Permit No.	Date	Document ID No.
06-03	**November 18, 2011**	**15641**

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

November 18, 2011

Mr. Allen Gaither, P.E.
Environmental Engineer II
NCDENR – Solid Waste Section
2090 U.S. Highway 70
Swannanoa, North Carolina 28778

Re: Phases I & II Closure Event No. 1
Avery County C&D Landfill
NC Solid Waste Permit No. 06-03

Dear Allen:

On behalf of Avery County, Richardson Smith Gardner & Associates (RSG) is hereby submitting the **enclosed** Construction Quality Assurance (CQA) Report (two (2) hard copies and one (1) electronic) for the above referenced facility for your review and records. Additionally, please find an updated financial assurance estimate (**attached**) to include the removal of these closed areas (2.65 acres) from the closure construction estimate. Additionally, this revised estimate includes a reduction of the potential assessment and corrective action costs; as recently allowed under Session Law 2011-262. Upon approval of this estimate, the County will update their financial test.

We appreciate your attention and we are prepared to respond to any questions or concerns regarding this information. Please feel free to contact me at (919) 828-0577 or by email below.

Sincerely,

Richardson Smith Gardner & Associates

Stacey A. Smith, P.E.
Project Manager, Ext. 127
stacey@rsgengineers.com

cc: Mr. Henry "Buddy" Norris, Avery County Solid Waste Department
Ms. Deb Aja, NCDENR
File

H:\Projects\Avery County (NC)\Avery-10-4 Phase I-II Closure\CQA Report\Letter11-18-11.doc

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

DATE: 15-Nov-11
BY: SAS

Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Closure Construction Cost Estimate

Item No.	Item Description	Unit	Contractor Quantity	Contractor Unit Price	Contractor Total Price	Comments
	Closure Area (Horizontal Plan) ---->	**AC**	**4.5**			
1.0	**Pre-Construction**			**Subtotal**	**$17,250.00**	
1.1	Construction Documents & Bidding	AC	5	$10k + $500/AC	$17,250.00	RSG Estimate
2.0	**Construction**				**$210,631.50**	References 1 and 2.
2.1	Surveys and Layout	AC	5	$1,500.00	$6,750.00	Site Historical Estimate
2.2	Mobilization	AC	5	$1,000.00	$4,500.00	~4% of Construction Cost
2.3	Site Preparation (repairs to intermediate cover layer)	AC	5	$2,000.00	$9,000.00	Assumed estimate for repair of erosion rills.
2.4	18" On-site Low Permeability Soil	CY	10,890	$7.60	$82,764.00	Site Historical Estimate
2.5	18" Vegetative Support Layer	CY	10,890	$5.75	$62,617.50	Site Historical Estimate
2.6	Landfill Gas Venting System	AC	5	$1,200.00	$5,400.00	Site Historical Estimate
2.7	Cap Drainage Structures (berms, piping, etc.)	AC	5	$5,000.00	$22,500.00	Site Historical Estimate
2.8	Erosion & Sediment Control (grading, silt fence, maintenance, etc.)	AC	5	$800.00	$3,600.00	Site Historical Estimate
2.9	Revegetation	AC	5	$3,000.00	$13,500.00	Site Historical Estimate
3.0	**Quality Assurance, Certification, & Deed Notation**				**$31,325.00**	
3.1	Field Monitoring	AC	5	$3,000.00	$13,500.00	RSG Estimate
3.2	Laboratory Testing	AC	5	$2,500.00	$11,250.00	RSG Estimate
3.3	Engineering Certification	AC	5	$5k + $250/AC	$6,125.00	RSG Estimate
3.4	Surveying and Deed Notation	AC	5	$100.00	$450.00	RSG Historical Estimate
4.0	**Miscellaneous Costs to Close**				**$5,625.00**	
4.1	Erosion and Stormwater Control (outside landfill footprint)	AC	5	$1,000.00	$4,500.00	RSG Historical Estimate
4.2	Engineering and Reporting	AC	5	$250.00	$1,125.00	RSG Historical Estimate
5.0	**Total Closure Costs**					
	Construction Estimate ----->				**$264,832**	(2010$)
	Cost per Acre ----->				***$58,851***	
	Total Estimate ----->				**$264,832** (2011$) (See Note 1)	

Notes:

1. All costs are presented in current dollars and should be increased at an inflation rate prescribed by the NCDENR Division of Waste Management per http://portal.ncdenr.org/web/wm/sw/financialassurance if additional review is not performed annually.
2. This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

References:

1. Avery County Construction and Demolition Landfill Phase III Permit to Construct Application by Richardson Smith Gardner & Associates, Inc. dated February 2009 with revisions through August 2009.
2. Correspondence dated March 17, 2010 regarding approval of the site suitability including lateral expansion of Phase 2 following purchase of the Lechler parcel to Mr. Buddy Norris, Avery County from Mr. Zinith Barbee, NCDENR.

Denotes values calculated in spreadsheet.

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

DATE: 15-Nov-11
BY: SAS

Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Post Closure Estimate

Item	Quantity	Unit	Comments
Groundwater Monitoring			
Monitoring wells	4	wells	Reference 1
Surface water point	2	points	Reference 1
Sampling frequency	2	events	Reference 1
Field sampling, collection, and shipping	$800	per event	RSG estimate
Laboratory Analysis	$325	per well	RSG estimate
Data review, statistics, and reporting	$2,000	per event	RSG estimate
Maintenance and repair	$1,000	per well	RSG historical estimate
Subtotal Cost	**$13,500**	**per year**	
Landfill Gas Management			
Control System Vents	7	vents	Per Ref. 1 (pro-rated @ one (1) per acre)
Sub-Surface Perimeter Monitoring Probes	4	probes	Per Ref. 1
Control system monitoring, maintenance and repair	$50	per vent per year	RSG estimate
Semi-Annual Perimeter Monitoring	$50	per probe per year	RSG estimate
Subtotal Cost	**$560**	**per year**	Averaged over post-closure period
Final Cover Management			
Area of maintenance	7.19	acres	Extends to area immediately around landfill.
Mowing	$100	per acre	Site historical estimate
Erosion and sediment control maintenance	$200	per acre	Site historical estimate
Topdressing (seed & fertilizer)	$150	per acre	Site historical estimate
Vector and rodent control	$10	per acre	Site historical estimate
Maintenance Mobilization	$1,000	per year	Site historical estimate
Subtotal Cost	**$4,307**	**per year**	
Administration, Inspections, and Reporting			
Administration and record keeping	$1,000	per year	Site historical estimate
Inspection	$1,000	per year	Site historical estimate
Miscellaneous engineering	$1,500	per year	Site historical estimate
Subtotal Cost	**$3,500**	**per year**	
Subtotal Post-Closure Costs			
Estimated Average Annual Costs	$21,867	per year (2011$)	
Number of Years for Post-Closure	30	years (see Note 1)	
Cost per Acre	$3,041.29	per year	
Subtotal Post Closure Costs	**$656,007**	(2011$) (See Note 2)	
Potential Assessment and Corrective (Remedial) Action			
Minimum amount required by NCDENR Division of Waste Management	$2,000,000	lump sum	Regulatory requirement (Session Law 2011-262)
Deduct Groundwater Monitoring	$405,000	see above	Includes full post closure period. 30 years.
Deduct Landffill Gas Management	$16,785	see above	Includes full post closure period. 30 years.
Deduct Administration, Inspections, and Reporting	$105,000	see above.	Includes full post closure period. 30 years.
Subtotal Remedial Cost	**$1,473,215**	**lump sum**	
Total Post Closure and Remedial Costs	**$2,129,222**	(2011$) (See Note 2)	
Total Closure, Post Closure, and Remedial Costs	**$2,394,054**	(2011$) (See Note 2)	

Notes:
1. All costs are presented in current dollars and should be increased at an inflation rate prescribed by the NCDENR Division of Waste Management per http://portal.ncdenr.org/web/wm/sw/financialassurance if additional review is not performed annually.
2. This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

References:
1. Avery County Construction and Demolition Landfill Phase III Permit to Construct Application by Richardson Smith Gardner & Associates, Inc. dated February 2009 with revisions through August 2009.

Denotes values calculated in spreadsheet.

Construction Quality Assurance Report

Avery County C&D Landfill
N.C. Solid Waste Permit No. 06-03
Phases I & II Closure Event No. 1

Prepared for:

Avery County
175 Linville Street
Newland, North Carolina

Prepared by:

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES
14 N. BOYLAN AVENUE
RALEIGH, NORTH CAROLINA 27603
NC. LIC. NO. C0828 (ENGINEERING)

November 2011

Construction Quality Assurance Report

Avery County C&D Landfill
N.C. Solid Waste Permit No. 06-03
Phases I & II Closure Event No. 1

Prepared for:

Avery County
175 Linville Street
Newland, North Carolina

To The Attention of:

Mr. Henry "Buddy" Norris
Avery County Solid Waste Department

RSG Project No. AVERY-10-4

NORTH CAROLINA PROFESSIONAL SEAL 023002 ENGINEER STACEY A. SMITH

11-18-11

Stacey A. Smith, P.E
Project Manager

November 2011

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

AVERY COUNTY C&D LANDFILL
PHASES I & II CLOSURE EVENT NO. 1

CONSTRUCTION QUALITY ASSURANCE REPORT

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1.0 INTRODUCTION

This Construction Quality Assurance Report has been prepared to document the construction activities performed during the closure of approximately 2.65 acres of Phases I & II (noted as "Closure Event No. 1") at the Avery County C&D Landfill located in Ingalls, North Carolina as shown in **Figure 1**.

The facility is located at 2175 Brushy Creek Road in Ingalls, Avery County, North Carolina, approximately 1.8 miles northeast of the intersection of Highway 19 East and Brushy Creek Road or 1.5 miles northeast of the Avery County Airport. The facility is owned and operated by the Avery County Solid Waste Department and operated by Avery County under NC Solid Waste Permit No. 06-03.

2.0 REFERENCE DOCUMENTS

Phases I & II – Closure Event No. 1 was performed in accordance with the following documents:

1. **Phase III Permit to Construct Application -** prepared by Richardson Gardner & Associates (RSGA) dated February 17, 2009, revised August 7, 2009.

2. **Stormwater Management Plan** - Avery County C&D Landfill Permit No. 06-03 prepared by Richardson Smith Gardner & Associates (RSGA) dated September 2008 with revisions through May 2009. Plan Approval by NCDENR Division of Land Resources, Land Quality Section, dated August 19, 2009. (A copy of the permit is provided in **Appendix A**).

3. **Permit to Construct - Avery County Construction and Demolition Landfill - Permit No. 06-03** by NCDENR dated October 16, 2009. (A copy of the permit is provided in **Appendix A**).

3.0 SCOPE OF PROJECT

The Avery County C&D Landfill facility permit for Phase I & II includes a total footprint of approximately five (5) acres. This report documents Closure Event No. 1 in accordance with the current permits and supporting documents. Closure Event No. 1 includes the construction of final cover (consisting (bottom up) of an 18-inch thick low-permeability compacted soil liner and an 18-inch thick vegetative cover soil), revegetation, and associated stormwater measures in the work and borrow areas.

