

# Construction Quality Assurance Report

## Harnett County Anderson Creek C&D Landfill - Phase IIIA-1 Spring Lake, North Carolina

Prepared for:

**Harnett County Solid Waste Department  
Lillington, North Carolina**



**September 2015**

Prepared by:

NC LIC. NO. C-0828 (ENGINEERING)

**SMITH+GARDNER**

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577



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## Chao, Ming-tai

---

**From:** Pieter Scheer <pieter@smithgardnerinc.com>  
**Sent:** Friday, September 25, 2015 6:02 PM  
**To:** Chao, Ming-tai  
**Cc:** Amanda Bader; al truelove; Randy W. Smith; Andrew Holland; Scheer, Pieter  
**Subject:** Harnett County - Anderson Creek C&DLF - Phase IIIA-1 CQA Report  
**Attachments:** DWM (Chao) Transmittal Letter 09-25-15.pdf; HC ACLF C&D Ph IIIA-1 CQA Report 09-15.pdf

**Follow Up Flag:** Flag for follow up  
**Flag Status:** Flagged

Ming:

Please find attached an electronic copy of a transmittal letter and CQA report for Phase IIIA-1. Just let me know if you have any questions or comments.

Thanks. Hope you have a nice weekend.

Pieter

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

**SMITH + GARDNER**

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Permit No.	Date	Document ID No.
4303	September 28, 2015,	25058

Received by an e-mail  
Date: September 25, 2015  
Solid Waste Section  
Raleigh Central Office

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September 25, 2015

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 - Phase IIIA-1 (Permit No. 43-03)  
Construction Quality Assurance (CQA) Report**

Dear Mr. Chao:

On behalf of Harnett County, Smith Gardner, Inc. (S+G) would like to submit the enclosed construction quality assurance (CQA) report for the Phase IIIA-1 construction and demolition debris (C&D) landfill unit at the County's Anderson Creek Landfill facility. Phase IIIA-1 is an initial (0.54 acre) portion of the approved Phase IIIA landfill unit. The County requests approval of Phase IIIA-1 as soon as possible as remaining capacity in Phases I/II is limited. The projected capacity of Phase IIIA-1 is approximately 23,000 CY based on the fill grades shown on the attached **Figure 1**. This should be sufficient capacity for the County to complete the remainder of Phase IIIA in the coming months.

Related to this submittal, note that the County intends to update the financial assurance requirements for this facility to include the entire Phase IIIA landfill unit. This information will be submitted in the near future.

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

Sincerely,  
**SMITH GARDNER, INC.**



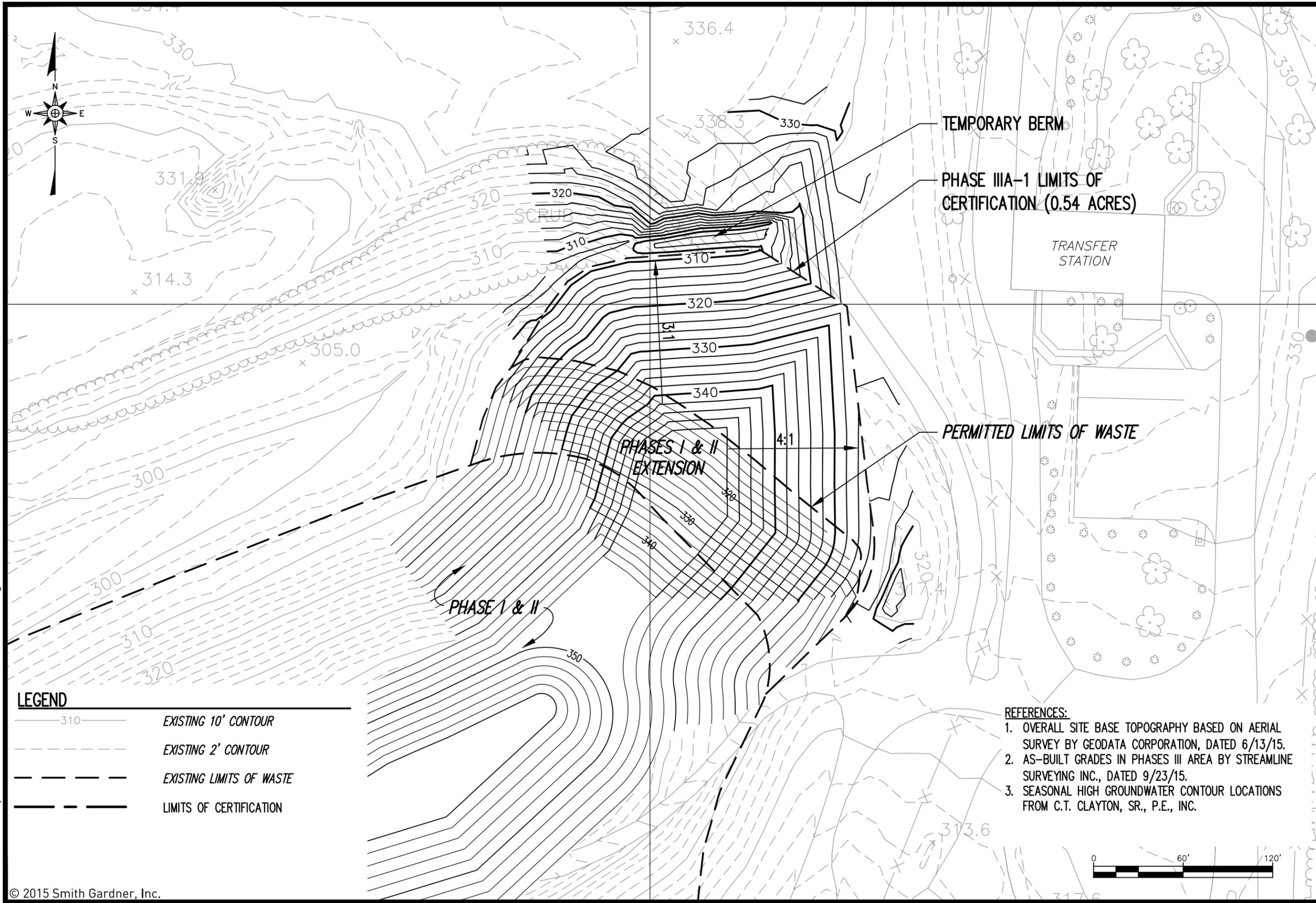
Pieter K. Scheer, P.E.  
Vice President, Senior Engineer  
[pieter@smithgardnerinc.com](mailto:pieter@smithgardnerinc.com)

Attachment: Figure 1 - Phase IIIA-1 Capacity

Enclosure: CQA Report

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

G:\CAD\Harnett County\Harnett-AC 15-2\sheets\HARNETT-B0083.dwg - 9/25/2015 5:29 PM



**LEGEND**

- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING LIMITS OF WASTE
- LIMITS OF CERTIFICATION

**REFERENCES:**

1. OVERALL SITE BASE TOPOGRAPHY BASED ON AERIAL SURVEY BY GEODATA CORPORATION, DATED 6/13/15.
2. AS-BUILT GRADES IN PHASES III AREA BY STREAMLINE SURVEYING INC., DATED 9/23/15.
3. SEASONAL HIGH GROUNDWATER CONTOUR LOCATIONS FROM C.T. CLAYTON, SR., P.E., INC.

