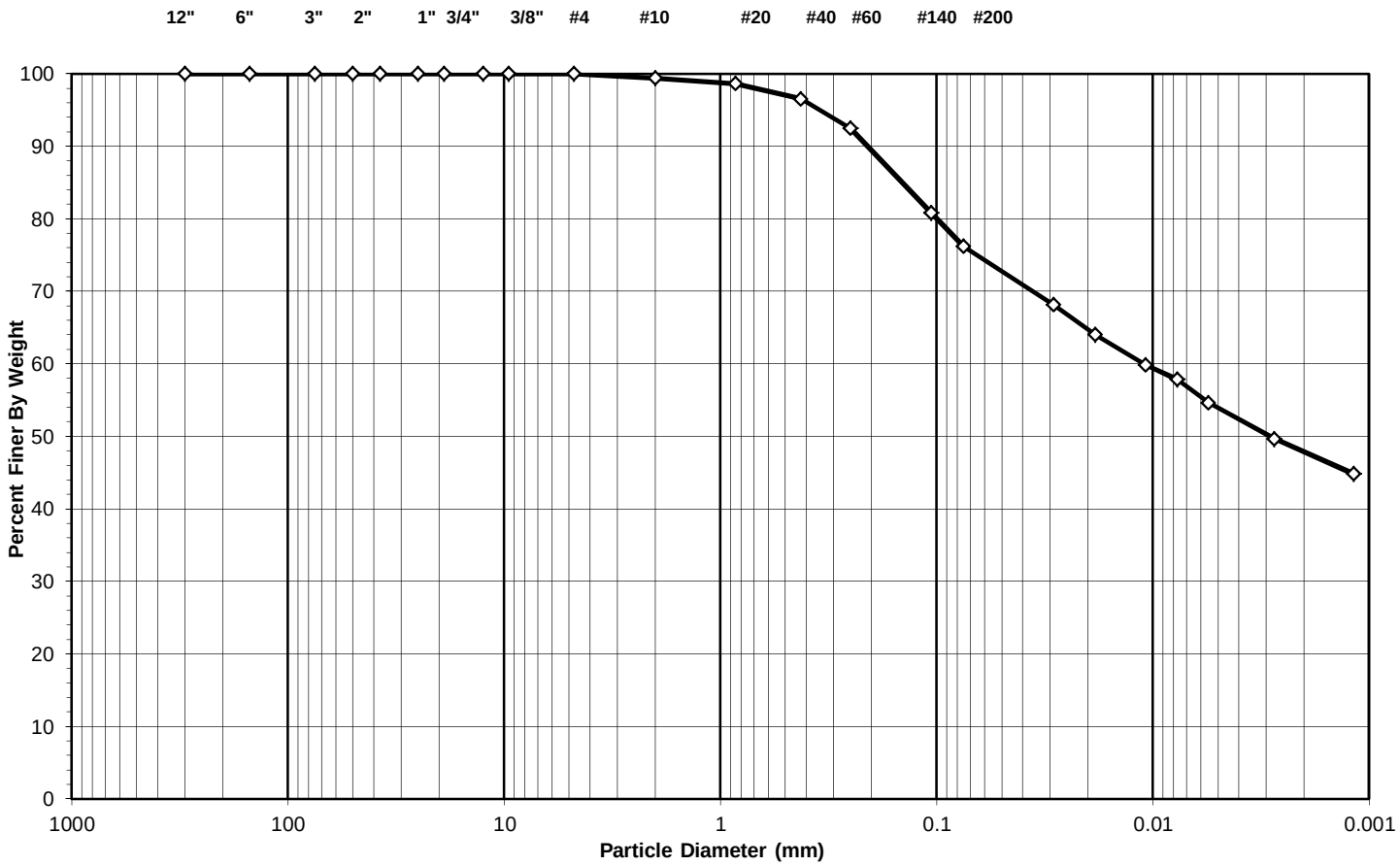
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID	2014-610-10-04	Soil Color	**ORANGE**

	SIEVE ANALYSIS					***HYDROMETER***
USCS	**cobbles**	**gravel**	**sand**			**silt and clay fraction**
USDA	**cobbles**	**gravel**	**sand**		**silt**	**clay**



Sieve Sizes (mm)	**USCS Summary**	**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	23.80
Finer Than #200	*Silt & Clay*	76.20

USCS Symbol ***CH, TESTED***

USCS Classification ***FAT CLAY WITH SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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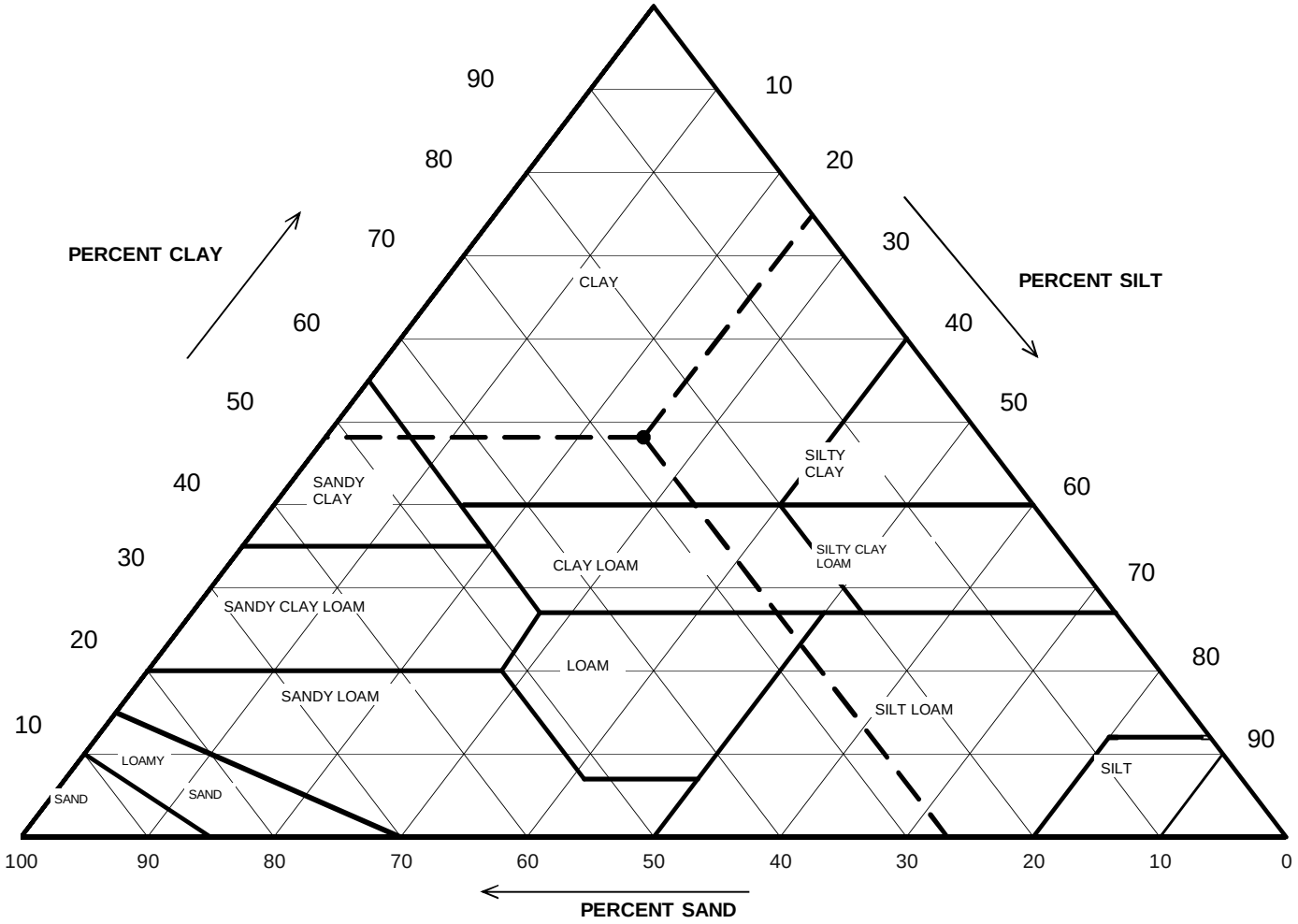
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID	2014-610-10-04	Soil Color	ORANGE



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.61	**0.00**
2	99.39	*Sand*	26.60	**26.76**
0.05	72.79	*Silt*	24.95	**25.10**
0.002	47.84	*Clay*	47.84	**48.14**

USDA Classification: ***CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-04 SIEVEHYD10.xls]Sheet1

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID	2014-610-10-04	Soil Color	**ORANGE**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	V-1	Air Dried - #10 Hydrometer Material (g)	50.03
Wgt.Tare + Wet Soil (g)	36.24	Corrected Dry Wt. of - #10 Material (g)	48.14
Wgt.Tare + Dry Soil (g)	35.70		
Weight of Tare (g)	21.94	Weight of - #200 Material (g)	36.91
Weight of Water (g)	0.54	Weight of - #10 ; + #200 Material (g)	11.23
Weight of Dry Soil (g)	13.76		
Moisture Content (%)	**3.9**	**J-FACTOR (%FINER THAN #10)**	**0.9939**
Soil Specimen Data			
Tare No.	162		
Wgt.Tare + Air Dry Soil (g)	523.07		
Weight of Tare (g)	237.29		
Air Dried Wgt. Total Sample (g)	285.78	Dry Weight of Material Retained on #10 (g)	1.69
Total Dry Sample Weight (g)	275.05	Corrected Dry Sample Wt - #10 (g)	273.36

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	1.69	0.6	0.6	99.4	**99.4**
#20	0.85	0.36	0.7	0.7	99.3	**98.6**
#40	0.425	1.03	2.1	2.9	97.1	**96.5**
#60	0.250	1.97	4.1	7.0	93.0	**92.4**
#140	0.106	5.62	11.7	18.7	81.3	**80.8**
#200	0.075	2.25	4.7	23.3	76.7	**76.2**
Pan	-	36.91	76.7	100.0	-	**-**

Notes :

Tested By BW Date 5/28/14 Checked By GEM Date 6/2/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID	2014-610-10-04	Soil Color	**ORANGE**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	37.0	24.9	3.67	33.3	68.5	0.01269	0.0287	**68.1**
5	35.0	24.9	3.67	31.3	64.4	0.01269	0.0184	**64.0**
15	33.0	24.8	3.70	29.3	60.2	0.01270	0.0108	**59.9**
30	32.0	24.8	3.70	28.3	58.2	0.01270	0.0077	**57.8**
60	30.5	24.6	3.76	26.7	55.0	0.01273	0.0055	**54.6**
250	28.0	24.8	3.70	24.3	50.0	0.01270	0.0027	**49.7**
1440	26.0	23.6	4.07	21.9	45.1	0.01288	0.0012	**44.8**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.14	Hygroscopic Moisture Factor	0.962	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	99.39	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 5/29/14 Checked By GEM Date 6/2/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-04 SIEVEHYD10.xls]Sheet1

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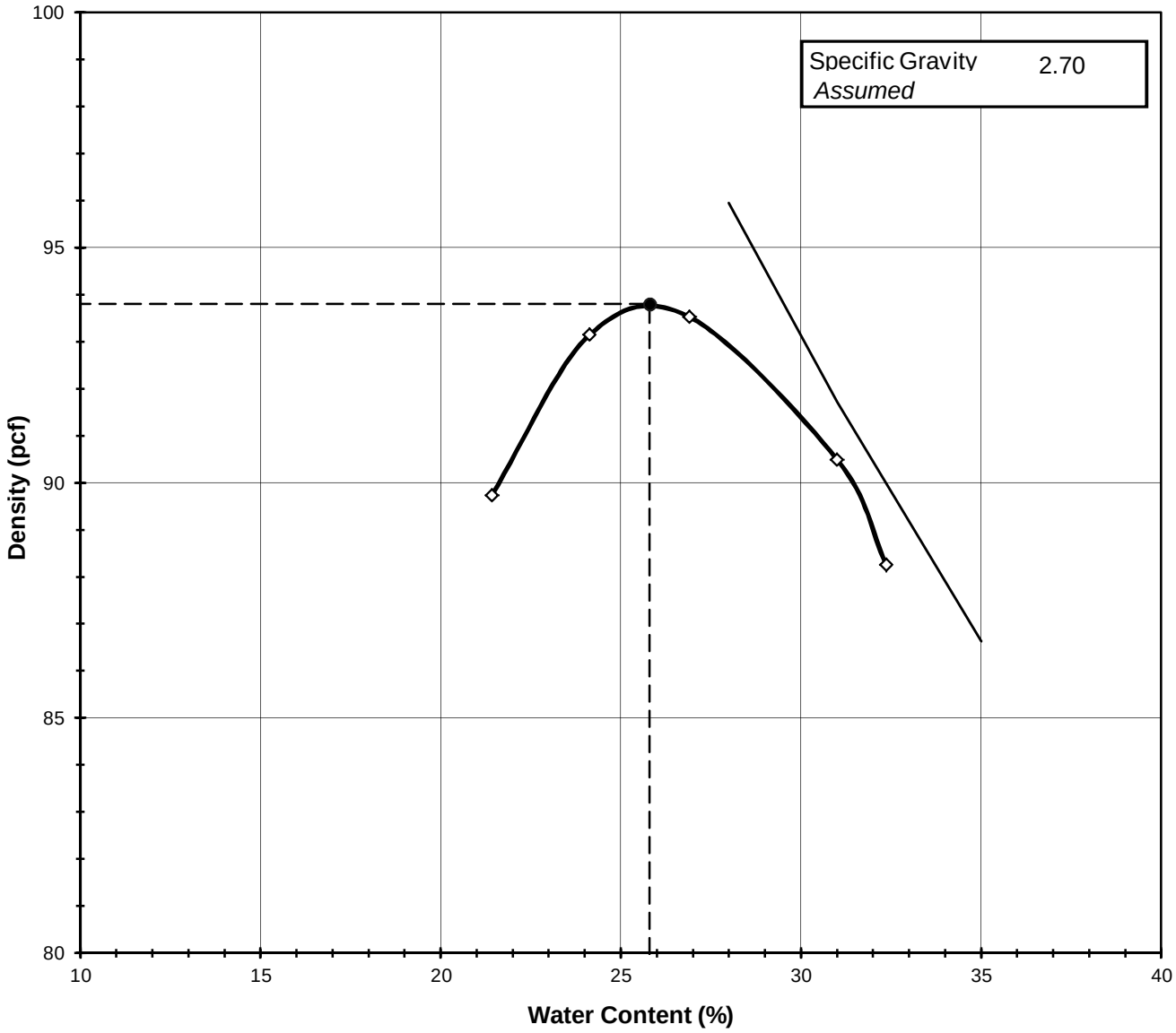
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04	Test Method	**STANDARD**

Visual Description: ORANGE FAT CLAY WITH SAND

Optimum Water Content	**25.8**
Maximum Dry Density	**93.8**



Tested By SFS *Date* 5/27/14 *Checked By* GEM *Date* 5/27/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Total Weight of the Sample (g)	15950
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4182
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5819	5919	5965	5963	5937
Wt.of Mold (g)	4182	4182	4182	4182	4182
Wt. of Wet Sample (g)	1637	1737	1783	1781	1755
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	806	803	807	813	801
Wt. of Tare & Wet Sample (g)	561.20	572.50	667.90	774.90	664.40
Wt. of Tare & Dry Sample (g)	479.97	481.65	548.65	617.88	526.55
Wt. of Tare (g)	100.80	105.20	105.40	111.40	100.70
Wt. of Water (g)	81.23	90.85	119.25	157.02	137.85
Wt. of Dry Sample (g)	379.17	376.45	443.25	506.48	425.85

Wet Density (g/cm^3)	1.75	1.85	1.90	1.90	1.87
Wet Density (pcf)	109.0	115.6	118.7	118.5	116.8
Moisture Content (%)	**21.4**	**24.1**	**26.9**	**31.0**	**32.4**
Dry Density (pcf)	**89.7**	**93.1**	**93.5**	**90.5**	**88.3**

Zero Air Voids

Moisture Content (%)	28.0	31.0	35.0
Dry Unit Weight (pcf)	95.9	91.7	86.6

Tested By SFS *Date* 5/27/14 *Checked By* GEM *Date* 5/27/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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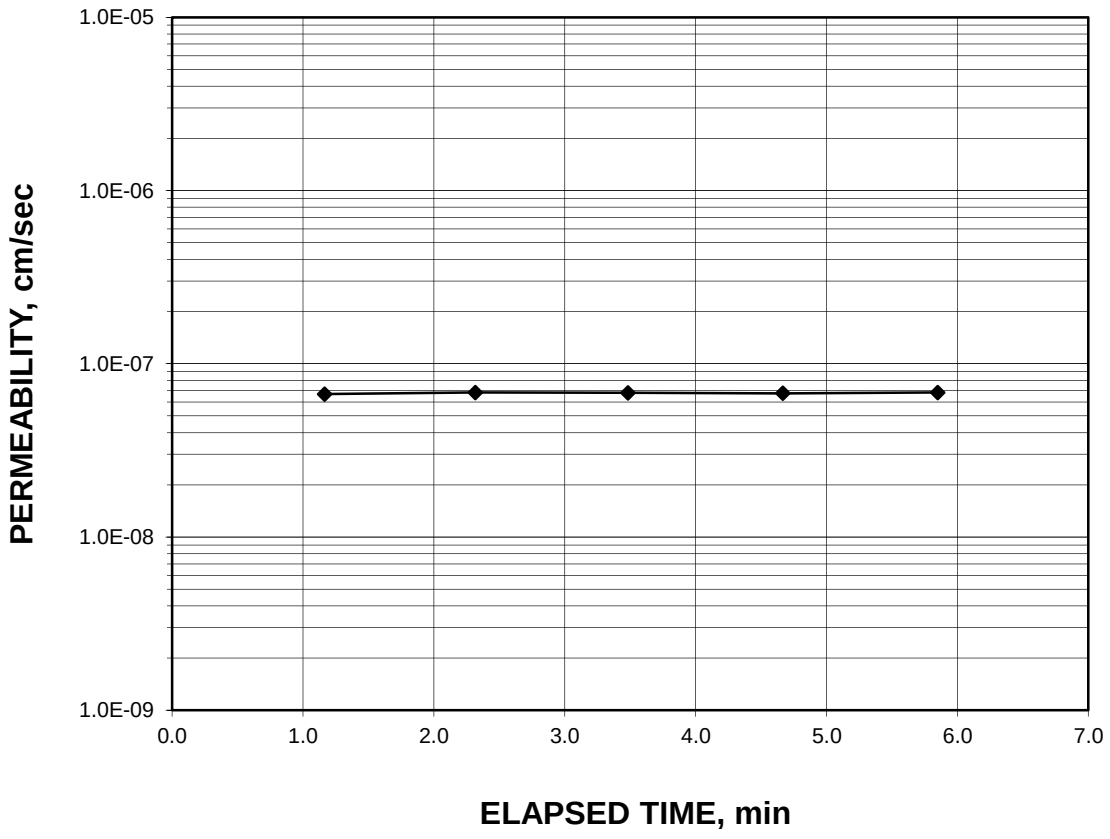
Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID No.	2014-610-10-04		

Visual Description: ORANGE SANDY CLAY

AVERAGE PERMEABILITY = 6.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.8E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

DCN: CT-22A DATE:2-2-10 REVISION:5 I:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID No.	2014-610-10-04		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: ORANGE SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	808	808
Wt. of Tare & WS (gm.)	294.70	547.45
Wt. of Tare & DS (gm.)	253.13	439.76
Wt. of Tare (gm.)	104.16	104.11
Wt. of Water (gm.)	41.57	107.69
Wt. of DS (gm.)	148.97	335.65
Moisture Content (%)	**27.9**	**32.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2430.94	NA
Wt. of Tube (gm.)	1632.74	NA
Wt. of WS (calc.) (gm.)	798.20	824.28
Length 1 (in.)	4.005	4.078
Length 2 (in.)	4.005	4.052
Length 3 (in.)	4.005	4.068
Top Diameter (in.)	2.867	2.897
Middle Diameter (in.)	2.867	2.893
Bottom Diameter (in.)	2.867	2.894
Average Length (in.)	4.01	4.07
Average Area (in.^{2})	6.46	6.58
Sample Volume (cm^3)	423.69	438.49
Unit Wet Wt. (gm./ cm^3)	1.884	1.880
Unit Wet Wt. (pcf)	117.6	117.3
Unit Dry Wt. (pcf)	91.9	88.8
Unit Dry Wt. (gm./ cm^3)	1.473	1.423
Void Ratio, e	0.833	0.897
Porosity, n	0.454	0.473
Pore Volume (cm^3)	192.6	207.4
Total Wt. Of Sample After Test		827.42

Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-04 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	ACRE 8 & 9
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	LIFT 1
Project No.	2014-610-10	Sample No.	CL-10
Lab ID No.	2014-610-10-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.33
Back Pressure(psi)	40.0	Sample Area (cm^2), A	42.46
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.8E-10 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/3/14	14	37	12	37.20	0.000	12.5	14.5	23.8	NA
6/3/14	14	38	22	38.37	1.167	12.4	14.4	23.8	6.7E-08
6/3/14	14	39	31	39.52	2.317	12.3	14.3	23.8	6.8E-08
6/3/14	14	40	41	40.68	3.483	12.2	14.2	23.8	6.8E-08
6/3/14	14	41	52	41.87	4.667	12.1	14.0	23.8	6.8E-08
6/3/14	14	43	3	43.05	5.850	12.0	13.9	23.8	6.8E-08

Tested By: SFS Date: 6/2/14 Checked By: GEM Date: 6/4/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-10-04 Permometer.xls]Sheet1

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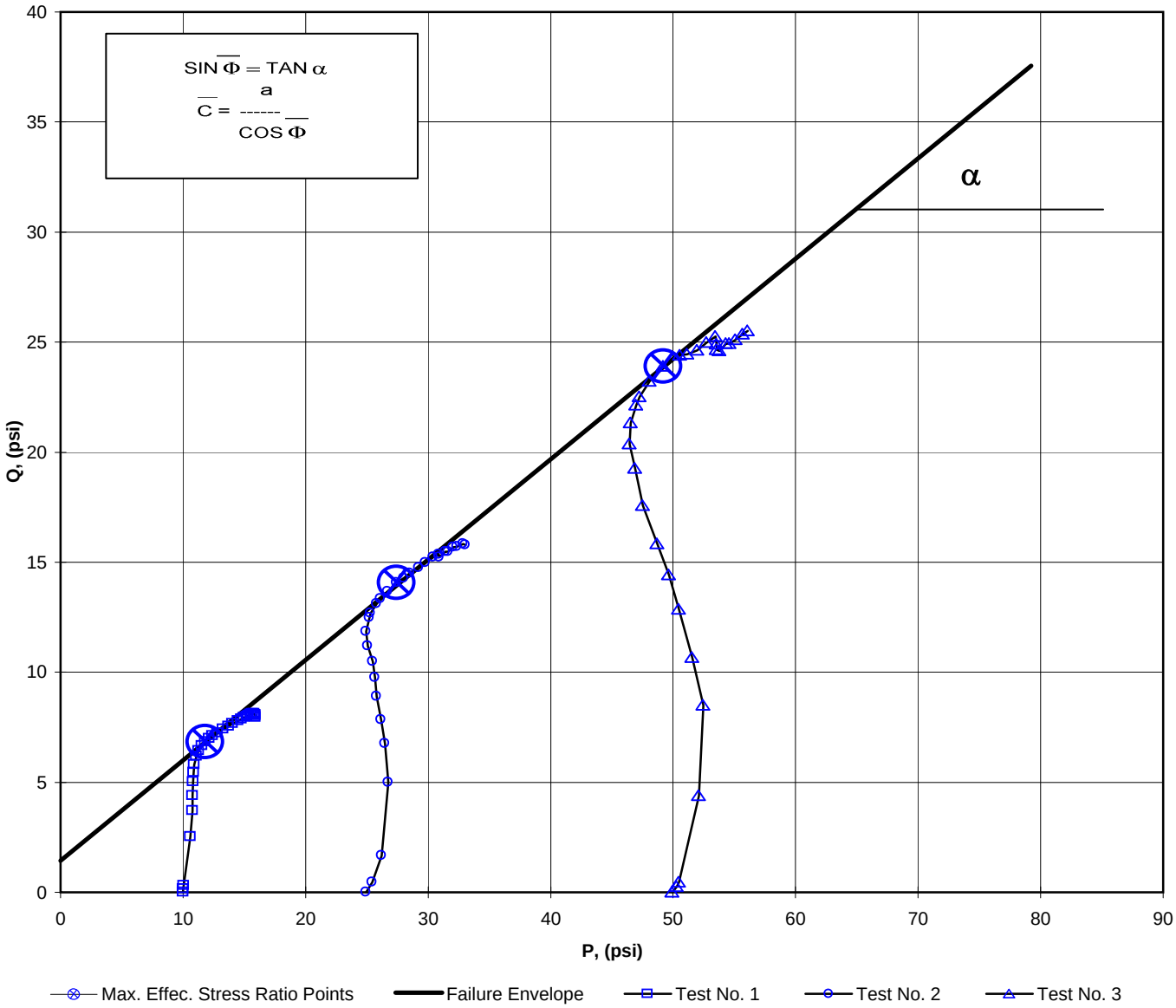
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**1.44**	$\overline{\mathbf{C}}$	=	**1.61**
α	=	**24.5**	$\overline{\Phi}$	=	**27.13**