A summary of major milestones associated with Closure Event No. 1 is provided in **Table A** (below).

Table A - Major Milestones Closure Event No. 1

Date	Task
April 13, 2011	Pre-Construction Meeting
April 18, 2011	Contractor Mobilization
May 6, 2011	Soil Liner Begins
June 3, 2011	Soil Liner Completed
August 3, 2011	Final Completion

4.0 PROJECT PARTICIPANTS

The following major parties were involved in the Phases I & II Closure Event No. 1:

Owner

Avery County Solid Waste Department
175 Linville Street
Newland, NC 28657
Phone: (828) 737-5420
Contact: Buddy Norris
Email: buddy.norris@averycountync.gov

General Contractor

M&M Construction of Banner Elk, Inc.
P.O. Box 695
Banner Elk, NC 28604
Phone: (828) 898-5862
Contact: Bill Cook
Email: bcook@skybest.com

Engineer

Richardson Smith Gardner & Associates (RSG)
14 N. Boylan Avenue
Raleigh, NC 27603
Phone: (919) 828-0577
Contact: Stacey Smith, P.E.
Email: stacey@rsgengineers.com

Surveyor

Daughtry Surveying
2043 Tynecastle Hwy.
Banner Elk, NC 28604
Phone: (828) 898-5591
Contact: Ralph Daughtry
Email: redsurveying@skybest.com

Soil Testing	Bunnel-Lammons Engineering, Inc. (BLE) 105 Fairway Road, Suite A Asheville, NC 28803 Phone: (828) 277-0100 Contact: Gary Weekley, P.E. Email: gary@blecorp.com
Regulatory Agency	North Carolina Department of Environment and Natural Resources – Asheville Regional Office 2090 U.S. Highway 70 Swannanoa, NC 28778 Phone: (828) 296-4500 Fax: (828) 299-7043 Contact: Allen Gaither, P.E. Email: allen.gaither@ncdenr.gov

5.0 CONSTRUCTION SUMMARY

5.1 Site Preparation

The final cover construction began in April of 2011 with mobilization by M&M. Initial site work included, surveying, site preparation and cleanup of the existing vegetation over the intermediate slopes of Phases I & II. The site preparation areas included approximately 2.65 acres of landfill area and approximately two (2) acres of borrow area.

5.2 Erosion and Sedimentation Control Measures

The construction of erosion and sedimentation control measures began in conjunction with site preparation activities. The majority of erosion and control measures were existing to serve operations and consisted of diversion ditches and silt fence placed around the perimeter of the work area. The final cover project included partial closure of the landfill including installation of the final stormwater features such as swales and down pipes incorporated in the cover.

5.3 Earthwork

The initial phase of the final cover project focused on excavation from the borrow area. General earthwork was minimal on the project as the predominant effort is further classified under the soil liner and the vegetative soil cover sections of this report.

5.4 Stormwater Management Systems

The project included certain permanent stormwater improvements. The existing 18" concrete pipe culvert from Phase III – Cell 1 was extended to match grades with the proposed final cover located just south of the central access road. Final cover swales were incorporated into the cover system. On the Phase II portion of the site, a down pipe was incorporated into the cover to convey stormwater from the swales to Sediment Basin No. 4, adjacent and to the south of Phase II.

5.5 Compacted Soil Liner

The final soil cover liner consisting of an 18-inch thick low-permeability compacted soil was installed over portions of Phases I & II. Based on final surveys by Daughtry Surveying, the final cover included 2.54 acres of actual coverage within the permit limits and approximately 0.11 acres that was determined through the course of this project to not include any waste disposal. Two (2) test pits and three (3) hand auger samples were analyzed to confirm the approximately 0.11 acre area did not contain any waste. Limits of closure are shown in **Figure 1**. Survey documentation by Daughtry is included in **Appendix D**. Monitoring of this layer is discussed in the construction quality assurance section below.

5.6 Vegetative Soil Layer

Vegetative Soil Layer (VSL) placement followed placement of the compacted soil liner. The VSL consisted of an 18-inch thick layer and consisted of a slightly clayey silty sand (SM). Twenty (20) test pits, approximately 8 test pits per acre, were collected to confirm the depth of the VSL. Any areas that did not meet an 18-inch depth were reworked until the adequate depth was met. Monitoring of this layer is discussed in the construction quality assurance section below.

5.7 Photographic Documentation

Photographs documenting the construction of Closure Event No. 1 can be found in **Appendix B.**

6.0 CQA PROGRAM

6.1 Scope of Services

In satisfying the requirements of the Project CQA Manual for the closure project, the following activities were performed:

- Observation and documentation of construction of the compacted soil liner and the vegetative soil layer (VSL)
- Field and/or laboratory testing of soil liner and VSL.

- Review of submittals from the Contractor for conformance with project specifications at CQA requirements.
- Review/preparation of record drawings.
- Preparation of the final CQA report.

6.2 Final Cover System CQA

6.2.1 Compacted Soil Liner

The criteria for the soil liner material requirements per the project specifications included the following:

Materials:	Clean natural fine-grained soil free from organics, debris, or other detrimental material. Soil type as required to achieve hydraulic conductivity criteria;
Clod Size:	Maximum = 3/4 inch (or less if required to achieve hydraulic conductivity criteria)
Gradation:	Maximum = ½ inch (finished surface) Maximum = 1 ½ inches (below finished surface);
Atterberg Limits:	As required based on soil type; and
Hydraulic Conductivity:	Less than or equal to $1x10^{-5}$ cm/s at a density of greater than or equal to 95% maximum standard dry density and a moisture content greater than or equal to optimum moisture content.

The criteria for the in-place soil liner material requirements per the project specifications included the following:

Density:	Greater than or equal to 95% Maximum Standard Dry Density;
Moisture Content:	Greater than or equal to optimum moisture content;
Lift Thickness:	6-inch max. (compacted);
Hydraulic Conductivity:	Less than or equal to $1x10^{-5}$ cm/s
Completed Thickness:	18 inches minimum

RSG reviewed and approved the soil liner system testing results provided by Bunnell-Lammons Engineering, Inc. The testing results confirmed that the soil liner testing met the requirements described in the specifications. The number

and results of record tests performed on the in-place soil liner is summarized in **Table 1** (In-Place Soil Liner).

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 6,150 CY of material placed (in-place measure) and an area of 2.54 acres (110,000 square feet). The results of field and laboratory testing of the soil liner can be found in **Appendix C**.

6.2.2 Vegetative Soil Layer

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

Materials: MH, ML, SC, or CL (ASTM D 2487);
Gradation: Max = 3 inches; and
Thickness: 18 inches min.

RSG reviewed and approved the soil liner system testing results provided by Bunnell-Lammons Engineering, Inc. A visual classification of soils (ASTM D 2488) was conducted during on-going operations in conjunction with confirmation soil classification testing. The results of field testing of VSL can be found in **Appendix C.**.

The resulting soil classification for the VSL material is SM. SM is a silty sand that is not listed above. However, the material is native to the site and has successfully established vegetation in the past and is not believed to create veneer stability problems within the cover system.

7.0 MODIFICATIONS

During construction, it is typically necessary to make modifications to the design and construction documents to accommodate field conditions, enhance design components, and/or improve constructability based on practical considerations. In the case of Closure Event No. 1, no design modifications were issued.

8.0 AS-BUILT SURVEY

After the completion of construction, an as-built survey was conducted by Ralph E. Daughtry Land Surveying to determine limits of the final cover construction shown in **Figure 1** (Limits of Certification). The as-built survey is provided in **Appendix D**.

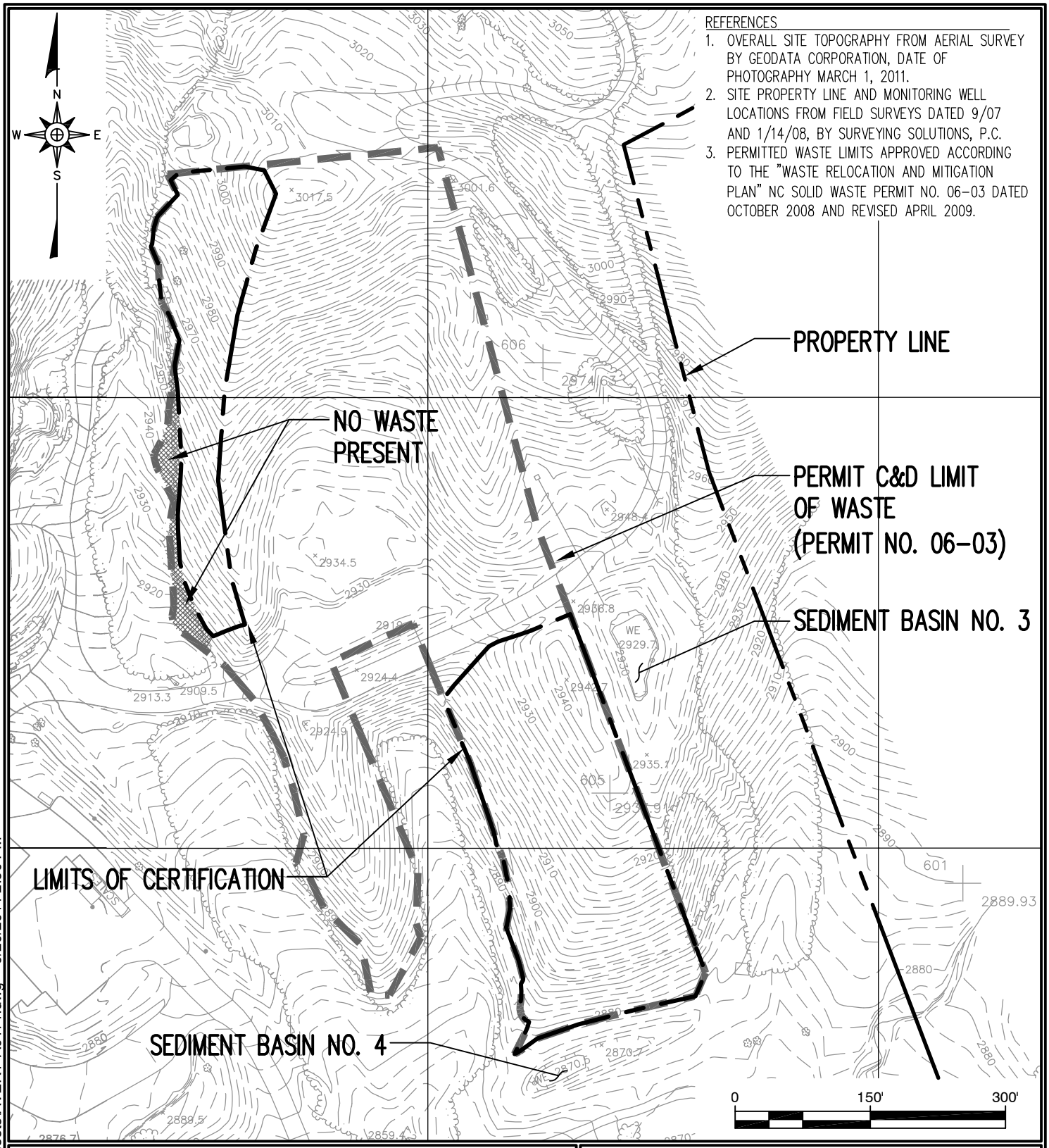
9.0 PROJECT CERTIFICATION

Based on the observations and results of the CQA program documented herein, it is our professional opinion that the construction of Phases I & II Closure Event No. 1 of the Avery County C&D Landfill was completed in accordance with the following:

i. The Project CQA Manual
ii. The conditions of the Permit to Construct Phase 3;
iii. The requirements of 15A NCAC 13B .0543;
iv. Acceptable engineering practices.