PREPARED BY: \_\_\_\_\_ NC LIC. NO. C-0828 (ENGINEERING)  
 FIGURE NO. 1  
 SCALE: AS SHOWN  
 APPROVED: P.K.S.  
 DRAWN: C.T.J.  
 DATE: Sep 2015  
 PROJECT NO.: HARNETT-AC 15-2  
 FILENAME: HARNETT-B0083

**ANDERSON CREEK GOLF  
 PHASE IIIA-1 CAPACITY**

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

# Construction Quality Assurance Report

## Harnett County Anderson Creek C&D Landfill - Phase IIIA-1 Spring Lake, North Carolina

Prepared For:

**Harnett County Solid Waste Department**  
**Lillington, North Carolina**

**S+G Project No. HARNETT-AC-15-2**

Based on the observations and results of the CQA program documented herein, it is my professional opinion that the construction of Phase IIIA-1 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.



---

Pieter K. Scheer, P.E.  
Project Manager



9/25/15

**September 2015**

NC LIC. NO. C-0828 (ENGINEERING)

**SMITH+GARDNER**

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

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# Harnett County Anderson Creek C&D Landfill - Phase IIIA-1 Spring Lake, North Carolina

## Construction Quality Assurance Report

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Appendix C	Earthwork CQA Data
Appendix D	Record Drawing

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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 Phase IIIA-1 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 Phase IIIA landfill unit was issued by the North Carolina Division of Waste Management (NCDWM) on June 5, 2015.

## 2.0 PROJECT DESCRIPTION

### 2.1 General

Phase IIIA-1 is an unlined C&D landfill unit designed by Smith Gardner, Inc. (S+G). This unit, which is part of the larger Phase IIIA landfill unit, is approximately 0.54 acres (limits of certification) 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.

### 2.2 Reference Documents

Phase IIIA-1 was constructed in accordance with the following documents.

**Permit to Construct Application - Harnett County Anderson Creek Landfill Facility C&D Landfill - Phase IIIA:**

Includes technical specifications, CQA manual, and permit drawings prepared by S+G as revised through May 2015 (Permit to Construct issued by NCDWM on June 5, 2015).

### 2.3 Project Participants

The following parties were involved in the construction and CQA of Phase IIIA-1:

#### 2.3.1 Owner

Harnett County Solid Waste Department (County)  
200 Alexander Drive  
Lillington, NC 27546  
Phone: (910) 814-6156

Contacts: Amanda Bader, P.E., County Engineer  
Al Truelove, Construction Project Manager  
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 Phase IIIA-1 can be found in **Appendix A**. Prior to beginning the project, a CQA meeting was held on July 7, 2015. Documentation of this meeting can be found in **Appendix B**.

### 3.1 **Site Preparation**

Construction of Phase IIIA-1 began in July 2015 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 previously 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 Phase IIIA-1, 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 Phase IIIA-1, 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 2,000 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 Phase IIIA-1 based on visual inspection and testing performed as part of construction. Two tests performed on actual materials placed in the upper two feet of the landfill subgrade show that the soils used were classified as SM. This soil type meets the requirements of 15A NCAC 13B.0540 for the upper two feet of the landfill subgrade. Given that each sample had 30% or more fines (material passing the #200 sieve) and were similar to each other, two material classification tests were deemed to be sufficient.

## 6.0 RECORD DRAWING

The following record (as-built) drawing depicting the construction of Phase IIIA-1 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
<b>Units</b>	-----	% Std. Proctor	%
<b>Test Method</b>	ASTM D 698	ASTM D 2937	ASTM D 4959
<b>Required Test Frequency</b>	5,000 CY per each soil	20,000 ft <sup>2</sup> per lift & 1 per 500 LF of Berms (<200 ft. base width) (+/- 1 Per 500 CY)	20,000 ft <sup>2</sup> per lift & 1 per 500 LF of Berms (<200 ft. base width) (+/- 1 Per 500 CY)
<b>No. of Tests Required</b>	1	4	4
<b>No. of Tests Performed</b>	2	5	5
<b>Specified Value</b>	-----	≥ 95% Std. Proctor	As Required for Density
<b>Minimum Value</b>	-----	95.0	-5.0 % Opt.
<b>Maximum Value</b>	-----	98.5	-2.0 % Opt.
<b>Average Value</b>	-----	96.4	-3.8 % Opt.
<b>Quantity of Structural Fill (In-Place):</b>		2,000 CY (Approx)	

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## **Appendix A**

### **Photographic Log**

**Construction Quality Assurance Report  
Harnett County Anderson Creek C&D Landfill - Phase IIIA-1  
Spring Lake, North Carolina**

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<b>Client Name:</b> Harnett County, North Carolina		<b>Site Location:</b> Anderson Creek C&DLF – Phase IIIA-1		<b>Project No.</b> HARNETT-AC-15-2	
<b>Photo No.</b> 1	<b>Date</b> 7/28/15				
<b>Direction Photo Taken:</b> East					
<b>Description:</b> Initial Excavation Activities					

<b>Photo No.</b> 2	<b>Date</b> 9/22/15				
<b>Direction Photo Taken:</b> North					
<b>Description:</b> Completed East Slope					

**Client Name:**  
Harnett County, North Carolina

**Site Location:**  
Anderson Creek C&DLF – Phase IIIA-1

**Project No.**  
HARNETT-AC-15-2

**Photo No.**  
**3**

**Date**  
9/22/15

**Direction Photo Taken:**  
East

**Description:**  
View from Phases I & II  
Berm



**Photo No.**  
**4**

**Date**  
9/22/15

**Direction Photo Taken:**  
Northwest

**Description:**  
View from Top of East  
Slope



<b>Client Name:</b> Harnett County, North Carolina		<b>Site Location:</b> Anderson Creek C&DLF – Phase IIIA-1	<b>Project No.</b> HARNETT-AC-15-2
<b>Photo No.</b> <b>5</b>	<b>Date:</b> 9/22/15		
<b>Direction Photo Taken:</b> West			
<b>Description:</b> Temporary Berm			

