Construction Quality Assurance Report

Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

Permit No.	Date	Document ID No.
43-03	**November 17, 2014**	**22287**

DOCUMENT APPROVED
Division of Waste Management
Solid Waste Section
Received Dated: **October, 2014 and revised through November 12, 2014**
Date: **November 14, 2014** By: **Ming-Tai Chao**

Prepared for:

Harnett County Solid Waste Department
Lillington, North Carolina

October 2014
Revised: November 2014

Prepared by:

NC LIC. NO. C-0828 (ENGINEERING)

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PRINTED ON 100% RECYCLED PAPER

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Construction Quality Assurance Report

Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

Prepared For:
Harnett County Solid Waste Department
Lillington, North Carolina

S+G Project No. HARNETT-AC-13-4

Based on the observations and results of the CQA program documented herein, it is my professional opinion that the construction of the Phases I & II Extension of the Anderson Creek C&D Landfill was completed in accordance with the following:

i. The Project CQA Manual;
ii. The conditions of the Permit;
iii. The requirements of 15A NCAC 13B.0541; and
iv. Acceptable engineering practices.

NORTH CAROLINA PROFESSIONAL SEAL 021666 ENGINEER PIETER K. SCHEER
11/11/14

Pieter K. Scheer, P.E.
Project Manager

October 2014
Revised: November 2014

NC LIC. NO. C-0828 (ENGINEERING)
SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

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SMITH+GARDNER
ENGINEERS

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WEB
www.smithgardnerinc.com

November 12, 2014

Mr. Ming-Tai Chao, P.E.
Environmental Engineer
NC DENR - Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699

RE: Harnett County Anderson Creek C&DLF - Phases I & II Extension (Permit No. 43-03)
Response to Review Comments

Dear Mr. Chao:

On behalf of Harnett County, Smith Gardner, Inc. (S+G) would like to respond to the comments in your email dated and received by S+G on November 6, 2014 (see **attached**). Your comments are repeated below in *italics* followed by our response in **bold**.

1. *(Section 2.1) Since the constructed berm deviated from the originally approved limits, please address the following concerns:*
   i. *Please provide the final acreage of the Phase I & II Extension (Area Certified) shown on Figure No. AB-1.*
   ii. *Please update data (waste footprint, capacity values, etc.) in Table 1 - Total Operating Capacity and Life Expectancy, Facility and Engineering Plan of the approved Permit Application dated January 2014 and revised March 2014 (DIN 20704).*

   Figure AB-1 has been revised to include the acreage (0.5 acres) and is included as part of the enclosed revised CQA report. Table 1 of the Facility and Engineering Plan is attached with the revised values.

2. *(Section 5.0) The Table 1 is not available in the submitted CQA Report. Please provide the Table 1.*

   Table 1 was inadvertently omitted from the pdf copy. The enclosed revised CQA report includes Table 1.

3. *(Appendix C) Pursuant to Section 3.1 - Embankment Material Approval of the approved CQA Manual, please provide the raw data & drawings that are used to determine the density and moisture relationship (according to ASTM D 698) of soil borrow used for this project.*

   Two laboratory standard Proctor (ASTM D 698) curves have been added to Appendix C. Note that the maximum dry density values differ slightly from the

one-point Proctor information provided on the field test forms. Per Geotechnologies, their technicians perform one point Proctor tests in the field when performing in-place density testing. The one point is plotted in relationship to the closest laboratory Proctor curve for the project. The technician then uses the maximum dry density from the plotted one point, instead of the actual proctor curve maximum dry density. Geotechnologies' experience is that this provides a more accurate measure of the % compaction of the material as tested.

Note that Table 1 reports the number of one-point tests performed (3), yet the number of laboratory tests (2) still exceeds the stipulated frequency (1 test per 5,000 CY).

Please contact me at your earliest convenience if you should have any questions or comments on this submittal.

Sincerely,
SMITH GARDNER, INC.

Pieter K. Scheer, P.E.
Vice President, Senior Engineer
pieter@smithgardnerinc.com

Attachments: M. Chao Email (November 6, 2014)
Revised Table 1 - Facility & Engineering Plan

Enclosure: Revised CQA Report

cc: Dennis Shakelford, DWM
Amanda Bader, P.E., Harnett County
Randy Smith, Harnett County
Andrew Holland, Harnett County

Pieter Scheer

From: Chao, Ming-tai
Sent: Thursday, November 06, 2014 3:50 PM
To: Amanda Bader (abader@harnett.org)
Cc: Pieter Scheer (pieter@smithgardnerinc.com); Shackelford, Dennis
Subject: Comments on the CQA Report, Anderson Creek CDLF, 43-03

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Ms. Bader:

I have completed a review of the following submittals related to the Anderson Creek C&DLF – Phases I & II Extension, Permit No. 43-03. Both submittals are prepared by Smith Gardner, Inc. on behalf of Harnett County, which are:

- *Construction Quality Assurance Report (CQA Report)*, Harnett County Anderson Creek C&DLF - Phase I & II Extension, dated October 2014 (DIN 22193).
- *Harnett County Anderson Creek C&DLF (Permit No. 43-03) Phases I & II Extension – Revised Final Cover Grading Plan* (DIN 22245).

I have few comments on the submittals stated below:

1. (Section 2.1) Since the constructed berm deviated from the originally approved limits, please address the following concerns:
    i. Please provide the final acreage of the Phase I & II Extension (Area Certified) shown on Figure No. AB-1.
    ii. Please update data (waste footprint, capacity values, etc.) in Table 1 – Total Operating Capacity and Life Expectancy, Facility and Engineering Plan of the approved Permit Application dated January 2014 and revised March 2014 (DIN 20704).

2. (Section 5.0) The Table 1 is not available in the submitted CQA Report. Please provide the Table 1.

3. (Appendix C) Pursuant to Section 3.1 – Embankment Material Approval of the approved CQA Manual, please provide the raw data & drawings that are used to determine the density and moisture relationship (according to ASTM D 698) of soil borrow used for this project.

Please also provide me the copy of the "Recorded" Permit as requested in the General Facility Permit Condition No. 3 of the PTC/PTO (DIN 20702) issued on March 14, 2014.

Thank you and have a wonderful day.

Ming Chao

Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section

6.5 Access and Roadways

The facility is accessed from Poplar Drive. A scale and a scale house are located near this entrance. **Drawing S1** (Existing Conditions) shows this infrastructure.

All-weather access to active areas as well as areas under intermediate cover will be provided. Access roads into the landfill units will be provided where necessary.

7.0 SLOPE STABILITY AND SETTLEMENT

An evaluation of the slope stability of the overall waste mass as well as an evaluation of foundation settlement is addressed in **Appendix A**. These analyses indicate that the proposed landfill configuration will satisfy applicable regulatory criteria.

Table 1 Total Operating Capacity and Life Expectancy

Unit	Area (Ac.)	Capacity (See Note 1)		Life Expectancy (Years)
		Gross (CY)	Net (CY/Tons)	
Phases I & II (Filled) (as of July 16, 2013)	7.0	461,978	392,681 CY 161,032 Tons	-----
Phases I & II – Extension	0.5	74,087	34,444 CY 17,222 Tons	1.2 (See Note 2)
Totals:	7.5	536,065	427,125 CY 178,254 Tons	1.2

Notes:

1. The net capacity is based on an assumed 10% periodic cover soil ratio and waste density of 0.5 tons/CY.
2. Life expectancy is based on an assumed average disposal rate of 15,000 tons/year and is projected from July 16, 2013.

Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

Construction Quality Assurance Report

Table of Contents

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1.0 OVERVIEW

This Construction Quality Assurance (CQA) Report has been prepared to document the CQA activities performed during the construction of the Phases I & II Extension of the Anderson Creek Construction and Demolition Debris (C&D) Landfill. The landfill facility is located at 1086 Poplar Drive in Spring Lake, North Carolina and is owned and operated by Harnett County under State Solid Waste Permit No. 43-03. A Permit to Construct for the Phases I & II Extension was issued by the North Carolina Division of Waste Management (NCDWM) on March 14, 2014.

2.0 PROJECT DESCRIPTION

2.1 General

The Phases I & II Extension is an unlined C&D landfill unit designed by Smith Gardner, Inc. (S+G). The extension is approximately 0.4 acres and is located to the northeast of the existing Phases I & II units. Construction activities included of subgrade preparation activities, and construction of a small berm.

It is noted that the berm construction for the extension differs somewhat from the originally approved plan. However, the capacity of the extension remains essentially the same as that previously approved (Refer to revised filling plan for Phases I & II Extension provided under separate cover.).

2.2 Reference Documents

The Phases I & II Extension was constructed in accordance with the following documents.

Permit Application - Harnett County Anderson Creek Landfill Facility C&D Landfill and Transfer Station Continued Operations:
Includes technical specifications, CQA manual, and permit drawings prepared by S+G as revised through March 2014 (Permit to Construct issued by NCDWM on March 14, 2014).

2.3 Project Participants

The following parties were involved in the construction and CQA of the Phases I & II Extension:

2.3.1 Owner

Harnett County Solid Waste Department
200 Alexander Drive
Lillington, NC 27546

Phone: (910) 814-6156

Contacts: Amanda Bader, P.E., County Engineer
Randy Smith, Solid Waste Operations Manager
Andrew Holland, Solid Waste Operations Crew Leader

Note: For this project, the County performed as the Contractor.

2.3.2 Engineer/CQA Engineer

Smith Gardner, Inc. (S+G)
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577
Fax: (919) 828-3899

Contacts: Pieter Scheer, P.E., Project Manager

2.3.3 CQA Testing - Earthwork & Construction Monitoring

GeoTechnologies,Inc., P.A.
3200 Wellington Ct., Suite 108
Raleigh, NC 27615
Phone: (919) 954-1514

Contacts: Mike Morton, Construction Services Manager
Mike Norton, Field Technician

2.3.4 Surveyor

Streamline Land Surveying
870 NC55W
Coats, NC 27358
Phone: (910) 897-7715

Contacts: Robert E. Godwin, Jr., PLS

3.0 SUMMARY OF CONSTRUCTION ACTIVITIES

Major elements of the project are discussed below. Photos documenting the construction of the Phases I & II Extension can be found in **Appendix A**. In conjunction with beginning the placement of structural fill, a CQA meeting was held on August 7, 2014. Documentation of this meeting can be found in **Appendix B**.

3.1 Site Preparation

Construction of the Phases I & II Extension began in August 2014 with the surveying/staking of the limits of construction by Streamline Land Surveying and the initiation of earthwork activities by County forces.

3.2 Earthwork

The site, which lies within a portion of the site designated for borrow, was previously cleared and grubbed. Additionally, an existing French drain running northeast of and adjacent to the Phases I & II Extension was removed to the extent practical and the remainder abandoned (References: NC DWM DIN 21375 (Revised Report with Documentation) and DIN 21384 (Acknowledgement of French Drain Removal)).

Once the site was staked, excavation and stockpiling activities were performed. Suitable soils identified for use as structural fill were excavated and placed and compacted or were temporarily stockpiled. A portion of the structural fill came from the County's nearby active borrow area.

During construction of the subgrade for the Phases I & II Extension, Mr. Pieter Scheer, P.E. visited the site and examined the subgrade in accordance with the requirements of 15A NCAC 13B.0540. As anticipated based on the site investigations performed in this area, no evidence of bedrock or groundwater was observed in excavations made to reach subgrade elevations.

An as-built drawing showing completed subgrade elevations is provided in Appendix D.

4.0 CQA PROGRAM

4.1 Scope of Services

In satisfying the requirements of the Project CQA Manual for the Phases I & II Extension, the following activities were performed:

- Observation and documentation of construction of prepared subgrade and structural fill.
- Field and laboratory testing of structural fill.
- Verification of the soil types in the upper two (2) feet of the subgrade.
- Review/preparation of record drawing.
- Preparation of the final CQA report.

5.0 EARTHWORK CQA

The criteria for construction of structural fill per the project specifications included the following:

Materials:	SP*, SW*, SM, SM-SC, SC, ML, MH, ML-CL, CL, or CH (ASTM D 2488) with no topsoil or other deleterious material and no stones or rocks in excess of one half the lift thickness as compacted;
Density:	Minimum 95% Maximum Standard Proctor Dry Density (ASTM D 698);
Moisture Content:	As necessary for compaction; and
Lift Thickness:	8-inch max. (compacted).

*Within the limits of the landfill, SP (poorly-graded sand) and SW (well-graded sand) soils are not allowed in the upper two (2) feet of the subgrade (see **Section 5.1**).