Richardson Smith Gardner & Associates, Inc.
NC Lic. No. C0828 (Engineering)

FIGURE 1



AVERY COUNTY C&D LANDFILL
FINAL COVER CONSTRUCTION
CLOSURE EVENT NO.1
LIMITS OF CERTIFICATION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave.
Raleigh, N.C. 27603
NC LIC. NO. C-0828 (Engineering)
www.rsgengineers.com
ph: 919-828-0577
fax: 919-828-3899

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.	FILE NAME
AS SHOWN	C.T.J.	L.A.Q.	Sep. 2011	AVERY 10-4	1	AVERY-A0171

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TABLE 1

TABLE 1
SUMMARY OF MATERIAL CONTROL
AND RECORD TESTS
SOIL LINER

	Property		
	Record Tests		
	In-Place Hydraulic Conductivity	**In-Place Density**	**In-Place Moisture Content**
Units	cm/sec	% Std. Proctor	%
Test Method	ASTM D 5084	ASTM D 6938	ASTM D 6938
Test Fill			
Required Test Frequency	1 per lift	3 per lift	3 per lift
No. of Tests Required	3	9	9
No. of Tests Performed	3	10	10
Soil Liner			
Required Test Frequency	80,000 ft^2 per lift	10,000 ft^2 per lift	10,000 ft^2 per lift
No. of Tests Required	5	34	34
No. of Tests Performed	11	44	44
Specified Value	≤ 1×10^{-5}	≥ 95% Std. Proctor	≥ Optimum Moisture Content
Minimum Value	1.8E-07	95.2	+ 4.5% Opt.
Maximum Value	1.7E-06	97.9	+ 5.2% Opt.
Average Value	7.2E-07	96.2	+ 5 % Opt.
Quantity of Compacted Soil Liner (In-Place):		6,150	CY
		110,000	SF (Each Lift)

Notes:
1. All soil test data provided by Bunnell-Lammons Engineering and reviewed by RSG Engineers.
2. Minimums, maximums, and averages are based on record tests only (not control tests)

APPENDIX A

PERMITS

Appendix A.1 Permits

Airspace letter cover

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

Beverly Eaves Perdue
Governor

Dexter R. Matthews
Director

Dee Freeman
Secretary

May 5, 2011

Mr. Buddy Norris
Avery County – Solid Waste Director
PO Box 640
Newland, North Carolina 28657

Subject: Facility Property Correction
Avery County C&D Landfill
Avery County, Permit #06-03, Document ID No. 13772

Mr. Norris:

This letter is being issued to correct an omission regarding the properties approved for the Avery County C&D landfill facility listed in the most recent Permit to Operate (DIN 13546) issued on April 13, 2011. The Permit only listed one of the properties incorporated within the facility boundary. The following table amends the properties approved for the Avery County C&D landfill facility using data from the Avery County GIS website accessed May 2011:

Avery County, N.C. Register of Deeds				
Book	Page	Acreage	Grantee	Parcel No.
266	646	±78.12	Avery County	182100088310
440	2195	±1.27	Avery County	182100174202
Total Site Acreage: ±79.4 acres				

The property information will be added to the Permit to Operate during the next permitting activity for this facility. This letter should be maintained on site and added to the operating record for the facility.

If you should have any other questions regarding this matter please contact me at (828) 296-4703, or by email at allen.gaither@ncdenr.gov .

Sincerely,

Allen Gaither
Environmental Engineer

Cc: Mr. Stacey Smith – Richardson, Smith, Gardner & Associates
Mr. Bill Wagner – SWS/ARO

Appendix A.2 Permits

PTO for landfill and transfer station

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

Beverly Eaves Perdue, Governor
Dexter R. Matthews, Director
Dee Freeman, Secretary

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION

SOLID WASTE MANAGEMENT FACILITY
Permit No. 06-03

AVERY COUNTY
is hereby issued a

PERMIT TO OPERATE
CONSTRUCTION & DEMOLITION DEBRIS LANDFILL PHASE 3
AND TRANSFER FACILITY

Located at 2175 Brushy Creek Road, Spruce Pine, North Carolina in Avery County, in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The legal description of the site is identified on the deeds recorded for this property listed in Attachment No. 1 of this permit.

Edward F. Mussler, III, P.E.,
Permitting Branch Supervisor
Solid Waste Section

ATTACHMENT 1

PART I: PERMITTING HISTORY

1. On October 25, 1996 a Permit to Construct/Operate was issued for a Construction and Demolition Debris landfill.
2. On October 16, 2009 an amendment was made to the permit for construction of Phase 3 and continued operation of Phases 1 and 2 for waste mitigation and relocation purposes.
3. On August 12, 2010 a modification was made to the permit for operation of Phase 3.
4. On April 13, 2011 an amendment was made to the permit for the addition and operation of the Transfer Facility.

Permit Type	**Date Issued**	**DIN**
Original Permit to Construct/Operate	October 25, 1996	
Permit Amendment	October 16, 2009	8705
Permit Modification	August 12, 2010	11315
Permit Modification	**April 13, 2011**	**13546**

PART II: LIST OF DOCUMENTS FOR THE APPROVED PLAN

NO.	**DOCUMENT DESCRIPTION**	**DOCUMENT ID NO.**
1.	*Trout Stream Buffer Variance Request and 401/404 Nationwide Permit No. 39 Application, Avery County C&D Landfill Expansion*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. September 2008.	5911
2.	*Transition Application, Avery County Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. October 23, 2008.	6095
3.	*Waste Relocation and Mitigation Plan, Avery County C&D Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. October 2008.	6097
4.	*Response to Comments-Transition Application*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. January 9, 2009.	6625
5.	*Permit To Construct Application, Phase III, Avery County C&D Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. February 2009.	6894
6.	*Letter of Approval with Modifications, Avery County C&D Landfill-Stormwater Management Plan*. Prepared by: Starr Silvis. Prepared for: Division of Land Resources, Land Quality Section. June 9, 2009.	7943

7.	*Response to Engineering Technical Review, Permit To Construct, Construction and Demolition Landfill Phase III*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. August 7, 2009.	8220
8.	*Stormwater Management Plan Modification, Permit To Construct, Avery County C&D Landfill Expansion*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. August 31, 2009.	8557
9.	*Operations Manual*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. February 2009.	11333
10.	*Operating Permit Renewal-Response to Comments (revised Operations Manual)*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. April 1, 2011	13455

PART III: PROPERTIES APPROVED FOR THE SOLID WASTE FACILITY

Avery County, N.C. Register of Deeds				
Book	Page	Acreage	Grantee	Parcel No.
266	646	±78.12	Avery County	182100088310
				Total Site Acreage: ±78.12 acres

Notes:

1. Deed book references are from the Avery County Register of Deeds office GIS website (http://arcims.webgis.net/nc/avery/default.asp) accessed September, 2009.

PART IV: GENERAL PERMIT CONDITIONS

1. This permit is issued by the North Carolina Department of Environment and Natural Resources, Division of Waste Management, Solid Waste Section (Section). In accordance with North Carolina Solid Waste Management Rule 15A NCAC 13B .0201(d), a solid waste management facility permit shall have two parts: a Permit to Construct and a Permit to Operate. The Permit to Construct must be implemented in accordance with Attachment 2 of this permit. The Permit to Operate must be implemented in accordance with Attachment 3 of this permit.
2. The persons to whom this permit is issued ("permittee") are the owners and operators of the solid waste management facility.
3. (Intentionally blank)
4. When this property is sold, leased, conveyed, or transferred in any manner, the deed or other instrument of transfer shall contain in the description section in no smaller type than that used in the body of the deed or instrument, a statement that the property has been

used as a sanitary landfill and a reference by book and page to the recordation of the permit.

5. By initiating construction or receiving waste at this facility the permittee shall be considered to have accepted the terms and conditions of this permit.

6. Construction and operation of this solid waste management facility must be in accordance with the Solid Waste Management Rules, 15A NCAC 13B, Article 9 of the Chapter 130A of the North Carolina General Statutes (NCGS 130A-290, et seq.), the conditions contained in this permit; and the approved plan. Should the approved plan and the rules conflict, the Solid Waste Management Rules shall take precedence unless specifically addressed by permit condition.

7. This permit is issued based on the documents submitted in support of the application for permitting the facility including those identified in Attachment 1, "List of Documents for Approved Plan," and which constitute the approved plan for the facility. Where discrepancies exist, the most recent submittals and the Conditions of Permit shall govern.

8. This permit may be transferred only with the approval of the Section, through the issuance of a new or substantially amended permit in accordance with applicable statutes and rules. In accordance with NCGS 130A-295.2(g) the permittee must notify the Section thirty (30) days prior to any significant change in the identity or business structure of either the owner or the operator, including but not limited to a proposed transfer of ownership of the facility or a change in the parent company of the owner or operator of the facility.

9. The permittee is responsible for obtaining all permits and approvals necessary for the development of this project including approval from appropriate agencies for a General or Individual NPDES Stormwater Discharge Permit. Issuance of this permit does not remove the permittee's responsibilities for compliance with any other local, state or federal rule, regulation or statute.

- End of Section -

ATTACHMENT 2
CONDITIONS OF PERMIT TO CONSTRUCT

PART I: GENERAL FACILITY CONDITIONS

Not Applicable

PART II: MUNICIPAL SOLID WASTE LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART III: CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART IV: LAND CLEARING AND INERT DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART V: MISCELLANEOUS SOLID WASTE MANAGEMENT SPECIFIC CONDITIONS

Not Applicable

ATTACHMENT 3
CONDITIONS OF PERMIT TO OPERATE

PART I: GENERAL FACILITY CONDITIONS

1. The Permit to Operate shall expire **April 13, 2016**. Pursuant to 15A NCAC 13B .0201(g), no later than **October 13, 2015**, the owner or operator must submit a permit amendment application prepared in accordance with 15A NCAC 13B.0535(b) to the Section for review.
2. All sedimentation and erosion control activities must be conducted in accordance with the Sedimentation Control Act N.C.G.S. 113A-50, et seq., and rules promulgated under 15A NCAC 4.
3. The edge of the waste footprint for all disposal units must be identified and maintained with permanent physical markers.
4. The permittee must not knowingly dispose of any type or form of municipal solid waste that is generated within the boundaries of a unit of local government that by ordinance:
   a. Prohibits generators or collectors of municipal solid waste from disposing of that type or form of municipal solid waste.
   b. Requires generators or collectors of municipal solid waste to recycle that type or form of municipal solid waste.
5. Copies of this permit, the approved plans, and all records required to be maintained by the permittee must be maintained at the facility and made available to the Section upon request during normal business hours.
6. Financial assurance as required by NCGS 130A-295.2 must be continuously maintained for the duration of the facility in accordance with applicable rules and statutes. Closure and Post-Closure cost estimates and financial instruments must be updated annually pursuant to 15A NCAC 13B.0543.
7. Closure or partial closure of any CDLF unit must be in accordance with the Closure Plans described in the approved plans and 15A NCAC 13B.0543. Any revisions to the Closure Plans must be submitted to the Division at least 90 days prior to implementation for approval.