<b>Photo No.</b> <b>6</b>	<b>Date:</b> 9/22/15		
<b>Direction Photo Taken:</b> East			
<b>Description:</b> View from West End of Phase IIIA-1			

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## **Appendix B**

### **CQA Meeting Documentation**

**Construction Quality Assurance Report  
Harnett County Anderson Creek C&D Landfill - Phase IIIA-1  
Spring Lake, North Carolina**

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# MEMORANDUM

<b>Date:</b>	August 19, 2015
<b>To:</b>	CQA Report
<b>From:</b>	Pieter K. Scheer, P.E. Smith Gardner, Inc. 
<b>RE:</b>	<b>Harnett County C&amp;DLF - Phase IIIA</b> <b>CQA Meeting Documentation</b>

**Attendees:**

- Amanda Bader, Harnett County
- Al Truelove, Harnett County
- 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 Tuesday July 7<sup>th</sup> at the site to discuss the plans for the placement of structural fill for construction of the Phase IIIA of the Harnett County Anderson Creek Construction and Demolition Debris (C&D) Landfill. The meeting began at approximately 2:00 p.m. and lasted approximately 30 minutes.

The County will contact Streamline Land Surveying (Robert Godwin, PLS) for staking of the site. Streamline will also prepare an as-built survey at the completion of the work.

The County will contact S+G/GeoTechnologies to perform moisture/density testing of structural fill placed. Earthwork testing and subgrade verification will follow the **attached** specification and CQA requirements (anticipated earthwork quantities are identified also). S+G will prepare the certification report which will include the as-built survey and information from tests performed by GeoTechnologies.

Attachment: Phase IIIA CQA Meeting Agenda

# PHASE IIIA CQA MEETING AGENDA

## 1. Quantities:

- A. Area = 2.1 Acres (91,500 SF)
- B. Excavation = 38,600 CY
- C. Structural Fill = 4,100 CY

## 2. Review of Specification Requirements:

### Earthwork (Perimeter Berms and Subgrade):

- Compaction Requirements:  $\geq 95\%$  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

## 3. 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 (Upper 2 Feet):
  - Visual Classification: 1 per 5,000 SF (Throughout)
  - Atterberg Limits: 1 per 10,000 SF (10 Tests Min.)
  - Grain Size Analysis: 1 per 10,000 SF (10 Tests Min.)

## **Appendix C**

### **Earthwork CQA Data**

**Construction Quality Assurance Report  
Harnett County Anderson Creek C&D Landfill - Phase IIIA-1  
Spring Lake, North Carolina**

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Geotechnical and Construction Materials Testing Services

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 Raleigh, NC 27615  
 (919) 954-1514

License No. C-0894

## FIELD REPORT

<b>RE:</b>	<b>PROJECT:</b> Anderson Creek C & D Landfill Expansion	<b>DATE OF VISIT:</b> August 12, 2015
	<b>LOCATION:</b> Harnett County	<input checked="" type="checkbox"/> SOILS <span style="margin-left: 100px;"><input type="checkbox"/> STRUCTURAL STEEL</span>
	<b>PROJECT NO:</b> 1150502CA	<input type="checkbox"/> FOOTING CHECK <span style="margin-left: 100px;"><input type="checkbox"/> CONCRETE</span> <input type="checkbox"/> OTHER (SPECIFY):

**FIELD INSPECTION AND OBSERVATION:**  
**August 12, 2015** (Warm, 83°F)

GeoTechnologies representative was onsite to perform in-place density testing on the area highlighted in yellow on the attached site plan. The technician observed that the material was placed in thin lifts and compacted before more fill was placed. The entire area was probed by the technician and two density tests were taken on the material placed at various locations, which are marked on the attached site plan. Both tests met specifications for compaction, and the contractor was informed of the results. Due to the landfill closing at noon, the contractor stopped work for the rest of the day after the second test was taken.

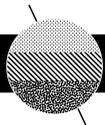
Representative departed the site once testing/inspection was completed.

### DENSITY TEST RESULTS

#	Type of Test	Compaction	Wc +/- Opt.	Pass/Fail	Elevation	Stone Depth (in.)
1	Drive Tube	95.0	-3.6	P	-1'	
2	Drive Tube	96.1	-5.0	P	-1'	

<b>GEOTECHNOLOGIES REP:</b> Dale Morton	<b>PRESENT AT SITE:</b>
<b>REVIEWED BY:</b> Michael Morton	
<b>APPROVED:</b> August 12, 2015	





# In-Place Density Test Results

**Project Info:** Anderson Creek C & D Landfill Expansion / Harnett County, NC  
**Client:** Harnett County Engineering & Fac. Maintenance

**Report Date:** August 12, 2015  
**Project No:** 1150502CA  
**Client Job No:**

Test		In-Place Density Test				Reference Standard			Compaction		Location	Elevation or Stone Depth
#	Date	Type	Wet Density	Dry Density	Moisture Content	Type	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1†	08/12/2015	D-2937	119.0	108.3	9.9	D-698	114.0	13.5	95	<b>95.0</b>	Area highlighted on attached site plan. (#1)	-1'
2†	08/12/2015	D-2937	118.4	109.6	8.0	D-698	114.0	13.0	95	<b>96.1</b>	Area highlighted on attached site plan. (#2)	-1'

\* = Failed Specified Compaction and/or Moisture Content

All Test Locations and Elevations are approximate

† **Note: A field technician was not present during the actual fill placement; therefore, field tests are only indicative of location and elevation.**

**References:** D-1556: Test Method for Density and Unit Weight of Soil In Place by Sand Cone Method, D-1557: Laboratory Compaction Characteristics of Soil Using Modified Effort, D-2167: 08 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber, D-2937: Test Method for Density of Soil In Place by Drive Cylinder Method, D-4959: Test Method for Determination of Soil by Direct Heating, D-558: Moisture - Density Relations of Soil-Cement Mixtures, D-6938: Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method, D-698: Laboratory Compaction Characteristics of Soil Using Standard Effort

**Distribution:** Amanda Bader

Michael K. Morton  
Name (Technical Responsibility)

  
Signature

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Geotechnical and Construction Materials Testing Services