Tested By: SFS Date: 6/2/14 Approved By: MPS Date: 6/10/14

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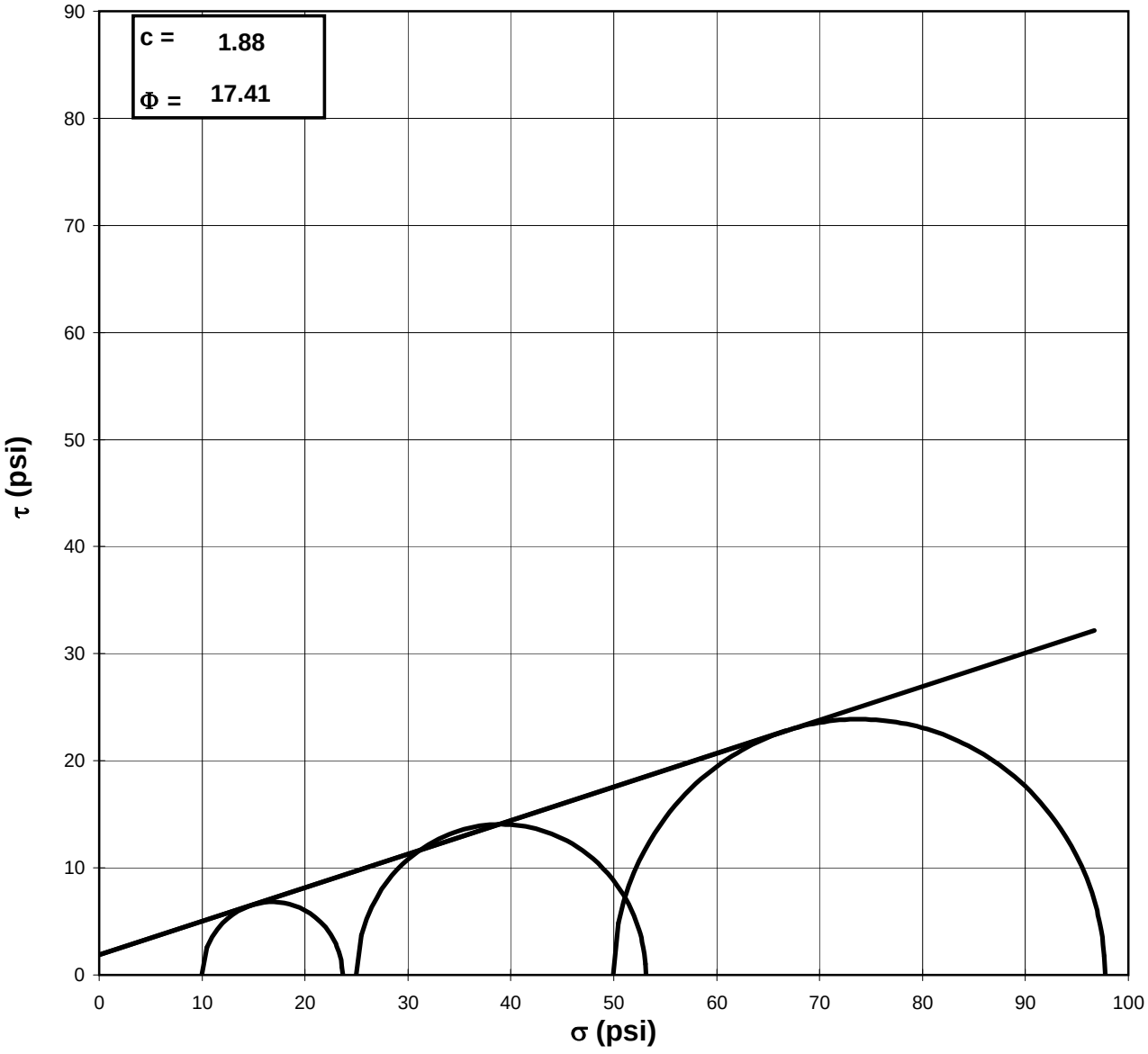
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		
Visual Description:	ORANGE FAT CLAY WITH SAND		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 6/2/14 *Approved By:* MPS *Date:* 6/10/14

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	50.0
Back Pressure (psi)	40.0
Eff. Conf. Pressure (psi)	10.0
Pore Pressure Response (%)	95

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	11.81
Q	=	6.82

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	13.1
Final Change (ml)	10.9

Initial Dial Reading (mil)	103
Dial Reading After Saturation (mil)	103
Dial Reading After Consolidation (mil)	109

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
9.1	0.000	40.0
11.1	0.001	40.1
12.8	0.003	40.2
40.9	0.007	41.9
56.2	0.011	42.9
64.7	0.017	43.6
73.0	0.025	44.2
78.4	0.034	44.6
83.0	0.046	44.9
88.1	0.067	45.1
92.0	0.097	45.1
95.2	0.133	45.1
98.0	0.169	45.0
100.7	0.210	44.8
103.0	0.240	44.7
105.4	0.283	44.4
108.6	0.340	44.1
111.4	0.400	43.8
113.9	0.445	43.6
117.0	0.506	43.3
118.9	0.550	43.1
120.8	0.595	43.0
122.4	0.640	42.8
123.7	0.670	42.7
125.2	0.700	42.6
126.2	0.731	42.5
127.0	0.760	42.3
127.2	0.804	42.2
127.4	0.849	42.1
126.9	0.880	42.1
126.2	0.910	42.0

Tested By: SFS Date: 6/2/14 Input Checked By: GEM Date: 6/10/14

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Effective Confining Pressure (psi)	10.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.96
Length After Consolidation (in)	5.99
Area After Consolidation (in^2)	6.338

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.32	0.12	10.18	9.9	1.032	0.41	10.02	0.16
0.05	0.60	0.22	10.37	9.8	1.061	0.38	10.07	0.30
0.11	5.02	1.90	13.12	8.1	1.621	0.40	10.61	2.51
0.19	7.42	2.94	14.47	7.0	2.053	0.42	10.76	3.71
0.28	8.75	3.61	15.13	6.4	2.372	0.43	10.76	4.38
0.42	10.05	4.21	15.83	5.8	2.740	0.44	10.80	5.03
0.58	10.88	4.58	16.29	5.4	3.012	0.44	10.85	5.44
0.78	11.58	4.85	16.72	5.1	3.255	0.44	10.93	5.79
1.12	12.33	5.07	17.26	4.9	3.506	0.43	11.09	6.17
1.62	12.88	5.14	17.72	4.8	3.657	0.42	11.29	6.44
2.22	13.29	5.11	18.18	4.9	3.723	0.40	11.53	6.65
2.82	13.64	5.00	18.63	5.0	3.736	0.39	11.81	6.82
3.50	13.95	4.83	19.11	5.2	3.705	0.36	12.13	6.98
4.01	14.22	4.68	19.54	5.3	3.678	0.35	12.42	7.11
4.72	14.49	4.44	20.04	5.5	3.610	0.32	12.79	7.24
5.68	14.81	4.15	20.65	5.8	3.534	0.29	13.25	7.40
6.67	15.06	3.82	21.24	6.2	3.441	0.27	13.70	7.53
7.43	15.32	3.60	21.70	6.4	3.398	0.25	14.05	7.66
8.44	15.59	3.32	22.26	6.7	3.339	0.22	14.46	7.80
9.18	15.75	3.12	22.61	6.9	3.293	0.21	14.74	7.87
9.93	15.89	2.95	22.93	7.0	3.257	0.20	14.98	7.94
10.68	15.98	2.79	23.19	7.2	3.218	0.18	15.20	7.99
11.19	16.06	2.66	23.40	7.3	3.190	0.17	15.37	8.03
11.70	16.19	2.57	23.61	7.4	3.180	0.17	15.52	8.09
12.20	16.23	2.45	23.77	7.5	3.152	0.16	15.65	8.11
12.69	16.25	2.33	23.91	7.7	3.120	0.15	15.79	8.12
13.42	16.14	2.18	23.95	7.8	3.068	0.14	15.88	8.07
14.18	16.02	2.10	23.91	7.9	3.030	0.14	15.90	8.01
14.69	15.87	2.05	23.81	7.9	2.997	0.14	15.88	7.93
15.19	15.67	2.00	23.66	8.0	2.961	0.13	15.83	7.84

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	65.0
Back Pressure (psi)	40.0
Eff. Conf. Pressure (psi)	25.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	27.45
Q	=	14.07

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	44.8
Final Burette Reading (ml)	20.9
Final Change (ml)	23.9

Initial Dial Reading (mil)	75
Dial Reading After Saturation (mil	75
Dial Reading After Consolidation(mil)	113

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
13.3	0.000	40.0
19.1	0.001	40.0
34.0	0.002	40.4
75.5	0.008	43.2
97.7	0.014	45.2
111.4	0.019	46.7
124.8	0.028	48.1
135.7	0.037	49.1
145.4	0.049	50.0
154.6	0.070	51.1
163.5	0.101	51.9
172.6	0.136	52.2
176.3	0.170	52.4
182.9	0.212	52.3
186.8	0.243	52.2
192.3	0.284	52.0
199.5	0.340	51.6
204.1	0.400	51.2
208.7	0.444	50.9
214.3	0.503	50.5
219.0	0.548	50.2
224.2	0.592	49.8
227.9	0.636	49.5
227.3	0.666	49.3
232.0	0.696	49.1
233.3	0.725	48.9
237.4	0.755	48.6
239.7	0.799	48.4
243.6	0.845	48.0
244.0	0.874	47.7
244.9	0.903	47.4

Tested By: SFS Date: 6/2/14 Input Checked By: GEM Date: 6/10/14

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Effective Confining Pressure (psi)	25.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.16
Length After Consolidation (in)	5.96
Area After Consolidation (in^2)	6.238

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.92	-0.02	25.91	25.0	1.037	-0.03	25.45	0.46
0.04	3.31	0.41	27.86	24.5	1.135	0.13	26.21	1.66
0.14	9.96	3.17	31.75	21.8	1.457	0.32	26.77	4.98
0.23	13.49	5.21	33.24	19.7	1.683	0.39	26.49	6.75
0.32	15.67	6.62	34.01	18.3	1.855	0.43	26.18	7.84
0.47	17.79	8.03	34.72	16.9	2.051	0.46	25.82	8.90
0.63	19.50	9.03	35.42	15.9	2.224	0.47	25.68	9.75
0.83	20.99	9.99	35.96	15.0	2.402	0.49	25.47	10.50
1.18	22.38	11.05	36.28	13.9	2.609	0.50	25.10	11.19
1.69	23.67	11.83	36.79	13.1	2.803	0.51	24.96	11.83
2.28	24.95	12.20	37.70	12.8	2.955	0.50	25.23	12.47
2.85	25.38	12.34	37.99	12.6	3.011	0.50	25.31	12.69
3.57	26.22	12.27	38.91	12.7	3.066	0.48	25.80	13.11
4.08	26.68	12.17	39.47	12.8	3.085	0.47	26.13	13.34
4.78	27.31	11.92	40.35	13.0	3.095	0.45	26.69	13.66
5.71	28.14	11.58	41.52	13.4	3.102	0.42	27.45	14.07
6.72	28.53	11.18	42.31	13.8	3.071	0.40	28.04	14.27
7.45	28.99	10.91	43.03	14.0	3.063	0.38	28.54	14.49
8.44	29.49	10.46	43.99	14.5	3.034	0.36	29.24	14.74
9.21	29.93	10.13	44.76	14.8	3.018	0.35	29.80	14.96
9.94	30.45	9.78	45.63	15.2	3.006	0.33	30.40	15.22
10.68	30.72	9.42	46.26	15.5	2.977	0.31	30.90	15.36
11.18	30.47	9.26	46.16	15.7	2.941	0.31	30.93	15.23
11.68	30.96	9.04	46.88	15.9	2.945	0.30	31.40	15.48
12.18	30.96	8.82	47.11	16.1	2.918	0.29	31.62	15.48
12.67	31.36	8.61	47.71	16.4	2.918	0.28	32.03	15.68
13.42	31.42	8.32	48.06	16.6	2.888	0.27	32.35	15.71
14.18	31.68	7.95	48.69	17.0	2.862	0.26	32.85	15.84
14.67	31.55	7.68	48.83	17.3	2.826	0.25	33.05	15.77
15.16	31.50	7.40	49.06	17.6	2.794	0.24	33.31	15.75

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WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	90.0
Back Pressure (psi)	40.0
Eff. Conf. Pressure (psi)	50.0
Pore Pressure Response (%)	95

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	49.22
Q	=	23.88

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	16.0
Final Change (ml)	32.0

Initial Dial Reading (mil)	45
Dial Reading After Saturation (mil	45
Dial Reading After Consolidation(mil)	132

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
13.7	0.000	40.0
16.9	0.001	40.0
19.2	0.002	40.0
68.2	0.007	42.3
119.2	0.013	46.0
146.4	0.019	49.1
174.1	0.027	52.4
193.8	0.036	54.8
211.8	0.048	57.1
234.3	0.069	60.0
256.7	0.099	62.4
272.3	0.134	63.9
286.0	0.169	64.8
298.5	0.210	65.2
305.0	0.240	65.3
316.1	0.281	65.1
328.1	0.337	64.7
338.3	0.398	63.8
341.8	0.442	63.3
347.6	0.501	62.6
355.3	0.547	62.2
362.1	0.590	61.8
360.0	0.634	61.4
358.4	0.665	61.1
359.8	0.695	60.8
366.3	0.724	60.6
368.4	0.753	60.3
373.9	0.798	60.0
380.7	0.843	59.7
385.0	0.872	59.4
387.6	0.889	59.4

Tested By: SFS Date: 6/2/14 Input Checked By: GEM Date: 6/10/14

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

Visual Description: ORANGE FAT CLAY WITH SAND

Effective Confining Pressure (psi)	50.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	36.67
Length After Consolidation (in)	5.91
Area After Consolidation (in^2)	6.207

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	0.53	-0.07	50.55	50.0	1.011	-0.13	50.29	0.26
0.04	0.90	-0.08	50.93	50.0	1.018	-0.09	50.49	0.45
0.13	8.77	2.23	56.50	47.7	1.184	0.27	52.12	4.39
0.22	16.96	5.98	60.94	44.0	1.386	0.37	52.46	8.48
0.32	21.32	9.03	62.24	40.9	1.521	0.45	51.58	10.66
0.46	25.73	12.33	63.35	37.6	1.684	0.50	50.49	12.86
0.61	28.85	14.72	64.09	35.2	1.819	0.54	49.67	14.42
0.81	31.67	17.06	64.56	32.9	1.963	0.57	48.73	15.84
1.17	35.13	20.00	65.09	30.0	2.173	0.60	47.52	17.57
1.67	38.51	22.30	66.16	27.7	2.393	0.61	46.91	19.26
2.26	40.72	23.87	66.80	26.1	2.561	0.62	46.44	20.36
2.86	42.63	24.71	67.87	25.2	2.688	0.61	46.56	21.31
3.55	44.27	25.11	69.11	24.8	2.782	0.60	46.98	22.14
4.06	45.04	25.20	69.79	24.8	2.819	0.59	47.27	22.52
4.76	46.41	25.09	71.28	24.9	2.866	0.57	48.07	23.20
5.70	47.77	24.62	73.10	25.3	2.885	0.54	49.22	23.88
6.73	48.78	23.76	74.97	26.2	2.862	0.51	50.58	24.39
7.48	48.91	23.26	75.61	26.7	2.832	0.50	51.15	24.45
8.49	49.24	22.59	76.61	27.4	2.799	0.48	51.99	24.62
9.25	49.96	22.19	77.72	27.8	2.799	0.47	52.74	24.98
9.99	50.53	21.77	78.71	28.2	2.793	0.45	53.45	25.26
10.74	49.81	21.33	78.44	28.6	2.740	0.45	53.53	24.91
11.25	49.30	21.07	78.19	28.9	2.707	0.45	53.54	24.65
11.76	49.21	20.80	78.37	29.2	2.688	0.44	53.76	24.60
12.25	49.85	20.54	79.27	29.4	2.695	0.43	54.34	24.93
12.75	49.87	20.29	79.54	29.7	2.681	0.43	54.61	24.93
13.51	50.20	19.96	80.20	30.0	2.673	0.42	55.10	25.10
14.27	50.70	19.64	81.02	30.3	2.672	0.41	55.67	25.35
14.77	51.00	19.37	81.58	30.6	2.667	0.40	56.08	25.50
15.05	51.17	19.31	81.82	30.6	2.670	0.40	56.23	25.59

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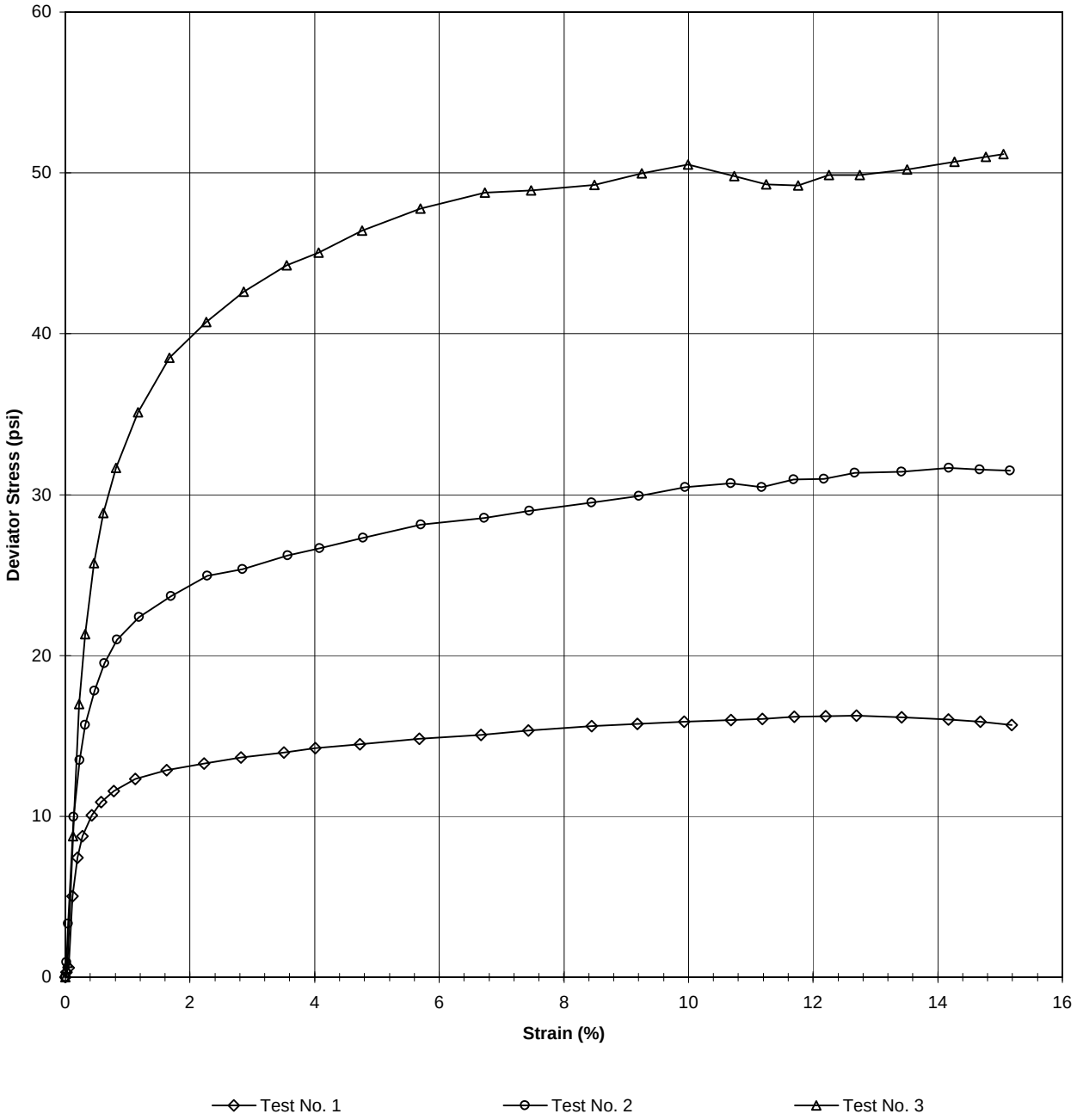
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		
Visual Description:	ORANGE FAT CLAY WITH SAND		



Tested By: SFS Date: 6/2/14 Approved By: MPS Date: 6/10/14

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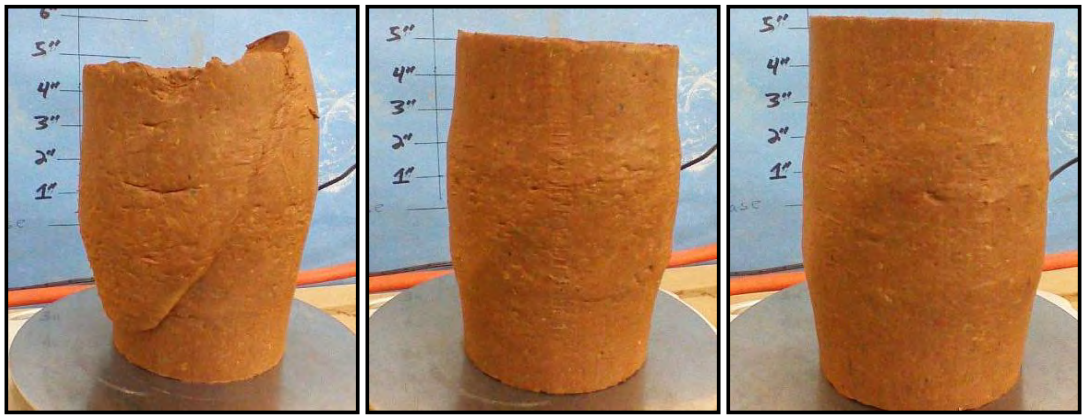
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.		
Client Reference:	ROXBORO LAM - PH 6A		
Project No.:	2014-610-10		
Lab ID:	2014-610-10-04	Specific Gravity (assumed)	2.7