Operational Requirements

8. This facility is permitted to receive solid waste generated within the following counties:

   North Carolina – Avery, Burke, Caldwell, McDowell, Mitchell, Watauga;
   Tennessee – Carter, Johnson, Unicoi;

consistent with the local government waste management plan and with local government approval except where prohibited by the N. C. General Statues Article 9 of Chapter 130A, and the rules adopted by the Commission for Health Services. Proposed changes to the service area must be approved by the Section and will constitute a permit modification and be subject to the applicable permitting fee.

9. The facility operator must complete an approved operator training course in compliance with G.S. 130A-309.25.

   a. A responsible individual certified in landfill operations must be on-site during all operating hours of the facility at all times while open for public use to ensure compliance with operational requirements.

   b. All pertinent landfill-operating personnel must receive training and supervision necessary to properly operate the landfill units in accordance with G.S. 130A-309.25 and addressed by memorandum dated November 29, 2000.

10. The use of different alternative daily cover requires approval, prior to implementation, by the Solid Waste Section. Requests for alternative daily cover approval must include a plan detailing the comprehensive use and a demonstration of the effectiveness of the alternative daily cover. The plan must be developed according to Section guidelines. Plans which are approved by the Section will be incorporated into, and made a part of, the approved documents listed in Attachment 1.

11. The facility must maintain records for all solid waste materials accepted as alternative cover material and used as alternate daily cover. The records must include: the date of receipt, weight of material, general description of the material, identity of the generator and transporter, and county of origin. Such records must be made available to the Solid Waste Section upon request.

Monitoring and Reporting Requirements

12. Groundwater, surface water, and landfill gas monitoring locations must be established and monitored as identified in the approved plans.

13. A licensed geologist must be present to supervise installation of groundwater and landfill gas monitoring wells and probes. The location, screen interval, spacing, diameter, depth, seal, cap, clustering and nesting, and other criteria for the wells must be established after consultation with the SWS Hydrogeologist at the time of well installation.

14. Ground water monitoring wells and surface water sampling locations must be sampled for Appendix I constituents at least semi-annually according to the specifications outlined in the approved water quality monitoring plan and the current policies and guidelines of the Section in effect at the time of sampling.

15. Landfill gas monitoring wells must be sampled for explosive gases at least quarterly and according to specifications outlined in 15A NCAC 13B .544(d), entitled "Gas Control Plan", and current policies and guidelines of the Section in effect at the time of sampling.

16. Reports of the analytical data for each monitoring event must be submitted to the Section within 120 days of the respective sampling event. Analytical data must be submitted in a manner prescribed by the Section. Records of all groundwater, surface water, landfill gas, and leachate analytical data must be kept as part of the permanent facility record.

17. A readily accessible unobstructed path must be cleared and maintained so that four-wheel vehicles may access monitoring well locations at all times.

18. A field log book which details all development, sampling, repair, and all other pertinent activities associated with each monitoring well and all sampling activities associated with each groundwater, surface water, landfill gas, and leachate sampling location must be kept as part of the permanent facility record.

19. All well construction records and soil boring logs for new wells and probes must be submitted to the Solid Waste Section Hydrogeologist for review within 30 days of completion.

20. The owner or operator must maintain a record of the amount of solid waste received at the landfill unit, compiled on a monthly basis. Scales must be used to weigh the amount of waste received.

21. On or before August 1 annually, the Permittee must submit an annual facility report to the Solid Waste Section, on forms prescribed by the Section.

    a. The reporting period shall be for the previous year beginning July 1 and ending June 30.

    b. The annual facility report must list the amount of waste received and landfilled in tons and be compiled:
        i) On a monthly basis.
        ii) By county, city or transfer station of origin.
        iii) By specific waste type.
        iv) By disposal location within the facility.
        v) By diversion to alternative management facilities.

    c. A measurement of volume utilized in the landfill cells must be performed during the second quarter of the calendar year. The date and volumes, in cubic yards, must be included in the report.

    d. The amount of waste, in tons from scale records, disposed in landfill cells from October 8, 1993 through the date of the annual volume survey must be included in the report.

e. The completed report must be forwarded to the Regional Waste Management Specialist for the facility by the date due on the prescribed annual facility report form.

f. A copy of the completed report must be forwarded to each county manager for each county from which waste was received at the facility. Documentation that a copy of the report has been forwarded to the county managers must be sent to the Regional Waste Management Specialist by the date due on the prescribed annual facility report form

PART II: MUNICIPAL SOLID WASTE LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART III: CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

22. This permit approves the operation of Phase 3, as well as the onsite environmental management and protection facilities as described in the approved plans.

23. This permit is for operational approval of a remaining gross capacity of 96,000 cubic yards. The facility is approved for an average annual disposal rate of approximately 10,000 tons per year (approximately 40 tons per day based on 260 operating days per year) as set forth in Attachment 1, Part II: "List of Documents for the Approved Plan". The maximum variance should be in accordance with GS 130A-294(b1)(1) and consistent with local government approval.

24. The following table lists the details for the landfill units. Gross capacity is defined as the volume of the landfill calculated from the elevation of the initial waste placement through the top of the final cover, including any periodic cover.

MSW Unit	Acres	Gross capacity (cubic yards)	Status
Phase 1	2.95	39,750	Closed
Phase 2	2.06	65,500	Closed
Phase 3, Cell 1	0.84	49,000	Operational
Phase 3, Cell 2	0.36	47,000	Operational
Phase 3, Cell 3	0.90	27,200	Future
Total	7.11	228,450	

Note: Phase 3, Cell 3 has not been constructed.

25. The following, at a minimum, must not be accepted for disposal at the facility: hazardous waste, yard trash, liquid wastes, regulated medical waste, sharps not properly packaged,

PCB waste as defined in 40 CFR 761, and wastes banned from disposal in North Carolina by G.S. 130A-309.10(f).

26. The C&D landfill units are permitted to receive the following waste types:

    a. "Construction or demolition debris" as defined in NCGS 130A-290 (a)(4) means solid waste resulting solely from construction, remodeling, repair or demolition operations on pavement, buildings, or other structures, but does not include inert debris, land-clearing debris or yard debris.

    b. "Inert debris" as defined in NCGS 130A-290 (a)(14) means solid waste that consists solely of material such as concrete, brick, concrete block, uncontaminated soil, rock, and gravel.

    c. "Land-clearing debris" as defined in NCGS 130A-290 (a)(15) means solid waste that is generated solely from land-clearing activities, such as stumps and tree trunks.

    d. "Asphalt" in accordance with NCGS 130-294(m).

PART IV: LAND CLEARING AND INERT DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART V: MISCELLANEOUS SOLID WASTE MANAGEMENT SPECIFIC CONDITIONS

General Conditions

27. Wastes received and product stored shall be maintained in reasonably sized piles with adequate fire breaks and lanes in accordance with the approved operational plans and the pertinent rules.

28. Surface water shall be diverted from all operational and storage areas to prevent standing water in operational areas and under or around storage piles. Water that comes in contact with solid waste shall be contained on-site or properly treated prior to discharge.

29. These areas shall be operated and maintained with sufficient dust control measures to minimize airborne emissions and to prevent dust from becoming a nuisance or safety hazard.

30. These areas shall be operated and maintained in a manner so as to minimize odors, prevent the creation of a nuisance, potential health hazard, or a potential fire hazard.

31. Effective vector control measures shall be applied as necessary to control flies, rodents, insects, or vermin.

Operational Conditions – Transfer Facility

32. The facility is permitted to receive solid waste as defined in NCGS 130A -290 (35).

33. The facility must meet the requirements of 15A NCAC 13B.0105. In addition, the following, at a minimum, must not be accepted at the facility; hazardous waste, liquid wastes, regulated medical waste, sharps not properly packaged, regulated-asbestos containing material as defined in 40 CFR 61, PCB waste as defined in 40 CFR 761.

34. The facility must transport waste to one of the following facilities for disposal:

    a. Bristol Integrated Waste management Facility, Bristol, VA – Permit No. 588,
    b. Iris Glen Environmental Center, Johnson City, TN – Permit No. SNL-901040262,
    c. Caldwell County Foothills Landfill, Lenoir, NC – Permit No. 14-03 (***NC originated wastes only***).

    Proposed changes to the disposal facility must be approved by the Section and will constitute a permit modification and be subject to the applicable permitting fee.

35. A responsible individual trained and certified in facility operations must be on-site at all times during all operating hours of the facility, in accordance with G.S. 130A-309.25.

36. The permittee must develop, and use, a training and screening program at the facility for detecting and preventing unauthorized wastes from being accepted at the facility. At a minimum, the program must include:

    a. Random inspections of incoming loads or other comparable procedures.
    b. Records of all inspections.
    c. Training of personnel to recognize hazardous, liquid and other excluded waste types.

37. The facility must not cause nuisance conditions.

    a. The tipping floor and transfer trailer loading area must be maintained in a clean, sanitary condition at all times and must be cleaned at least daily in accordance with the approved Operational Plan.

    b. Waste must only be deposited on a “tipping floor” or directly into a transfer container. Waste must not be stored on the “tipping floor” after operating hours.

    c. Waste may be stored on-site, in leak proof transfer trailers, with watertight covers, a maximum of 24 hours except that a minimal amount of waste may be stored for a maximum of 72 hours when the facility is closed during a weekend or holiday. Storage of the waste must not cause any nuisance, such as odor or attraction of vectors.
    d. Effective vector control measures must be applied at all times to control any potential vectors including flies, rodents, insects, and other vermin.

    e. Control measures must be utilized to minimize and eliminate visible dust emissions and blowing litter.

i) Fugitive dust emissions are prohibited.
ii) Windblown materials must be collected by the end of the day and no windblown material may be allowed to leave the facility boundary.

38. All water that comes in contact with solid waste, including vehicle wash-down water, is leachate and must be captured and properly treated before release to the environment.

a. The leachate control system, such as floor drains, leachate collection devices, sanitary sewer connections and leachate storage tanks, must be operational during facility operations.

b. The tipping floor must drain away from the building entrance and into the leachate collection system.

39. The permittee must maintain a record of the amount of solid waste received at the facility, including daily records of waste received and origins of the loads. Scales must be used to weigh the amount of waste received. The daily records are to be summarized into a monthly report for use in the required annual reports.