The number and results of material control and record tests performed on the structural fill are summarized in **Table 1**. Other tests performed on an on-going basis during construction included a visual classification of soils (ASTM D 2488) and monitoring of loose lift thickness. Note that the number of tests required was based on an approximate quantity of 2,350 CY of material placed (in-place measure). The results of field and laboratory testing of structural fill can be found in **Appendix C**. An as-built drawing showing completed subgrade elevations is provided in **Appendix D**.

5.1 Soil Types in Upper Two Feet of Landfill Subgrade

For this site, no SP, SW, or coarser soil types (as defined using ASTM D 2488) were found to be present within the limits of the Phases 1 & II Extension based on visual inspection and testing performed as part of construction. Five tests performed on actual materials placed in the upper two feet of the landfill subgrade show that the soils used were classified as SC or SM-SC. These soil types meet the requirements of 15A NCAC 13B.0540 for the upper two feet of the landfill subgrade.

6.0 RECORD DRAWING

The following record (as-built) drawing depicting the construction of the Phases I & II Extension can be found in **Appendix D**:

- Subgrade (prepared by S+G using surveyed elevations by Streamline Land Surveying, Robert Godwin, PLS).

TABLE 1
SUMMARY OF MATERIAL CONTROL AND RECORD TESTS
STRUCTURAL FILL

	Property		
	Control Tests	Record Tests	
	Moisture-Density Relationship (Proctor)	In-Place Density	In-Place Moisture Content
Units	-----	% Std. Proctor	%
Test Method	ASTM D 698	ASTM D 2937	ASTM D 4959
Required Test Frequency	5,000 CY per each soil	20,000 ft^2 per lift & 1 per 500 LF of Berms (<200 ft. base width) (+/- 1 Per 500 CY)	20,000 ft^2 per lift & 1 per 500 LF of Berms (<200 ft. base width) (+/- 1 Per 500 CY)
No. of Tests Required	1	5	5
No. of Tests Performed	3	12	12
Specified Value	-----	≥ 95% Std. Proctor	As Required for Density
Minimum Value	-----	95.9	-4.7 % Opt.
Maximum Value	-----	99.5	-0.2 % Opt.
Average Value	-----	97.6	-2.3 % Opt.
Quantity of Structural Fill (In-Place):		2,350 CY	

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Appendix A

Photographic Log

Construction Quality Assurance Report
Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

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S+G ENGINEERS

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Harnett County, North Carolina	Anderson Creek C&DLF – Phases I & II Extension	HARNETT-AC-13-4

Photo No. 1

Direction Photo Taken:

Northwest

Description:

Construction Area from Access Road

Photo No. 2

Direction Photo Taken:

Southeast

Description:

Construction Area from Berm

S+G ENGINEERS

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Harnett County, North Carolina	Anderson Creek C&DLF – Phases I & II Extension	HARNETT-AC-13-4

Photo No. 3

Direction Photo Taken:

North

Description:

Construction Area from Phases I & II

Photo No. 4

Direction Photo Taken:

Northeast

Description:

Construction Area from Phases I & II

Appendix B

CQA Meeting Documentation

Construction Quality Assurance Report
Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

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SMITH+GARDNER
ENGINEERS

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MEMORANDUM

Date:	October 28, 2014
To:	CQA Report
From:	Pieter K. Scheer, P.E. Smith Gardner, Inc.
RE:	**Harnett County C&DLF - Phases I & II Extension** **CQA Meeting Documentation**

Attendees:

Randy Smith, Harnett County
Andrew Holland, Harnett County
Mike Morton, GeoTechnologies
Pieter Scheer, Smith Gardner (S+G)

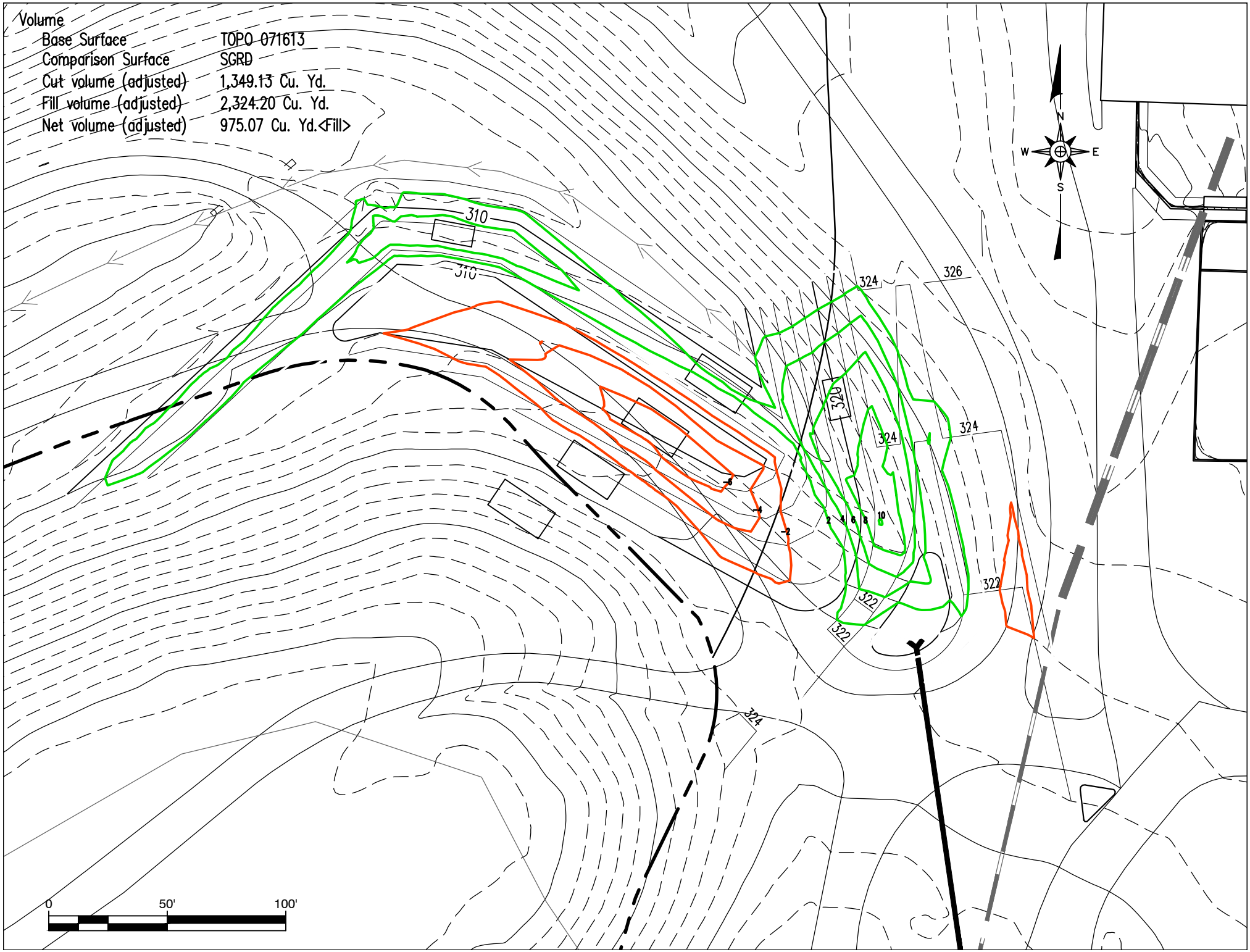
Meeting Summary:

A construction quality assurance (CQA) meeting was held Thursday August 7th at the site to discuss the plans for the placement of structural fill for construction of the Phases I & II Extension of the Harnett County Anderson Creek Construction and Demolition Debris (C&D) Landfill. The meeting began at approximately 2:30 p.m. and lasted approximately 30 minutes.

The site has currently been staked and the County has performed initial earthwork activities. Anticipated earthwork quantities are shown in the **attached** isopach drawing.

The County will contact S+G/GeoTechnologies to perform moisture/density testing of structural fill placed to construct the planned berm. Earthwork testing and subgrade verification will follow the **attached** specification and CQA requirements. An as-built survey will be performed by Streamline Land Surveying (Robert Godwin, PLS). S+G will prepare the certification report which will include the as-built survey and information from tests performed by GeoTechnologies.

Attachments: Isopach Drawing showing Anticipated Earthwork
Earthwork Specification & CQA Requirements


Volume
Base Surface TOPO 071613
Comparison Surface SGRD
Cut volume (adjusted) 1,349.13 Cu. Yd.
Fill volume (adjusted) 2,324.20 Cu. Yd.
Net volume (adjusted) 975.07 Cu. Yd.<Fill>
N
W
E
S
310
310
324
326
320
324
324
322
322
322
324
-6
-4
-2
2
4
6
8
10
0
50'
100'

CQA MEETING
AGENDA

1. Review of Specification Requirements

Earthwork (Perimeter Berm and Subgrade):

- Compaction Requirements: ≥ 95% Std. Proctor; moisture content as required to obtain density
- Surveying: Verify elevation and slope of completed subgrade
- Upper 2 Feet of Subgrade Must be SM, SC, ML, MH, CL, or CH

2. Review of CQA Requirements

A. Control Tests on Subgrade Material
- Visual Classification
- Moisture-Density Relationship: 1 per 5,000 CY (per Each Soil)

B. Approval of Subgrade (visual (by P.G. or P.E. (S+G) and review of survey information)

C. CQA Testing:
- In-Place Moisture/Density Testing: 20,000 SF/Lift & 1 per 500/LF/Lift of Berms
- Verification of Subgrade Soil Type (Atterberg Limits & Grain Size Analysis on Upper 2 Feet): 1 per 10,000 SF (Test 2 Locations Minimum)

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Appendix C

Earthwork CQA Data

Construction Quality Assurance Report
Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

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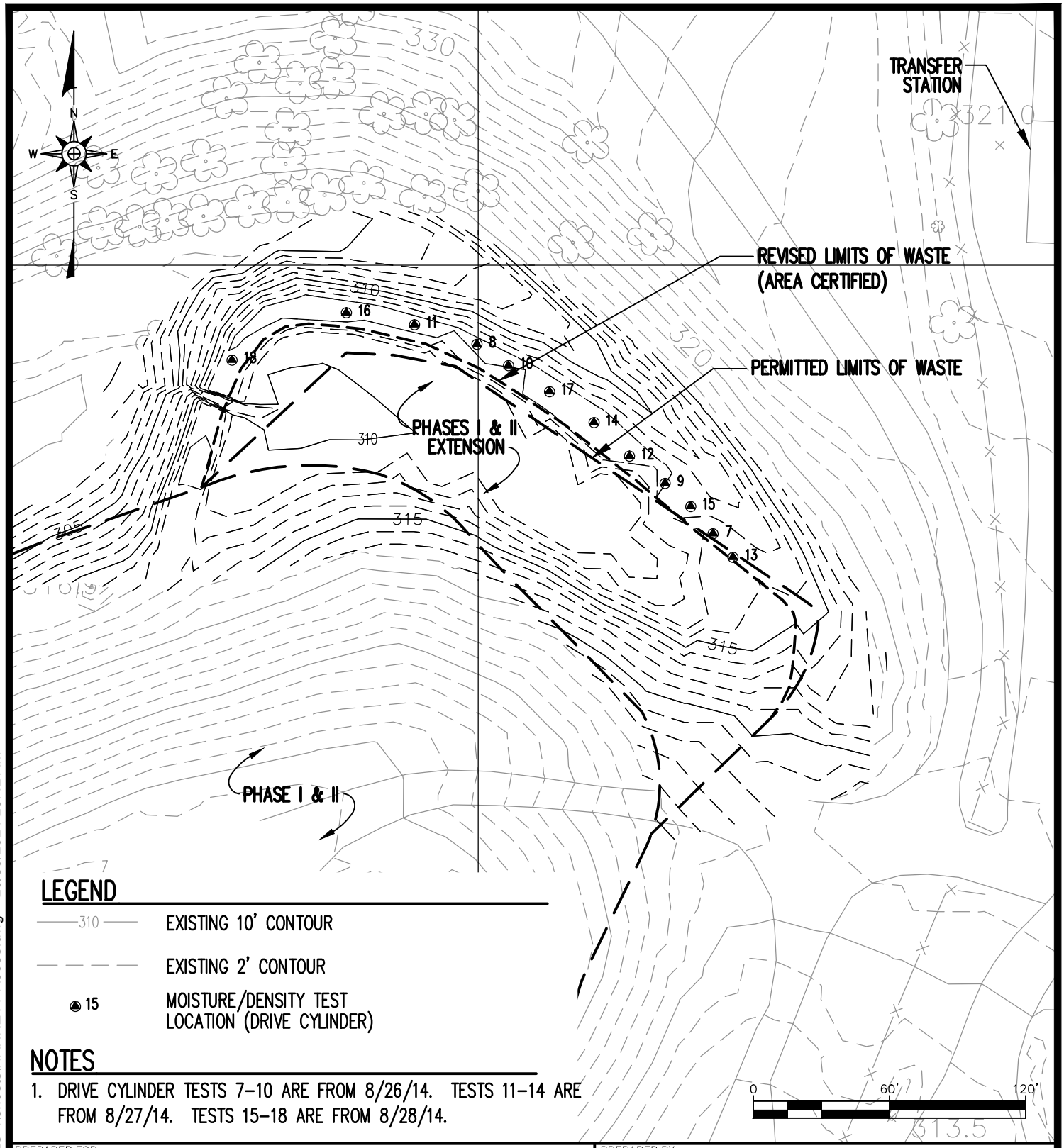