Visual Description: ORANGE FAT CLAY WITH SAND

SAMPLE CONDITION SUMMARY

Boring No.:	ACRE 8 & 9	ACRE 8 & 9	ACRE 8 & 9
Depth (ft):	LIFT 1	LIFT 1	LIFT 1
Sample No.:	CL-10	CL-10	CL-10
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0005	0.0005	0.0005
Back Pressure (psi)	40.0	40.0	40.0
Consolidation Time (days)	1	2	2
Moisture Content (%) (INITIAL)	27.6	27.6	27.6
Total Unit Weight (pcf)	117.0	117.7	118.4
Dry Unit Weight (pcf)	91.6	92.2	92.8
Moisture Content (%) (FINAL)	33.2	30.3	29.1
Initial State Void Ratio,e	0.839	0.828	0.817
Void Ratio at Shear, e	0.808	0.759	0.725



Tested By: SFS Date: 6/2/14 Input Checked By: GEM Date: 6/10/14

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2	T3
Tare Number	801	801	801
Weight of Tare & Wet Sample (g)	318.36	318.36	318.36
Weight of Tare & Dry Sample (g)	271.12	271.12	271.12
Weight of Tare (g)	100.23	100.23	100.23
Moisture Content (%) (INITIAL)	27.64	27.64	27.64
Tare Number	812	814	811
Weight of Tare & Wet Sample (g)	666.25	750.04	636.9
Weight of Tare & Dry Sample (g)	526.85	601.29	517.25
Weight of Tare (g)	106.92	111.13	106.06
Moisture Content (%) (FINAL)	33.20	30.35	29.10

UNIT WEIGHT

Weight of Tube & Wet Sample (g)	2740.18	2747.52	2754.73
Weight of Tube (g)	1554.29	1554.29	1554.29
Weight of Wet Sample (g)	1185.89	1193.23	1200.44
Length 1 (in)	5.995	5.995	5.995
Length 2 (in)	5.995	5.995	5.995
Length 3 (in)	5.995	5.995	5.995
Top Diameter (in)	2.864	2.864	2.864
Middle Diameter (in)	2.864	2.864	2.864
Bottom Diameter (in)	2.864	2.864	2.864
Average Length (in)	5.995	5.995	5.995
Average Area (in)	6.442	6.442	6.442
Sample Volume (cm^3)	632.89	632.89	632.89
Unit Wet Weight (g/cm^3)	1.87	1.89	1.90
Unit Wet Weight (pcf)	116.98	117.70	118.42
Unit Dry Weight (pcf)	91.65	92.21	92.77
Unit Dry Weight (g/cm^3)	1.47	1.48	1.49
Initial Burette Reading	**24**	**44.8**	**48**
Final Burette Reading	**13.1**	**20.9**	**16**
Initial Dial Reading	**103**	**75**	**45**
Dial Reading After Saturation	**103**	**75**	**45**
Dial Reading After Consolidation	**109**	**113**	**132**
Volume Change during Consolidation	10.9	23.9	32
Volume Change during Saturation	0.00	0.00	0.00
Volume at Shear (cm^3) *These	621.99	608.99	600.89
Volume of Solids (cm^3) measurements	344.10	346.23	348.32
Volume of Voids (cm^3) are all	277.89	262.76	252.57
Volume of Water (cm^3) at	308.41	283.69	273.66
Void Ratio, e shear	0.808	0.759	0.725

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	ACRE 8 & 9
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	LIFT 1
Project No.:	2014-610-10	Sample No.:	CL-10
Lab ID:	2014-610-10-04		

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Tested By SFS *Date* *6/2/14* *Approved By* MPS *Date* 6/10/14

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-12	Sample No.:	CL-11
Lab ID:	2014-610-12-02	Soil Description:	BROWN LEAN CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

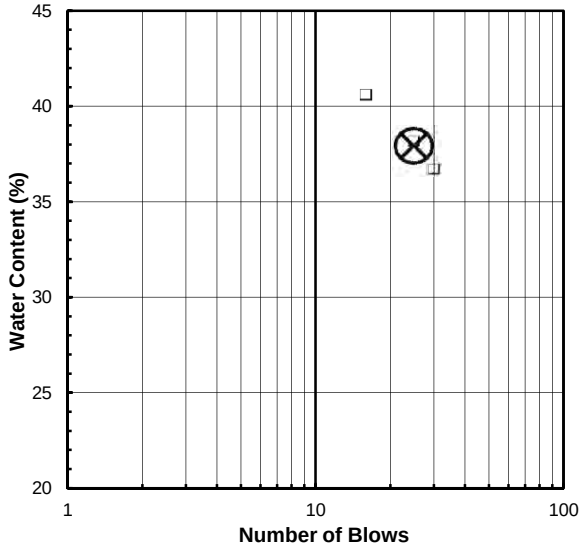
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	W	A-N	A-Z	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	31.30	34.52	30.71	
Wt. of Tare & Dry Sample (g)	26.97	29.26	26.33	
Wt. of Tare (g)	15.16	15.46	15.53	
Wt. of Water (g)	4.3	5.3	4.4	
Wt. of Dry Sample (g)	11.8	13.8	10.8	
Moisture Content (%)	**36.7**	**38.1**	**40.6**	
Number of Blows	**30**	**25**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B2	3M	
Wt. of Tare & Wet Sample (g)	22.56	23.19	
Wt. of Tare & Dry Sample (g)	21.49	22.12	
Wt. of Tare (g)	15.42	15.60	
Wt. of Water (g)	1.1	1.1	
Wt. of Dry Sample (g)	6.1	6.5	
Moisture Content (%)	**17.6**	**16.4**	**1.2**

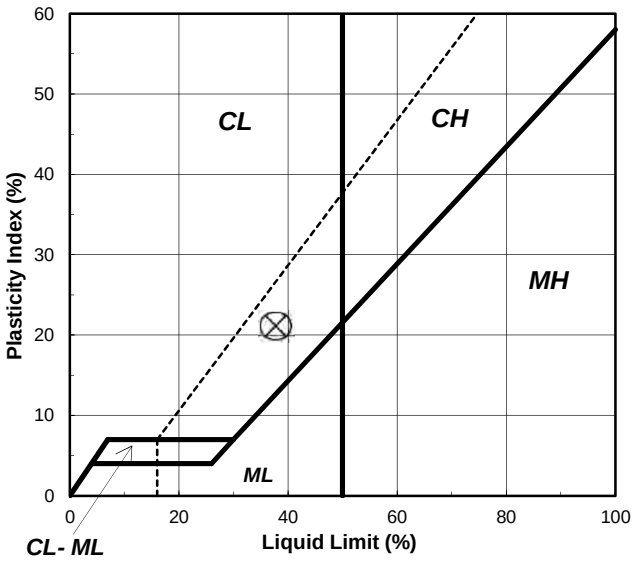
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**38**
Plastic Limit (%)	**17**
Plasticity Index (%)	**21**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *6/2/14* *Checked By* *GEM* *Date* 6/3/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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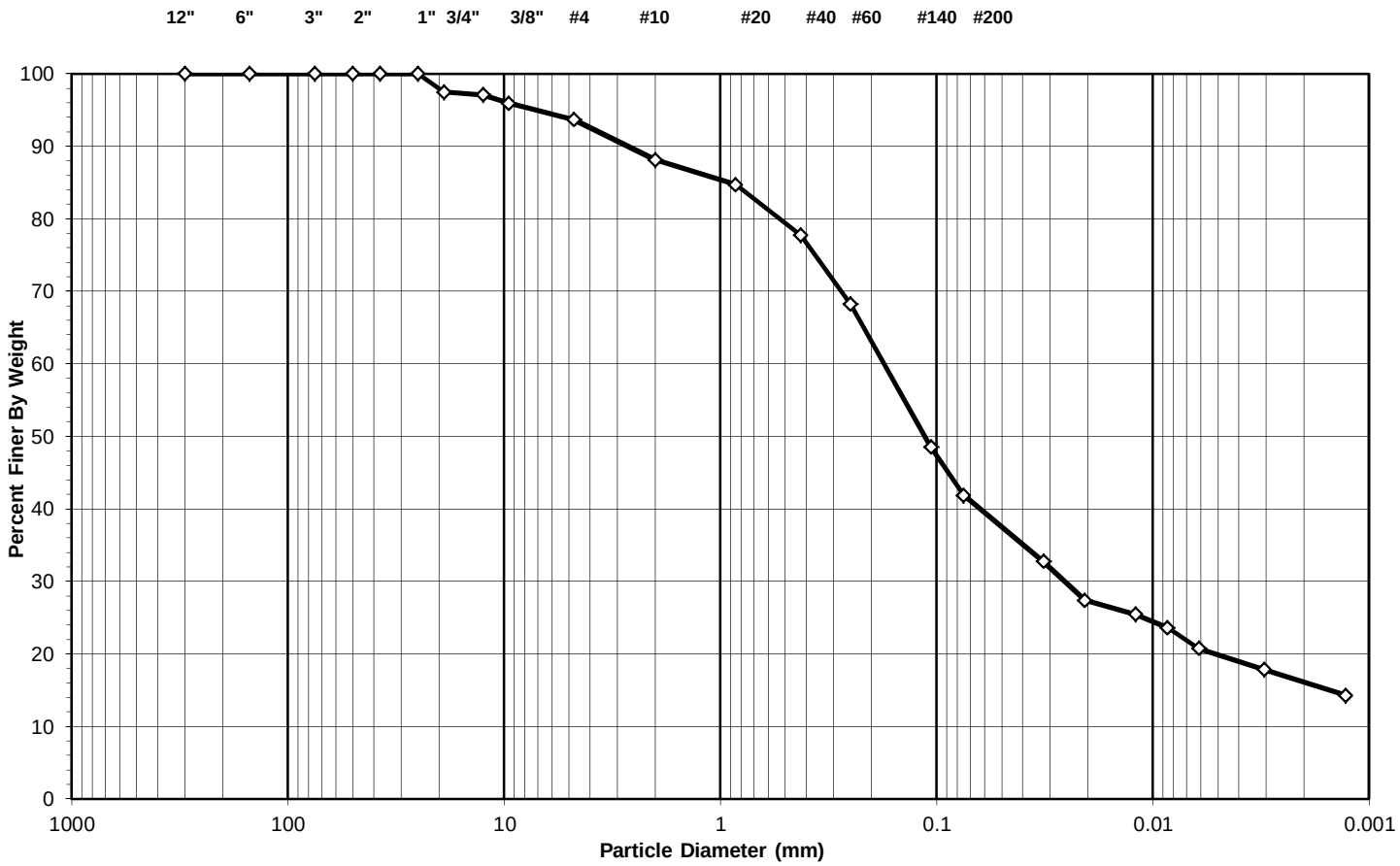
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-12	Sample No.	CL-11
Lab ID	2014-610-12-02	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



Sieve Sizes (mm)	**USCS Summary**	**Percentage**
Greater Than #4	*Gravel*	6.35
#4 To #200	*Sand*	51.79
Finer Than #200	*Silt & Clay*	41.86

USCS Symbol ***SC, TESTED***

USCS Classification ***CLAYEY SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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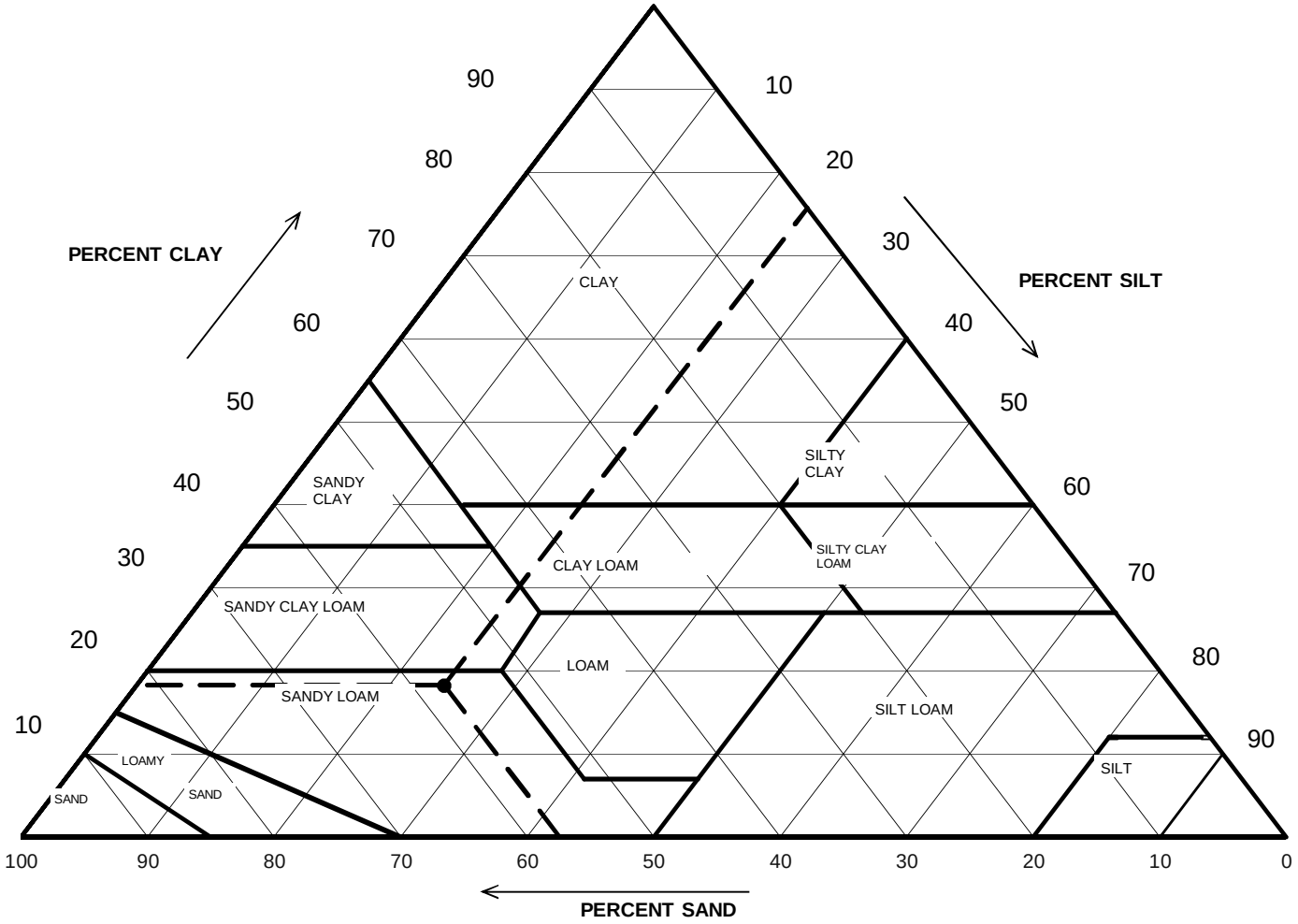
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-12	Sample No.	CL-11
Lab ID	2014-610-12-02	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	11.86	**0.00**
2	88.14	*Sand*	50.62	**57.43**
0.05	37.52	*Silt*	21.41	**24.29**
0.002	16.11	*Clay*	16.11	**18.28**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-12	Sample No.	CL-11
Lab ID	2014-610-12-02	Soil Color	**BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	E-20	Air Dried - #10 Hydrometer Material (g)	50.13
Wgt.Tare + Wet Soil (g)	32.76	Corrected Dry Wt. of - #10 Material (g)	48.65
Wgt.Tare + Dry Soil (g)	32.44		
Weight of Tare (g)	21.89	Weight of - #200 Material (g)	23.10
Weight of Water (g)	0.32	Weight of - #10 ; + #200 Material (g)	25.55
Weight of Dry Soil (g)	10.55		
Moisture Content (%)	**3.0**	**J-FACTOR (%FINER THAN #10)**	**0.8814**
Soil Specimen Data			
Tare No.	151		
Wgt.Tare + Air Dry Soil (g)	1531.47		
Weight of Tare (g)	240.68		
Air Dried Wgt. Total Sample (g)	1290.79	Dry Weight of Material Retained on #10 (g)	149.07
Total Dry Sample Weight (g)	1257.18	Corrected Dry Sample Wt - #10 (g)	1108.11

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	31.95	2.5	2.5	97.5	**97.5**
1/2"	12.5	4.55	0.4	2.9	97.1	**97.1**
3/8"	9.50	14.48	1.2	4.1	95.9	**95.9**
#4	4.75	28.88	2.3	6.4	93.6	**93.6**
#10	2.00	69.21	5.5	11.9	88.1	**88.1**
#20	0.85	1.89	3.9	3.9	96.1	**84.7**
#40	0.425	3.86	7.9	11.8	88.2	**77.7**
#60	0.250	5.25	10.8	22.6	77.4	**68.2**
#140	0.106	10.86	22.3	44.9	55.1	**48.5**
#200	0.075	3.69	7.6	52.5	47.5	**41.9**
Pan	-	23.10	47.5	100.0	-	**-**

Notes :

Tested By BW Date 5/30/14 Checked By GEM Date 6/3/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-12	Sample No.	CL-11
Lab ID	2014-610-12-02	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	22.0	24.7	3.73	18.3	37.2	0.01272	0.0320	**32.8**
5	19.0	24.7	3.73	15.3	31.1	0.01272	0.0207	**27.4**
15	18.0	24.5	3.80	14.2	28.9	0.01275	0.0120	**25.5**
30	17.0	24.4	3.83	13.2	26.8	0.01276	0.0086	**23.6**
60	15.5	24.1	3.92	11.6	23.6	0.01281	0.0061	**20.8**
250	14.0	23.7	4.04	10.0	20.3	0.01287	0.0030	**17.9**
1440	12.0	23.7	4.04	8.0	16.2	0.01287	0.0013	**14.3**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.65	Hygroscopic Moisture Factor	0.971	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	88.14	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 5/30/14 Checked By GEM Date 6/3/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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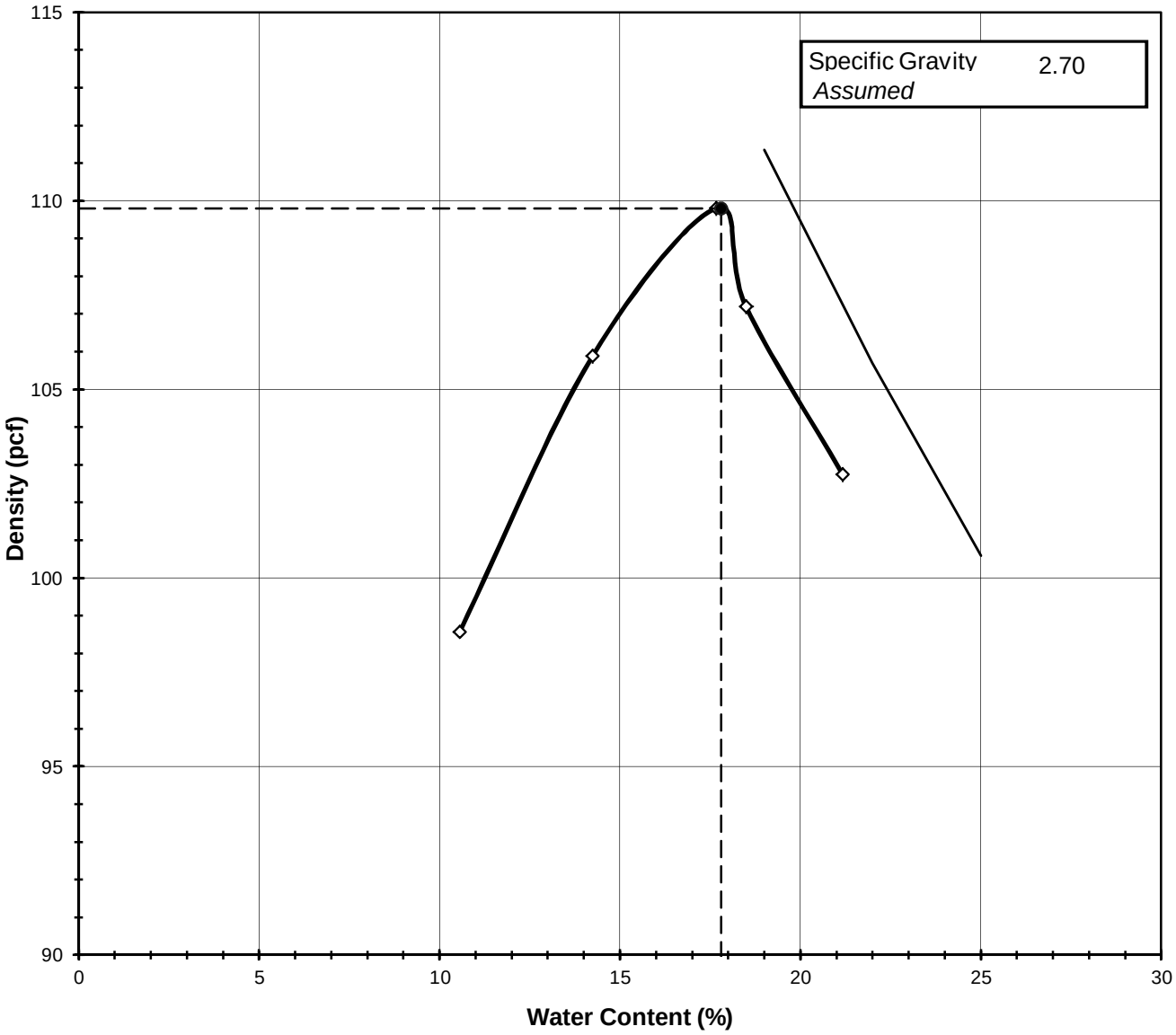
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-12	Sample No.:	CL-11
Lab ID:	2014-610-12-02	Test Method	**STANDARD**

Visual Description: BROWN SANDY CLAY W/GRAVEL

Optimum Water Content	**17.8**
Maximum Dry Density	**109.8**



Tested By SFS *Date* 5/27/14 *Checked By* GEM *Date* 5/27/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-12	Sample No.:	CL-11
Lab ID:	2014-610-12-02		

Visual Description: BROWN SANDY CLAY W/GRAVEL

Total Weight of the Sample (g)	21250
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	1
Percent Retained on #4	7
Oversize Material	Not included
Procedure Used	B

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4182
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5819	5999	6123	6090	6052
Wt.of Mold (g)	4182	4182	4182	4182	4182
Wt. of Wet Sample (g)	1637	1817	1941	1908	1870
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	866	314	300	310	399
Wt. of Tare & Wet Sample (g)	463.50	429.20	641.70	546.40	526.00
Wt. of Tare & Dry Sample (g)	427.50	386.20	561.97	478.30	449.22
Wt. of Tare (g)	86.50	84.20	110.90	110.00	86.50
Wt. of Water (g)	36.00	43.00	79.73	68.10	76.78
Wt. of Dry Sample (g)	341.00	302.00	451.07	368.30	362.72

Wet Density (g/cm^3)	1.75	1.94	2.07	2.04	2.00
Wet Density (pcf)	109.0	121.0	129.2	127.0	124.5
Moisture Content (%)	**10.6**	**14.2**	**17.7**	**18.5**	**21.2**
Dry Density (pcf)	**98.6**	**105.9**	**109.8**	**107.2**	**102.7**

Zero Air Voids

Moisture Content (%)	19.0	22.0	25.0
Dry Unit Weight (pcf)	111.4	105.7	100.6

Tested By *SFS* *Date* *5/27/14* *Checked By* *GEM* *Date* 5/27/14

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERS, INC.
Client Reference:	ROXBORO LAM - PH 6A
Project No.:	2014-610-12