40. On or before August 1 annually, the Permittee must submit an annual facility report to the Solid Waste Section, on forms prescribed by the Section.

a. The reporting period shall be for the previous year beginning July 1 and ending June 30.
b. The annual facility report must list the amount of waste received in tons and be compiled:

i) On a monthly basis.
ii) By county, city or transfer station of origin.
iii) By specific waste type.
iv) By receiving disposal facility.
v) By diversion to alternative management facilities.

c. The completed report must be forwarded to the Regional Environmental Specialist for the facility by the date due on the prescribed annual facility report form.

d. A copy of the completed report must be forwarded to each county manager for each county from which waste was received the facility. Documentation that a copy of the report has been forwarded to the county managers must be sent to the Regional Environmental Specialist by the date due on the prescribed annual facility report form.

Operational Conditions – White Goods

41. The facility is permitted to receive white goods as defined in North Carolina General Statute Article 9, Chapter 130A-290(44).

42. The facility must manage white goods according to the Operation Plan included in Attachment 1, Part II "List of Documents for the Approved Plan". This document is included in the approved plan. Any revisions to the approved plan shall be approved by the North Carolina Division of Waste Management (DWM), Solid Waste Section, prior to implementation.

43. White goods collection areas shall provide for the proper removal of chlorofluorocarbon refrigerants.

Operational Conditions – Scrap Tires

44. The facility is permitted to receive tires and scrap tires as defined in North Carolina General Statute Article 9, Chapter 130A-309.53(6) & (7).

45. Scrap tire collection areas shall be operated in accordance with the requirements of 15A NCAC 13B.1107.

46. The facility must manage tires according to the Operation Plan included in Attachment 1, Part II, "List of Documents for the Approved Plan". This document is included in the approved plan. Any revisions to the approved plan shall be approved by the North Carolina Division of Waste Management (DWM), Solid Waste Section, prior to implementation.

- *End of Permit Conditions* –

Appendix A.3 Permits

PTC for landfill

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

Beverly Eaves Perdue, Governor
Dexter R. Matthews, Director
Dee Freeman, Secretary

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION

SOLID WASTE MANAGEMENT LANDFILL FACILITY
Permit No. 06-03

AVERY COUNTY
is hereby issued a

PERMIT TO OPERATE
CONSTRUCTION & DEMOLITION DEBRIS LANDFILL PHASES 1 AND 2
PERMIT TO CONSTRUCT
CONSTRUCTION & DEMOLITION DEBRIS LANDFILL PHASE 3

Located at 2175 Brushy Creek Road, Spruce Pine, North Carolina in Avery County, in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The legal description of the site is identified on the deeds recorded for this property listed in Attachment No. 1 of this permit.

Edward F. Mussler, III, P.E.,
Permitting Branch Supervisor
Solid Waste Section

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone 919-508-8400 \ FAX 919-733-4810 \ Internet: www.wastenotnc.org/swhome

ATTACHMENT 1

PART I: PERMITTING HISTORY

1. On October 25, 1996 a Permit to Construct/Operate was issued for a Construction and Demolition Debris landfill.

2. On October 16, 2009 an amendment was made to the permit for construction of Phase 3 and continued operation of Phases 1 and 2 for waste mitigation and relocation purposes.

Permit Type	**Date Issued**	**DIN**
Original Permit to Construct/Operate	October 25, 1996	
Permit Amendment	**October 16, 2009**	**8705**

PART II: LIST OF DOCUMENTS FOR THE APPROVED PLAN

NO.	**DOCUMENT DESCRIPTION**	**DOCUMENT ID NO.**
1.	*Trout Stream Buffer Variance Request and 401/404 Nationwide Permit No. 39 Application, Avery County C&D Landfill Expansion*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. September 2008.	5911
2.	*Transition Application, Avery County Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. October 23, 2008.	6095
3.	*Waste Relocation and Mitigation Plan, Avery County C&D Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. October 2008.	6097
4.	*Response to Comments-Transition Application*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. January 9, 2009.	6625
5.	*Permit To Construct Application, Phase III, Avery County C&D Landfill*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. February 2009.	6894
6.	*Letter of Approval with Modifications, Avery County C&D Landfill-Stormwater Management Plan*. Prepared by: Starr Silvis. Prepared for: Division of Land Resources, Land Quality Section. June 9, 2009.	7943
7.	*Response to Engineering Technical Review, Permit To Construct, Construction and Demolition Landfill Phase III*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. August 7, 2009.	8220

8.	*Stormwater Management Plan Modification, Permit To Construct, Avery County C&D Landfill Expansion*. Prepared by: Richardson, Smith, Gardner & Associates. Prepared for: Avery County. August 31, 2009.	8557

PART III: PROPERTIES APPROVED FOR THE SOLID WASTE FACILITY

Avery County, N.C. Register of Deeds				
Book	Page	Acreage	Grantee	Parcel No.
266	646	±78.12	Avery County	182100088310
				Total Site Acreage: ±78.12 acres

Notes:
1. Deed book references are from the Avery County Register of Deeds office GIS website (http://arcims.webgis.net/nc/avery/default.asp) accessed September, 2009.

PART IV: GENERAL PERMIT CONDITIONS

1. This permit is issued by the North Carolina Department of Environment and Natural Resources, Division of Waste Management, Solid Waste Section (Section). In accordance with North Carolina Solid Waste Management Rule 15A NCAC 13B .0201(d), a solid waste management facility permit shall have two parts: a Permit to Construct and a Permit to Operate. The Permit to Construct must be implemented in accordance with Attachment 2 of this permit. The Permit to Operate must be implemented in accordance with Attachment 3 of this permit.
2. The persons to whom this permit is issued ("permittee") are the owners and operators of the solid waste management facility.
3. (Intentionally blank)
4. When this property is sold, leased, conveyed, or transferred in any manner, the deed or other instrument of transfer shall contain in the description section in no smaller type than that used in the body of the deed or instrument, a statement that the property has been used as a sanitary landfill and a reference by book and page to the recordation of the permit.
5. By initiating construction or receiving waste at this facility the permittee shall be considered to have accepted the terms and conditions of this permit.

6. Construction and operation of this solid waste management facility must be in accordance with the Solid Waste Management Rules, 15A NCAC 13B, Article 9 of the Chapter 130A of the North Carolina General Statutes (NCGS 130A-290, et seq.), the conditions contained in this permit; and the approved plan. Should the approved plan and the rules conflict, the Solid Waste Management Rules shall take precedence unless specifically addressed by permit condition.

7. This permit is issued based on the documents submitted in support of the application for permitting the facility including those identified in Attachment 1, "List of Documents for Approved Plan," and which constitute the approved plan for the facility. Where discrepancies exist, the most recent submittals and the Conditions of Permit shall govern.

8. This permit may be transferred only with the approval of the Section, through the issuance of a new or substantially amended permit in accordance with applicable statutes and rules. In accordance with NCGS 130A-295.2(g) the permittee must notify the Section thirty (30) days prior to any significant change in the identity or business structure of either the owner or the operator, including but not limited to a proposed transfer of ownership of the facility or a change in the parent company of the owner or operator of the facility.

9. The permittee is responsible for obtaining all permits and approvals necessary for the development of this project including approval from appropriate agencies for a General or Individual NPDES Stormwater Discharge Permit. Issuance of this permit does not remove the permittee's responsibilities for compliance with any other local, state or federal rule, regulation or statute.

- End of Section -

ATTACHMENT 2
CONDITIONS OF PERMIT TO CONSTRUCT

PART I: GENERAL FACILITY CONDITIONS

1. The issuance date of the Permit to Construct is October 16, 2009. The initial, substantial, construction authorized by this Permit to Construct must commence within 18 months from the issuance date of this permit. If substantial construction does not begin within 18 months from the issuance date of this permit, then the permit to construct shall expire. Substantial construction includes, but is not limited to, issuance of construction contracts, mobilization of equipment on site, and construction activities including installation of sedimentation and erosion control structures. The permittee may reapply for the permit to construct prior to the expiration date. The re-application will be subject to the statutes and rules in effect on that date and may be subject to additional fees.
2. Construction of all solid waste management units within this facility must be in accordance with the pertinent approved plans and only for those phases of development approved for construction as described in Attachment I, Part II List of Documents for the Approved Plan.
3. The permittee must conduct a preconstruction meeting at the facility prior to initiating construction of any unit/cell and must notify the Section at least 10 days prior to the meeting.
4. Modifications or revisions of the approved documents or changes during construction of any landfill unit/cell require approval by the Section, and may constitute a permit modification and be subject to a permitting fee.

Geologic, Groundwater, Surface water, Landfill Gas, and Monitoring Requirements

5. (Intentionally blank)
6. Prior to construction of the phase or cell(s) within the phase, all piezometers, borings, probes, landfill gas monitoring wells, and groundwater monitoring wells within the footprint must be properly abandoned in accordance with 15A NCAC 2C.0113(b), entitled “Abandonment of Wells.”
7. In areas where soil is to be undercut, abandoned piezometers, monitoring wells and borings must not be grouted to pregrade land surface, but to the proposed base grade surface to prevent having to cut excess grout and possibly damage the wells.
8. A Licensed Geologist must report any pertinent geological feature(s) exposed during phase or cell excavation. Prior to placing any landfill liner, the geologist must submit to the Section hydrogeologist a written report that includes an accurate description of the

exposed geological feature(s), subsurface soil condition, and effect of the geological feature(s) on the design, construction, and operation of the cell, phase, or unit.

9. A Licensed Geologist must supervise installation of groundwater monitoring wells, landfill gas monitoring wells and probes, and surface water sampling stations.

10. Any modification to the approved water quality and landfill gas monitoring, sampling, and analysis plans must be submitted to the Section Hydrogeologist for review.

11. Within 30 days of completed construction of any new groundwater and/or landfill gas monitoring well, a well construction record (GW-1 form), typical well schematic, boring log, field log and notes, and description of well development activities must be submitted to the Section.

12. The permittee must provide a legible plan sheet-sized, scaled topographical map with a legend, showing the location and identification of all new, existing, and abandoned wells, probes, and piezometers after installation of groundwater and landfill gas monitoring wells.

13. Within thirty (30) days of the completed permanent abandonment of a groundwater or landfill gas monitoring well, the well abandonment record (GW-30 form) and any additional information included in the abandonment record) must be submitted to the Section. The well abandonment records must be submitted to the Solid Waste Section in accordance with 15A NCAC 2C .0114(b) and be certified by a Licensed Geologist.

Erosion and Sedimentation Control Requirements

14. All required sedimentation and erosion control measures must be installed and operable to mitigate excessive on-site erosion and to prevent silt from leaving the area of the landfill unit during the service life of the facility.

15. All earth disturbing activities must be conducted in accordance with the Sedimentation Pollution Control Act of 1973 (15 NCAC 4) and consistent with any other local, state or federal requirements.

16. Facility construction, operations or practices must not cause or result in a discharge of pollution, dredged material, and/or fill material into waters of the state in violation of the requirements under Sections 401 and 404 of the Clean Water Act, as amended.

17. Modifications to the approved sedimentation and erosion control activities require approval by the North Carolina Land Quality Section. The Section must be notified of any sedimentation and erosion control plan modifications.