3200 Wellington Court, Suite 108  
 Raleigh, NC 27615  
 (919) 954-1514

License No. C-0894

## FIELD REPORT

<b>RE:</b>	<b>PROJECT:</b> Anderson Creek C & D Landfill Expansion	<b>DATE OF VISIT:</b> August 13, 2015
	<b>LOCATION:</b> Harnett County	<input checked="" type="checkbox"/> SOILS <input type="checkbox"/> STRUCTURAL STEEL <input type="checkbox"/> FOOTING CHECK <input type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER (SPECIFY):
	<b>PROJECT NO:</b> 1150502CA	

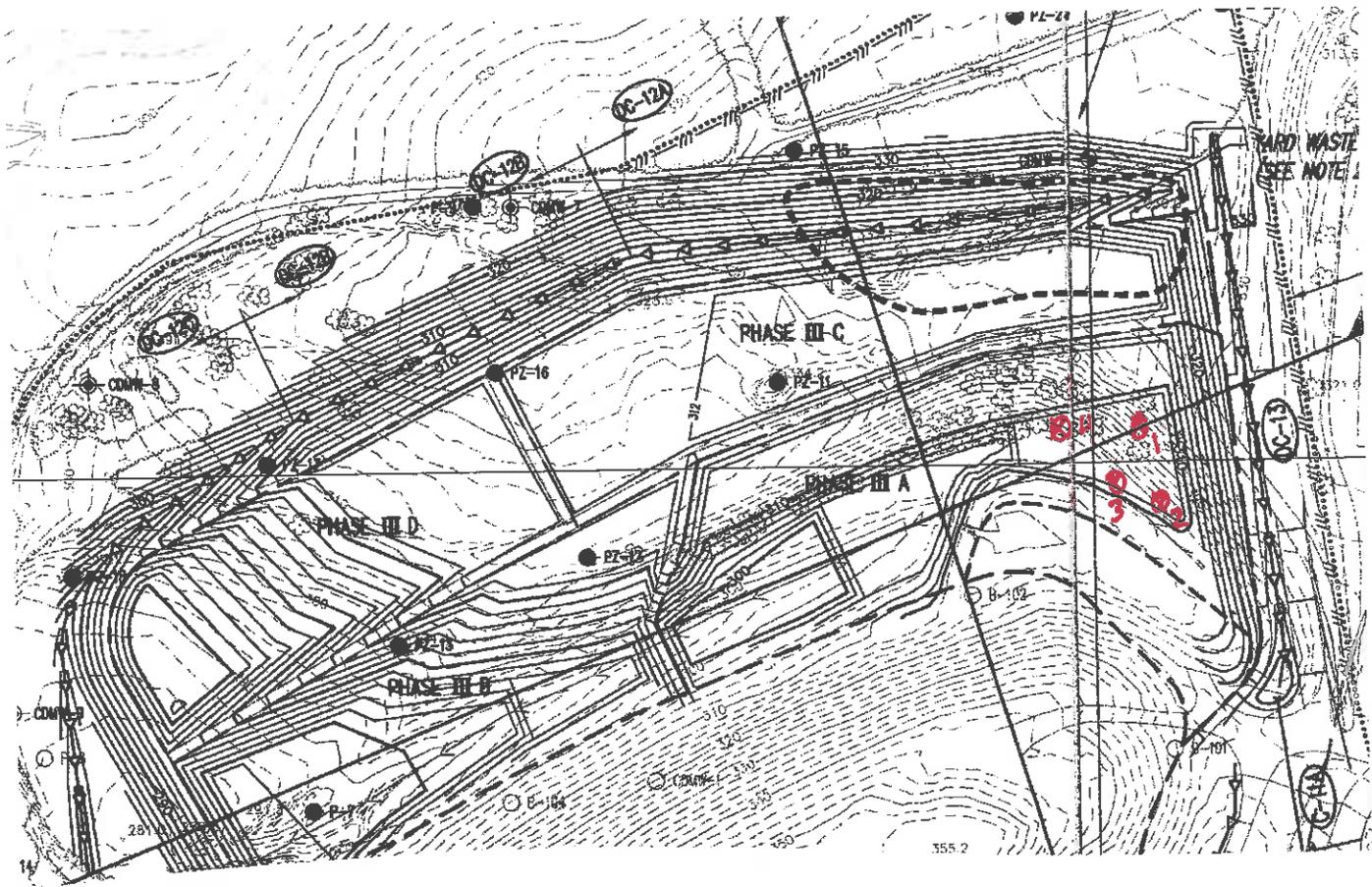
**FIELD INSPECTION AND OBSERVATION:**  
**August 13, 2015** (Warm, 70°F)

GeoTechnologies representative was onsite to perform in-place density testing on the area marked on the attached site plan. The technician observed one lift of material being placed and compacted. The technician took a density test, which did not meet specifications. The technician recommended rolling the material more and once this was done, another test was taken. This test did not meet compaction requirement either, so the contractor elected to bring in a water truck to wet the entire lift and roll it again. After this was complete, the technician took a retest, which met the compaction requirement. Another test was obtained on a lower area. This test also met compaction requirement and the contractor was informed of the results. After all tests were complete, the technician departed the site.

### DENSITY TEST RESULTS

#	Type of Test	Compaction	Wc +/- Opt.	Pass/Fail	Elevation	Stone Depth (in.)
1	Drive Tube	92.7	-5.8	F	SG	
2	Drive Tube	92.5	-5.2	F	SG	
3	Drive Tube	95.6	-4.9	P	SG	
4	Drive Tube	96.8	-2.0	P	-1'	

<b>GEOTECHNOLOGIES REP:</b> Dale Morton	<b>PRESENT AT SITE:</b>
<b>REVIEWED BY:</b> Michael Morton	
<b>APPROVED:</b> August 13, 2015	



8-13-15

<p>Site Plan Anderson Creek C&amp;D Landfill Spring Lake, North Carolina</p>	<p>Legend Test Locations</p>	<p>Project No. 1-15-0502-CA Scale: = NTS Figure: 1</p>
--	----------------------------------	--



# In-Place Density Test Results

**Project Info:** Anderson Creek C & D Landfill Expansion / Harnett County, NC  
**Client:** Harnett County Engineering & Fac. Maintenance

**Report Date:** August 18, 2015  
**Project No:** 1150502CA  
**Client Job No:**

Test		In-Place Density Test				Reference Standard			Compaction		Location	Elevation or Stone Depth
#	Date	Type	Wet Density	Dry Density	Moisture Content	Type	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
3	08/13/2015	D-2937	116.9	108.5	7.7*	D-698	117.0	13.5	95	92.7*	Fill area shown on attached site plan. (#1)	SG
3a	08/13/2015	D-2937	117.2	108.2	8.3*	D-698	117.0	13.5	95	92.5*	Fill area shown on attached site plan. (#2)	SG
3b	08/13/2015	D-2937	121.4	111.8	8.6*	D-698	117.0	13.5	95	95.6	Fill area shown on attached site plan. (#3)	SG
4	08/13/2015	D-2937	126.3	113.3	11.5	D-698	117.0	13.5	95	96.8	Fill area shown on attached site plan. (#4)	-1'