Lab ID:	002
Boring No.:	NA
Depth (ft):	NA
Sample No.:	CL-11
Tare Number	807
Wt. of Tare & Wet Sample (g)	489.09
Wt. of Tare & Dry Sample (g)	437.28
Weight of Tare (g)	105.37
Weight of Water (g)	51.81
Weight of Dry Sample (g)	331.91
Water Content (%)	**15.6**

Notes :

Tested By	*SFS*	*Date*	*5/27/14*	*Checked By*	*GEM*	*Date*	*5/27/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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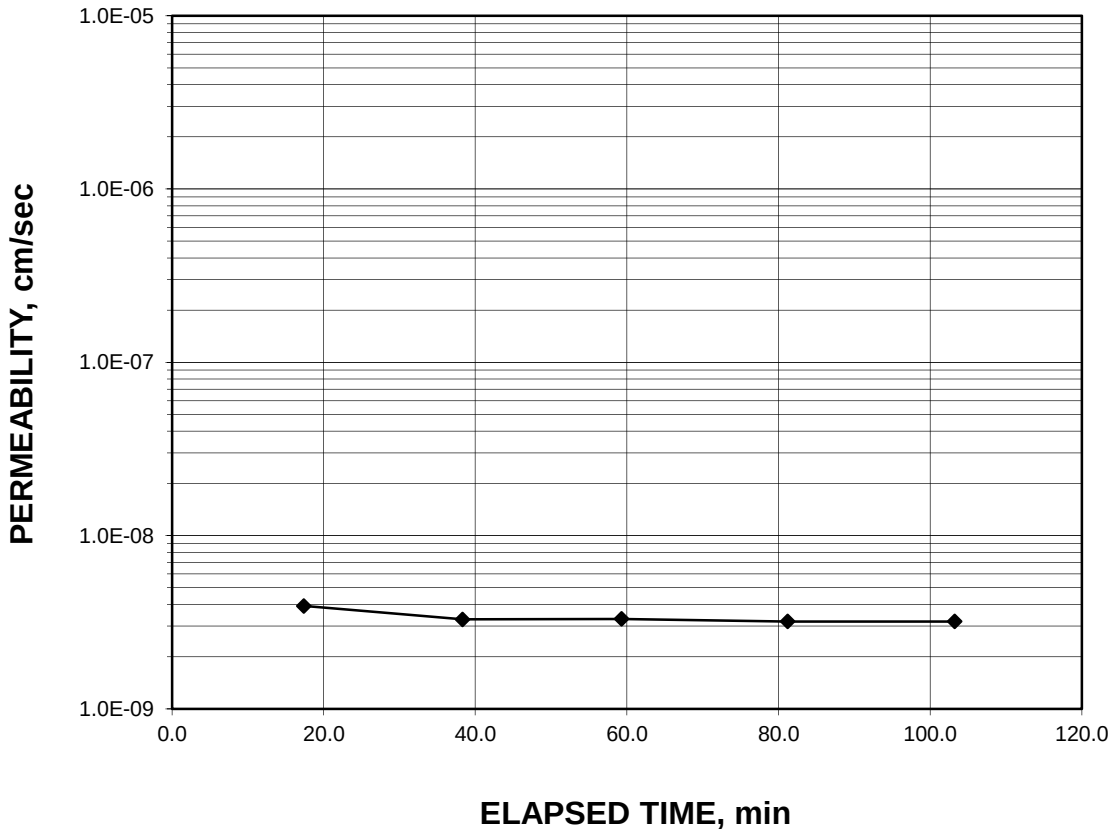
Client	BLACKROCK ENGINEERS, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-12	Sample No.	CL-11
Lab ID No.	2014-610-12-02		

Visual Description: BROWN SANDY CLAY WITH GRAVEL

AVERAGE PERMEABILITY = 3.2E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-11 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-12	Sample No.	CL-11
Lab ID No.	2014-610-12-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY CLAY WITH GRAVEL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	821	809
Wt. of Tare & WS (gm.)	321.14	608.12
Wt. of Tare & DS (gm.)	289.22	512.05
Wt. of Tare (gm.)	137.27	112.48
Wt. of Water (gm.)	31.92	96.07
Wt. of DS (gm.)	151.95	399.57
Moisture Content (%)	**21.0**	**24.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2479.29	NA
Wt. of Tube (gm.)	1632.76	NA
Wt. of WS (calc.) (gm.)	846.53	867.77
Length 1 (in.)	4.005	3.952
Length 2 (in.)	4.005	3.951
Length 3 (in.)	4.005	3.970
Top Diameter (in.)	2.867	2.863
Middle Diameter (in.)	2.867	2.845
Bottom Diameter (in.)	2.867	2.857
Average Length (in.)	4.01	3.96
Average Area (in.^{2})	6.46	6.40
Sample Volume (cm^3)	423.69	415.19
Unit Wet Wt. (gm./ cm^3)	1.998	2.090
Unit Wet Wt. (pcf)	124.7	130.5
Unit Dry Wt. (pcf)	103.1	105.2
Unit Dry Wt. (gm./ cm^3)	1.651	1.685
Void Ratio, e	0.635	0.602
Porosity, n	0.388	0.376
Pore Volume (cm^3)	164.6	156.1
Total Wt. Of Sample After Test		848.14

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-12-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERS, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-12	Sample No.	CL-11
Lab ID No.	2014-610-12-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.05
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.30
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.2E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-11 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/29/14	15	47	0	47.00	0.000	14.4	17.4	22.9	NA
5/29/14	16	4	23	4.38	17.383	14.3	17.3	22.9	3.9E-09
5/29/14	16	25	20	25.33	38.333	14.2	17.1	22.9	3.3E-09
5/29/14	16	46	18	46.30	59.300	14.1	17.0	22.9	3.3E-09
5/29/14	17	8	11	8.18	81.183	14.0	16.9	22.9	3.2E-09
5/29/14	17	30	14	30.23	103.233	13.9	16.8	22.9	3.2E-09

Tested By: SFS Date: 5/28/14 Checked By: GEM Date: 5/30/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-12-02 Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-16	Sample No.:	CL-12
Lab ID:	2014-610-16-01	Soil Description:	**BROWN LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

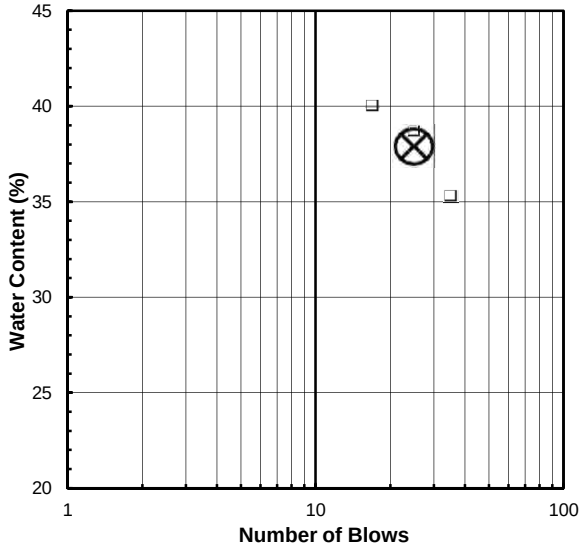
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	AN	AL	W	**M U L T I P O I N T**
Wt. of Tare & Wet Sample (g)	28.11	28.12	30.38	
Wt. of Tare & Dry Sample (g)	24.81	24.61	26.03	
Wt. of Tare (g)	15.46	15.53	15.16	
Wt. of Water (g)	3.3	3.5	4.4	
Wt. of Dry Sample (g)	9.4	9.1	10.9	
Moisture Content (%)	**35.3**	**38.7**	**40.0**	
Number of Blows	**35**	**25**	**17**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B2	3M	
Wt. of Tare & Wet Sample (g)	22.38	22.03	
Wt. of Tare & Dry Sample (g)	21.27	21.03	
Wt. of Tare (g)	15.41	15.60	
Wt. of Water (g)	1.1	1.0	
Wt. of Dry Sample (g)	5.9	5.4	
Moisture Content (%)	**18.9**	**18.4**	**0.5**

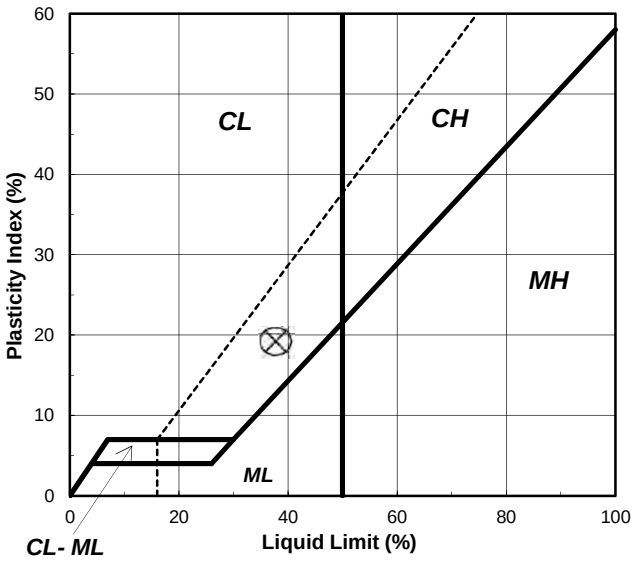
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**38**
Plastic Limit (%)	**19**
Plasticity Index (%)	**19**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *6/3/14* *Checked By* *GEM* *Date* 6/4/14

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SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

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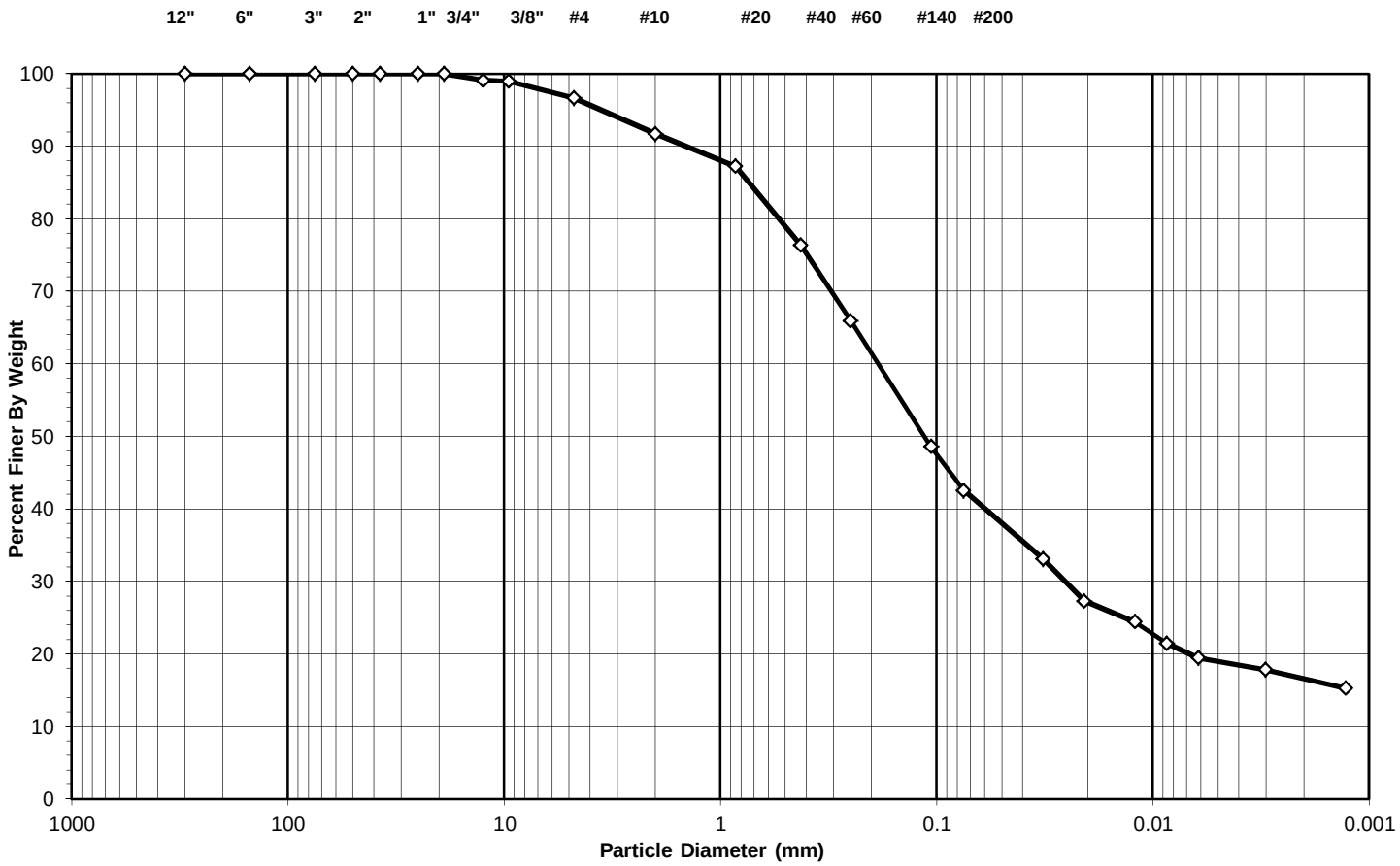
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-16	Sample No.	CL-12
Lab ID	2014-610-16-01	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	3.36
#4 To #200	*Sand*	54.07
Finer Than #200	*Silt & Clay*	42.57

USCS Symbol ***SC, TESTED***

USCS Classification ***CLAYEY SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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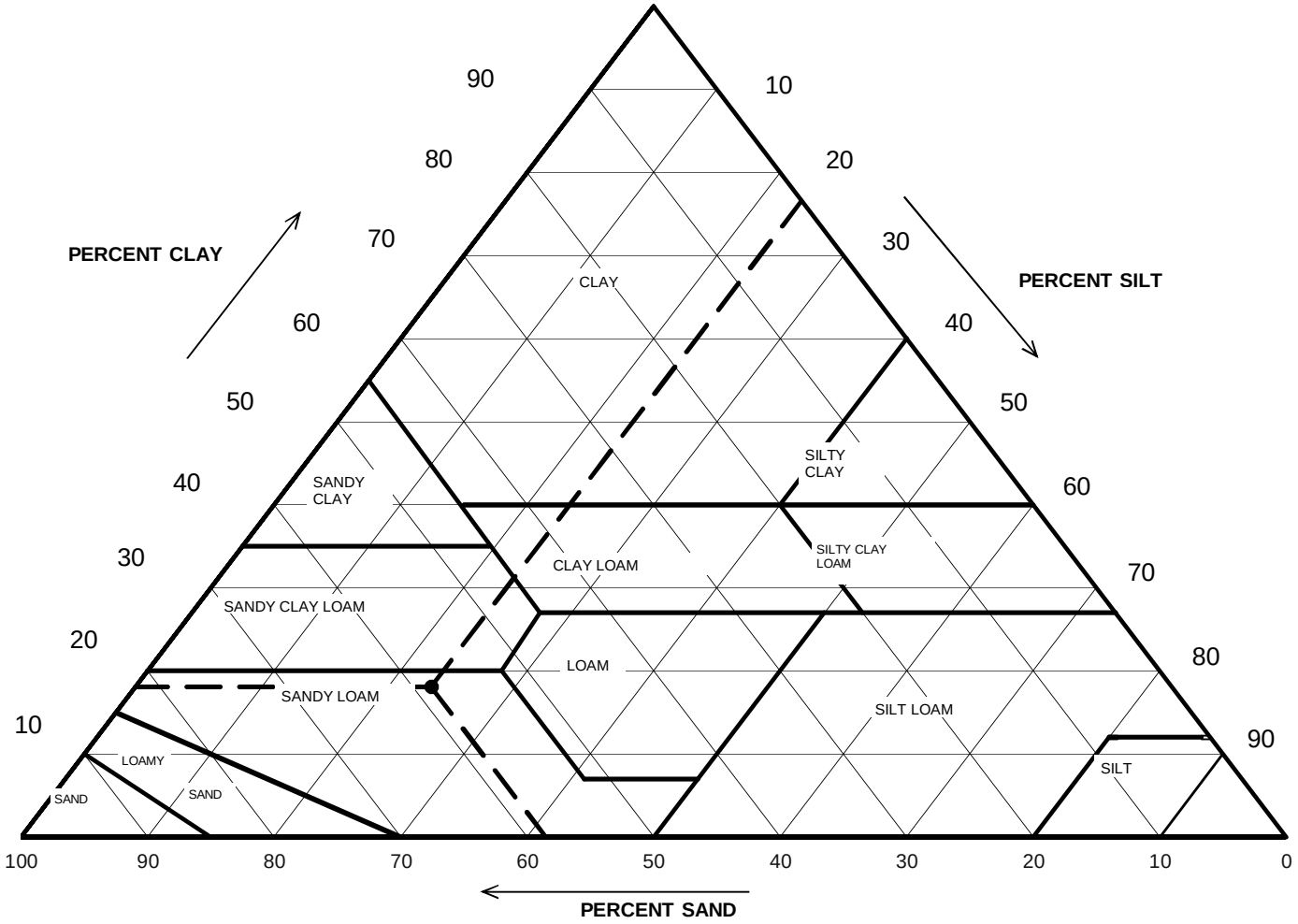
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-16	Sample No.	CL-12
Lab ID	2014-610-16-01	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	8.29	**0.00**
2	91.71	*Sand*	53.68	**58.53**
0.05	38.03	*Silt*	21.44	**23.37**
0.002	16.60	*Clay*	16.60	**18.10**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-16	Sample No.	CL-12
Lab ID	2014-610-16-01	Soil Color	**BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	A-5	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	32.25	Corrected Dry Wt. of - #10 Material (g)	47.33
Wgt.Tare + Dry Soil (g)	31.69		
Weight of Tare (g)	21.77	Weight of - #200 Material (g)	21.97
Weight of Water (g)	0.56	Weight of - #10 ; + #200 Material (g)	25.36
Weight of Dry Soil (g)	9.92		
Moisture Content (%)	**5.6**	**J-FACTOR (%FINER THAN #10)**	**0.9171**
Soil Specimen Data			
Tare No.	152		
Wgt.Tare + Air Dry Soil (g)	1162.78		
Weight of Tare (g)	239.07		
Air Dried Wgt. Total Sample (g)	923.71	Dry Weight of Material Retained on #10 (g)	72.79
Total Dry Sample Weight (g)	878.24	Corrected Dry Sample Wt - #10 (g)	805.45

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	7.81	0.9	0.9	99.1	**99.1**
3/8"	9.50	1.43	0.2	1.1	98.9	**98.9**
#4	4.75	20.30	2.3	3.4	96.6	**96.6**
#10	2.00	43.25	4.9	8.3	91.7	**91.7**
#20	0.85	2.31	4.9	4.9	95.1	**87.2**
#40	0.425	5.61	11.9	16.7	83.3	**76.4**
#60	0.250	5.38	11.4	28.1	71.9	**65.9**
#140	0.106	8.96	18.9	47.0	53.0	**48.6**
#200	0.075	3.10	6.6	53.6	46.4	**42.6**
Pan	-	21.97	46.4	100.0	-	**-**

Notes :

Tested By BW Date 6/5/14 Checked By GEM Date 6/5/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-16	Sample No.	CL-12
Lab ID	2014-610-16-01	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	21.0	24.7	3.73	17.3	36.1	0.01272	0.0322	**33.1**
5	18.0	24.6	3.76	14.2	29.8	0.01273	0.0208	**27.3**
15	16.5	24.6	3.76	12.7	26.6	0.01273	0.0121	**24.4**
30	15.0	24.5	3.80	11.2	23.4	0.01275	0.0087	**21.5**
60	14.0	24.3	3.86	10.1	21.2	0.01278	0.0062	**19.5**
250	13.0	24.8	3.70	9.3	19.4	0.01270	0.0030	**17.8**
1440	12.0	23.7	4.04	8.0	16.6	0.01287	0.0013	**15.3**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	47.33	Hygroscopic Moisture Factor	0.947	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	91.71	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 6/3/14 Checked By GEM Date 6/5/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERING, INC.
Client Reference:	ROXBORO LAM - PH 6A
Project No.:	2014-610-16

Lab ID:	001
Boring No.:	NA
Depth (ft):	NA
Sample No.:	CL-12
Tare Number	Y-11
Wt. of Tare & Wet Sample (g)	700.84
Wt. of Tare & Dry Sample (g)	609.44
Weight of Tare (g)	93.84
Weight of Water (g)	91.40
Weight of Dry Sample (g)	515.60
Water Content (%)	**17.7**

Notes :

Tested By	*SFS*	*Date*	*6/5/14*	*Checked By*	*GEM*	*Date*	*6/6/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	N/A
Client Reference:	ROXBORO LF PH. 7-9	Depth (ft):	N/A
Project No.:	2014-610-19	Sample No.:	CL-13
Lab ID:	2014-610-19-02	Soil Description:	**BROWN LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .

(Minus No. 40 sieve material, Airdried)

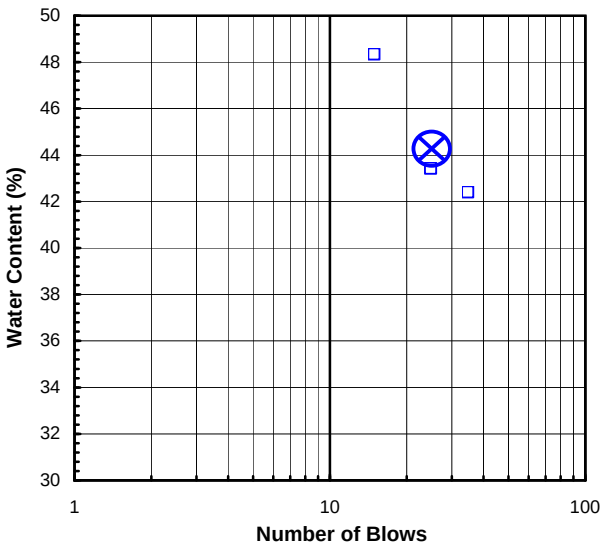
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-N	3M	A-L	**U**
Wt. of Tare & Wet Sample (g)	28.90	30.45	27.76	**L**
Wt. of Tare & Dry Sample (g)	24.90	25.95	23.78	**T**
Wt. of Tare (g)	15.46	15.58	15.54	**I**
Wt. of Water (g)	4.0	4.5	4.0	**P**
Wt. of Dry Sample (g)	9.4	10.4	8.2	**O**
				I
Moisture Content (%)	**42.4**	**43.4**	**48.3**	**N**
Number of Blows	**35**	**25**	**15**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B2	W	
Wt. of Tare & Wet Sample (g)	22.02	22.21	
Wt. of Tare & Dry Sample (g)	20.92	21.00	
Wt. of Tare (g)	15.41	15.18	
Wt. of Water (g)	1.1	1.2	
Wt. of Dry Sample (g)	5.5	5.8	
Moisture Content (%)	**20.0**	**20.8**	**-0.8**

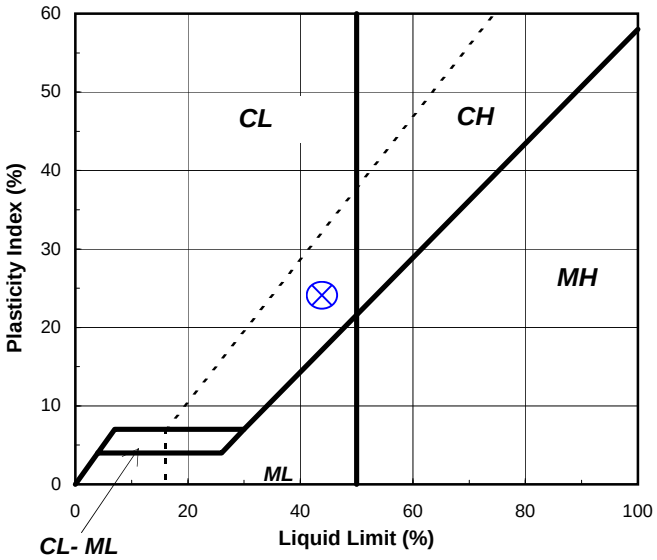
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**44**
Plastic Limit (%)	**20**
Plasticity Index (%)	**24**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*6/10/14*	*Checked By*	*SFS*	*Date*	6/11/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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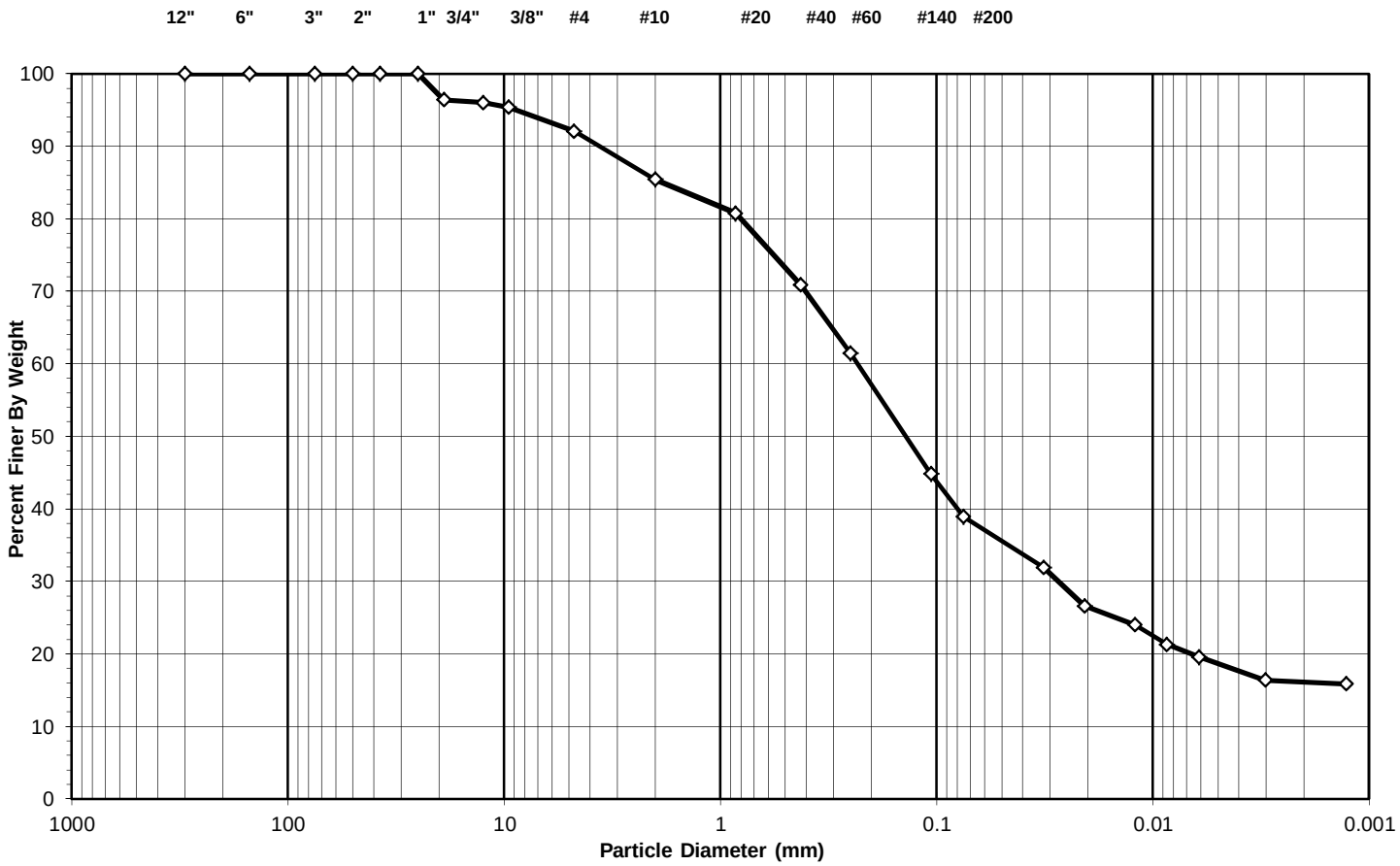
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-13
Lab ID	2014-610-19-02	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	7.91
#4 To #200	*Sand*	53.15
Finer Than #200	*Silt & Clay*	38.93

USCS Symbol ***SC, TESTED***

USCS Classification ***CLAYEY SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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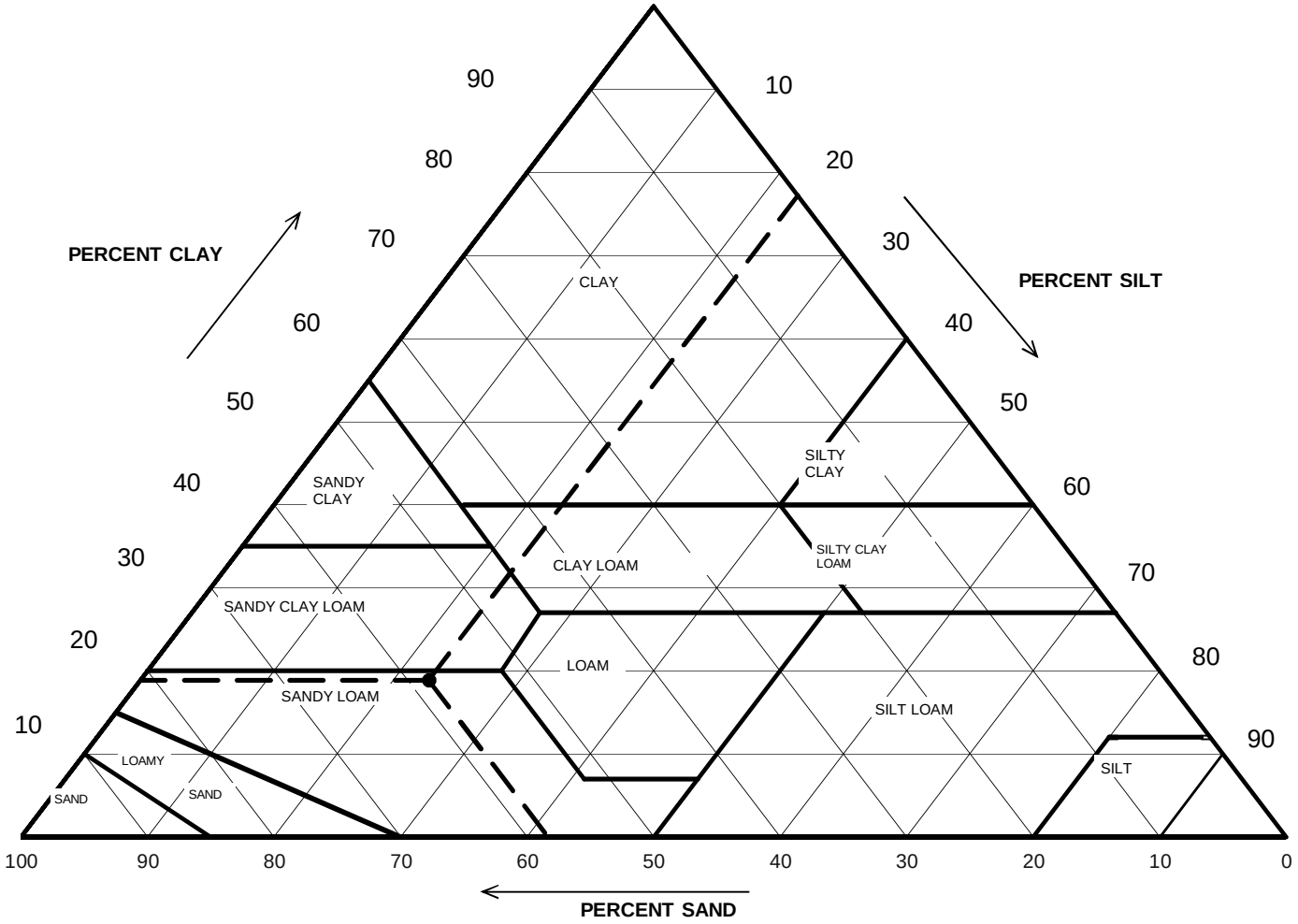
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-13
Lab ID	2014-610-19-02	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	14.59	**0.00**
2	85.41	*Sand*	49.82	**58.33**
0.05	35.60	*Silt*	19.46	**22.78**
0.002	16.14	*Clay*	16.14	**18.89**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-13
Lab ID	2014-610-19-02	Soil Color	**BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	A-5	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	33.62	Corrected Dry Wt. of - #10 Material (g)	48.27
Wgt.Tare + Dry Soil (g)	33.21		
Weight of Tare (g)	21.76	Weight of - #200 Material (g)	22.00
Weight of Water (g)	0.41	Weight of - #10 ; + #200 Material (g)	26.27
Weight of Dry Soil (g)	11.45		
Moisture Content (%)	**3.6**	**J-FACTOR (%FINER THAN #10)**	**0.8541**
Soil Specimen Data			
Tare No.	158		
Wgt.Tare + Air Dry Soil (g)	1008.79		
Weight of Tare (g)	238.71		
Air Dried Wgt. Total Sample (g)	770.08	Dry Weight of Material Retained on #10 (g)	108.99
Total Dry Sample Weight (g)	747.23	Corrected Dry Sample Wt - #10 (g)	638.24

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	26.97	3.6	3.6	96.4	**96.4**
1/2"	12.5	2.79	0.4	4.0	96.0	**96.0**
3/8"	9.50	4.97	0.7	4.6	95.4	**95.4**
#4	4.75	24.41	3.3	7.9	92.1	**92.1**
#10	2.00	49.85	6.7	14.6	85.4	**85.4**
#20	0.85	2.63	5.4	5.4	94.6	**80.8**
#40	0.425	5.59	11.6	17.0	83.0	**70.9**
#60	0.250	5.33	11.0	28.1	71.9	**61.4**
#140	0.106	9.40	19.5	47.5	52.5	**44.8**
#200	0.075	3.32	6.9	54.4	45.6	**38.9**
Pan	-	22.00	45.6	100.0	-	**-**

Notes :

Tested By SFS Date 6/12/14 Checked By GEM Date 6/12/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-13
Lab ID	2014-610-19-02	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	22.0	24.6	3.76	18.2	37.4	0.01273	0.0321	**31.9**
5	19.0	24.5	3.80	15.2	31.2	0.01275	0.0207	**26.6**
15	17.5	24.5	3.80	13.7	28.1	0.01275	0.0121	**24.0**
30	16.0	24.4	3.83	12.2	25.0	0.01276	0.0086	**21.3**
60	15.0	24.4	3.83	11.2	22.9	0.01276	0.0061	**19.6**
250	13.0	25	3.64	9.4	19.2	0.01268	0.0030	**16.4**
1440	13.0	24	3.95	9.1	18.6	0.01282	0.0013	**15.9**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.27	Hygroscopic Moisture Factor	0.965	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	85.41	
		Specific Gravity	2.70	Assumed

Notes:

Tested By SFS Date 6/10/14 Checked By GEM Date 6/12/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	N/A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	N/A
Project No.:	2014-610-19	Sample No.:	CL-14
Lab ID:	2014-610-19-03	Soil Description:	**BROWN LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .

(Minus No. 40 sieve material, Airdried)

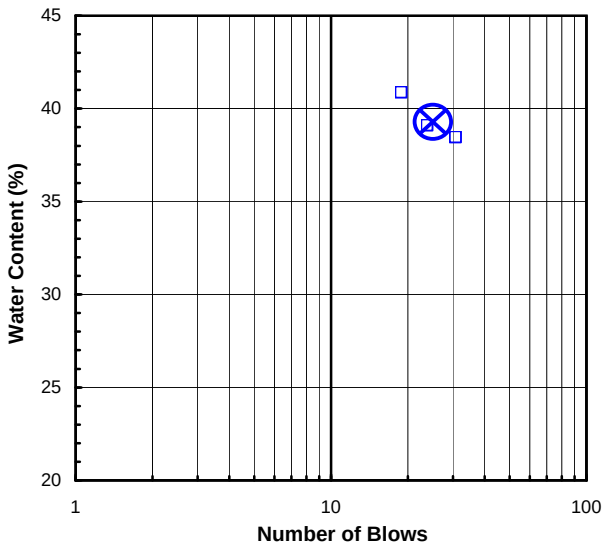
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	B4	V2	B3	**U**
Wt. of Tare & Wet Sample (g)	31.31	35.07	36.44	**L**
Wt. of Tare & Dry Sample (g)	26.91	29.62	30.47	**T**
Wt. of Tare (g)	15.46	15.67	15.85	**I**
Wt. of Water (g)	4.4	5.5	6.0	**P**
Wt. of Dry Sample (g)	11.5	14.0	14.6	**O**
				I
Moisture Content (%)	**38.4**	**39.1**	**40.8**	**N**
Number of Blows	**31**	**24**	**19**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	1M	A-I	
Wt. of Tare & Wet Sample (g)	25.82	25.14	
Wt. of Tare & Dry Sample (g)	24.07	23.46	
Wt. of Tare (g)	15.91	15.47	
Wt. of Water (g)	1.8	1.7	
Wt. of Dry Sample (g)	8.2	8.0	
Moisture Content (%)	**21.4**	**21.0**	**0.4**

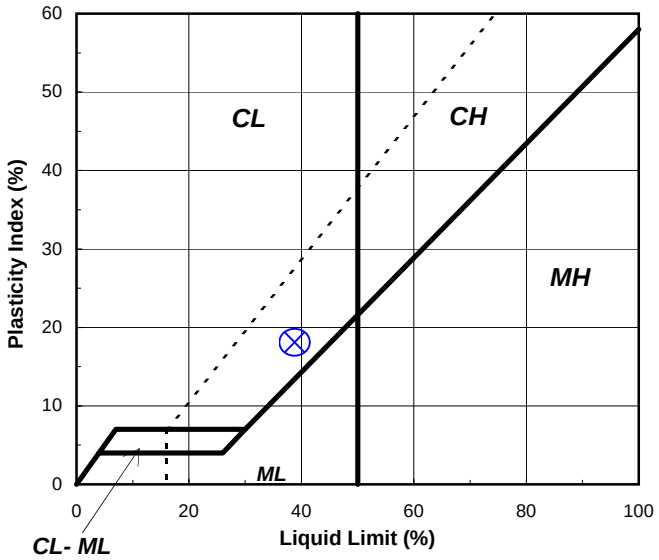
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**39**
Plastic Limit (%)	**21**
Plasticity Index (%)	**18**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*SFS*	*Date*	*6/10/14*	*Checked By*	*BW*	*Date*	6/11/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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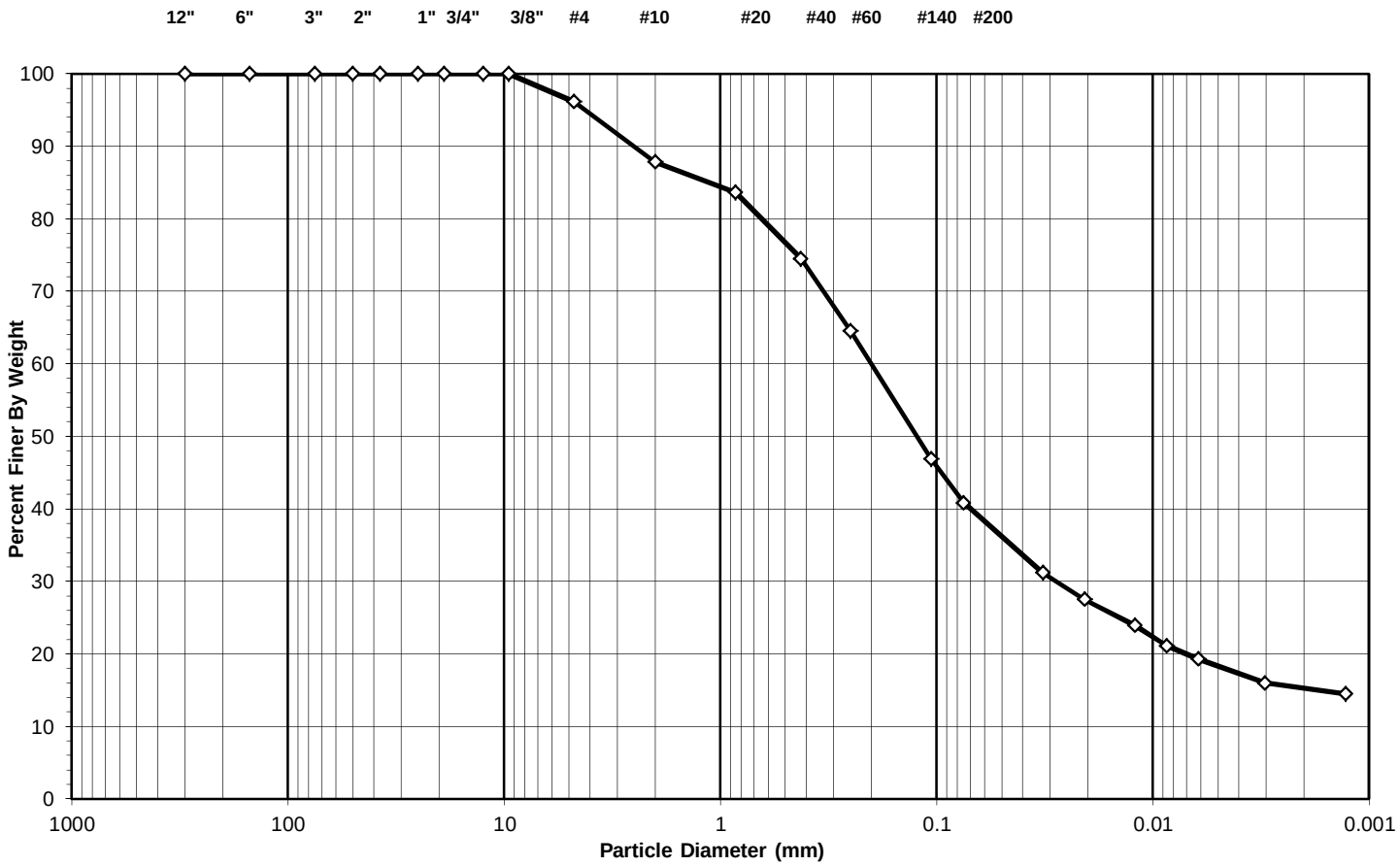
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-14
Lab ID	2014-610-19-03	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	3.84
#4 To #200	*Sand*	55.33
Finer Than #200	*Silt & Clay*	40.83

USCS Symbol ***SC, TESTED***

USCS Classification ***CLAYEY SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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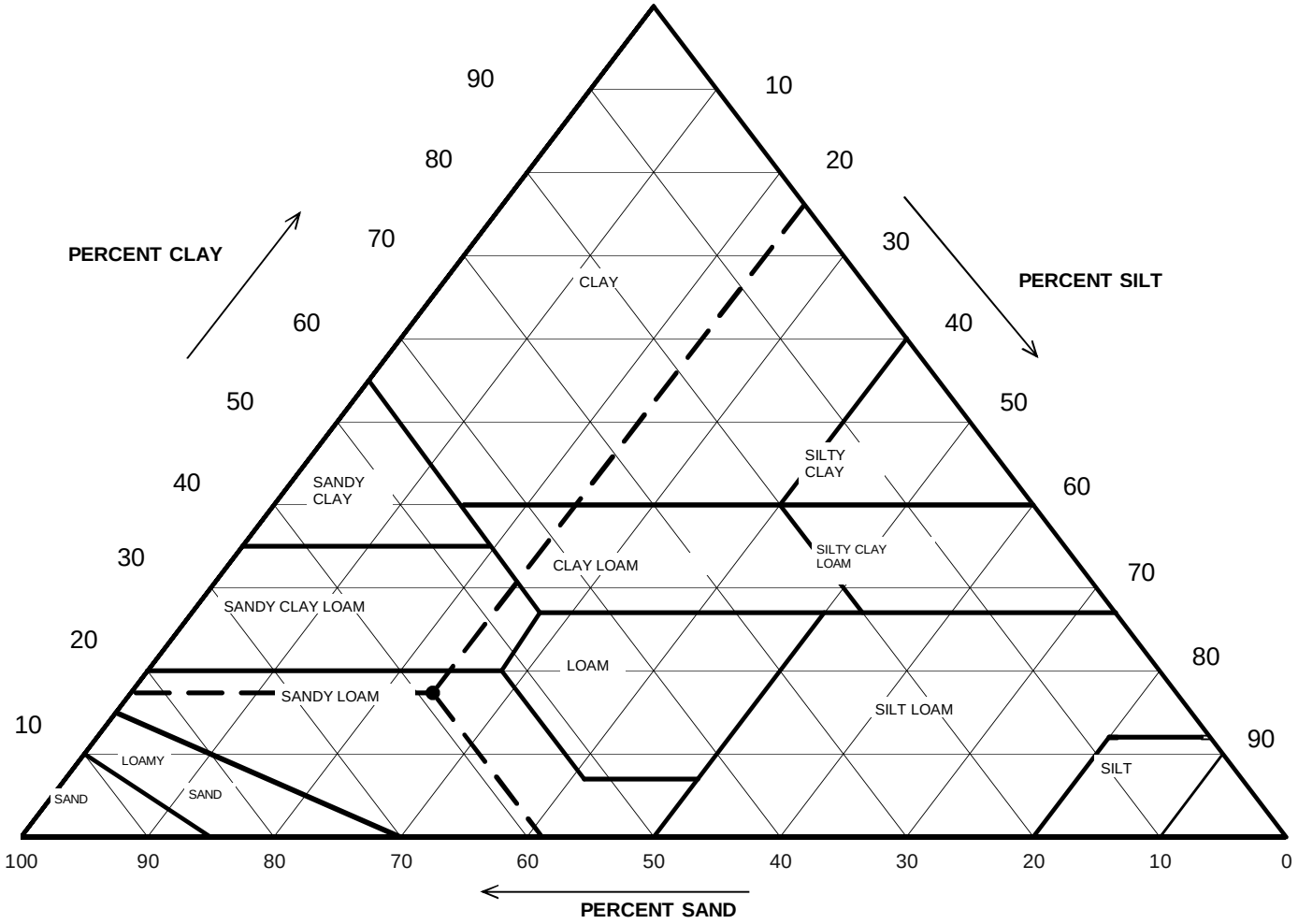
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-14
Lab ID	2014-610-19-03	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	12.19	**0.00**
2	87.81	*Sand*	51.62	**58.78**
0.05	36.20	*Silt*	20.93	**23.83**
0.002	15.27	*Clay*	15.27	**17.39**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-19-03 SIEVEHYD10.xls]Sheet1

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-14
Lab ID	2014-610-19-03	Soil Color	**BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	E-20	Air Dried - #10 Hydrometer Material (g)	50.01
Wgt.Tare + Wet Soil (g)	35.68	Corrected Dry Wt. of - #10 Material (g)	48.12
Wgt.Tare + Dry Soil (g)	35.16		
Weight of Tare (g)	21.89	Weight of - #200 Material (g)	22.37
Weight of Water (g)	0.52	Weight of - #10 ; + #200 Material (g)	25.75
Weight of Dry Soil (g)	13.27		
Moisture Content (%)	**3.9**	**J-FACTOR (%FINER THAN #10)**	**0.8781**
Soil Specimen Data			
Tare No.	167		
Wgt.Tare + Air Dry Soil (g)	883.71		
Weight of Tare (g)	239.05		
Air Dried Wgt. Total Sample (g)	644.66	Dry Weight of Material Retained on #10 (g)	75.94
Total Dry Sample Weight (g)	623.21	Corrected Dry Sample Wt - #10 (g)	547.27