LEGEND

310	EXISTING 10' CONTOUR
	EXISTING 2' CONTOUR
▲15	MOISTURE/DENSITY TEST LOCATION (DRIVE CYLINDER)

NOTES

1. DRIVE CYLINDER TESTS 7–10 ARE FROM 8/26/14. TESTS 11–14 ARE FROM 8/27/14. TESTS 15–18 ARE FROM 8/28/14.

PREPARED FOR:

ANDERSON CREEK C&DLF
PHASES I & II EXTENSION
STRUCTURAL FILL TEST LOCATIONS

PREPARED BY:
NC LIC. NO. C-0828 (ENGINEERING)
SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:	FILE NAME:
C.T.J.	P.K.S.	AS SHOWN	Oct 2014	HARNETT-AC 13-4	1	HARNETT-A0053

G:\CAD\Harnett County\Harnett-AC-13-4\sheets\HARNETT-A0053.dwg - 10/30/2014 10:42 AM

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GeoTechnologies, Inc.
3200 Wellington Court, Suite 108
Raleigh, NC 27615
Phone 919-954-1514 Fax 919-954-1428

Field Report

PROJECT INFORMATION

Project Name:	Anderson Creek Landfill	*Project Number:*	1-14-0619 CA
Location:	Anderson Creek	*Technician:*	M. Norton
Date:	8-26-14	*Weather:*	
Temp:			
Present at Site:		*Arrive at Site:*	7:30 am/pm
		Depart Site:	12:30 am/pm
		# of Trips:	1

DENSITY TESTS

Note: For location of failing density tests, see "Remarks".

Type of Test		#1	#2	#3	#4	#5	#6	#7	#8	#9
Sandcone	Compaction	96.4	95.9	99.3	97.5					
Drive Tube X	Wc +/- Opt.	-3.9	-4.7	-1.4	-2.0					
Nuclear	Pass/Fail	P	P	P	P					
CABC	Elevation	-3'	-3'	-6'	-6'					
	Stone Depth, in.									

CONCRETE/GROUT/MORTAR

Description	No. Sets		#1	#2	#3	#4	#5	#6	#7	#8
6" x 12"		Slump, in.								
4" x 8"		Air, %								
Grout		Unit Weight								
Mortar		Conc. Temp.								

PROOFROLL

Proofroll					
	Subgrade		Stable?		If not stable, see "Remarks".
	CABC Stone		Stable?		For location, see "Remarks".

FOOTING INSPECTIONS

Location		#1	#2	#3	#4	#5	#6	#7	#8
#1)	Req. Bearing								
#2)	Blows @ SG								
#3)	Blows -1'								
#4)	Blows -2'								
#5)	Blows- 3'								
#6)	Blows -4'								
#7)	Blows -5'								
#8)	Blows-6'								

REMARKS

Conducted soil density testing on Berm of CaD Landfill. Moisture contents were low but, due to the sandy material being used, if density is achieved, moisture is not an issue.
All tests meet the minimum density requirement of 95% of maximum dry density.

Signature Michael Norton

Page _____ of _____

White Copy - *Office* Yellow Copy - *Field*

GeoTechnologies, Inc.

PROJECT NO: 1.14.0619 CA

DRIVE TUBE

PROJECT NAME: Anderson Creek Landfill

FIELD DENSITY WORKSHEET

TEST NO.	1	2	3	4
DATE	8-26			
A. Wet Weight of Sample & Mold	5.51	5.46	5.74	5.64
B. Weight of Mold	1.26	1.26	1.26	1.26
C. Wet Weight of Sample (A-B)	4.25	4.20	4.48	4.38
D. Mold Volume Factor	29.54	29.54	29.54	29.54
E. Wet Weight Soil / Cu. Ft.(CxD)	125.55	124.07	132.34	129.39
F. Wet Weight of Moisture Sample	214.6	209.1	210.9	208.3
G. Dry Weight of Moisture Sample	198.8	195.2	191.1	189.7
H. Weight of Water (F-G)	15.8	13.9	19.8	18.6
I. Percent Moisture ((H/G) x 100)	7.9	7.1	10.4	9.8
J. Dry Density per Cu. Ft.	116.4	115.8	119.9	117.8

ONE POINT PROCTOR DETERMINATION

K. Weight of Soil & Mold	13.09			
L. Weight of Mold	9.06			
M. Mold Volume Factor	29.95			
N. Wet Weight (Cu. Ft.) ((K-L) x M)	120.70			
O. **Dry Weight** (Cu. Ft.)	111.9			
P. Wet Weight of Moisture Sample				
Q. Dry Weight of Moisture Sample				
R. Weight of Water (P-Q)				
S. **Moisture Content** ((R/Q)x100)	7.9			
MAXIMUM DRY DENSITY	120.8	120.8	120.8	120.8
OPTIMUM MOISTURE CONTENT	11.8	11.8	11.8	11.8
% COMPACTION	96.4	95.9	99.3	97.5
TEST LOCATION	SE Section of Berm	NE Section of Berm	SE Section of Berm	NE Section of Berm
TEST ELEVATION	-3'	-3'	-6'	-6'
SPECIFIED COMPACTION	95	95	95	95
PASSED (P) / FAILED (F)	P	P	P	P

TECHNICIAN: Michael Martin

GeoTechnologies, Inc.
3200 Wellington Court, Suite 108
Raleigh, NC 27615
Phone 919-954-1514 Fax 919-954-1428

Field Report

PROJECT INFORMATION

Project Name:	Anderson Creek Landfill	*Project Number:*	1-14-0619 CA
Location:	Anderson Creek	*Technician:*	M. Norton
Date:	8-27-14	*Weather:*	
Temp:			
Present at Site:		*Arrive at Site:*	7:00 am/pm
		Depart Site:	12:00 am/pm
		# of Trips:	1

DENSITY TESTS

Note: For location of failing density tests, see "Remarks".

Type of Test		#1	#2	#3	#4	#5	#6	#7	#8	#9
Sandcone	Compaction	97.6	96.1	99.5	98.3					
Drive Tube X	Wc +/- Opt.	-1.0	-0.2	-2.8	-2.9					
Nuclear	Pass/Fail	P	P	P	P					
CABC	Elevation	-5'	-5'	-4'	-4'					
	Stone Depth, in.									

CONCRETE/GROUT/MORTAR

Description	No. Sets		#1	#2	#3	#4	#5	#6	#7	#8
6" x 12"		Slump, in.								
4" x 8"		Air, %								
Grout		Unit Weight								
Mortar		Conc. Temp.								

PROOFROLL

Proofroll					
	Subgrade		Stable?		If not stable, see "Remarks".
	CABC Stone		Stable?		For location, see "Remarks".

FOOTING INSPECTIONS

Location		#1	#2	#3	#4	#5	#6	#7	#8
#1)	Req. Bearing								
#2)	Blows @ SG								
#3)	Blows -1'								
#4)	Blows -2'								
#5)	Blows- 3'								
#6)	Blows -4'								
#7)	Blows -5'								
#8)	Blows-6'								

REMARKS

Conducted soil density testing on berm of C&D landfill as fill was placed. All tests meet minimum density requirement of 95% of maximum dry density.

Signature Michael Norton

White Copy - *Office* Yellow Copy - *Field*

GeoTechnologies, Inc.

PROJECT NO: 1.14.0619 CA

PROJECT NAME: ANDERSON CREEK LANDFILL

DRIVE TUBE

FIELD DENSITY WORKSHEET

TEST NO.	1	2	3	4
DATE	8-27			
A. Wet Weight of Sample & Mold	5.72	5.68	5.73	5.67
B. Weight of Mold	1.26	1.26	1.26	1.26
C. Wet Weight of Sample (A-B)	4.46	4.42	4.47	4.41
D. Mold Volume Factor	29.54	29.54	29.54	29.54
E. Wet Weight Soil / Cu. Ft.(CxD)	131.75	130.57	132.04	130.27
F. Wet Weight of Moisture Sample	204.7	206.7	207.9	206.8
G. Dry Weight of Moisture Sample	185.6	186.1	191.6	190.7
H. Weight of Water (F-G)	19.1	20.6	16.3	16.1
I. Percent Moisture ((H/G) x 100)	10.3	11.1	8.5	8.4
J. Dry Density per Cu. Ft.	119.4	117.5	121.7	120.2

ONE POINT PROCTOR DETERMINATION

K. Weight of Soil & Mold	13.49			
L. Weight of Mold	9.06			
M. Mold Volume Factor	29.95			
N. Wet Weight (Cu. Ft.) ((K-L) x M)	132.68			
O. **Dry Weight** (Cu. Ft.)	120.3			
P. Wet Weight of Moisture Sample				
Q. Dry Weight of Moisture Sample				
R. Weight of Water (P-Q)				
S. **Moisture Content** ((R/Q)x100)	10.3			
MAXIMUM DRY DENSITY	122.3	122.3	122.3	122.3
OPTIMUM MOISTURE CONTENT	11.3	11.3	11.3	11.3
% COMPACTION	97.6	96.1	99.5	98.3
TEST LOCATION	NE SECTION OF BERM	SE SECTION OF BERM	SE SECTION OF BERM	NE SECTION OF BERM
TEST ELEVATION	-5'	-5'	-4'	-4'
SPECIFIED COMPACTION	95	95	95	95
PASSED (P) / FAILED (F)	P	P	P	P

TECHNICIAN: Michael Mundell

GeoTechnologies, Inc.
3200 Wellington Court, Suite 108
Raleigh, NC 27615
Phone 919-954-1514 Fax 919-954-1428

Field Report

PROJECT INFORMATION

Project Name:	Anderson Creek Landfill	**Project Number:**	1-14-0619 CA
Location:	Anderson Creek	**Technician:**	M. Norton
Date:	8-28-14	**Weather:**	
Present at Site:		**Temp:**	
		Arrive at Site:	8:00 am/pm
		Depart Site:	11:30 am/pm
		# of Trips:	1

DENSITY TESTS

Note: For location of failing density tests, see "Remarks".

Type of Test		#1	#2	#3	#4	#5	#6	#7	#8	#9
Sandcone	Compaction	96.2	95.5	97.9	98.3					
Drive Tube X	Wc +/- Opt.	-3.5	-2.3	-1.5	-1.4					
Nuclear	Pass/Fail	P	P	P	P					
CABC	Elevation	JG	-2	-1'	JG					
	Stone Depth, in.									

CONCRETE/GROUT/MORTAR

Description	No. Sets		#1	#2	#3	#4	#5	#6	#7	#8
6" x 12"		Slump, in.								
4" x 8"		Air, %								
Grout		Unit Weight								
Mortar		Conc. Temp.								

PROOFROLL

Proofroll					
	Subgrade		Stable?		If not stable, see "Remarks".
	CABC Stone		Stable?		For location, see "Remarks".

FOOTING INSPECTIONS

Location		#1	#2	#3	#4	#5	#6	#7	#8
#1)	Req. Bearing								
#2)	Blows @ SG								
#3)	Blows -1'								
#4)	Blows -2'								
#5)	Blows- 3'								
#6)	Blows -4'								
#7)	Blows -5'								
#8)	Blows-6'								

REMARKS

Conducted soil density tests on Berm of C&D landfill.
Adjusted elevations on South end of Berm due to being given wrong elevation on the first day.
All tests meet the minimum density requirement of 95% of maximum dry density.

Signature Michael Norton

White Copy - *Office* Yellow Copy - *Field*

GeoTechnologies, Inc.