\* = Failed Specified Compaction and/or Moisture Content

All Test Locations and Elevations are approximate

**References:** D-1556: Test Method for Density and Unit Weight of Soil In Place by Sand Cone Method, D-1557: Laboratory Compaction Characteristics of Soil Using Modified Effort, D-2167: 08 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber, D-2937: Test Method for Density of Soil In Place by Drive Cylinder Method, D-4959: Test Method for Determination of Soil by Direct Heating, D-558: Moisture - Density Relations of Soil-Cement Mixtures, D-6938: Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method, D-698: Laboratory Compaction Characteristics of Soil Using Standard Effort

**Distribution:** Amanda Bader

Michael K. Morton  
 Name (Technical Responsibility)

  
 Signature

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Geotechnical and Construction Materials Testing Services

3200 Wellington Court, Suite 108  
 Raleigh, NC 27615  
 (919) 954-1514

License No. C-0894

## FIELD REPORT

<b>RE:</b>	<b>PROJECT:</b> Anderson Creek C & D Landfill Expansion	<b>DATE OF VISIT:</b> August 14, 2015
	<b>LOCATION:</b> Harnett County	<input checked="" type="checkbox"/> SOILS <input type="checkbox"/> STRUCTURAL STEEL <input type="checkbox"/> FOOTING CHECK <input type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER (SPECIFY):
	<b>PROJECT NO:</b> 1150502CA	

**FIELD INSPECTION AND OBSERVATION:**  
August 14, 2015 (Warm, 85°F)

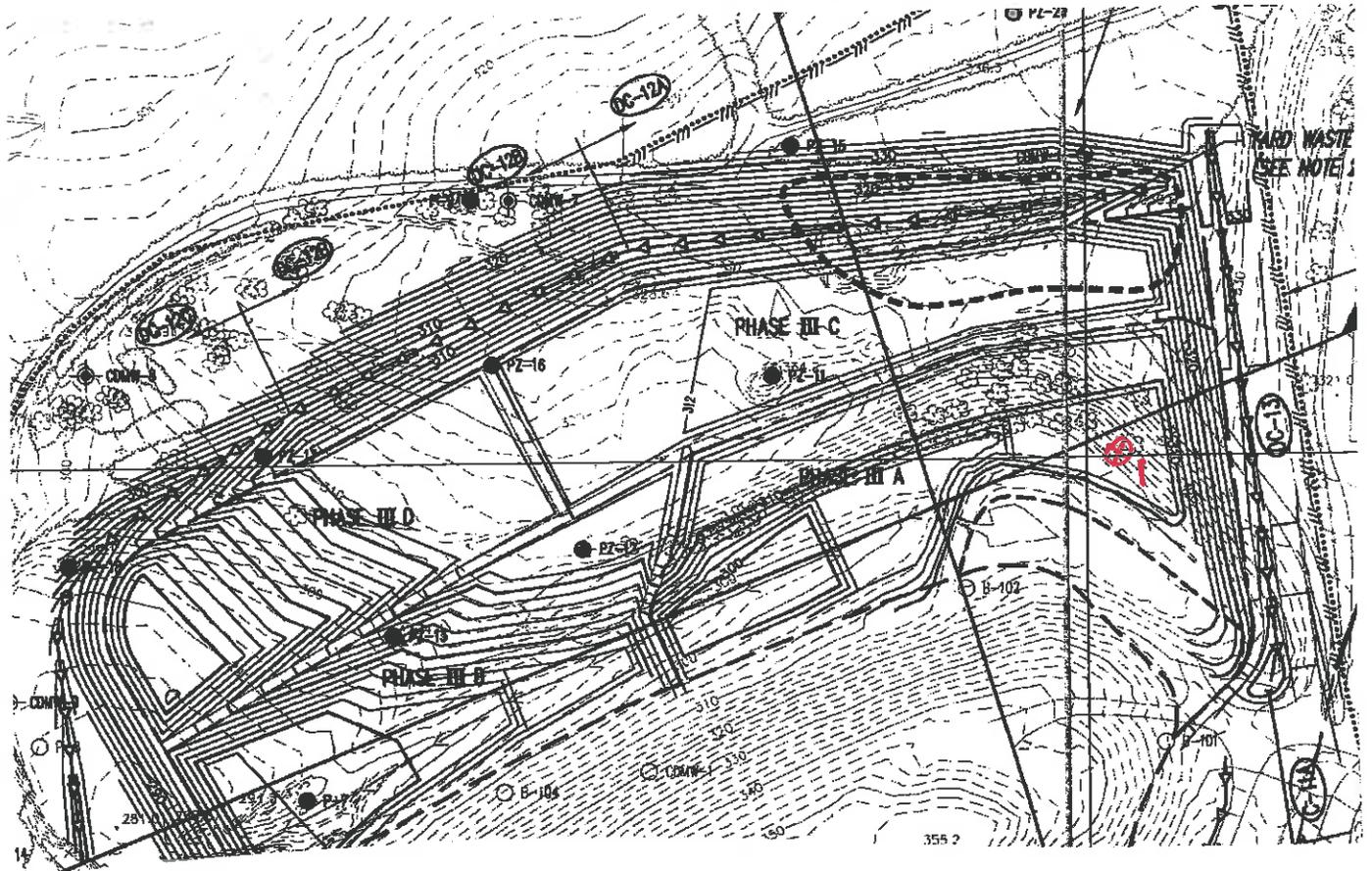
GeoTechnologies representative was onsite to perform in-place density testing on the small fill area marked on the attached site plan. The technician observed as the contractor placed, wet, and compacted. The area was probed and one test was taken by the technician. This test met specifications for compaction and the contractor was informed of the results.

The technician departed the site once all testing was completed.