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	23.95	3.8	3.8	96.2	**96.2**
#10	2.00	51.99	8.3	12.2	87.8	**87.8**
#20	0.85	2.29	4.8	4.8	95.2	**83.6**
#40	0.425	5.01	10.4	15.2	84.8	**74.5**
#60	0.250	5.47	11.4	26.5	73.5	**64.5**
#140	0.106	9.65	20.1	46.6	53.4	**46.9**
#200	0.075	3.33	6.9	53.5	46.5	**40.8**
Pan	-	22.37	46.5	100.0	-	**-**

Notes :

Tested By SFS Date 6/12/14 Checked By GEM Date 6/12/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-19	Sample No.	CL-14
Lab ID	2014-610-19-03	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	21.0	24.7	3.73	17.3	35.5	0.01272	0.0322	**31.2**
5	19.0	24.6	3.76	15.2	31.3	0.01273	0.0207	**27.5**
15	17.0	24.6	3.76	13.2	27.2	0.01273	0.0121	**23.9**
30	15.5	24.5	3.80	11.7	24.1	0.01275	0.0086	**21.1**
60	14.5	24.4	3.83	10.7	22.0	0.01276	0.0061	**19.3**
250	12.5	25	3.64	8.9	18.2	0.01268	0.0030	**16.0**
1440	12.0	23.9	3.98	8.0	16.5	0.01284	0.0013	**14.5**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.12	Hygroscopic Moisture Factor	0.962	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	87.81	
		Specific Gravity	2.70	Assumed

Notes:

Tested By SFS Date 6/10/14 Checked By GEM Date 6/12/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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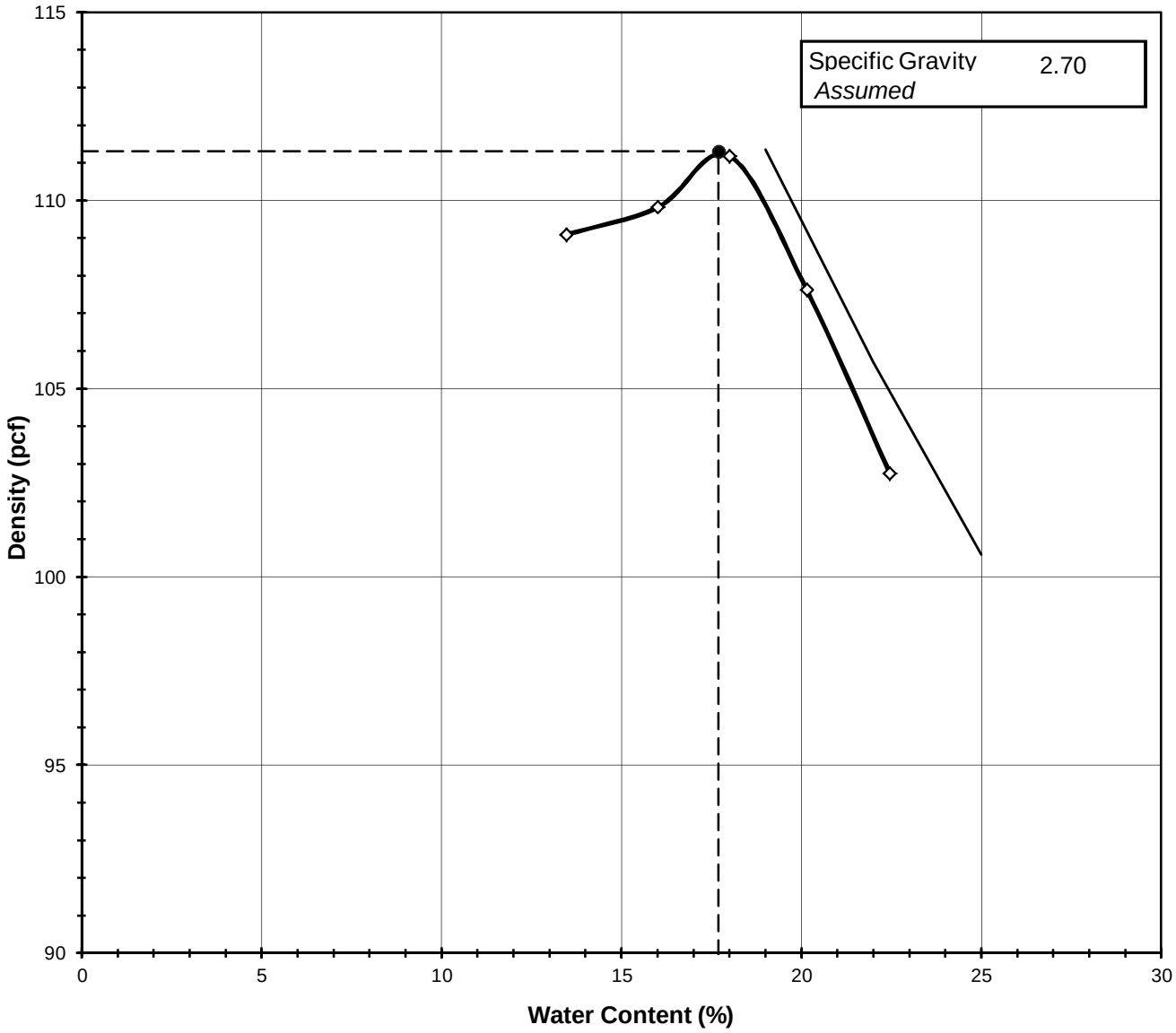
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	N/A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	N/A
Project No.:	2014-610-19	Sample No.:	CL-14
Lab ID:	2014-610-19-03	Test Method	**STANDARD**

Visual Description: BROWN CLAYEY SAND

Optimum Water Content	**17.7**
Maximum Dry Density	**111.3**



Tested By *BW* *Date* *6/10/14* *Checked By* *SFS* *Date* 6/11/14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	N/A
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	N/A
Project No.:	2014-610-19	Sample No.:	CL-14
Lab ID:	2014-610-19-03		

Visual Description: BROWN CLAYEY SAND

Total Weight of the Sample (g)	21700
As Received Water Content (%)	16.4
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	3
Percent Retained on #4	6
Oversize Material	Not included
Procedure Used	B

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4182
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	6041	6096	6153	6124	6072
Wt.of Mold (g)	4182	4182	4182	4182	4182
Wt. of Wet Sample (g)	1859	1914	1971	1942	1890
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	803	808	806	805	810
Wt. of Tare & Wet Sample (g)	366.20	382.40	476.80	485.30	431.70
Wt. of Tare & Dry Sample (g)	335.21	344.00	419.40	421.43	373.52
Wt. of Tare (g)	105.10	104.20	100.50	104.50	114.50
Wt. of Water (g)	30.99	38.40	57.40	63.87	58.18
Wt. of Dry Sample (g)	230.11	239.80	318.90	316.93	259.02

Wet Density (g/cm^3)	1.98	2.04	2.10	2.07	2.02
Wet Density (pcf)	123.8	127.4	131.2	129.3	125.8
Moisture Content (%)	**13.5**	**16.0**	**18.0**	**20.2**	**22.5**
Dry Density (pcf)	**109.1**	**109.8**	**111.2**	**107.6**	**102.7**

Zero Air Voids

Moisture Content (%)	19.0	22.0	25.0
Dry Unit Weight (pcf)	111.4	105.7	100.6

Tested By *BW* *Date* *6/10/14* *Checked By* *SFS* *Date* 6/11/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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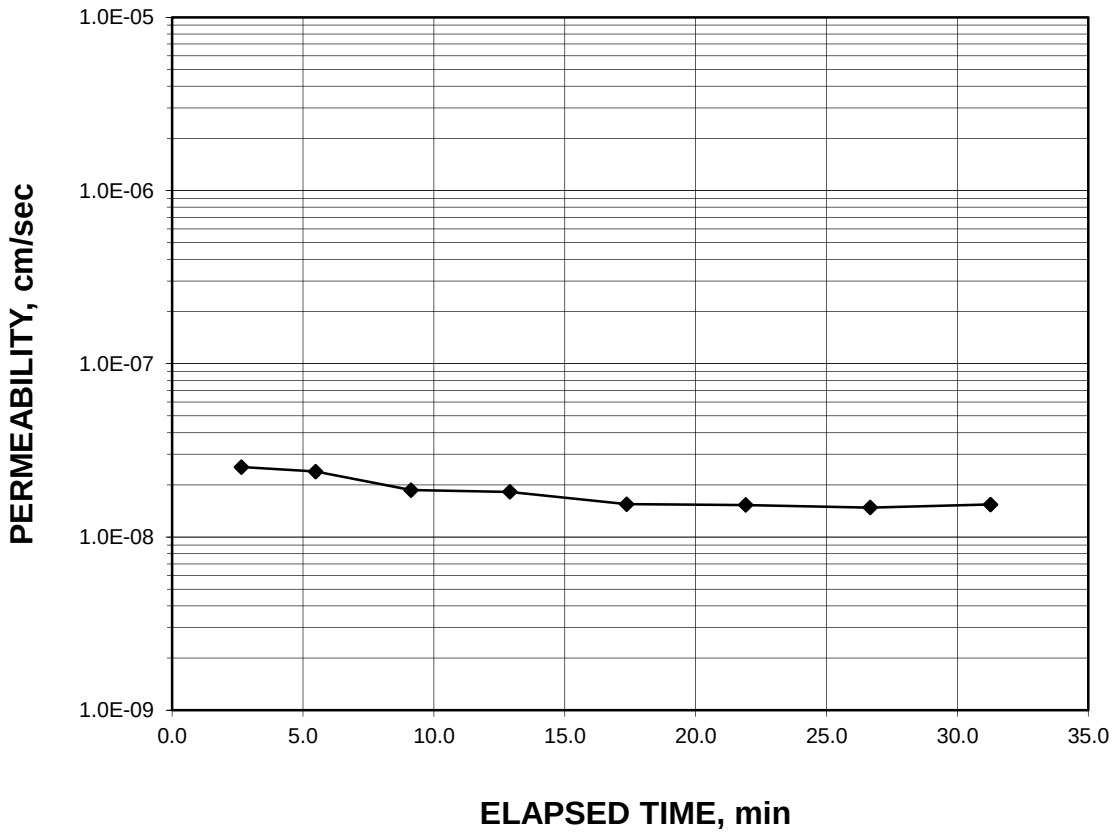
Client	BLACKROCK ENGINEERING, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-19	Sample No.	CL-14
Lab ID No.	2014-610-19-03		

Visual Description: BROWN SANDY CLAY

AVERAGE PERMEABILITY = 1.5E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.5E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD
ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-19	Sample No.	CL-14
Lab ID No.	2014-610-19-03		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	812	Y-11
Wt. of Tare & WS (gm.)	415.97	513.92
Wt. of Tare & DS (gm.)	364.66	443.85
Wt. of Tare (gm.)	106.89	93.79
Wt. of Water (gm.)	51.31	70.07
Wt. of DS (gm.)	257.77	350.06
Moisture Content (%)	**19.9**	**20.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2511.95	NA
Wt. of Tube (gm.)	1632.70	NA
Wt. of WS (calc.) (gm.)	879.25	880.07
Length 1 (in.)	4.005	3.953
Length 2 (in.)	4.005	3.970
Length 3 (in.)	4.005	3.960
Top Diameter (in.)	2.867	2.854
Middle Diameter (in.)	2.867	2.860
Bottom Diameter (in.)	2.867	2.858
Average Length (in.)	4.01	3.96
Average Area (in.^{2})	6.46	6.41
Sample Volume (cm^3)	423.69	416.21
Unit Wet Wt. (gm./ cm^3)	2.075	2.114
Unit Wet Wt. (pcf)	129.5	132.0
Unit Dry Wt. (pcf)	108.0	110.0
Unit Dry Wt. (gm./ cm^3)	1.731	1.762
Void Ratio, e	0.560	0.533
Porosity, n	0.359	0.347
Pore Volume (cm^3)	152.1	144.6
Total Wt. Of Sample After Test		881.16

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-19-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	BLACKROCK ENGINEERING, INC.	Boring No.	N/A
Client Project	ROXBORO LAM - PH 6A	Depth (ft.)	N/A
Project No.	2014-610-19	Sample No.	CL-14
Lab ID No.	2014-610-19-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	50.0	Sample Length (cm), L	10.06
Back Pressure(psi)	40.0	Sample Area (cm^2), A	41.37
Eff. Cons. Pressure(psi)	10.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 1.5E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 1.5E-10 m/sec @ 20°C

DATE			TIME		ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
6/12/14	16	6	18	6.30	0.000	14.4	17.4	23.6	NA
6/12/14	16	8	57	8.95	2.650	14.3	17.3	23.6	2.5E-08
6/12/14	16	11	47	11.78	5.483	14.2	17.1	23.6	2.4E-08
6/12/14	16	15	26	15.43	9.133	14.1	17.0	23.6	1.9E-08
6/12/14	16	19	12	19.20	12.900	14.0	16.9	23.6	1.8E-08
6/12/14	16	23	40	23.67	17.367	13.9	16.7	23.6	1.5E-08
6/12/14	16	28	13	28.22	21.917	13.8	16.6	23.6	1.5E-08
6/12/14	16	32	58	32.97	26.667	13.7	16.5	23.6	1.5E-08
6/12/14	16	37	34	37.57	31.267	13.6	16.4	23.6	1.5E-08

Tested By: SFS Date: 6/11/14 Checked By: GEM Date: 6/13/14

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-19-03 Permometer.xls]Sheet1

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	BLACKROCK ENGINEERS, INC.	Boring No.:	NA
Client Reference:	ROXBORO LAM - PH 6A	Depth (ft):	NA
Project No.:	2014-610-23	Sample No.:	CL-15
Lab ID:	2014-610-23-02	Soil Description:	**BROWN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

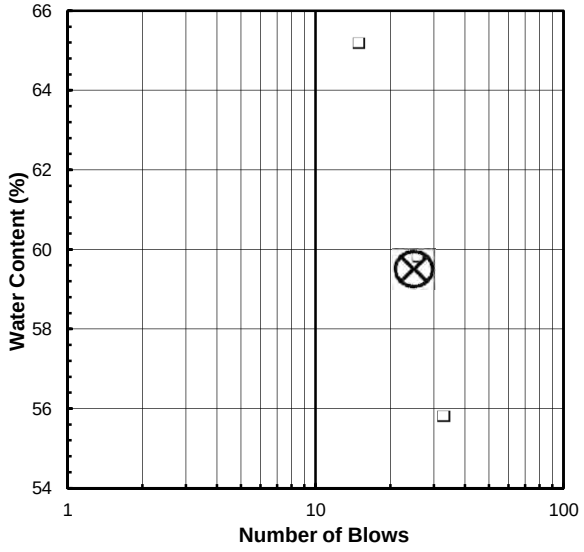
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	L	I	A-O	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	26.97	26.79	30.25	
Wt. of Tare & Dry Sample (g)	22.78	22.48	24.43	
Wt. of Tare (g)	15.27	15.27	15.50	
Wt. of Water (g)	4.2	4.3	5.8	
Wt. of Dry Sample (g)	7.5	7.2	8.9	
Moisture Content (%)	**55.8**	**59.8**	**65.2**	
Number of Blows	**33**	**26**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	U	A-C	
Wt. of Tare & Wet Sample (g)	23.70	22.60	
Wt. of Tare & Dry Sample (g)	22.36	21.44	
Wt. of Tare (g)	15.19	15.60	
Wt. of Water (g)	1.3	1.2	
Wt. of Dry Sample (g)	7.2	5.8	
Moisture Content (%)	**18.7**	**19.9**	**-1.2**

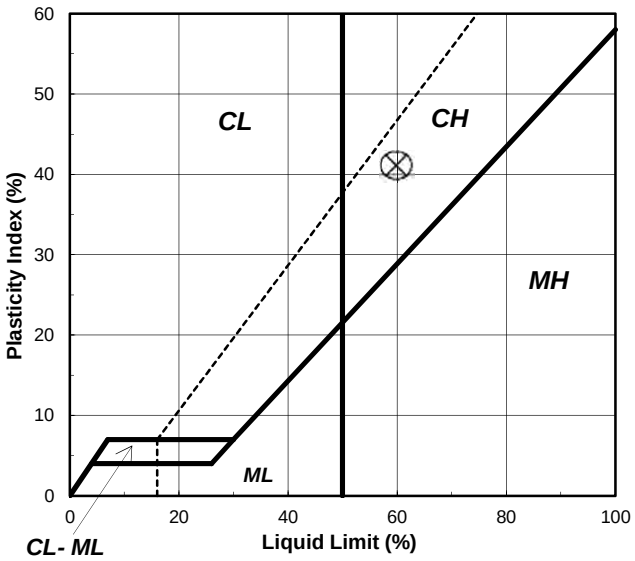
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**60**
Plastic Limit (%)	**19**
Plasticity Index (%)	**41**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*6/16/14*	*Checked By*	*GEM*	*Date*	6/17/14

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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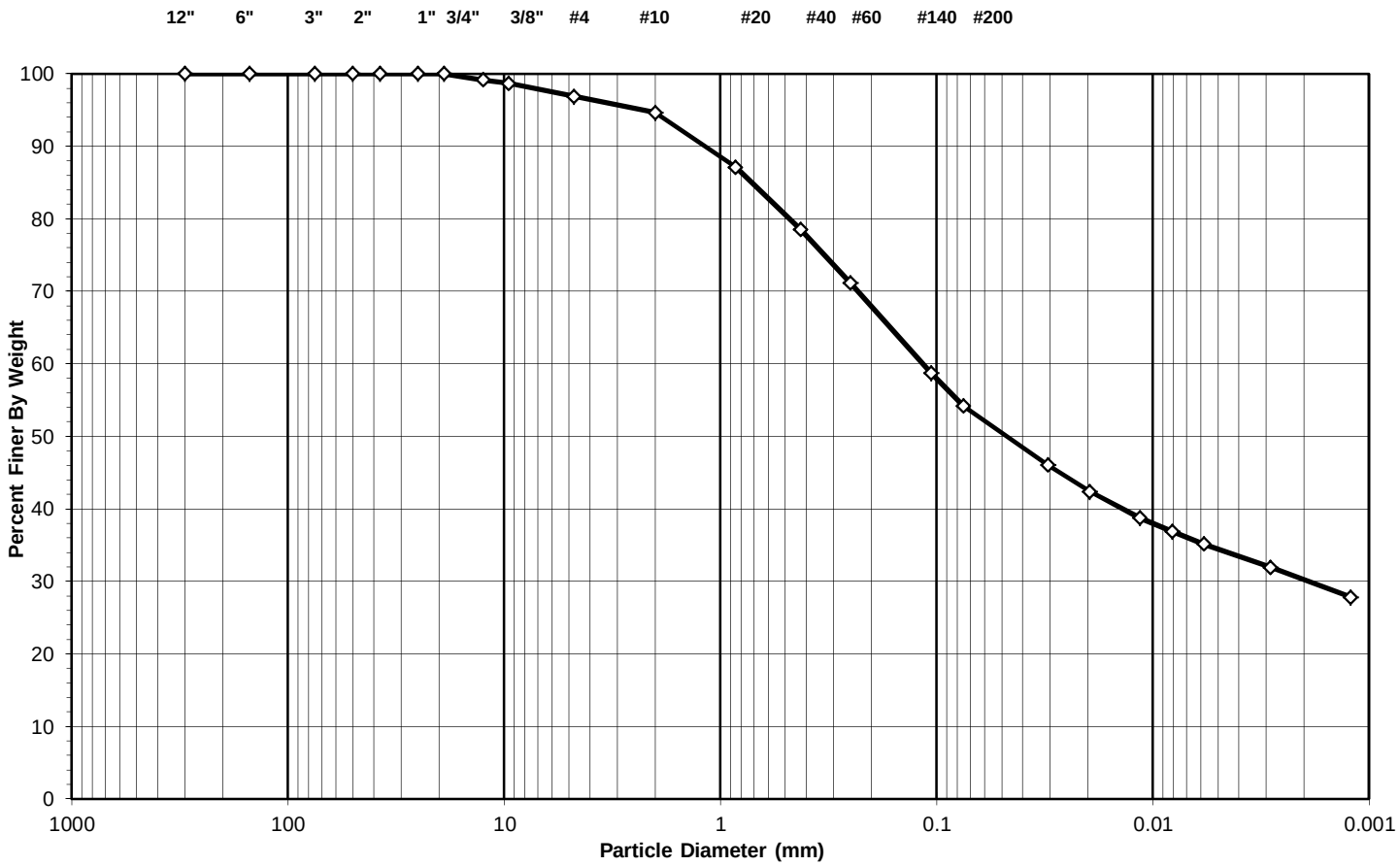
Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-23	Sample No.	CL-15
Lab ID	2014-610-23-02	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	3.11
#4 To #200	*Sand*	42.74
Finer Than #200	*Silt & Clay*	54.15

USCS Symbol ***CH, TESTED***

USCS Classification ***SANDY FAT CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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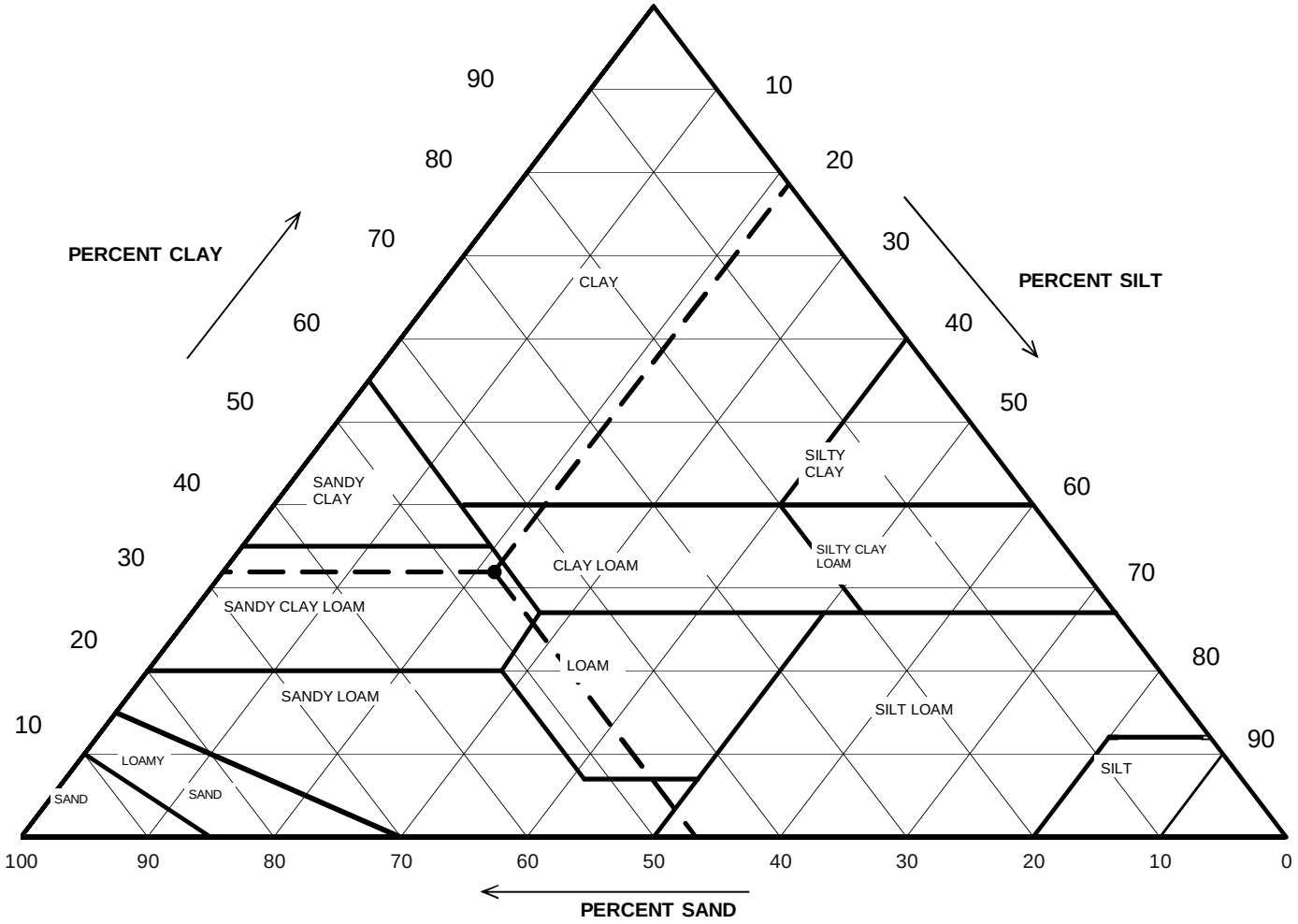
USDA CLASSIFICATION CHART