PART II: MUNICIPAL SOLID WASTE LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART III: CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

18. Pursuant to the NC Solid Waste Management Rules (Rule) 15A NCAC 13B .0201(c) and (d)(1), this permit approves construction for Phase 3 consisting of approximately 2.1 acres with a calculated gross capacity of approximately 129,000 cubic yards.

19. Pursuant to the NC Solid Waste Management Rule (Rule) 15A NCAC 13B .542(i)(2) burning of land-clearing debris generated on site as a result of construction activities requires approval by the Section prior to initiating the burn. In addition, the Division of Air Quality and local fire department must approve the activity prior to burning.

20. The following conditions must be met prior to operation of the Phase 3:

    a. The Permittee must obtain a Permit to Operate for Phase 3 from the Section in accordance with 15A NCAC 13B .0201(d).

    b. Construction Quality Assurance (CQA) documentation as well as a certification by the project engineer that the landfill was built in accordance with approved plans and the conditions of the permit must be submitted to the Section for review and approval.

    c. The Permittee must contact the appropriate regional environmental specialist and permitting engineer to determine whether the Section chooses to hold a pre-operative meeting with key landfill personnel and representatives of the Section.

    d. The edge of the waste footprint must be identified with permanent physical markers.

    e. A permit activity fee (Modification) must be paid prior to receiving the Permit to Operate for Phase 3.

    f. The Financial Assurance instrument for approved Closure and Post-closure Care costs must be submitted to the Section.

PART IV: LAND CLEARING AND INERT DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART V: MISCELLANEOUS SOLID WASTE MANAGEMENT SPECIFIC CONDITIONS

Not Applicable

ATTACHMENT 3
CONDITIONS OF PERMIT TO OPERATE

PART I: GENERAL FACILITY CONDITIONS

1. (Intentionally blank)

2. All sedimentation and erosion control activities must be conducted in accordance with the Sedimentation Control Act N.C.G.S. 113A-50, et seq., and rules promulgated under 15A NCAC 4.

3. The edge of the waste footprint for all disposal units must be identified and maintained with permanent physical markers.

Operational Requirements

4. This facility is permitted to receive solid waste generated within Avery County, consistent with the local government waste management plan and with local government approval except where prohibited by the N. C. General Statues Article 9 of Chapter 130A, and the rules adopted by the Commission for Health Services.

5. The C&D landfill units are permitted to receive the following waste types:

   a. "Construction or demolition debris" as defined in NCGS 130A-290 (a)(4) means solid waste resulting solely from construction, remodeling, repair or demolition operations on pavement, buildings, or other structures, but does not include inert debris, land-clearing debris or yard debris.

   b. "Inert debris" as defined in NCGS 130A-290 (a)(14) means solid waste that consists solely of material such as concrete, brick, concrete block, uncontaminated soil, rock, and gravel.

   c. "Land-clearing debris" as defined in NCGS 130A-290 (a)(15) means solid waste that is generated solely from land-clearing activities, such as stumps and tree trunks.

   d. "Asphalt" in accordance with NCGS 130-294(m).

6. The facility operator must complete an approved operator training course in compliance with G.S. 130A-309.25.

   a. A responsible individual certified in landfill operations must be on-site during all operating hours of the facility at all times while open for public use to ensure compliance with operational requirements.

b. All pertinent landfill-operating personnel must receive training and supervision necessary to properly operate the landfill units in accordance with G.S. 130A-309.25 and addressed by memorandum dated November 29, 2000.

7. The use of different alternative daily cover requires approval, prior to implementation, by the Solid Waste Section. Requests for alternative daily cover approval must include a plan detailing the comprehensive use and a demonstration of the effectiveness of the alternative daily cover. The plan must be developed according to Section guidelines. Plans which are approved by the Section will be incorporated into, and made a part of, the approved documents listed in Attachment 1.

8. The facility must maintain records for all solid waste materials accepted as alternative cover material and used as alternate daily cover. The records must include: the date of receipt, weight of material, general description of the material, identity of the generator and transporter, and county of origin. Such records must be made available to the Solid Waste Section upon request.

Monitoring and Reporting Requirements

9. Groundwater, surface water, and landfill gas monitoring locations must be established and monitored as identified in the approved plans.

10. A licensed geologist must be present to supervise installation of groundwater and landfill gas monitoring wells and probes. The location, screen interval, spacing, diameter, depth, seal, cap, clustering and nesting, and other criteria for the wells must be established after consultation with the SWS Hydrogeologist at the time of well installation.

11. Ground water monitoring wells and surface water sampling locations must be sampled for Appendix I constituents at least semi-annually according to the specifications outlined in the approved water quality monitoring plan and the current policies and guidelines of the Section in effect at the time of sampling.

12. Landfill gas monitoring wells must be sampled for explosive gases at least quarterly and according to specifications outlined in 15A NCAC 13B .544(d), entitled “Gas Control Plan”, and current policies and guidelines of the Section in effect at the time of sampling.

13. Reports of the analytical data for each monitoring event must be submitted to the Section within 120 days of the respective sampling event. Analytical data must be submitted in a manner prescribed by the Section. Records of all groundwater, surfacewater, landfill gas, and leachate analytical data must be kept as part of the permanent facility record.

14. A readily accessible unobstructed path must be cleared and maintained so that four-wheel vehicles may access monitoring well locations at all times.

15. A field log book which details all development, sampling, repair, and all other pertinent activities associated with each monitoring well and all sampling activities associated with each groundwater, surfacewater, landfill gas, and leachate sampling location must be kept as part of the permanent facility record.

16. All well construction records and soil boring logs for new wells and probes must be submitted to the Solid Waste Section Hydrogeologist for review within 30 days of completion.

17. Copies of this permit, the approved plans, and all records required to be maintained by the permittee must be maintained at the facility and made available to the Section upon request during normal business hours.

18. The owner or operator must maintain a record of the amount of solid waste received at the landfill unit, compiled on a monthly basis. Scales must be used to weigh the amount of waste received.

19. On or before August 1 annually, the Permittee must submit an annual facility report to the Solid Waste Section, on forms prescribed by the Section.

    a. The reporting period shall be for the previous year beginning July 1 and ending June 30.

    b. The annual facility report must list the amount of waste received and landfilled in tons and be compiled:
        i) On a monthly basis.
        ii) By county, city or transfer station of origin.
        iii) By specific waste type.
        iv) By disposal location within the facility.
        v) By diversion to alternative management facilities.

    c. A measurement of volume utilized in the landfill cells must be performed during the second quarter of the calendar year. The date and volumes, in cubic yards, must be included in the report.

    d. The amount of waste, in tons from scale records, disposed in landfill cells from October 8, 1993 through the date of the annual volume survey must be included in the report.

    e. The completed report must be forwarded to the Regional Waste Management Specialist for the facility by the date due on the prescribed annual facility report form.

    f. A copy of the completed report must be forwarded to each county manager for each county from which waste was received at the facility. Documentation that a

copy of the report has been forwarded to the county managers must be sent to the Regional Waste Management Specialist by the date due on the prescribed annual facility report form

PART II: MUNICIPAL SOLID WASTE LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART III: CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

20. This permit approves the continued operation of Phases 1 and 2, as well as the onsite environmental management and protection facilities as described in the approved plans.

21. The facility is only approved to receive material generated during waste relocation in accordance with the Waste Relocation and Mitigation Plan as listed in Attachment 1, Part II: List of Documents for the Approved Plan, Document No. 3.

22. The following table lists the details for the landfill units. Gross capacity is defined as the volume of the landfill calculated from the elevation of the initial waste placement through the top of the final cover, including any periodic cover.

MSW Unit	Acres	Gross capacity (cubic yards)	Status
Phase 1	2.95	10,800	Closed
Phase 2	2.06	11,500	Closed
Phase 3, Cell 1	0.84	49,000	Future
Phase 3, Cell 2	0.36	47,000	Future
Phase 3, Cell 3	0.90	33,000	Future
Total	7.11	151,300	

23. The following, at a minimum, must not be accepted for disposal at the facility: hazardous waste, yard trash, liquid wastes, regulated medical waste, sharps not properly packaged, PCB waste as defined in 40 CFR 761, and wastes banned from disposal in North Carolina by G.S. 130A-309.10(f).

24. The permittee must not knowingly dispose of any type or form of municipal solid waste that is generated within the boundaries of a unit of local government that by ordinance:

    a. Prohibits generators or collectors of municipal solid waste from disposing of that type or form of municipal solid waste.

    b. Requires generators or collectors of municipal solid waste to recycle that type or form of municipal solid waste.

25. Financial assurance as required by state rules and statutes must be continuously maintained for the duration of the facility in accordance with applicable rules and statutes. Closure and Post-Closure cost estimates and financial instruments must be updated annually pursuant to 15A NCAC 13B .1628.

26. Closure or partial closure of any landfill unit must be in accordance with the Closure Plans described in the approved plans. Final Closure Plans must be submitted to the Division at least 90 days prior to implementation.

PART IV: LAND CLEARING AND INERT DEBRIS LANDFILL UNIT SPECIFIC CONDITIONS

Not Applicable

PART V: MISCELLANEOUS SOLID WASTE MANAGEMENT SPECIFIC CONDITIONS

Not Applicable

- *End of Permit Conditions* –

Appendix A.4 Permits

Land disturbance approval

REC'D AUG 24 2009

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Land Resources
Land Quality Section

James D. Simons, PG, PE
Director and State Geologist

Beverly Eaves Perdue, Governor
Dee Freeman, Secretary

August 19, 2009

LETTER OF APPROVAL WITH MODIFICATIONS

Avery County
ATTN: Henry C. Norris, Solid Waste Director
Post Office Box 640
Newland, North Carolina 28657

RE: Project Name: Avery County C&D Landfill - Stormwater Management Plan - Modification
Acres Approved: 15
Project ID: AVERY-2009-003
County: Avery
Street and City: Brushy Creek Road, Toe River
River Basin: Catawba
Stream Classification: c, Tr
Latitude: 35.9619 Longitude: -81.9719
Submitted By: Richardson, Smith, Gardner & Associates, Inc
Date Received by LQS: 5/20/2009
Plan Type: New Submittal

Dear Mr. Norris:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable with modifications and hereby issue this letter of Approval With Modifications. The Modifications Required for Approval are listed on the attached page. This plan approval shall expire three (3) years following the date of approval, if no land-disturbing activity has been undertaken, as is required by Title 15A NCAC 4B .0129.

Please be advised that Title 15A NCAC 4B .0118(a) requires that a copy of the approved erosion control plan be on file at the job site. Also, you should consider this letter to give the Notice required by G.S. 113A-61.1(a) of our right of periodic inspection to insure compliance with the approved plan.

North Carolina's Sedimentation Pollution Control Program is performance-oriented, requiring protection of existing natural resources and adjoining properties. If, following the commencement of this project, it is determined that the erosion and sedimentation control plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute 113A-51 through 66), this office may require revisions to the plan and implementation of the revisions to insure compliance with the Act.

Acceptance and approval of this plan is conditioned upon your compliance with Federal and State water quality laws, regulations, and rules. In addition, local city or county ordinances or rules may also apply to this land-disturbing activity. This approval does not supersede any other permit or approval.