PROJECT NO: 1·14·0619 CA

DRIVE TUBE

PROJECT NAME: Anderson Creek Landfill

FIELD DENSITY WORKSHEET

TEST NO.	1	2	3	4
DATE	8-28			
A. Wet Weight of Sample & Mold	5.53	5.68	5.69	5.71
B. Weight of Mold	1.26	1.26	1.26	1.26
C. Wet Weight of Sample (A-B)	4.27	4.42	4.43	4.45
D. Mold Volume Factor	29.54	29.54	29.54	29.54
E. Wet Weight Soil / Cu. Ft.(CxD)	126.14	130.57	130.86	131.45
F. Wet Weight of Moisture Sample	205.3	204.4	209.4	208.1
G. Dry Weight of Moisture Sample	189.8	186.9	190.0	188.7
H. Weight of Water (F-G)	15.5	17.5	19.4	19.4
I. Percent Moisture ((H/G) x 100)	8.2	9.4	10.2	10.3
J. Dry Density per Cu. Ft.	116.6	119.4	118.7	119.2

ONE POINT PROCTOR DETERMINATION

K. Weight of Soil & Mold	13.17			
L. Weight of Mold	9.06			
M. Mold Volume Factor	29.95			
N. Wet Weight (Cu. Ft.) ((K-L) x M)	123.09			
O. **Dry Weight** (Cu. Ft.)	113.8			
P. Wet Weight of Moisture Sample				
Q. Dry Weight of Moisture Sample				
R. Weight of Water (P-Q)				
S. **Moisture Content** ((R/Q)x100)	8.2			
MAXIMUM DRY DENSITY	121.2	121.2	121.2	121.2
OPTIMUM MOISTURE CONTENT	11.7	11.7	11.7	11.7
% COMPACTION	96.2	98.5	97.9	98.3
TEST LOCATION	SE SECTION OF BERM	NE SECTION OF BERM	NE SECTION OF BERM	NORTH END of BERM
TEST ELEVATION	SG	-2	-1	SG
SPECIFIED COMPACTION	95	95	95	95
PASSED (P) / FAILED (F)	P	P	P	P

TECHNICIAN: Michael L Morton

GeoTechnologies, Inc.

Geotechnical and Construction Materials Testing Services

October 13, 2014

Attached for your review are reports and/or other information for the Anderson Creek Landfill project which is located in Anderson Creek, NC. If you should have any questions regarding this information, please feel free to contact the project manager.

GEOTECHNOLOGIES, INC., P.A.

Project No. 1140619CA

Enclosures

3200 Wellington Ct., Ste. 108 • Raleigh, NC 27615 • Phone 919-954-1514 • Fax 919-954-1428 • www.geotechpa.com • License No. C-0894

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GeoTechnologies, Inc.

3200 Wellington Court, Suite 108
Raleigh, NC 27615
Phone 919-954-1514 Fax 919-954-1428

Field Report

PROJECT INFORMATION

Project Name:	Anderson Creek Landfill	**Project Number:**	1-14-0619-CA
Location:	Anderson Creek, NC	***Technician:***	Jeffrey Whitley
Date:	9/30/2014 ***Weather:*** Sunny	***Temp:***	°
Present at Site:		***Arrive at Site:***	10:00 X am pm
		Depart Site:	10:30 X am pm
		# of Trips:	1

DENSITY TESTS

Note: For location of failing density tests, see "Remarks".

Type of Test		#1	#2	#3	#4	#5	#6	#7	#8	#9
Sandcone	Compaction (%)									
Drive Tube	Wc +/- Opt. (%)									
Nuclear	Pass/Fail									
CABC	Elevation (ft)									
Moisture	Stone Depth (inches)									

CONCRETE/GROUT/MORTAR

Description	No. Sets		#1	#2	#3	#4	#5	#6	#7	#8
6" x 12"		Slump (inches)								
4" x 8"		Air (%)								
Grout		Unit Weight (pcf)								
Mortar		Conc. Temp. (degrees)								

PROOFROLL

Proofroll					
	Subgrade		Stable?		If not stable, see "Remarks".
	CABC Stone		Stable?		For location, see "Remarks".

FOOTING INSPECTIONS

Location		#1	#2	#3	#4	#5	#6	#7	#8
#1)	Req. Bearing								
#2)	Blows @ SG								
#3)	Blows -1'								
#4)	Blows -2'								
#5)	Blows- 3'								
#6)	Blows -4'								
#7)	Blows -5'								
#8)	Blows -6'								

REMARKS

Technician picked up two samples and brought back to our laboratory.

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GeoTechnologies, Inc.

Job No: 1-14-0619-CA Date: 8/19/14

Job Name: Anderson Creek Landfill

Job Location: Anderson Creek, NC

Boring No:

Sample No: S-1

Depth:

TEST RESULTS

Method of Test: ASTM D 698

Maximum Dry Density: 123.0 PCF

Optimum Moisture Content: 11.2%

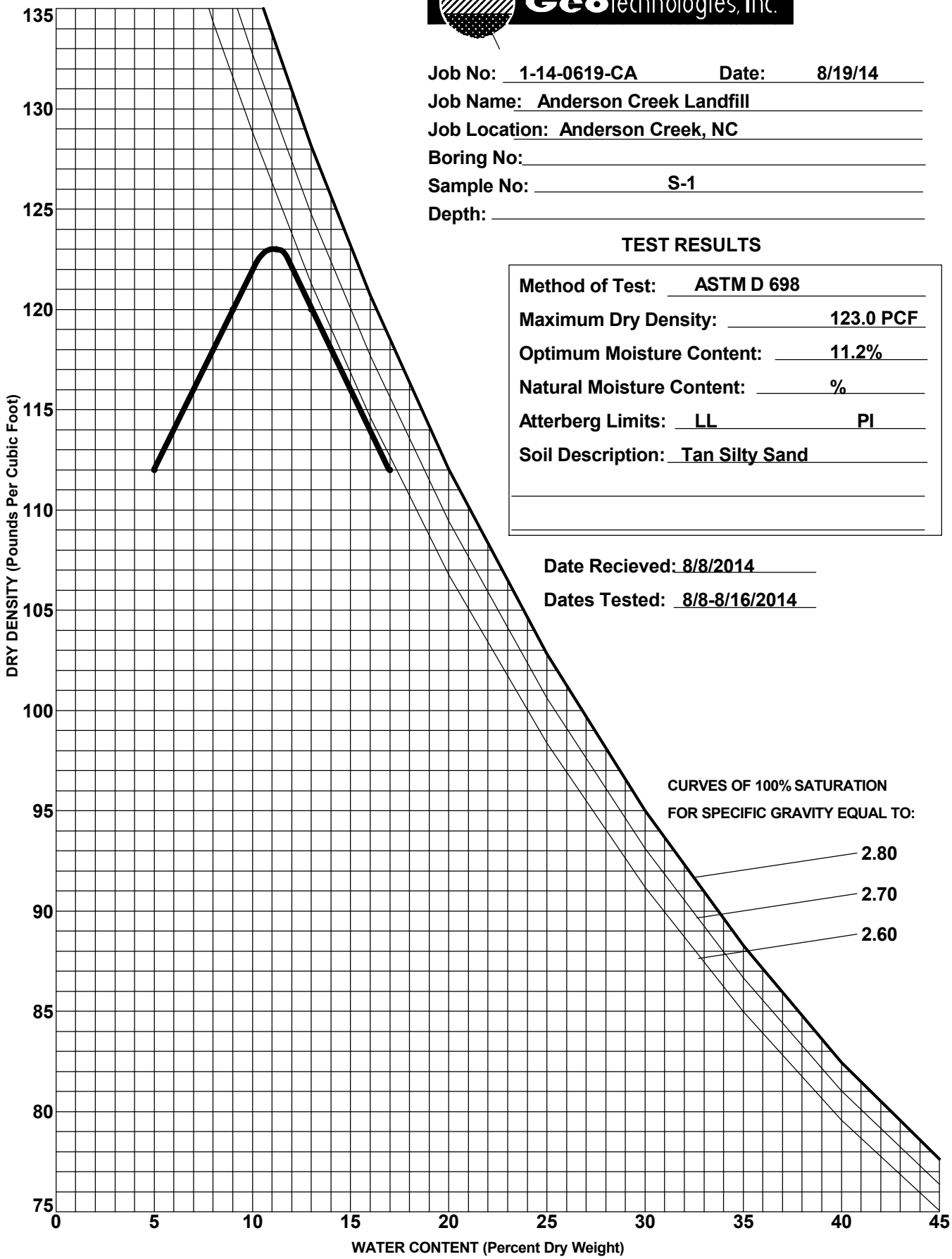
Natural Moisture Content: %

Atterberg Limits: LL PI

Soil Description: Tan Silty Sand

Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014



MOISTURE-DENSITY RELATIONSHIP

3200 Wellington Court, Suite 108
Raleigh, NC 27615

GeoTechnologies, Inc.

Job No: 1-14-0619-CA Date: 8/19/14

Job Name: Anderson Creek Landfill

Job Location: Anderson Creek, NC

Boring No:

Sample No: S-2

Depth:

TEST RESULTS

Method of Test: ASTM D 698

Maximum Dry Density: 123.0 PCF

Optimum Moisture Content: 10.9%

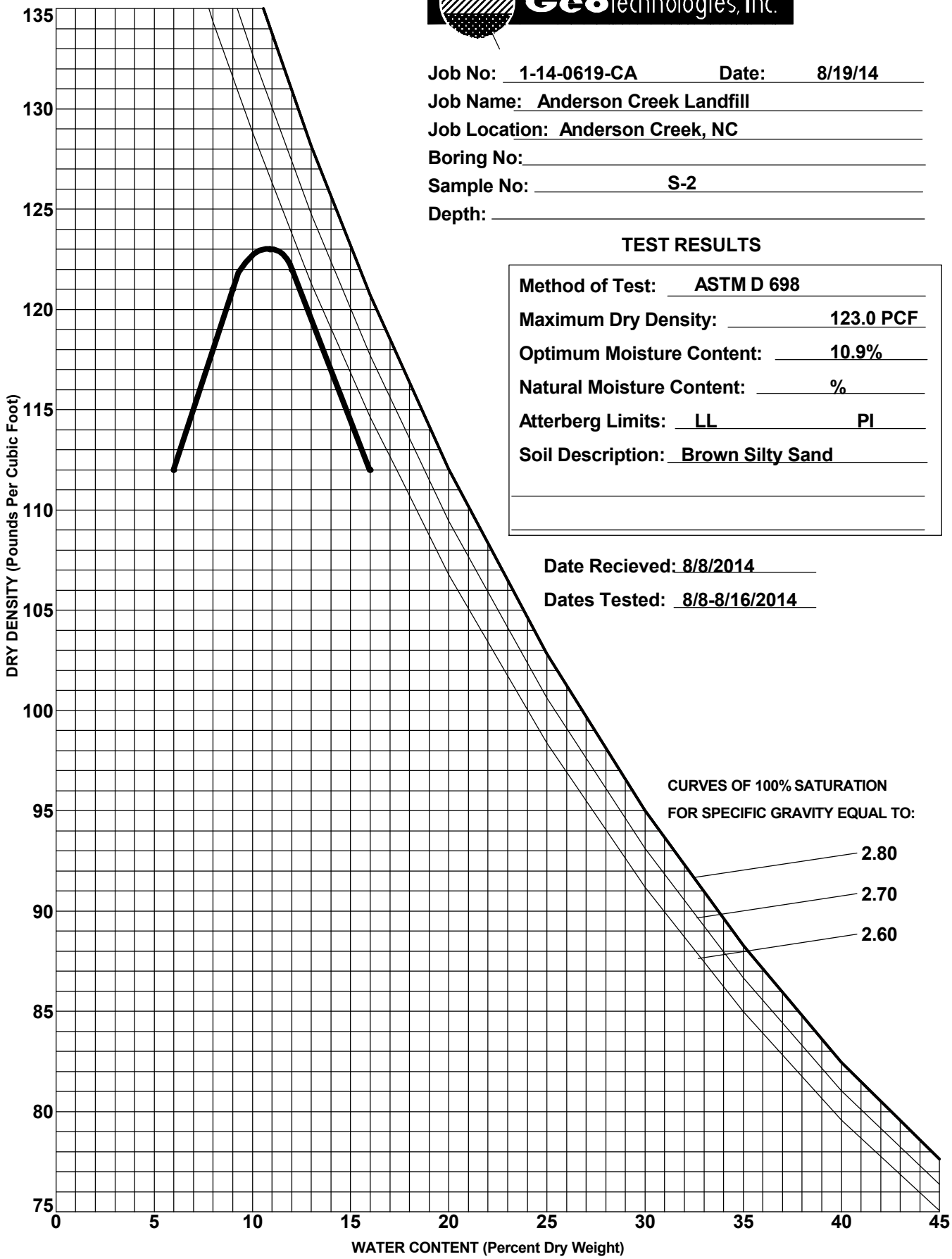
Natural Moisture Content: %

Atterberg Limits: LL PI

Soil Description: Brown Silty Sand

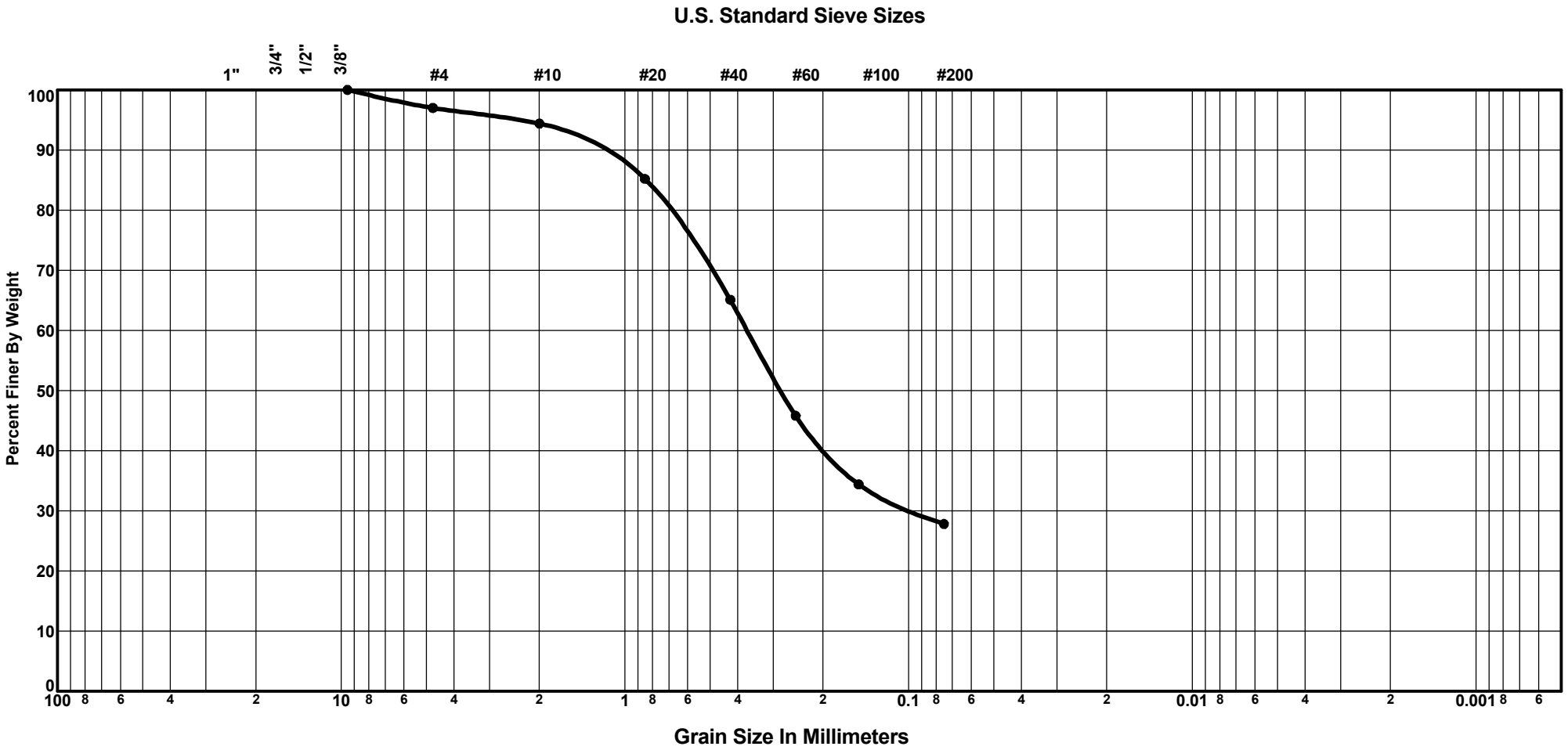
Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014



MOISTURE-DENSITY RELATIONSHIP

3200 Wellington Court, Suite 108
Raleigh, NC 27615



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
1 & 2			32.0	19.0	13.0	Tan Clayey Medium to Fine Sand

Project:

Anderson Creek Landfill
Anderson Creek, NC

Job No.: 1-14-0619-CA

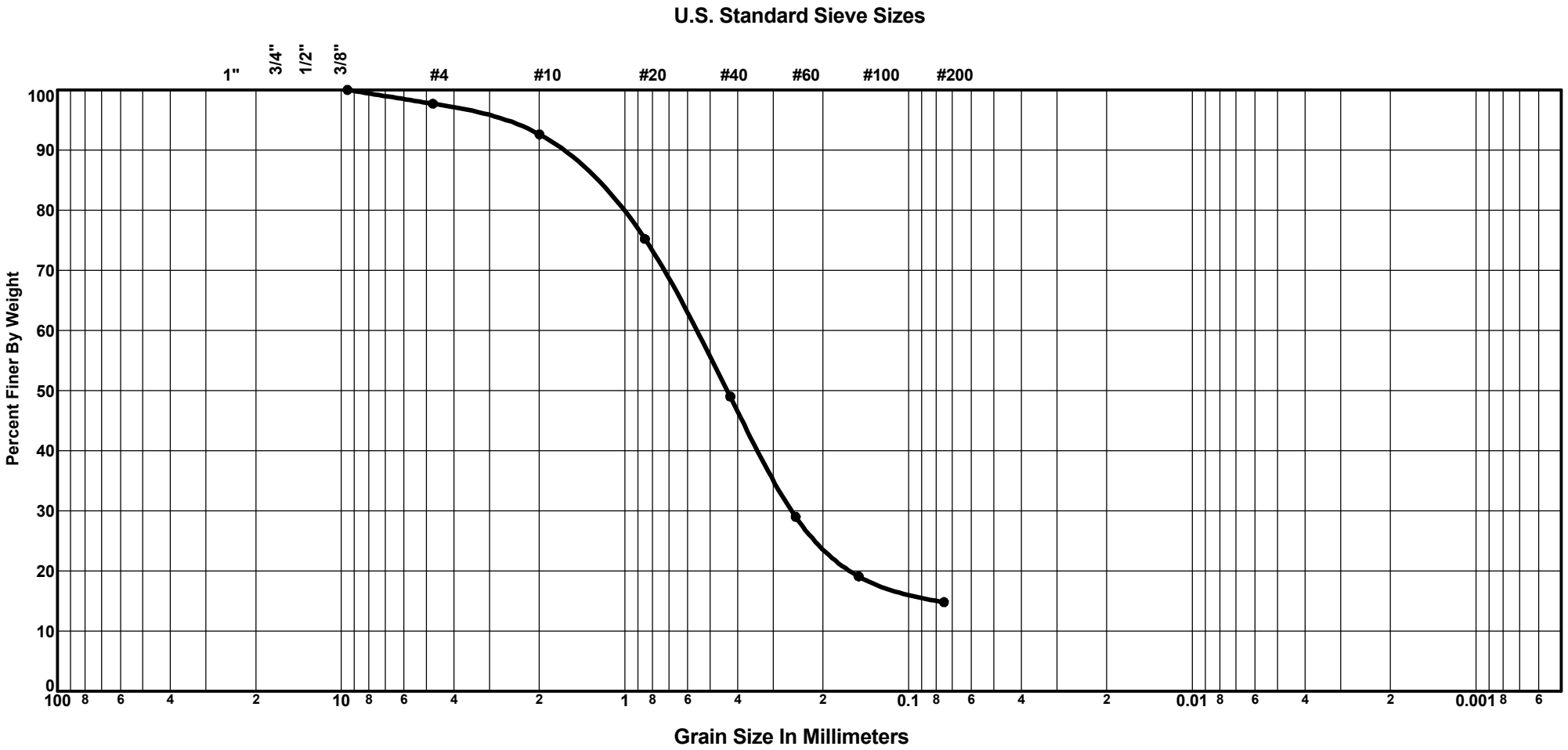
Date: 8/19/14

Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014

GRAIN SIZE DISTRIBUTION

GeoTechnologies, Inc.
3200 Wellington Court, Suite 108
Raleigh, NC 27615



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
3 & 4			21.0	20.0	1.0	Tan Silty Clayey Medium to Fine Sand

Project:

Anderson Creek Landfill
Anderson Creek, NC

Job No.: 1-14-0619-CA

Date: 8/19/14

Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014

GRAIN SIZE DISTRIBUTION

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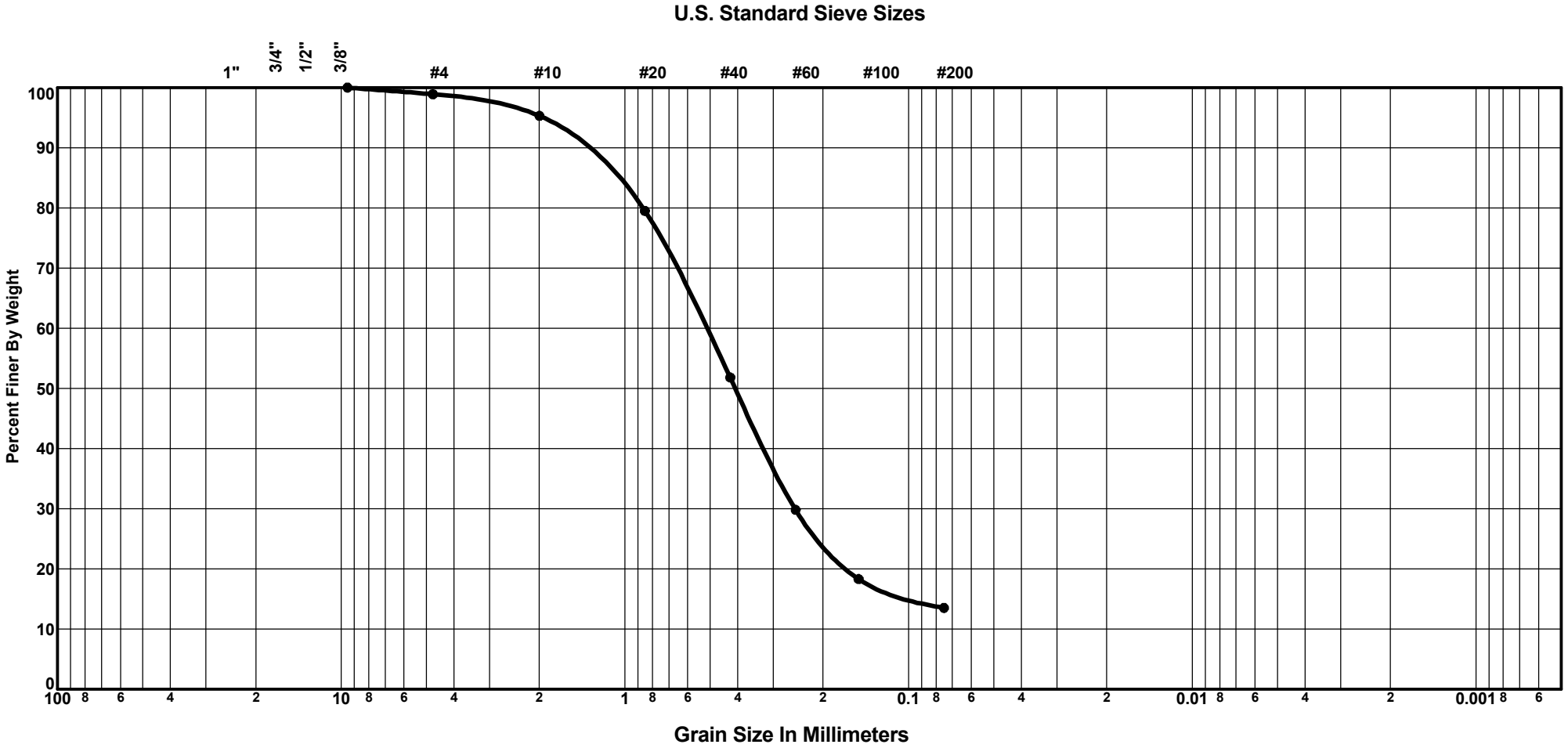
Raleigh, NC 27615



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
5 & 6			22.0	18.0	4.0	Tan Silty Clayey Medium to Fine Sand

Project:

Anderson Creek Landfill
Anderson Creek, NC

Job No.: 1-14-0619-CA

Date: 8/19/14

Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014

GRAIN SIZE DISTRIBUTION

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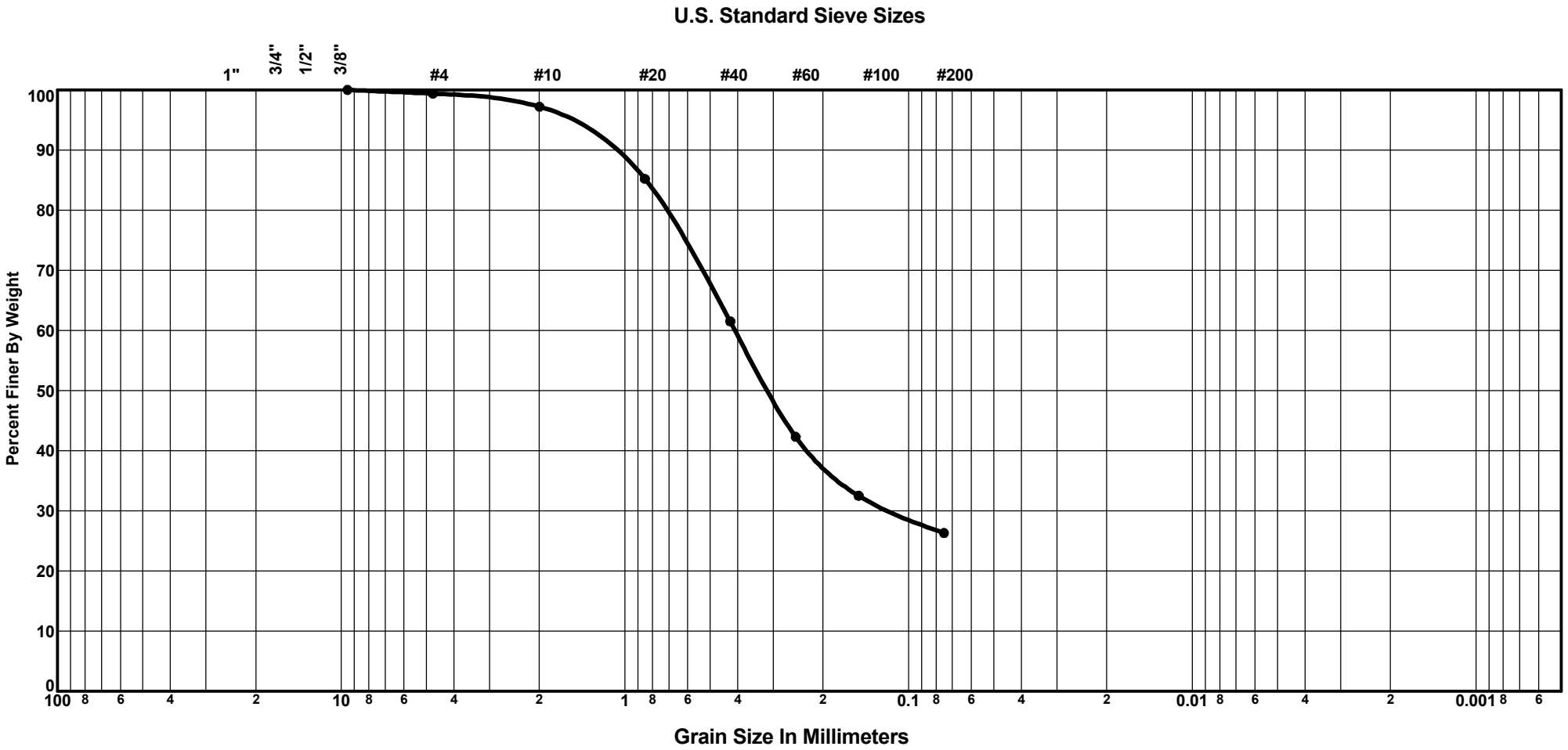
Raleigh, NC 27615



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
S-3			28.0	20.0	8.0	Brown Silty Clayey Fine to Medium Sand (SM-SC)

Project:

Anderson Creek Landfill
Anderson Creek, NC

Job No.: 1-14-0619-CA

Date: 10/9/14

Date Recieved: 10/1/2014

Dates Tested: 10/1-10/6/2014

GRAIN SIZE DISTRIBUTION

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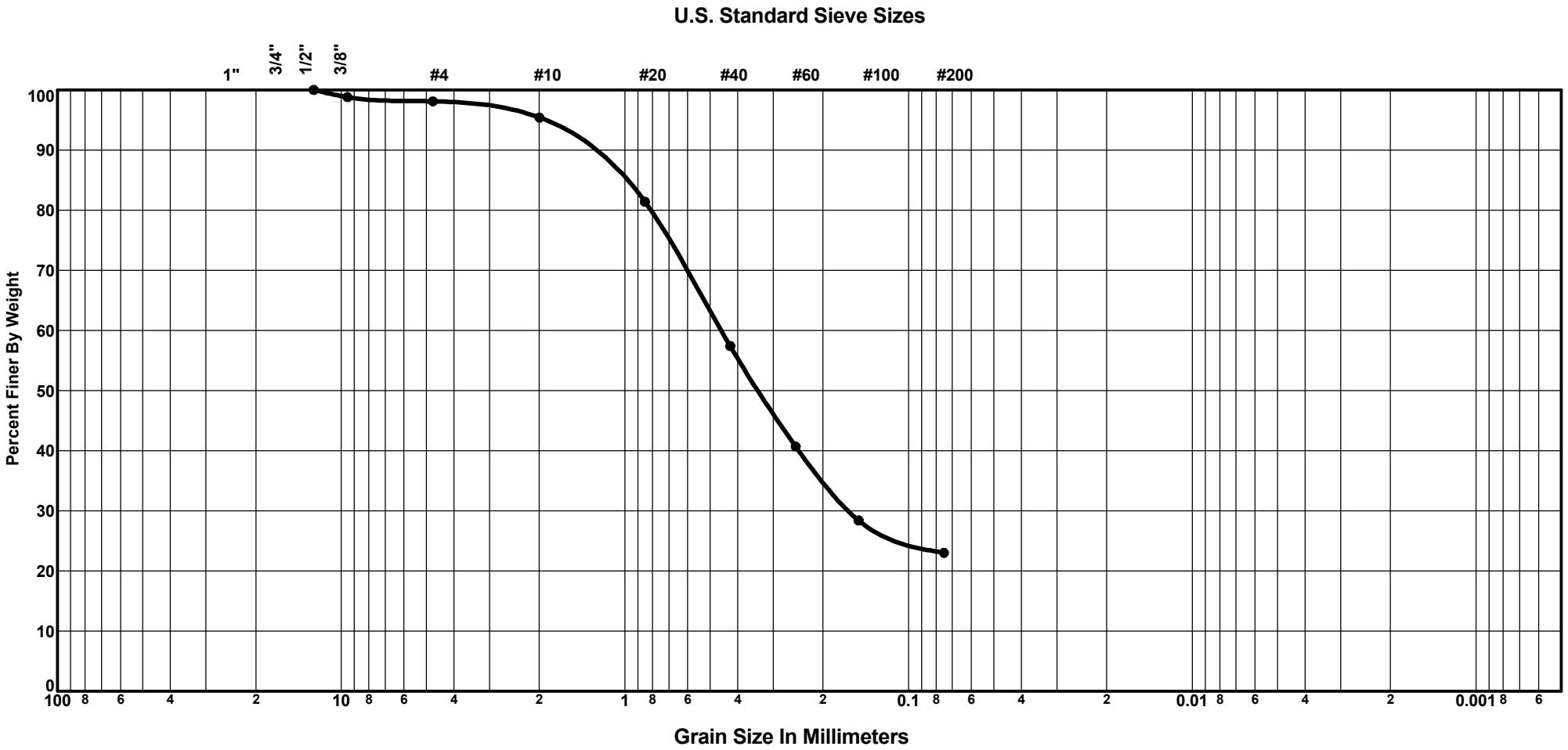
Raleigh, NC 27615



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
S-4			26.0	19.0	7.0	Brown Silty Clayey Fine to Medium Sand (SM-SC)

Project:

Anderson Creek Landfill
Anderson Creek, NC

Job No.: 1-14-0619-CA

Date: 10/9/14

Date Recieved: 10/1/2014

Dates Tested: 10/1-10/6/2014

GRAIN SIZE DISTRIBUTION

GeoTechnologies, Inc.
3200 Wellington Court, Suite 108
Raleigh, NC 27615

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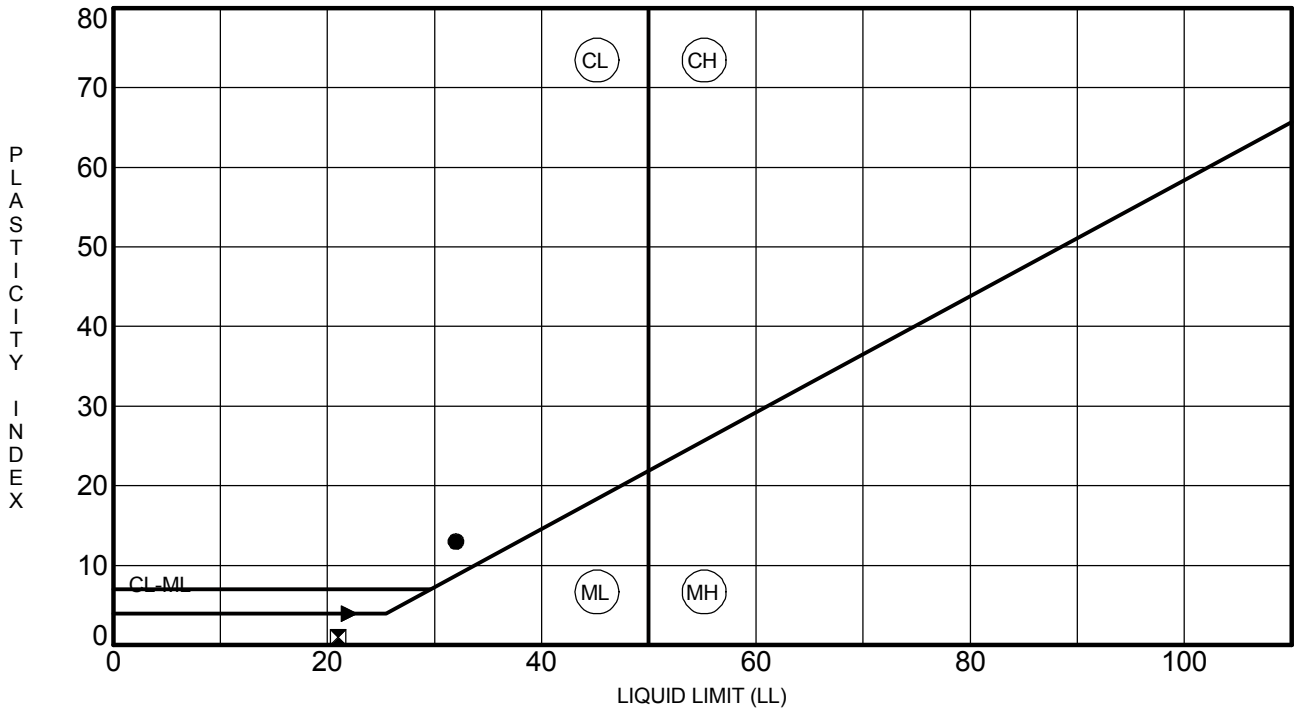


	Specimen Identification	LL	PL	PI	Fines	Classification
●	1 & 2	32	19	13	27.8	Tan Clayey Medium to Fine Sand
⊠	3 & 4	21	20	1	14.8	Tan Silty Clayey Medium to Fine Sand
▶	5 & 6	22	18	4	13.5	Tan Silty Clayey Medium to Fine Sand