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-23	Sample No.	CL-15
Lab ID	2014-610-23-02	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.37	**0.00**
2	94.63	*Sand*	44.14	**46.65**
0.05	50.48	*Silt*	20.27	**21.42**
0.002	30.21	*Clay*	30.21	**31.92**

USDA Classification: ***SANDY CLAY LOAM***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-23	Sample No.	CL-15
Lab ID	2014-610-23-02	Soil Color	**BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	U-1	Air Dried - #10 Hydrometer Material (g)	56.89
Wgt.Tare + Wet Soil (g)	43.40	Corrected Dry Wt. of - #10 Material (g)	51.50
Wgt.Tare + Dry Soil (g)	41.38		
Weight of Tare (g)	22.06	Weight of - #200 Material (g)	29.47
Weight of Water (g)	2.02	Weight of - #10 ; + #200 Material (g)	22.03
Weight of Dry Soil (g)	19.32		
Moisture Content (%)	**10.5**	**J-FACTOR (%FINER THAN #10)**	**0.9463**
Soil Specimen Data			
Tare No.	152		
Wgt.Tare + Air Dry Soil (g)	992.35		
Weight of Tare (g)	239.00		
Air Dried Wgt. Total Sample (g)	753.35	Dry Weight of Material Retained on #10 (g)	36.84
Total Dry Sample Weight (g)	685.53	Corrected Dry Sample Wt - #10 (g)	648.69

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	6.02	0.9	0.9	99.1	**99.1**
3/8"	9.50	3.25	0.5	1.4	98.6	**98.6**
#4	4.75	12.07	1.8	3.1	96.9	**96.9**
#10	2.00	15.50	2.3	5.4	94.6	**94.6**
#20	0.85	4.10	8.0	8.0	92.0	**87.1**
#40	0.425	4.69	9.1	17.1	82.9	**78.5**
#60	0.250	4.01	7.8	24.9	75.1	**71.1**
#140	0.106	6.72	13.0	37.9	62.1	**58.8**
#200	0.075	2.51	4.9	42.8	57.2	**54.2**
Pan	-	29.47	57.2	100.0	-	**-**

Notes :

Tested By BW Date 6/16/14 Checked By GEM Date 6/19/14

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	BLACKROCK ENGINEERS, INC.	Boring No.	NA
Client Reference	ROXBORO LAM - PH 6A	Depth (ft)	NA
Project No.	2014-610-23	Sample No.	CL-15
Lab ID	2014-610-23-02	Soil Color	**BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	29.0	24.8	3.70	25.3	48.6	0.01270	0.0305	**46.0**
5	27.0	24.8	3.70	23.3	44.8	0.01270	0.0196	**42.4**
15	25.0	24.8	3.70	21.3	40.9	0.01270	0.0115	**38.7**
30	24.0	24.8	3.70	20.3	39.0	0.01270	0.0082	**36.9**
60	23.0	24.9	3.67	19.3	37.2	0.01269	0.0058	**35.2**
250	21.0	25.6	3.46	17.5	33.7	0.01259	0.0029	**31.9**
1440	19.0	24.8	3.70	15.3	29.4	0.01270	0.0012	**27.8**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	51.50	Hygroscopic Moisture Factor	0.905	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	94.63	
		Specific Gravity	2.70	Assumed

Notes:

Tested By BW Date 6/16/14 Checked By GEM Date 6/19/14

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2014 PROJECTS\2014-610 BLACKROCK PH 6A\[2014-610-23-02 SIEVEHYD10.xls]Sheet1

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MOISTURE CONTENT

ASTM D 2216-10

Client:	BLACKROCK ENGINEERS, INC.
Client Reference:	ROXBORO LAM - PH 6A
Project No.:	2014-610-23

Lab ID:	001
Boring No.:	NA
Depth (ft):	NA
Sample No.:	CL-15
Tare Number	E-2
Wt. of Tare & Wet Sample (g)	80.11
Wt. of Tare & Dry Sample (g)	72.96
Weight of Tare (g)	22.21
Weight of Water (g)	7.15
Weight of Dry Sample (g)	50.75
Water Content (%)	**14.1**

Notes :

Tested By	*SFS*	*Date*	*6/13/14*	*Checked By*	*GEM*	*Date*	*6/16/14*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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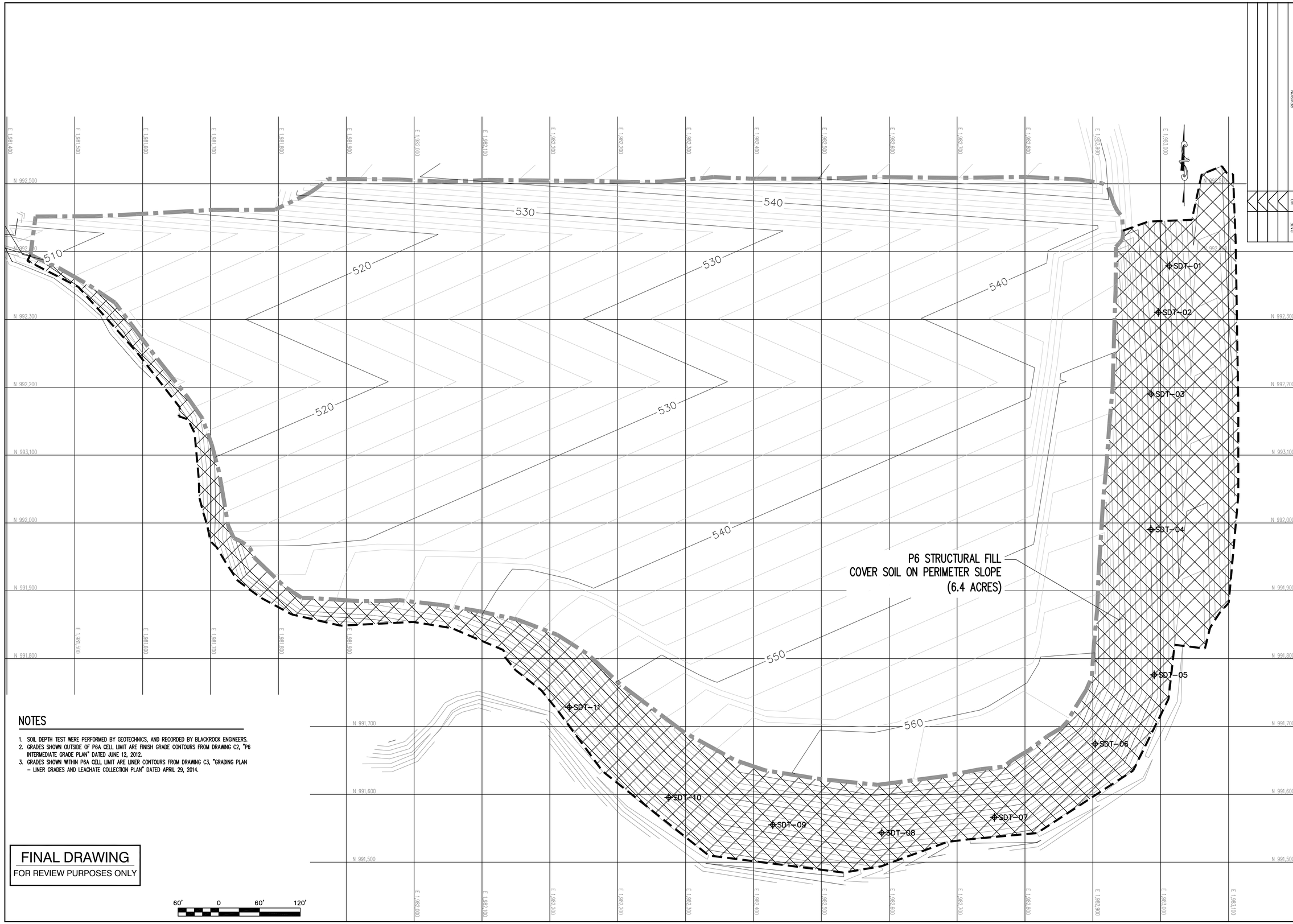
Appendix E – Perimeter Structural Fill Cover Thickness Verification Field Report



NOTES

1. SOIL DEPTH TEST WERE PERFORMED BY GEOTECHNICS, AND RECORDED BY BLACKROCK ENGINEERS.
2. GRADES SHOWN OUTSIDE OF P6A CELL LIMIT ARE FINISH GRADE CONTOURS FROM DRAWING C2, "P6 INTERMEDIATE GRADE PLAN" DATED JUNE 12, 2012.
3. GRADES SHOWN WITHIN P6A CELL LIMIT ARE LINER CONTOURS FROM DRAWING C3, "GRADING PLAN – LINER GRADES AND LEACHATE COLLECTION PLAN" DATED APRIL 29, 2014.

FINAL DRAWING
FOR REVIEW PURPOSES ONLY

NO.	DATE	REVISION

BLACKROCK ENGINEERS, INC.
5102 WRIGHTSVILLE AVENUE
WILMINGTON, NORTH CAROLINA 28403
PHONE: 910.232.6696
NC LICENSE # C-2919

SEAL

SEAL

PROJECT TITLE:
DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
P6 STRUCTURAL FILL

DRAWING TITLE:
P6 STRUCTURAL FILL
COVER THICKNESS CERTIFICATION
0-7021

DESIGNED BY: WML	DRAWN BY: NAP
CHECKED BY: GWA	PROJECT NO.: 11001
SCALE: 1"=60'	DATE: 07.16.14
FILE NAME: P6-ST-FILL-CT	
SHEET NO. 2	DRAWING NO. 6SF2

Day:	**Tuesday**
Date:	**7.1.14**
Log No.:	**47**
Page:	**1 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A / Borrow Site "G"	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 9:30 AM **Departed:** 2:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 75-95 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 9

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. discussed testing area at Basin "D" overflow with Randy Berarducci, and Glover superintendent and concluded that area was not ready for testing at that time.
- Geotechnics Rep. performed a 1-point proctor using material at Basin "D" to establish what soil type was present.
- Geotechnics Rep. began soil cover depth testing at cell P6A rear embankment slope by method of hand auger for Blackrock Engineers.
- Geotechnics Rep. departed the site.

APG	7.1.14	**Checked By:**	MPS	**Date:**	7.9.14

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Day:	**Wed**
Date:	**7.2.14**
Log No.:	**48**
Page:	**2 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A / Borrow Site "G"	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 2:00 PM **Departed:** 5:00 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineers	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 90-94 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 9

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived Borrow Site "G".
- Geotechnics Rep. performed nuclear density testing for overflow berms for both Basin's "D", and "E" within borrow area Site "G".
- A total of (8) moisture/density relationship - compaction tests were taken within both basin's overflow berms.
- Geotechnics Rep. took a 1-point proctor at Basin "E" to identify material used for construction of berm.
- Geotechnics Rep. monitored constuction of Basin "E" ensuring workers followed design drawings and specifications.
- Geotechnics Rep. departed the site.

Prepared By:	APG	**Date:**	7.2.14	**Checked By:**	MPS	**Date:**	7.9.14

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Day:	**Thursday**
Date:	**7.3.14**
Log No.:	**49**
Page:	**3 of 3**

geotechnics
INTEGRITY IN TESTING

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 12:30 PM **Departed:** 5:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	Representative's Name and Title
Blackrock Engineering	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 77-91 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 9

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. continued soil cover depth testing at cell P6A rear embankment by method of hand augering for Blackrock Engineers.
- Geotechnics Rep. checked soil cover depth approximetly every 100’ along rear embankment of P6A.
- Rep. flagged locations for surveyor referencing. A total of (8) holes were augered. **Soil Depth Test** (SDT) over coal ash base were recorded as follows :

SDT - 1	2.0’	East Bench
SDT - 2	1’ 8"	East Bench
SDT - 3	2.0’	East Bench
SDT - 4	2.0’	East Bench
SDT - 5	2.0’	SE Slope
SDT - 6	2.0’	SE Slope
SDT - 7	2.0’	SE Slope
SDT - 8	2.0’	SE Slope

- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	7.3.14	**Checked By:**	MPS	**Date:**	7.9.14

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Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A Borrow Site "G"
Project Number : 2014-610

geotechnics
INTEGRITY IN TESTING

Field Density Report

Report Number : **FDR-15**	Geotechnics Representative : Abe Gaeta	Page : 1 of 1
Date (s) : 7.2.14	Reviewed By : MPS	Date : 7.9.14

Contractor :	Glover Construction	Borrow Source :	Site "G" Borrow Pit
Superintendent :	Reuben Williams		
Gauge Number	Gauge Model	Compaction Equipment :	CAT D6 DOZER
32387	3440		
Moisture Offset = N/A	WD Offset = N/A	Rod Depth= 12"	MS= 693 DS= 2294

Test Number		Test Location	Elevation/ Lift	Rod Depth	Proctor I.D. No.	Proctor Data		Measured In Place			Compaction		Comments
						MDD pcf	Opt. %M	WD (pcf)	%M	DD (pcf)	% C	Req %	
ND -	01	Basin D	SG	12"	657-01-03	113.3	16.2	**132.6**	**14.6**	**115.7**	**102.1%**	**95.0%**	Taken @ Top West Facing
ND -	02	Basin D	SG	12"	657-01-03	113.3	16.2	**129.0**	**12.9**	**114.3**	**100.8%**	**95.0%**	Taken @ Slope West Facing
ND -	03	Basin D	SG	12"	657-01-03	113.3	16.2	**130.8**	**14.4**	**114.3**	**100.9%**	**95.0%**	Taken @ Top East Facing
ND -	04	Basin E	SG	12"	657-01-03	113.3	16.2	**122.3**	**10.0**	**111.2**	**98.1%**	**95.0%**	Taken @ Slope West Facing
ND -	05	Basin E	SG	12"	657-01-03	113.3	16.2	**128.6**	**12.4**	**114.4**	**101.0%**	**95.0%**	Taken @ Top West Facing
ND -	06	Basin E	SG	12"	845-04-01	122.8	11.4	**133.2**	**12.8**	**118.1**	**96.2%**	**95.0%**	Taken @ Top Center
ND -	07	Basin E	SG	12"	657-01-03	113.3	16.2	**128.0**	**13.3**	**113.0**	**99.7%**	**95.0%**	Taken @ Top East Facing
ND -	08	Basin E	SG	12"	845-04-01	122.8	11.4	**132.1**	**10.5**	**119.5**	**97.4%**	**95.0%**	Taken @ Slope East Facing

Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A Borrow Site "G"
Project Number : 2014-610

Report Number : **FDR-15**
Date (s) : 7.1 & 7.2.14

ONE POINT PROCTOR - Method for Soil Identification

Test Information

Test Number :	1pt-01	1pt-02
Location:	Basin "D"	Basin "E"
Depth (ft):	SG	SG
Date :	7.1.14	7.2.14

Mold

Weight of Mold (lbs.)	9.25	9.25
Volume OF Mold (ft^3)	0.033	0.033

Specimen

Weight of Mold & WS (lbs)	13.54	13.80
Weight of Mold (lbs)	9.25	9.25
Weight of WS (lbs)	4.29	4.55
Volume of Mold (ft^3)	0.033	0.033

Moisture / Density

Tare Number	Z-1	Z-2
Wt. of Tare & WS (gm)	759.60	815.60
Wt. of Tare & DS (gm)	689.00	737.60
Wt. of Tare (gm)	207.40	211.40
Wt. of water (gm)	70.60	78.00
Wt. of DS (gm)	481.60	526.20
Wet **Density (pcf):**	130.0	137.9
Moisture Content (%):	**14.7**	**14.8**
Dry Density (pcf):	**113.4**	**120.1**

Comment(s): Water was added during preparation of material for 1-point testing.

Geotechnics Representative : Abe Gaeta

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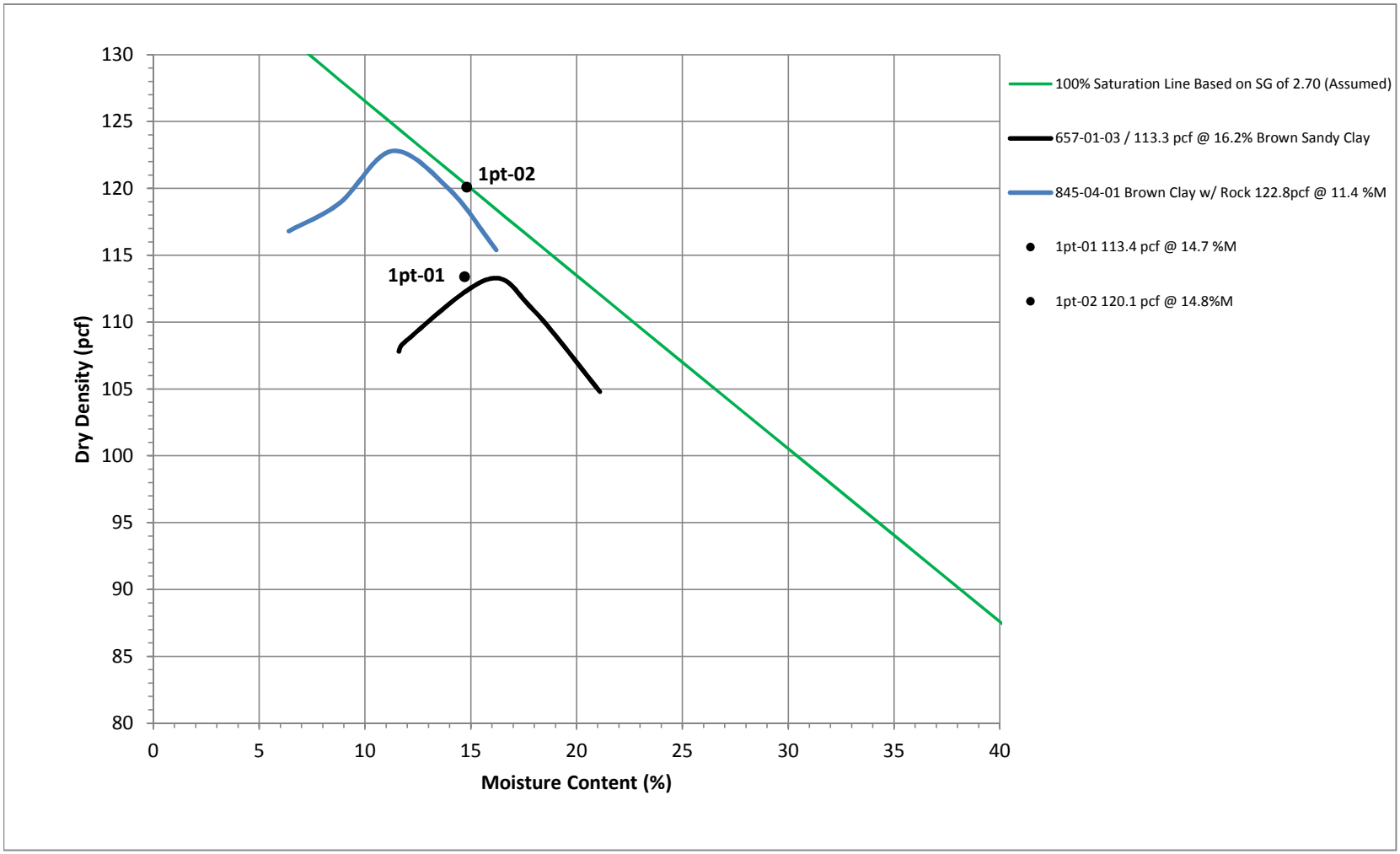
INTEGRITY IN TESTING

Compacted Clay Liner Moisture Density Relationships

Date: 7.1 - 7.3.14
Client: BLACKROCK ENGINEERS
Project Name : ROXBORO ASH LANDFILL P6A Borrow Site "G"
Project Number : 2014-610



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Day:	**Tuesday**
Date:	**7.8.14**
Log No.:	**50**
Page:	**1 of 1**

Daily Field Report

Project Name:	Roxboro LF P6A	**Project No.:**	2014-610
Client Name:	Blackrock Engineers	**Client Contact:**	Bill Lupi
Site Location:	Semora, NC	**Time on Site:**	**Arrived:** 10:00 AM **Departed:** 2:30 PM
General Contractor:	Glover Construction	**Superintendent:**	Reuben Williams

Other Firms / Sub-Contractor Represented On Site

Firm / Sub-Contractor	**Representative's Name and Title**
Blackrock Engineering	Randy Berarducci / CQA Rep.

Weather Conditions: Sunny **Temperature:** 78-94 F

Contractor's Equipment: (2) CAT D6 Dozers, (10) Bottom dump haul trucks, (1) New Holland Tractor w/ smooth drum roller, (1) CAT C554 smooth drum roller, (1) Case tractor w/ disc, (1) CAT 349E Excavator, (1) CAT 140H Motor Grader.

Contractor's Personnel: 9

Description of Daily Activities & Events

- Geotechnics Rep. Abe Gaeta arrived at jobsite.
- Geotechnics Rep. continued soil cover depth testing at cell P6A rear embankment by method of hand augering for Blackrock Engineers.
- Geotechnics Rep. checked soil cover depth approximetly every 100’ along rear embankment of P6A.
- Rep. flagged locations for surveyor referencing. A total of (3) holes were augered. **Soil Depth Test** (SDT) over coal ash base were recorded as follows :

SDT- 9	2.0’	South Slope
SDT- 10	2.0’	South Slope
SDT - 11	2’ 5"'	South Slope

- Geotechnics Rep. departed jobsite.