Please be aware that your project will be covered by the enclosed NPDES General Stormwater Permit NCG010000 (Construction Activities). You should first become familiar with all of the requirements for compliance with the enclosed general permit.

Please note that this approval is based in part on the accuracy of the information provided in the Financial Responsibility Form, which you have provided. You are requested to file an amended form if there is any change in the information included on the form. In addition, it would be helpful if you notify this office of the proposed starting date for this project. Please notify **William Beck** or myself if you plan to have a pre-construction conference.

Your cooperation is appreciated.

Sincerely,

Starr Silvis, PE
Land Quality Section

Enclosures: Certificate of Approval
Modifications Required for Approval
NPDES Permit

cc: Richardson Smith Gardner & Associates, Inc. Attn: Mr. Stacey A. Smith PE

MODIFICATIONS REQUIRED FOR APPROVAL

Project Name: Avery County C&D Landfill - Stormwater Management Plan - Modificatior
Project ID: AVERY-2009-003
County: Avery
Reviewed By: Starr Silvis, PE

1. Appropriate sediment control measures in accordance with *The State of North Carolina Erosion and Sediment Control Planning and Design Manual* shall be constructed in the area between the creek and Phase 2 upslope of the road crossing and in the vicinity of the road crossing.

2. This plan approval is valid for portions of the project outside the required trout buffer zone. Work may not be initiated inside the trout buffer zone without written approval from the director of the Division of Land Resources. A copy of Trout Buffer Zone Waiver dated May 1, 2009, is on file in the Asheville Regional Office.

3. All silt fence shall be designed and constructed in accordance with *The State of North Carolina Erosion and Sediment Control Planning and Design Manual* Practice Standards and Specification 6.62.

4. Rolled erosion control fabric is required on all slopes completed between the dates of October 15th and March 15th.

5. Skimmer sediment basins shall be designed and constructed in accordance with *The State of North Carolina Erosion and Sediment Control Planning and Design Manual* Practice Standards and Specification 6.64.

APPENDIX B

PHOTOGRAPHS

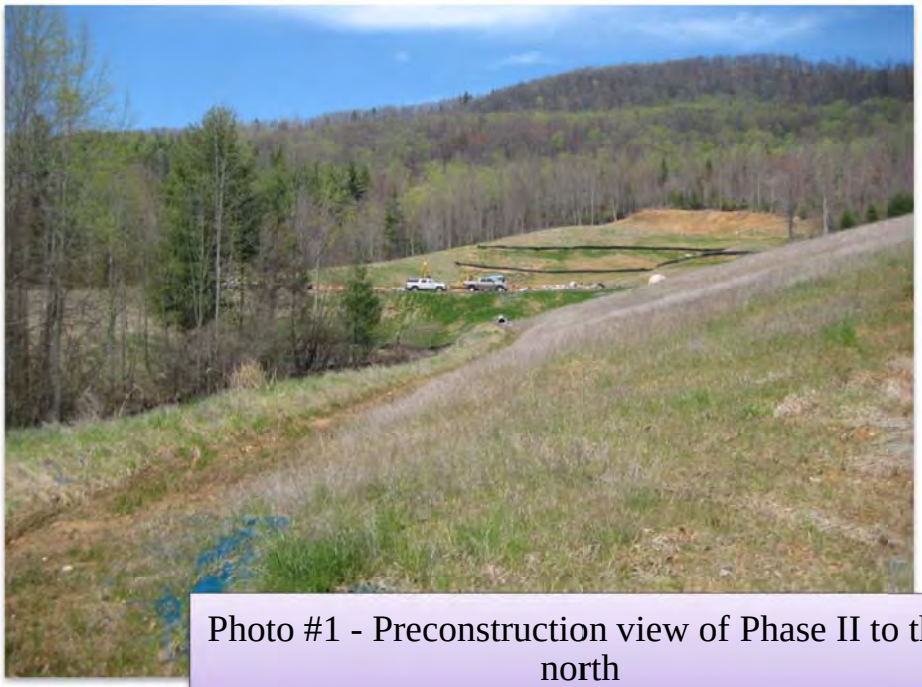


Photo #1 - Preconstruction view of Phase II to the north

Photo #2 - View along eastern side of Phase II of new access road

Photo #3 - View of western side of Phase II

Photo #4 - View to the north along eastern side of Phase II

Photo #5 - View along western side of Phase I

Photo #6 - View from the north of Phase II

Photo #7 - View along northern side of Phase I

Photo #8 - View to the south of Phase II

APPENDIX C

SOIL TESTING

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

REPORT OF CONSTRUCTION QUALITY CONTROL SERVICES

COMPACTED SOIL LINER AND CONFORMANCE TESTING OF VEGETATIVE SOIL LAYER

PHASES I AND II CLOSURE EVENT NO. 1
AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Prepared for:

M&M Construction of Banner Elk
Banner Elk, North Carolina

Prepared by:

Bunnell Lammons Engineering, Inc.
Greenville, South Carolina
BLE Project No. J11-7577-01
NC Engineering License C-1538

August 31, 2011

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

August 31, 2011

M&M Construction of Banner Elk
P. O. Box 696
Banner Elk, North Carolina 28604

Attention: Mr. Bill Cook

Subject: **Report of Construction Quality Control Services**
Compacted Soil Liner and Conformance Testing of Vegetative Soil Layer
Phases I and II Closure Event No. 1
Avery County C&D Landfill
Avery County, North Carolina
BLE Project No. J11-7577-01
NC Engineering License C-1538

Dear Mr. Cook:

The attached report summarizes our observations and construction quality control test results for the construction of the Phases I & II Closure Event No. 1 at the Avery County C&D Landfill located in Avery County, North Carolina. This report documents the compacted soil liner to verify that the construction was performed in accordance with the project drawings and specifications. Conformance testing of the vegetative soil cover was also performed.

The purpose of this document is to report construction observations and testing by Bunnell-Lammons Engineering, Inc. as required by the project specifications. In our professional opinion, the construction was completed in accordance with the following:

- The Construction Plans and Specifications
- The CQA Plan
- Requirements of NCDENR
- Acceptable Engineering Practices

6004 PONDERS COURT
GREENVILLE, SOUTH CAROLINA 29615

PHONE (864) 288-1265
FAX (864) 288-4430

To the best of our knowledge, deviations from the plans and specifications are not substantial. It is our professional opinion that the compacted soil liner and vegetative soil cover material are in conformance with the project requirements. This statement is based on the results of the observation and quality control procedures described in the attached report.

Please call us if you have questions concerning the attached field and laboratory test results.

Sincerely,

BUNNELL-LAMMONS ENGINEERING, INC.

Gary L. Weekley, P. E.
Senior Engineer
Registered, NC #8251

8-31-11

Attachments

Copy: Mr. Stacey A. Smith, P.E.
Richardson, Smith Gardner & Associates

PROJECT DESCRIPTION

Bunnell-Lammons Engineering, Inc. (BLE) was contracted by M&M Construction of Banner Elk to perform Construction Quality Control (CQC) observation and testing for the construction of Phases I & II Closure Event No. 1 at the Avery County C&D Landfill located in Avery County, North Carolina. We have been furnished project drawings and Contract Documents and Specifications for the proposed construction dated April 2011 prepared by Richardson Smith Gardner & Associates of Raleigh, North Carolina.

The Phases I and II closure areas at the Avery County C&D Landfill will occupy approximately 1.89 and 0.83 acres, respectively (total 2.72 acres). The plans call for a 1.5-foot thick compacted soil liner (approximately 6,600 cy) having a permeability of less than $1x10^{-5}$ cm/sec overlain by a 1.5-foot thick vegetative soil cover. An exploration of on site borrow source was conducted by BLE prior to the start of construction. A compacted soil liner test strip was constructed within the closure area prior to construction of the soil liner. The test strip was constructed using the on-site borrow soils and production equipment.

CONSTRUCTION OBSERVATION AND TESTING

Bunnell-Lammons Engineering (BLE) personnel observed placement of the compacted soil liner. BLE has also performed conformance testing of the protective cover material and leachate drainage stone.

The general construction procedures that BLE observed and the testing performed during landfill construction are as follows:

Borrow Source Testing

The material available for use in construction of the compacted soil liner was sampled during a borrow study by BLE. The material was determined by laboratory testing to be suitable to construct the compacted soil liner. Two samples (BW-1 and BW-2) were obtained by BLE from the borrow area prior to the start of soil liner construction. Additional samples were obtained later during the test strip and liner construction from the borrow area for testing. Samples were selected for performance of Atterberg limits (ASTM D 4318), moisture content (ASTM D 2216), grain size (ASTM D 422), standard Proctor compaction (ASTM D 698) and remolded hydraulic conductivity (ASTM D 5084). The borrow area test results were used to verify the suitability of the material for use in construction of the compacted soil liner. The laboratory test results of the stockpile samples are attached along with a summary table.

Based on the test results, the soil liner material was dark brown clayey sandy silt (MH) and clayey silty sand (SM). A target density of 95% of the standard Proctor maximum dry density at moisture content of the standard Proctor optimum moisture content was selected for test strip construction.

Soil Liner Construction

Construction of the compacted soil liner for the closure began with the test strip on May 6, 2011 and was completed on June 3, 2011. Placement of the compacted soil liner was conducted in accordance with the project specifications.

A compacted soil liner test strip was constructed within the Phase I limits at the beginning of liner construction. The permeability of the samples from the first two lifts of the test strip met the project requirements. However, the permeability of the third lift initially failed. The third lift was reprocessed, recompacted, sampled and tested. The permeability of the reprocessed Lift 3 met the project requirement. During construction of the test strip, bulk samples of the soil liner material were collected for testing (compaction) to verify the suitability of the material. The test results are attached. The test results and conclusions from the 3-lift test strip were used in constructing the soil liner.

Three 6-inch thick (compacted) lifts of the on-site borrow soils were placed as the compacted soil liner to attain the required minimum 1.5-foot thickness. The CQC technician monitored the soils obtained from the borrow area and identified soils for use consistent with the prior borrow testing and test strip construction.

The soil was initially spread by bulldozers. Each lift was carefully inspected for rock inclusions. Water was applied as necessary to achieve the target moisture range. The processed soil was then compacted.

The CQC technician performed field density tests on the compacted soil liner using the drive tube method (ASTM D 2937). The tests were performed at a minimum frequency of one per 10,000 square feet of lined area for each lift. The field density test results and approximate test locations with the closure areas are attached. The field in-place dry density and moisture content test results were compared to the recommended relationship derived from the test strip.

All test results on the compacted soil liner achieved the required compaction. The attached test results indicate that the compacted soil liner was placed in accordance with project requirements for compaction to achieve the required minimum permeability.

Undisturbed thin wall tube samples (Shelby tubes) were obtained in each lift of the compacted soil liner by CQC personnel at the specified frequency. The thin wall tube samples were sent to the laboratory for hydraulic conductivity (permeability) (ASTM D 5084). The laboratory permeability and associated test results are attached. The soil liner achieved a permeability ranging from 1.7×10^{-6} to 1.8×10^{-7} cm/sec. The relative locations of the permeability test samples within the two closure areas are presented on the site sketches with the density test locations.