PROJECT **Anderson Creek Landfill - Anderson Creek, NC**

JOB NO. **1-14-0619-CA**

DATE **8/19/14**

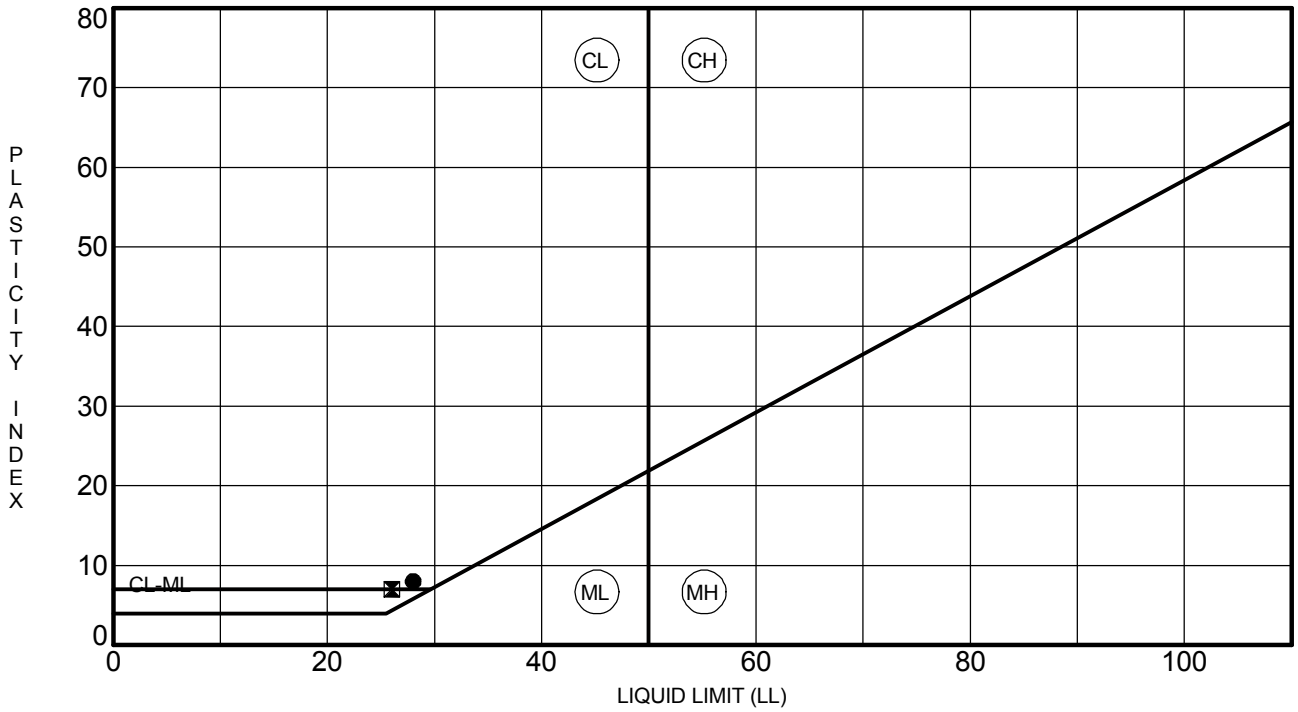
Date Recieved: 8/8/2014

Dates Tested: 8/8-8/16/2014

ATTERBERG LIMITS' RESULTS

3200 Wellington Court, Suite 108
Raleigh, NC 27615

ASTM D-4318



	Specimen Identification	LL	PL	PI	Fines	Classification
●	S-3	28	20	8	26.3	Brown Silty Clayey Fine to Medium Sand (SM-SC)
⊠	S-4	26	19	7	23.0	Brown Silty Clayey Fine to Medium Sand (SM-SC)

PROJECT **Anderson Creek Landfill - Anderson Creek, NC**

JOB NO. **1-14-0619-CA**

DATE **10/9/14**

Date Recieved: 10/1/2014

Dates Tested: 10/1-10/6/2014

ATTERBERG LIMITS' RESULTS

3200 Wellington Court, Suite 108
Raleigh, NC 27615

Appendix D

Record Drawing

Construction Quality Assurance Report
Harnett County Anderson Creek C&D Landfill - Phases I & II Extension
Spring Lake, North Carolina

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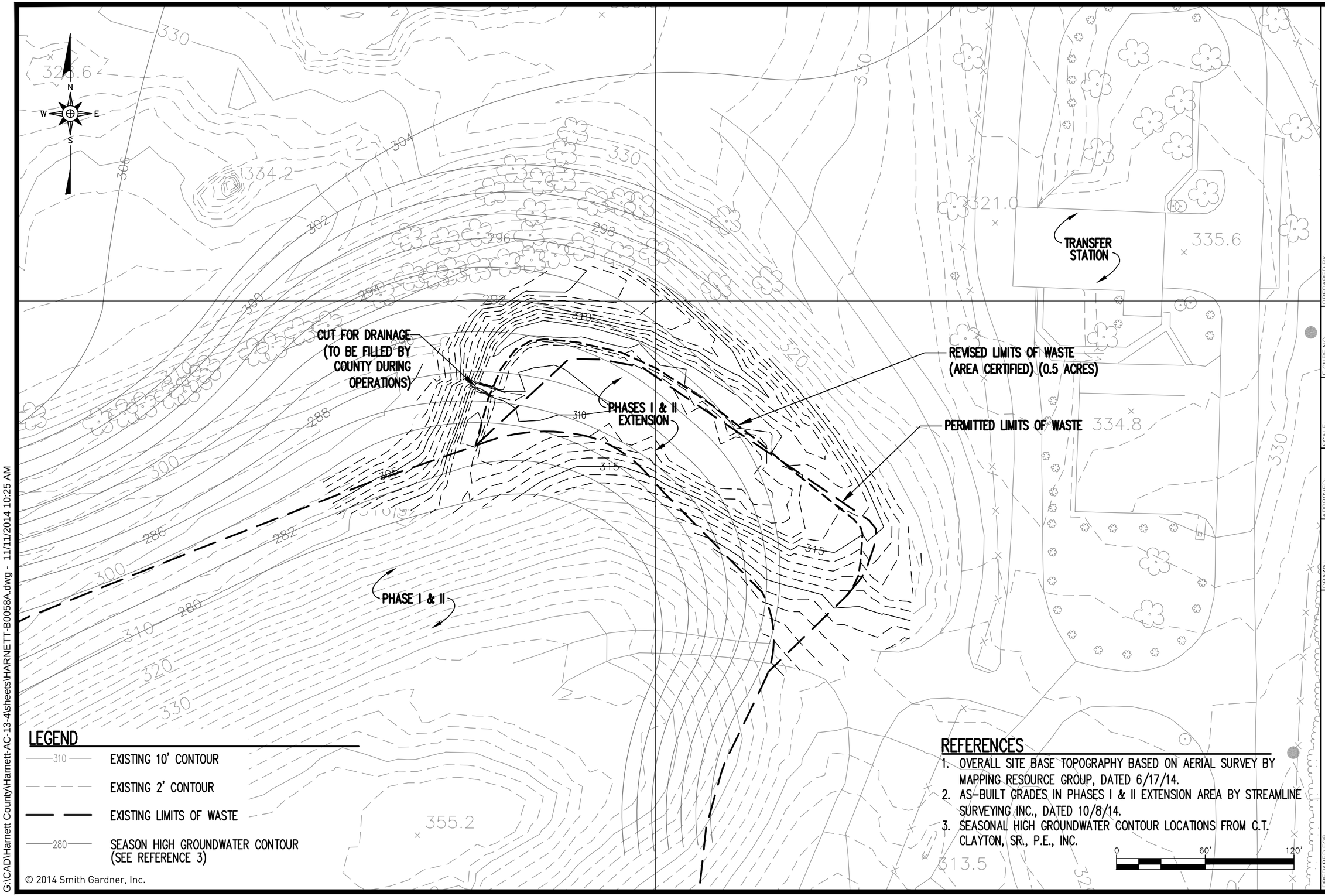

LEGEND

- 310 — EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING LIMITS OF WASTE
- 280 — SEASON HIGH GROUNDWATER CONTOUR (SEE REFERENCE 3)

REFERENCES

1. OVERALL SITE BASE TOPOGRAPHY BASED ON AERIAL SURVEY BY MAPPING RESOURCE GROUP, DATED 6/17/14.
2. AS-BUILT GRADES IN PHASES I & II EXTENSION AREA BY STREAMLINE SURVEYING INC., DATED 10/8/14.
3. SEASONAL HIGH GROUNDWATER CONTOUR LOCATIONS FROM C.T. CLAYTON, SR., P.E., INC.

0 60' 120'

PREPARED BY:

SMITH+GARDNER
NC LIC. NO. C-0828 (ENGINEERING)
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PREPARED FOR:

ANDERSON CREEK C&DLF
PHASES I AND II EXTENSION
AS-BUILT

DRAWN:	K.C.B.
APPROVED:	P.K.S.
DATE:	Nov 2014
SCALE:	AS SHOWN
PROJECT NO:	HARNETT-AC-13-4
FILENAME:	HARNETT-B0058A
FIGURE NO.	AB-1

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SMITH+GARDNER
ENGINEERS

ADDRESS
14 N. Boylan Avenue, Raleigh NC 27603

TEL
919.828.0577

WEB
www.smithgardnerinc.com

November 4, 2014

Permit No.	Date	Document ID No.
43-03	**November 04, 2014**	**22245**

Mr. Ming-Tai Chao, P.E.
Environmental Engineer
NC DENR - Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699

Received by an e-mail
Date: **November 04, 2014**
Solid Waste Section
Raleigh Central Office

RE: Harnett County Anderson Creek C&DLF (Permit No. 43-03)
Phases I & II Extension - Revised Final Cover Grading Plan

Dear Mr. Chao:

Per your request and on behalf of Harnett County, Smith Gardner, Inc. (S+G) would like to provide the **attached** revised final cover grading plan. This plan revises the final grading plan shown in the approved permit drawings to reflect the as-built berm location for the Phases I & II Extension which was documented in the recently submitted CQA report.

In order to demonstrate that the revised grading plan provides essentially the same capacity as that previously approved, the net volume between the as-built grades for the Phases I & II Extension and 2013 topography was determined. This volume (37,787 CY from 2013 topography to top of intermediate cover) was compared with the volume for the previously permitted grading plan (36,871 CY from 2013 topography to top of intermediate cover) (see **attached** cut/fill isopachs). Given that the net volume figures are within approximately 2.5% of each other, the capacity of the revised grading plan is essentially the same capacity as that previously approved.

Please contact me at your earliest convenience if you should have any questions or comments or if additional information is required.

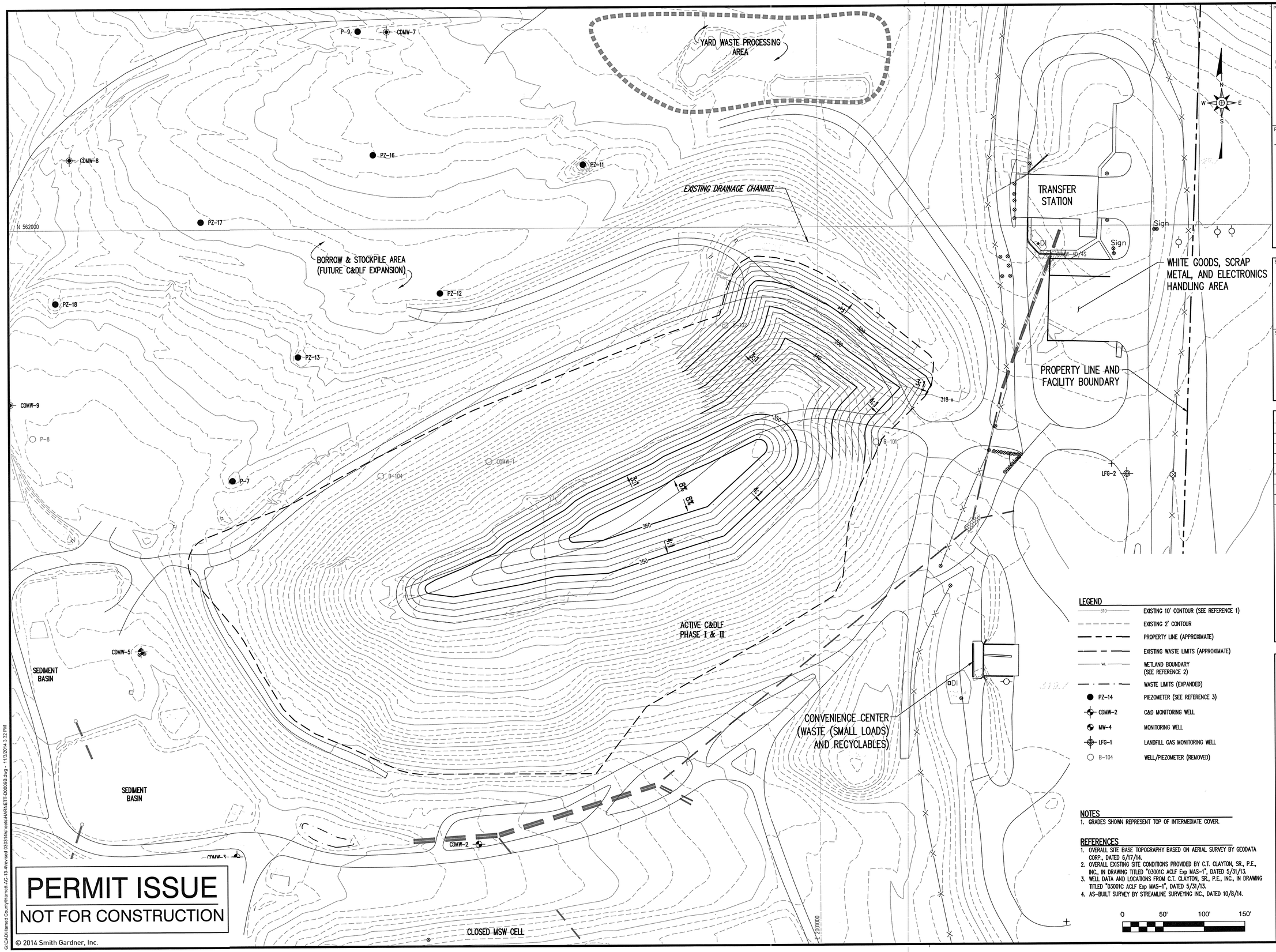
Sincerely,
SMITH GARDNER, INC.