Prepared By:	APG	**Date:**	7.8.14	**Checked By:**	MPS	**Date:**	7.14.14

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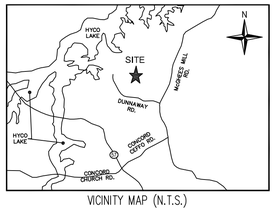
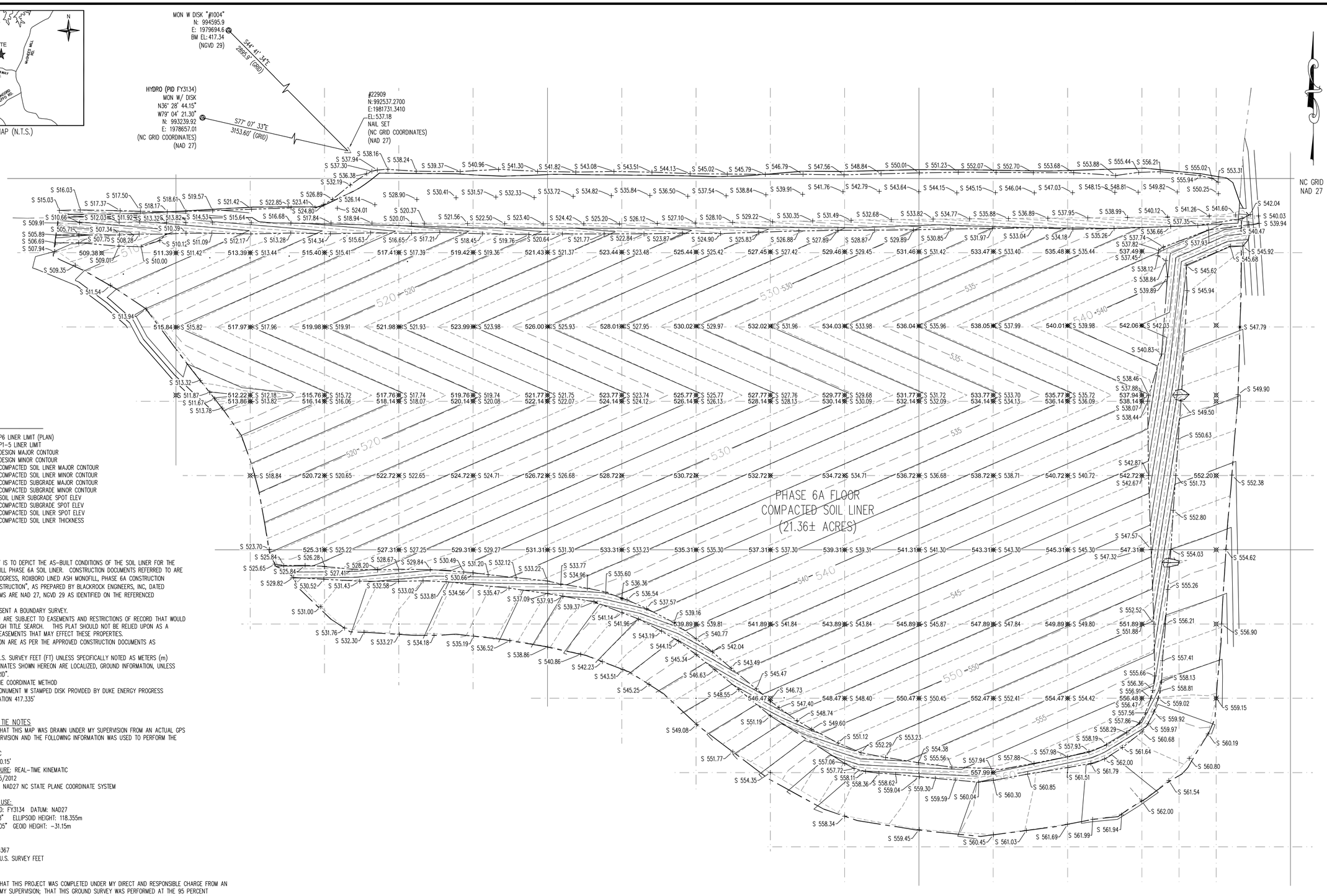
Appendix F – Record Survey Drawings



VICINITY MAP (N.T.S.)



LEGEND

— — — —	P6 LINER LIMIT (PLAN)
———	P1-5 LINER LIMIT
——— 100 ———	DESIGN MAJOR CONTOUR
———	DESIGN MINOR CONTOUR
——— 100 ———	COMPACTED SOIL LINER MAJOR CONTOUR
———	COMPACTED SOIL LINER MINOR CONTOUR
——— 100 ———	COMPACTED SUBGRADE MAJOR CONTOUR
———	COMPACTED SUBGRADE MINOR CONTOUR
100.00 ⊠	SOIL LINER SUBGRADE SPOT ELEV
+ S 100.00	COMPACTED SUBGRADE SPOT ELEV
+ L 100.00	COMPACTED SOIL LINER SPOT ELEV
+ T=X.XX	COMPACTED SOIL LINER THICKNESS

GENERAL NOTES

1) THE PURPOSE OF THIS PLAT IS TO DEPICT THE AS-BUILT CONDITIONS OF THE SOIL LINER FOR THE ROXBORO LINED ASH MONOFILL PHASE 6A SOIL LINER. CONSTRUCTION DOCUMENTS REFERRED TO ARE ENTITLED "DUKE ENERGY PROGRESS, ROXBORO LINED ASH MONOFILL, PHASE 6A CONSTRUCTION DRAWINGS, ISSUED FOR CONSTRUCTION", AS PREPARED BY BLACKROCK ENGINEERS, INC, DATED 11/7/2013. PROJECT DATUMS ARE NAD 27, NGVD 29 AS IDENTIFIED ON THE REFERENCED CONSTRUCTION DOCUMENTS.
2) THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY.
3) PROPERTIES SHOWN HEREON ARE SUBJECT TO EASEMENTS AND RESTRICTIONS OF RECORD THAT WOULD BE REVEALED BY A THOROUGH TITLE SEARCH. THIS PLAT SHOULD NOT BE RELIED UPON AS A COMPLETE RECORD OF ALL EASEMENTS THAT MAY EFFECT THESE PROPERTIES.
4) PLANIMETRICS SHOWN HEREON ARE AS PER THE APPROVED CONSTRUCTION DOCUMENTS AS REFERENCED PREVIOUSLY.
5) UNIT OF MEASUREMENT IS U.S. SURVEY FEET (FT) UNLESS SPECIFICALLY NOTED AS METERS (m)
6) ALL DISTANCES AND COORDINATES SHOWN HEREON ARE LOCALIZED, GROUND INFORMATION, UNLESS SPECIFICALLY NOTED AS "GRID".
7) AREA(S) CALCULATED BY THE COORDINATE METHOD
8) ELEVATIONS BASED UPON MONUMENT W STAMPED DISK PROVIDED BY DUKE ENERGY PROGRESS IDENTIFIED AS "1004", ELEVATION 417.335'

SURVEY CONTROL / GRID TIE NOTES

I, AARON D. JOPLIN, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE SURVEY:

1) CLASS OF SURVEY: CLASS C
2) POSITIONAL ACCURACY: H: 0.15'
3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC
4) DATE OF GPS SURVEY: 8/15/2012
5) HORIZONTAL DATUM/EPOCH: NAD27 NC STATE PLANE COORDINATE SYSTEM
   VERTICAL DATUM: NAVD88
6) PUBLISHED/FIXED-CONTROL USE:
   NAME: HYDRO PID: FY3134 DATUM: NAD27
   LATITUDE: 36°28'44.1558" ELLIPSOID HEIGHT: 118.355m
   LONGITUDE: 79°04'21.3005" GEOID HEIGHT: -31.15m
   ELEVATION: 490.5
7) GEOID MODEL: GEOID 09
8) COMBINED FACTOR: 0.99989367
9) UNITS: LOCALIZED GROUND U.S. SURVEY FEET

I, AARON D. JOPLIN, CERTIFY THAT THIS PROJECT WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION; THAT THIS GROUND SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL (2 SIGMA) TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THE HORIZONTAL ACCURACY HAS A RATIO EXCEEDING 1:10000, THAT THE VERTICAL ACCURACY IS +/- 0.02', AND THAT THE ORIGINAL DATA WAS OBTAINED FROM DECEMBER 17, 2013 THROUGH JUNE 27, 2014, THAT THE SURVEY WAS COMPLETED ON JUNE 27, 2014, AND ALL COORDINATES ARE BASED ON NAD 27, AND ALL ELEVATIONS ARE BASED ON NGVD 29.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 23rd DAY OF JULY 2014.

AARON D. JOPLIN LICENSE NO. L-4927

FINAL DRAWING

0 60' 120' 180'
1" = 60'

BLACKROCK ENGINEERS, INC.
ENGINEERING & SURVEYING
5102 WRIGHTSVILLE AVE.
WILMINGTON, NC 28403
117 CENTREWEST CT.
CARY, NC 27513
NC LICENSE #C-2919
PH. 910.742.8346
BLACKROCK

SEAL: NORTH CAROLINA PROFESSIONAL SEAL L-4927 LAND SURVEYOR AARON D. JOPLIN

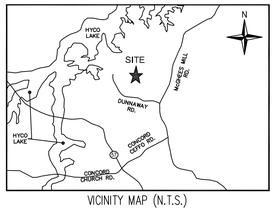
NO.	DATE	REVISION

SURVEY NOTES:

SURVEY PREPARED FOR:
DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
PHASE 6A CONSTRUCTION

SURVEY DESCRIPTION:
AS-BUILT PLAN
COMPACTED SOIL
LINER SUBGRADE
0-7021

DRAWN BY: ADJ	DATE: JUL 10, 2014
CHECKED BY: ADJ	SCALE: AS SHOWN
PROJECT NO.: 11001	
FILE NAME: ROX P6A SOIL LINER ASBUILT	
SHEET NO. 1 / 3	



VICINITY MAP (N.T.S.)

MON W DISK "#1004"
N: 994595.9
E: 1979694.6
BM EL:417.34
(NGVD 29)

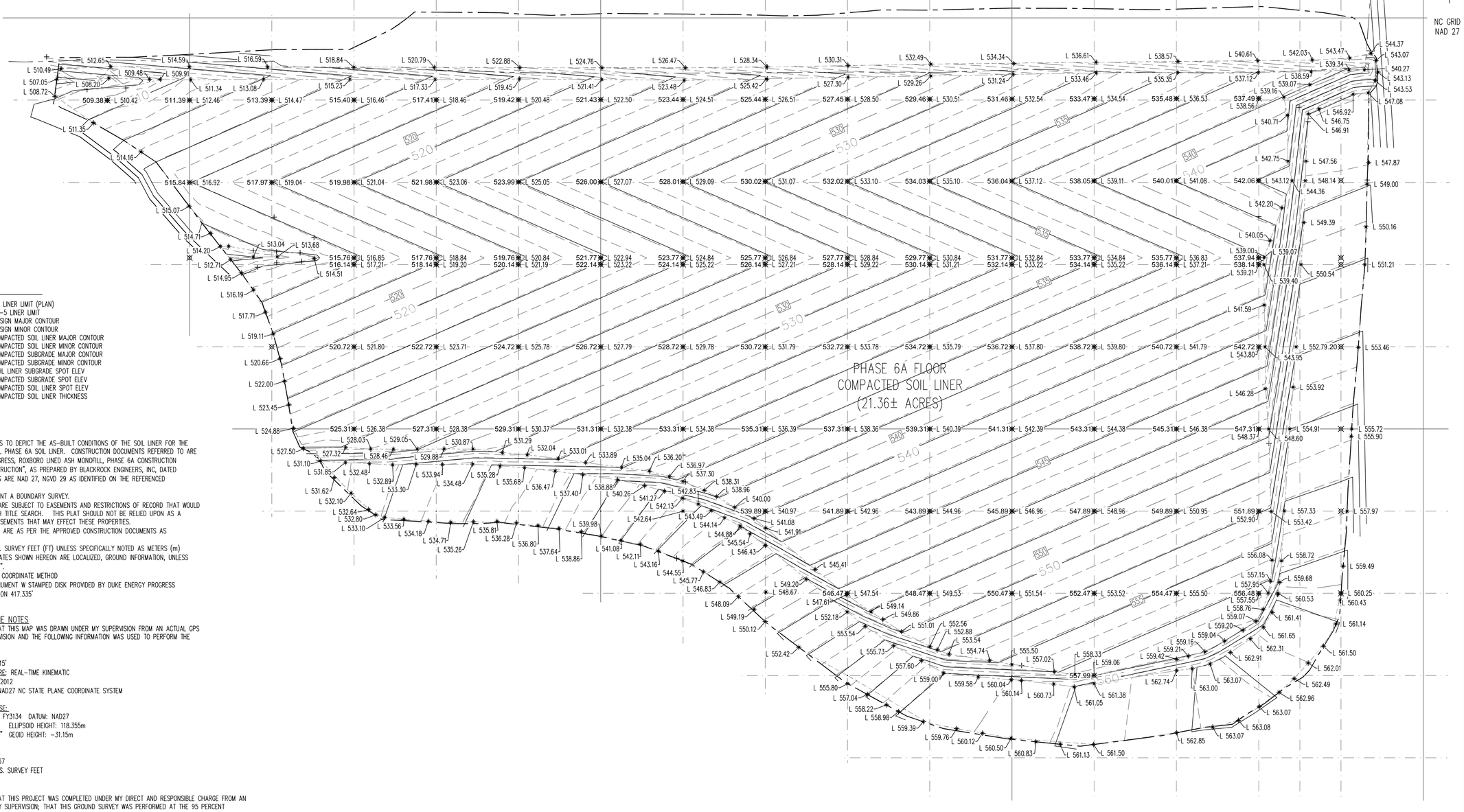
S44° 41' 34"E
2885.97' (GRID)

HYDRO (PID FY3134)
MON W/ DISK
N36° 28' 44.15"
W79° 04' 21.30"
N: 993239.92
E: 1978657.01
(NC GRID COORDINATES)
(NAD 27)

S77° 07' 33"E
3153.60' (GRID)

#22909
N:992537.2700
E:1981731.3410
EL:537.18
NAIL SET
(NC GRID COORDINATES)
(NAD 27)

NC GRID
NAD 27



LEGEND

- P6 LINER LIMIT (PLAN)
- P1-5 LINER LIMIT
- 100 DESIGN MAJOR CONTOUR
- DESIGN MINOR CONTOUR
- 100 COMPACTED SOIL LINER MAJOR CONTOUR
- COMPACTED SOIL LINER MINOR CONTOUR
- 100 COMPACTED SUBGRADE MAJOR CONTOUR
- COMPACTED SUBGRADE MINOR CONTOUR
- 100.00 SOIL LINER SUBGRADE SPOT ELEV
- + S 100.00 COMPACTED SUBGRADE SPOT ELEV
- + L 100.00 COMPACTED SOIL LINER SPOT ELEV
- + T=X.XX COMPACTED SOIL LINER THICKNESS

GENERAL NOTES

1) THE PURPOSE OF THIS PLAT IS TO DEPICT THE AS-BUILT CONDITIONS OF THE SOIL LINER FOR THE ROXBORO LINED ASH MONOFILL PHASE 6A SOIL LINER. CONSTRUCTION DOCUMENTS REFERRED TO ARE ENTITLED "DUKE ENERGY PROGRESS, ROXBORO LINED ASH MONOFILL, PHASE 6A CONSTRUCTION DRAWINGS, ISSUED FOR CONSTRUCTION", AS PREPARED BY BLACKROCK ENGINEERS, INC, DATED 11/7/2013. PROJECT DATUMS ARE NAD 27, NGVD 29 AS IDENTIFIED ON THE REFERENCED CONSTRUCTION DOCUMENTS.
2) THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY.
3) PROPERTIES SHOWN HEREON ARE SUBJECT TO EASEMENTS AND RESTRICTIONS OF RECORD THAT WOULD BE REVEALED BY A THOROUGH TITLE SEARCH. THIS PLAT SHOULD NOT BE RELIED UPON AS A COMPLETE RECORD OF ALL EASEMENTS THAT MAY EFFECT THESE PROPERTIES.
4) PLANIMETRICS SHOWN HEREON ARE AS PER THE APPROVED CONSTRUCTION DOCUMENTS AS REFERENCED PREVIOUSLY.
5) UNIT OF MEASUREMENT IS U.S. SURVEY FEET (FT) UNLESS SPECIFICALLY NOTED AS METERS (m)
6) ALL DISTANCES AND COORDINATES SHOWN HEREON ARE LOCALIZED, GROUND INFORMATION, UNLESS SPECIFICALLY NOTED AS "GRID".
7) AREA(S) CALCULATED BY THE COORDINATE METHOD
8) ELEVATIONS BASED UPON MONUMENT W STAMPED DISK PROVIDED BY DUKE ENERGY PROGRESS IDENTIFIED AS "1004", ELEVATION 417.335'

SURVEY CONTROL / GRID TIE NOTES

I, AARON D. JOPLIN, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE SURVEY:

1) CLASS OF SURVEY: CLASS C
2) POSITIONAL ACCURACY: H: 0.15'
3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC
4) DATE OF GPS SURVEY: 8/15/2012
5) HORIZONTAL DATUM/EPOCH: NAD27 NC STATE PLANE COORDINATE SYSTEM
   VERTICAL DATUM: NAVD88
6) PUBLISHED/FIXED-CONTROL USE:
   NAME: HYDRO PID: FY3134 DATUM: NAD27
   LATITUDE: 36°28'44.1558" ELLIPSOID HEIGHT: 118.355m
   LONGITUDE: 79°04'21.3005" GEOID HEIGHT: -31.15m
   ELEVATION: 490.5
7) GEOID MODEL: GEOID 09
8) COMBINED FACTOR: 0.99989367
9) UNITS: LOCALIZED GROUND U.S. SURVEY FEET

I, AARON D. JOPLIN, CERTIFY THAT THIS PROJECT WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION; THAT THIS GROUND SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL (2 SIGMA) TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THE HORIZONTAL ACCURACY HAS A RATIO EXCEEDING 1:10000, THAT THE VERTICAL ACCURACY IS +/- 0.02', AND THAT THE ORIGINAL DATA WAS OBTAINED FROM DECEMBER 17, 2013 THROUGH JUNE 27, 2014, THAT THE SURVEY WAS COMPLETED ON JUNE 27, 2014, AND ALL COORDINATES ARE BASED ON NAD 27, AND ALL ELEVATIONS ARE BASED ON NGVD 29.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 23rd DAY OF JULY 2014.

AARON D. JOPLIN LICENSE NO. L-4927

FINAL DRAWING

0 60' 120' 180'
1" = 60'

BLACKROCK ENGINEERS, INC.
ENGINEERING & SURVEYING
5102 WRIGHTSVILLE AVE.
WILMINGTON, NC 28403
117 CENTREWEST CT.
CARY, NC 27513
NC LICENSE #C-2919
PH. 910.742.8346

BLACKROCK

SEAL: NORTH CAROLINA PROFESSIONAL SEAL L-4927 LAND SURVEYOR AARON D. JOPLIN

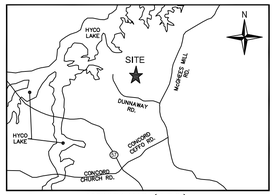
NO.	DATE	REVISION

SURVEY NOTES:

SURVEY PREPARED FOR:
DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
PHASE 6A CONSTRUCTION

SURVEY DESCRIPTION:
AS-BUILT PLAN
TOP OF COMPACTED
SOIL LINER
0-7021

DRAWN BY: ADJ	DATE: JUL 10, 2014
CHECKED BY: ADJ	SCALE: AS SHOWN
PROJECT NO.: 11001	
FILE NAME: ROX P6A SOIL LINER ASBUILT	
SHEET NO. 2 / 3	



VICINITY MAP (N.T.S.)

MON W DISK "#1004"
N: 994595.9
E: 1979694.6
BM EL: 417.34
(NGVD 29)

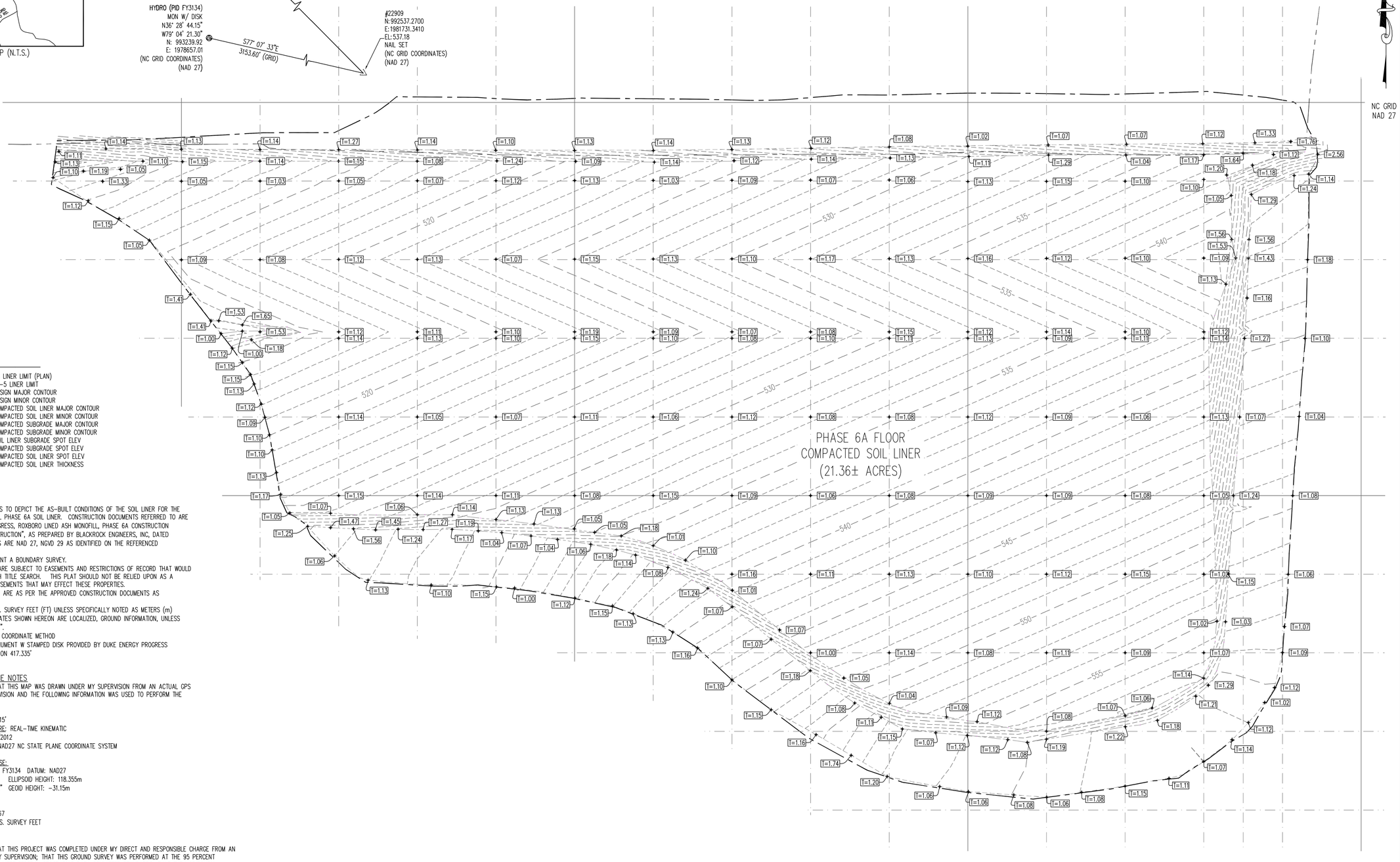
S44° 41' 34"E
2895.97' (GRID)

HYDRO (PID FY3134)
MON W/ DISK
N36° 28' 44.15"
W79° 04' 21.30"
N: 993239.92
E: 1978657.01
(NC GRID COORDINATES)
(NAD 27)

S77° 07' 33"E
3153.60' (GRID)

#22909
N:992537.2700
E:1981731.3410
EL:537.18
NAIL SET
(NC GRID COORDINATES)
(NAD 27)

NC GRID
NAD 27



LEGEND

— — — —	P6 LINER LIMIT (PLAN)
— — — —	P1-5 LINER LIMIT
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100	DESIGN MINOR CONTOUR
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NO.	DATE	REVISION

SURVEY NOTES:

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DUKE ENERGY PROGRESS
ROXBORO LINED ASH MONOFILL
PHASE 6A CONSTRUCTION

SURVEY DESCRIPTION:
AS-BUILT PLAN
COMPACTED SOIL LINER
THICKNESS AS BUILT
0-7021

DRAWN BY: ADJ	DATE: JUL 10, 2014
CHECKED BY: ADJ	SCALE: AS SHOWN
PROJECT NO.: 11001	
FILE NAME: ROX P6A SOIL LINER ASBUILT	
SHEET NO. 3 / 3	