### DENSITY TEST RESULTS

#	Type of Test	Compaction	Wc +/- Opt.	Pass/Fail	Elevation	Stone Depth (in.)
1	Drive Tube	98.5	-3.4	P	SG	

<b>GEOTECHNOLOGIES REP:</b> Dale Morton	<b>PRESENT AT SITE:</b>
<b>REVIEWED BY:</b> Michael Morton	
<b>APPROVED:</b> August 14, 2015	

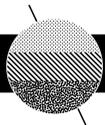


8-14-15

Site Plan  
Anderson Creek C&D Landfill  
Spring Lake, North Carolina

Legend  
Test Locations

Project No. 1-15-0502-CA  
Scale: = NTS  
Figure: 1



# In-Place Density Test Results

**Project Info:** Anderson Creek C & D Landfill Expansion / Harnett County, NC  
**Client:** Harnett County Engineering & Fac. Maintenance

**Report Date:** August 19, 2015  
**Project No:** 1150502CA  
**Client Job No:**

Test		In-Place Density Test				Reference Standard			Compaction		Location	Elevation or Stone Depth
#	Date	Type	Wet Density	Dry Density	Moisture Content	Type	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
5	08/14/2015	D-2937	126.2	115.7	9.1	D-698	117.5	12.5	95	<b>98.5</b>	Fill area marked on attached site plan. (#1)	SG

\* = Failed Specified Compaction and/or Moisture Content

All Test Locations and Elevations are approximate

**References:** D-1556: Test Method for Density and Unit Weight of Soil In Place by Sand Cone Method, D-1557: Laboratory Compaction Characteristics of Soil Using Modified Effort, D-2167: 08 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber, D-2937: Test Method for Density of Soil In Place by Drive Cylinder Method, D-4959: Test Method for Determination of Soil by Direct Heating, D-558: Moisture - Density Relations of Soil-Cement Mixtures, D-6938: Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method, D-698: Laboratory Compaction Characteristics of Soil Using Standard Effort

**Distribution:** Amanda Bader

Michael K. Morton  
Name (Technical Responsibility)

  
Signature

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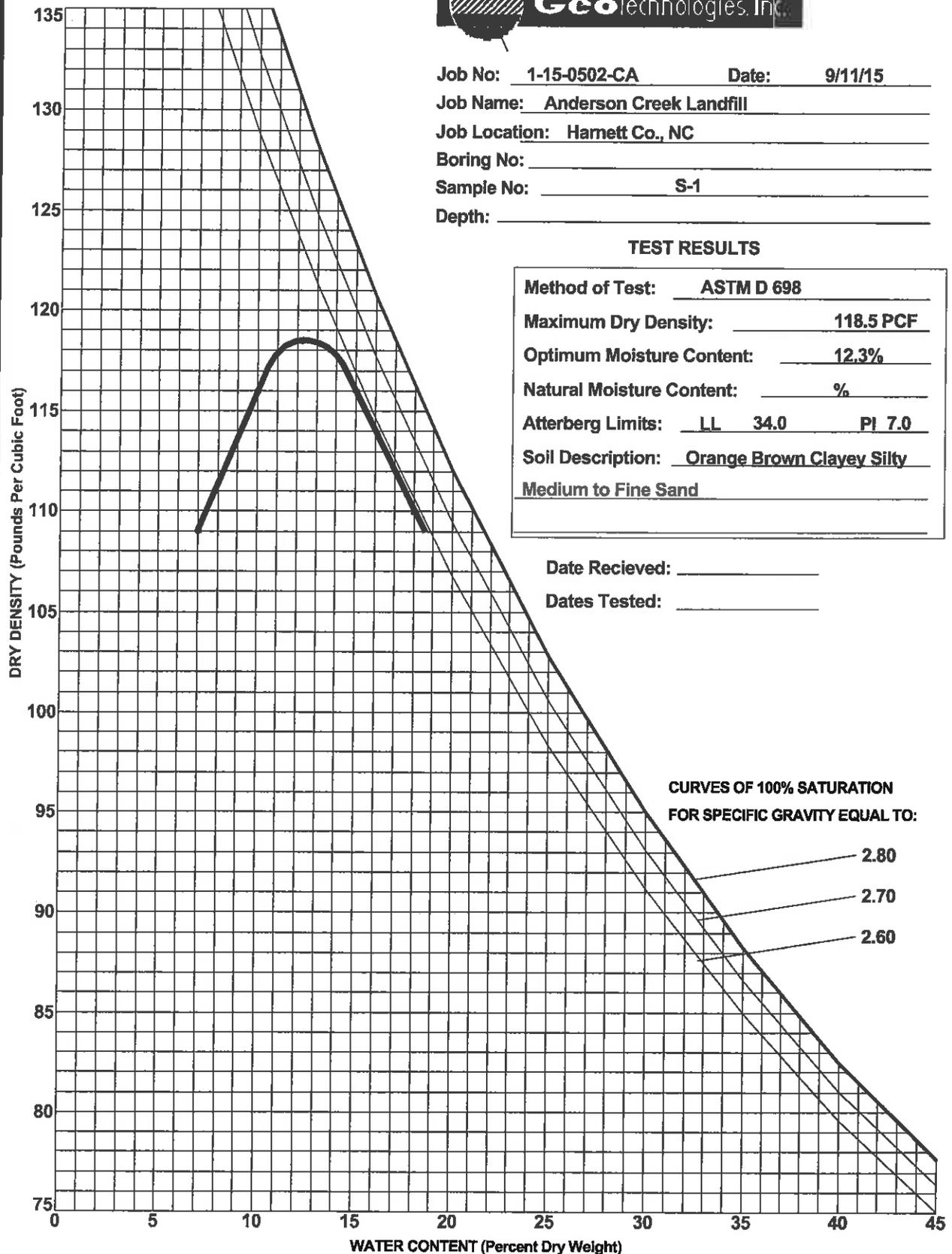


Job No: 1-15-0502-CA Date: 9/11/15  
Job Name: Anderson Creek Landfill  
Job Location: Harnett Co., NC  
Boring No: \_\_\_\_\_  
Sample No: S-1  
Depth: \_\_\_\_\_

**TEST RESULTS**

Method of Test:	<u>ASTM D 698</u>
Maximum Dry Density:	<u>118.5 PCF</u>
Optimum Moisture Content:	<u>12.3%</u>
Natural Moisture Content:	<u>%</u>
Atterberg Limits:	<u>LL 34.0 PI 7.0</u>
Soil Description:	<u>Orange Brown Clayey Silty</u>
	<u>Medium to Fine Sand</u>