Pieter K. Scheer, P.E.
Vice President, Senior Engineer
pieter@smithgardnerinc.com

NORTH CAROLINA PROFESSIONAL SEAL 021666 ENGINEER PIETER K. SCHEER
11/4/14

Attachments: Revised Final Cover Grading Plan
Cut/Fill Isopach - Revised Grades to 2013 Topo.
Cut/Fill Isopach - Permit Grades to 2013 Topo.

cc: Amanda Bader, P.E., Harnett County
Randy Smith, Harnett County
Andrew Holland, Harnett County



PERMIT ISSUE
NOT FOR CONSTRUCTION

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LEGEND

- 310 — EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- PROPERTY LINE (APPROXIMATE)
- EXISTING WASTE LIMITS (APPROXIMATE)
- WL — WETLAND BOUNDARY (SEE REFERENCE 2)
- WASTE LIMITS (EXPANDED)
- PZ-14 — PIEZOMETER (SEE REFERENCE 3)
- CDMW-2 — C&D MONITORING WELL
- MW-4 — MONITORING WELL
- LFG-1 — LANDFILL GAS MONITORING WELL
- B-104 — WELL/PIEZOMETER (REMOVED)

NOTES

1. GRADES SHOWN REPRESENT TOP OF INTERMEDIATE COVER.

REFERENCES

1. OVERALL SITE BASE TOPOGRAPHY BASED ON AERIAL SURVEY BY GEODATA CORP., DATED 6/17/14.
2. OVERALL EXISTING SITE CONDITIONS PROVIDED BY C.T. CLAYTON, SR., P.E., INC., IN DRAWING TITLED "03001C ACLF Exp MAS-1", DATED 5/31/13.
3. WELL DATA AND LOCATIONS FROM C.T. CLAYTON, SR., P.E., INC., IN DRAWING TITLED "03001C ACLF Exp MAS-1", DATED 5/31/13.
4. AS-BUILT SURVEY BY STREAMLINE SURVEYING INC., DATED 10/8/14.

0 50' 100' 150'

PREPARED FOR:

HARNETT COUNTY
NORTH CAROLINA
SOLID WASTE DEPARTMENT

PREPARED BY:

NC LIC. NO. C-0828 (ENGINEERING)

SMITH+ GARDNER
ENGINEERS
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 021666 ENGINEER PIETER K. SCHEER 11/4/14

SEAL

REV.	DATE	DESCRIPTION
1	3/14	REVISIONS PER DWM
		COMMENTS

PROJECT TITLE:

ANDERSON CREEK C&D LANDFILL PHASES I & II

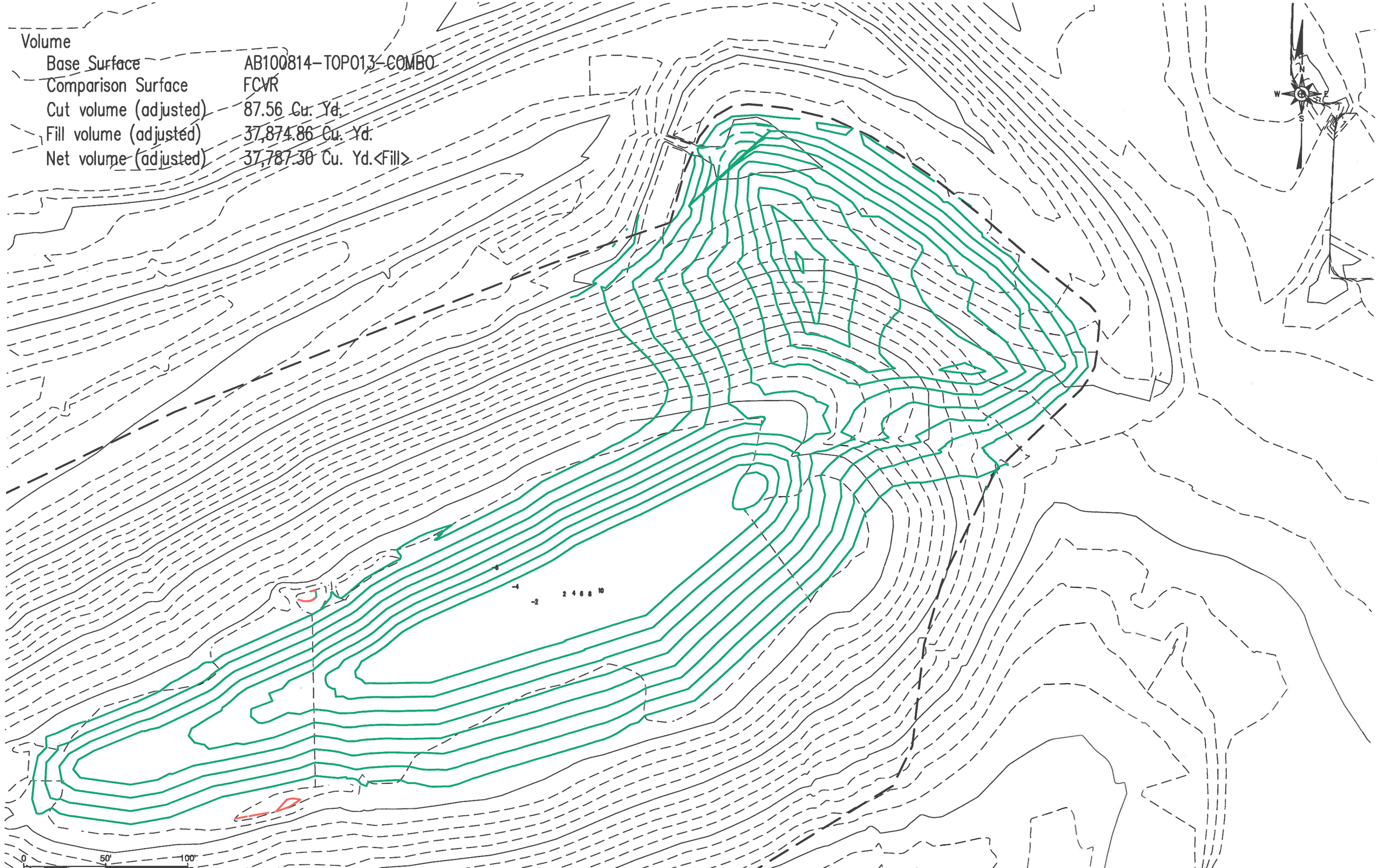
DRAWING TITLE:

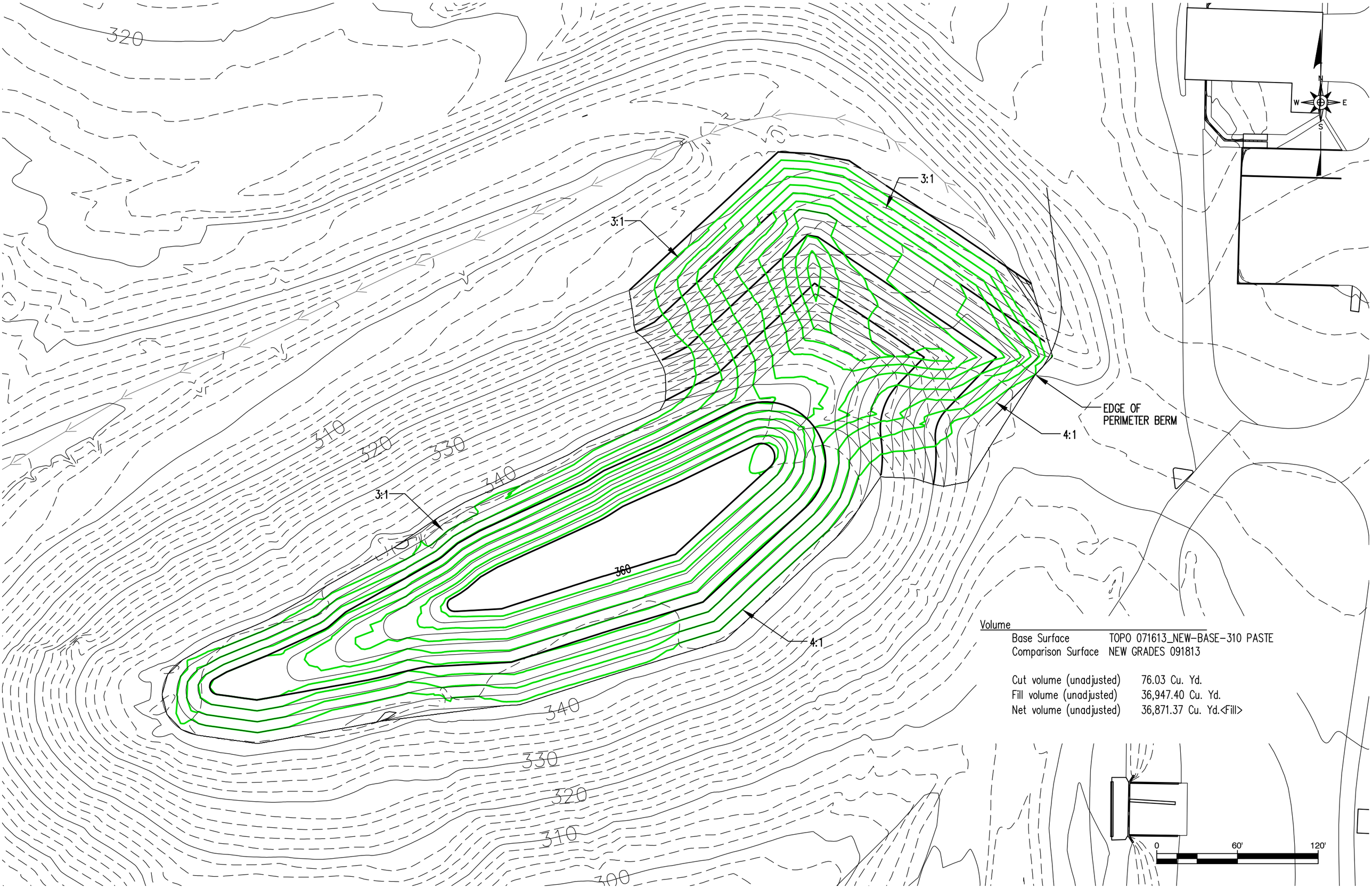
REVISED FINAL COVER GRADING PLAN

DESIGNED: P.K.S.	PROJECT NO: HARNETT-AC-13-4
DRAWN: K.C.B.	SCALE: AS SHOWN
APPROVED: PKS	DATE: JAN. 2014
FILENAME: HARNETT-D0009B	
SHEET NUMBER:	DRAWING NUMBER: FIG. 1

Volume

Base Surface	AB100814-TOP013-COMBO
Comparison Surface	FCVR
Cut volume (adjusted)	87.56 Cu. Yd.
Fill volume (adjusted)	37,874.86 Cu. Yd.
Net volume (adjusted)	37,787.30 Cu. Yd.<Fill>





Volume

Base Surface	TOPO 071613_NEW-BASE-310 PASTE
Comparison Surface	NEW GRADES 091813
Cut volume (unadjusted)	76.03 Cu. Yd.
Fill volume (unadjusted)	36,947.40 Cu. Yd.
Net volume (unadjusted)	36,871.37 Cu. Yd.<Fill>

From:	Pieter Scheer
To:	Chao, Ming-tai
Cc:	Amanda Bader; Randy W. Smith; Andrew Holland; Scheer, Pieter
Subject:	Harnett County - Anderson Creek C&DLF - Phases I & II Extension - Revised Final Cover Grading Plan
Date:	Tuesday, November 04, 2014 10:42:03 AM
Attachments:	DWM (Chao) AC C&DLF Revised Grading Plan 11-04-14.pdf

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Ming:

Attached is a letter transmitting the revised grading plan and documenting that the capacity is essentially the same as previously approved. Please let me know if you have any questions or comments or need anything further on this.

Thanks.

Pieter

Pieter K. Scheer, P.E.
Vice President, Senior Engineer

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