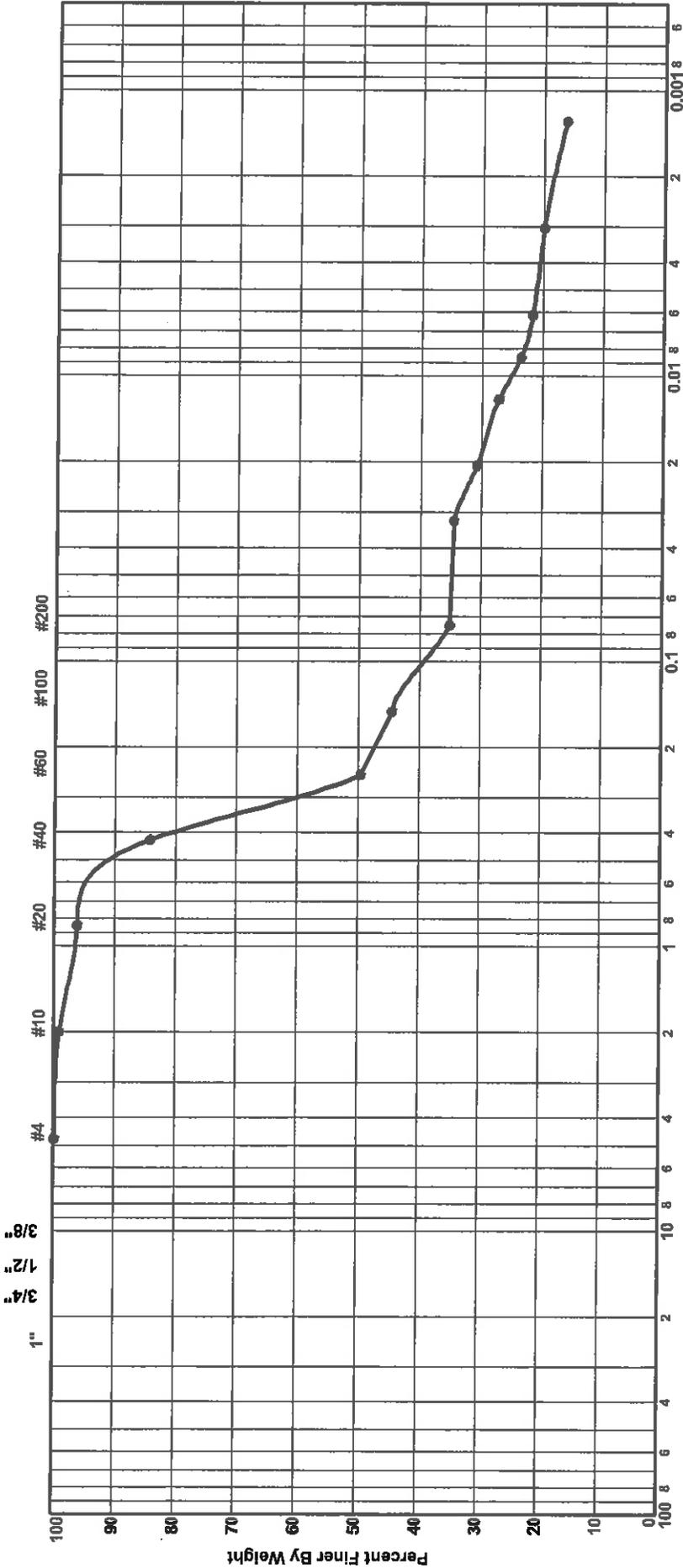
Date Received: \_\_\_\_\_  
Dates Tested: \_\_\_\_\_



**MOISTURE-DENSITY RELATIONSHIP**

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Raleigh, NC 27615

U.S. Standard Sieve Sizes



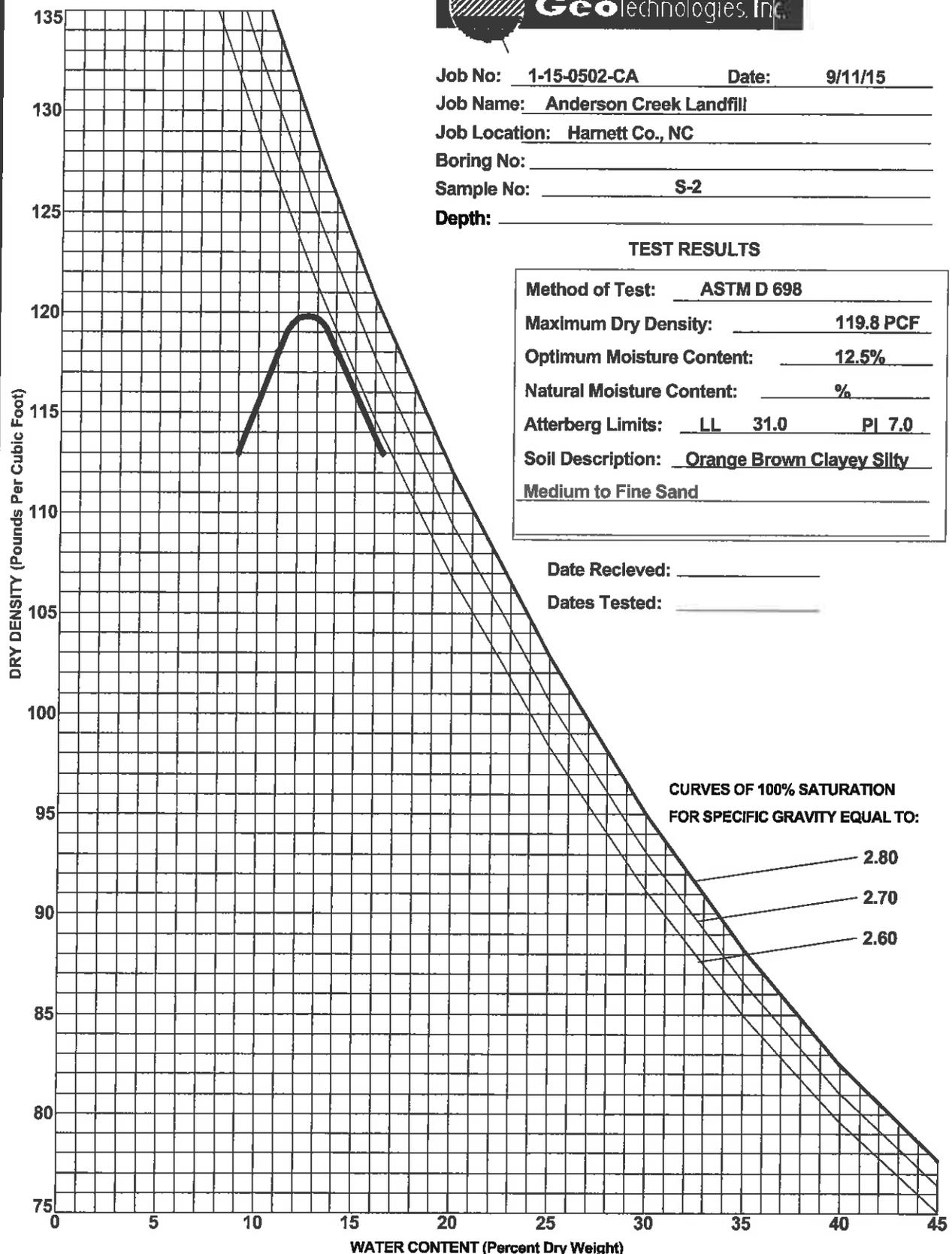


Job No: 1-15-0502-CA Date: 9/11/15  
Job Name: Anderson Creek Landfill  
Job Location: Harnett Co., NC  
Boring No: \_\_\_\_\_  
Sample No: S-2  
Depth: \_\_\_\_\_

**TEST RESULTS**

Method of Test:	<u>ASTM D 698</u>
Maximum Dry Density:	<u>119.8 PCF</u>
Optimum Moisture Content:	<u>12.5%</u>
Natural Moisture Content:	<u>%</u>
Atterberg Limits:	<u>LL 31.0 PI 7.0</u>
Soil Description:	<u>Orange Brown Clayey Silty</u>
	<u>Medium to Fine Sand</u>

Date Received: \_\_\_\_\_  
Dates Tested: \_\_\_\_\_



**MOISTURE-DENSITY RELATIONSHIP**

3200 Wellington Court, Suite 108  
Raleigh, NC 27615





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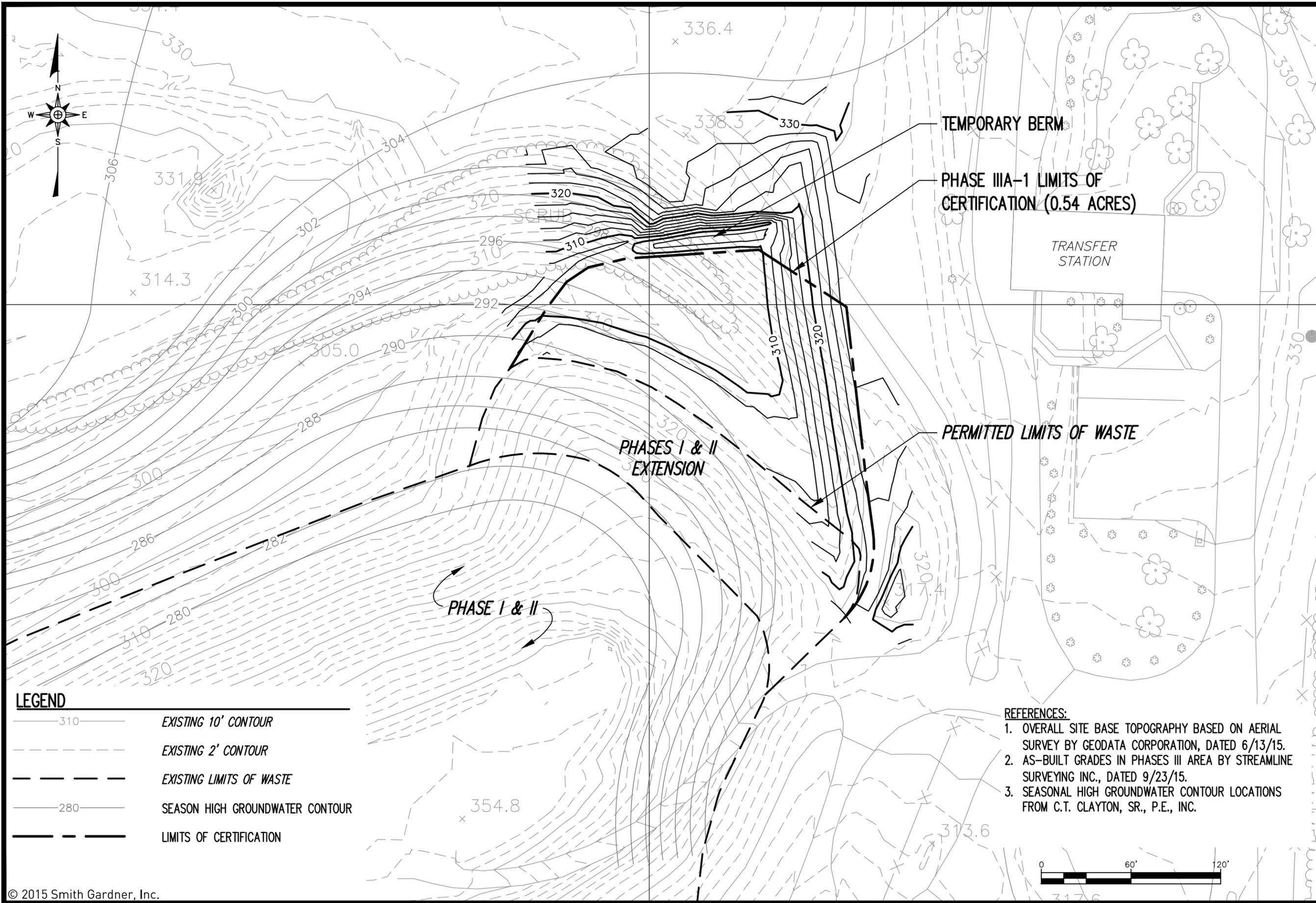
## **Appendix D**

### **Record Drawing**

**Construction Quality Assurance Report  
Harnett County Anderson Creek C&D Landfill - Phase IIIA-1  
Spring Lake, North Carolina**

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**LEGEND**

- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING LIMITS OF WASTE
- SEASON HIGH GROUNDWATER CONTOUR
- LIMITS OF CERTIFICATION

**REFERENCES:**

1. OVERALL SITE BASE TOPOGRAPHY BASED ON AERIAL SURVEY BY GEODATA CORPORATION, DATED 6/13/15.
2. AS-BUILT GRADES IN PHASES III AREA BY STREAMLINE SURVEYING INC., DATED 9/23/15.
3. SEASONAL HIGH GROUNDWATER CONTOUR LOCATIONS FROM C.T. CLAYTON, SR., P.E., INC.

PREPARED FOR: ANDERSON CREEK C&DIF PHASE IIIA-1 AS-BUILT

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

APPROVED:	P. K. S.	SCALE:	AS SHOWN	FIGURE NO.:	AB-1
DRAWN:	C. T. J.	PROJECT NO.:	HARNETT-AC 15-2	FILENAME:	HARNETT-B0083
DATE:	Sep 2015				

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