In summary, the laboratory test results of the compacted soil liner undisturbed samples indicated that the compacted soil liner achieved the specified hydraulic conductivity (coefficient of permeability, $k \leq 1 \times 10^{-5}$ cm/sec). Based on the full-time observation and field and laboratory testing by CQC personnel of Bunnell-Lammons Engineering, Inc., it is our opinion that the compacted soil liner for the Phases I & II Closure Event No. 1 has been constructed in accordance with the project plans and specifications.

Vegetative Soil Cover Conformance Testing

Samples of the vegetative soil cover were collected from the on site borrow area for laboratory conformance testing. Gradation and Atterberg limits tests were performed on the vegetative soil cover. The laboratory results indicate that the cover soil is slightly clayey silty sand (SM). The test results are attached.

FIELD DENSITY TEST RESULTS

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-1	CTP-1-1	5.67	1.35	4.32	129.7	F	200.3	160.3	40.0	25.0	7.7	103.8	95.2	95	P	1	North End of Test Pad
CD-2	CTP-2-1	5.51	1.35	4.16	124.9	F	200.5	160.8	39.7	24.7	4.4	100.2	98.1	95	P	1	Center of Test Pad
CD-3	CTP-2-1	5.53	1.35	4.18	125.5	F	200.7	161.4	39.3	24.3	4.0	100.9	98.9	95	P	1	South End of Test Pad

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
CTP-1-1	109.1	17.3
CTP-2-1	102.1	20.3

Technician: RONNIE MIZELLE

Date: 5-6-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-4	CTP-2-1	5.50	1.35	4.15	124.6	F	200.1	157.3	42.8	27.2	6.9	98.0	96.0	95	P	2	North End of Test Pad
CD-5	CTP-2-1	5.48	1.35	4.13	124.0	F	200.2	158.4	41.8	26.4	6.1	98.1	96.1	95	P	2	Center of Test Pad
CD-6	CTP-2-1	5.39	1.35	4.04	121.3	F	200.3	160.4	39.9	24.9	4.6	97.2	95.2	95	P	2	South End of Test Pad
CD-7	CTP-2-1	5.51	1.35	4.16	124.9	F	200.2	156.3	43.9	28.1	7.8	97.5	95.5	95	P	3	North End of Test Pad
CD-8	CTP-2-1	5.47	1.35	4.12	123.7	F	200.1	157.6	42.5	27.0	6.7	97.4	95.4	95	P	3	Center of Test Pad
CD-9	CTP-2-1	5.52	1.35	4.17	125.2	F	200.5	156.9	43.6	27.8	7.5	98.0	96.0	95	P	3	South End of Test Pad

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
CTP-2-1	102.1	20.3

Technician: RONNIE MIZELLE

Date: 5-9-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-10	CTP-2-1	5.52	1.35	4.17	125.2	F	200.2	156.6	43.6	27.8	7.5	98.0	95.9	95	P	1	South End of Area 1
CD-11	CTP-2-1	5.40	1.35	4.05	121.6	F	200.2	160.7	39.5	24.6	4.3	97.6	95.6	95	P	1	South End of Area 1
CD-12	CTP-2-1	5.44	1.35	4.09	122.8	F	200.2	160.2	40.0	25.0	4.7	98.3	96.3	95	P	1	Middle of Area 1
CD-13	CTP-2-1	5.46	1.35	4.11	123.4	F	200.3	159.8	40.5	25.3	5.0	98.5	96.4	95	P	1	Middle of Area 1
CD-14	CTP-2-1	5.41	1.35	4.06	121.9	F	200.1	160.1	40.0	25.0	4.7	97.5	95.5	95	P	2	Southcentral Area 1
CD-15	CTP-2-1	5.39	1.35	4.04	121.3	F	200.2	160.4	39.8	24.8	4.5	97.2	95.2	95	P	1	North End of Area 1
CD-16	CTP-2-1	5.48	1.35	4.13	124.0	F	200.5	158.7	41.8	26.3	6.0	98.2	96.1	95	P	1	North End of Area 1
CD-17	CTP-2-1	5.45	1.35	4.10	123.1	F	200.0	158.6	41.4	26.1	5.8	97.6	95.6	95	P	2	South End of Area 1
CD-18	CTP-2-1	5.43	1.35	4.08	122.5	F	200.0	160.8	39.2	24.4	4.1	98.5	96.5	95	P	2	South End of Area 1
CD-19	CTP-2-1	5.47	1.35	4.12	123.7	F	200.3	159.8	40.5	25.3	5.0	98.7	96.7	95	P	2	South End of Area 1

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
CTP-2-1	102.1	20.3

Technician: RONNIE MIZELLE

Date: 5-10-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-20	CTP-2-1	5.49	1.35	4.14	124.3	F	200.0	156.9	43.1	27.5	7.2	97.5	95.5	95	P	2	Middle of Area 1
CD-21	CTP-2-1	5.51	1.35	4.16	124.9	F	200.3	157.1	43.2	27.5	7.2	98.0	96.0	95	P	2	Middle of Area 1
CD-22	CTP-2-1	5.48	1.35	4.13	124.0	F	200.3	156.9	43.4	27.7	7.4	97.2	95.2	95	P	2	Northern End of Area 1
CD-23	CTP-2-1	5.60	1.35	4.25	127.6	F	200.2	152.5	47.7	31.3	11.0	97.2	95.2	95	P	2	Northern End of Area 1
CD-24	CTP-2-1	5.46	1.35	4.11	123.4	F	200.4	157.9	42.5	26.9	6.6	97.2	95.2	95	P	3	South End of Area 1
CD-25	CTP-2-1	5.42	1.35	4.07	122.2	F	200.3	160.2	40.1	25.0	4.7	97.8	95.7	95	P	3	South End of Area 1
CD-26	CTP-2-1	5.50	1.35	4.15	124.6	F	200.1	158.3	41.8	26.4	6.1	98.6	96.6	95	P	3	South End of Area 1
CD-27	CTP-2-1	5.53	1.35	4.18	125.5	F	200.5	157.7	42.8	27.1	6.8	98.7	96.7	95	P	3	South End of Area 1
CD-28	CTP-2-1	5.48	1.35	4.13	124.0	F	200.0	158.1	41.9	26.5	6.2	98.0	96.0	95	P	3	Middle of Area 1
CD-29	CTP-2-1	5.51	1.35	4.16	124.9	F	200.3	158.3	42.0	26.5	6.2	98.7	96.7	95	P	3	Western Edge of Area 1

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %		
CTP-2-1	102.1	20.3	Technician	RONNIE MIZELLE
			Date	5-13-11
			Reviewed By	GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-30	CTP-2-1	5.51	1.35	4.16	124.9	F	200.6	156.7	43.9	28.0	7.7	97.6	95.6	95	P	3	North End of Area 1
CD-31	CTP-2-1	5.53	1.35	4.18	125.5	F	200.3	156.1	44.2	28.3	8.0	97.8	95.8	95	P	3	Northwest Corner of Area 1

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %		
CTP-2-1	102.1	20.3	Technician	RONNIE MIZELLE
			Date	5-13-11
			Reviewed By	GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-32	CTP-2-1	5.56	1.35	4.21	126.4	F	200.4	156.8	43.6	27.8	7.5	98.9	96.9	95	P	1	Southwest Corner of Area 1
CD-33	CTP-2-1	5.48	1.35	4.13	124.0	F	200.3	158.6	41.7	26.3	6.0	98.2	96.2	95	P	2	Southwest Corner of Area 1
CD-34	CTP-2-1	5.53	1.35	4.18	125.5	F	200.0	159.3	40.7	25.5	5.2	100.0	97.9	95	P	3	Southwest Corner of Area 1
CD-35	CTP-2-1	5.57	1.35	4.22	126.7	F	200.2	154.7	45.5	29.4	9.1	97.9	95.9	95	P	3	South End of Test Pad
Repair of failed permeability samples.																	

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %		
CTP-2-1	102.1	20.3	Technician	RONNIE MIZELLE
			Date	5-16-11
			Reviewed By	GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-36	CTP-2-1	5.49	1.38	4.11	123.4	F	200.0	159.5	40.5	25.4	5.1	98.4	96.4	95	P	1	South Slope of Area 1
CD-37	CTP-2-1	5.51	1.38	4.13	124.0	F	200.0	158.6	41.4	26.1	5.8	98.4	96.3	95	P	1	South Slope of Area 1
CD-38	CTP-2-1	5.51	1.38	4.13	124.0	F	200.0	157.8	42.2	26.7	6.4	97.9	95.8	95	P	2	South Slope of Area 1
CD-39	CTP-2-1	5.53	1.38	4.15	124.6	F	200.0	159.4	40.6	25.5	5.2	99.3	97.3	95	P	2	South Slope of Area 1
CD-40	CTP-2-1	5.57	1.38	4.19	125.8	F	200.0	158.8	41.2	25.9	5.6	99.9	97.9	95	P	3	South Slope of Area 1
CD-41	CTP-2-1	5.55	1.38	4.17	125.2	F	200.0	158.1	41.9	26.5	6.2	99.0	97.0	95	P	3	South Slope of Area 1

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
CTP-2-1	102.1	20.3

Technician: ANTHONY BARRACO

Date: 5-25-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-42	BW-2	5.37	1.37	4.00	120.1	F	200.1	152.5	47.6	31.2	6.9	91.5	96.4	95	P	1	South End of Area 2
CD-43	BW-2	5.42	1.37	4.05	121.6	F	200.4	151.7	48.7	32.1	7.8	92.1	96.9	95	P	1	Center of Area 2
CD-44	BW-2	5.38	1.37	4.01	120.4	F	200.2	152.9	47.3	30.9	6.6	92.0	96.8	95	P	1	North End of Area 2
CD-45	BW-2	5.36	1.37	3.99	119.8	F	200.4	154.1	46.3	30.0	5.7	92.1	97.0	95	P	1	South End of Area 2

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
BW-2	95.0	24.3

Technician: RONNIE MIZELLE

Date: 6-1-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION												
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-46	BW-2	5.40	1.37	4.03	121.0	F	200.1	151.9	48.2	31.7	7.4	91.9	96.7	95	P	2	Center of Area 2
CD-47	BW-2	5.37	1.37	4.00	120.1	F	200.5	151.2	49.3	32.6	8.3	90.6	95.4	95	P	2	North End of Area 2
CD-48	BW-2	5.36	1.37	3.99	119.8	F	200.4	152.1	48.3	31.8	7.5	90.9	95.7	95	P	2	South End of Area 2
CD-49	BW-2	5.34	1.37	3.97	119.2	F	200.6	152.7	47.9	31.4	7.1	90.8	95.5	95	P	2	Center of Area 2
CD-50	BW-2	5.37	1.37	4.00	120.1	F	200.1	152.3	47.8	31.4	7.1	91.4	96.2	95	P	2	North End of Area 2

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
BW-2	95.0	24.3

Technician: RONNIE MIZELLE

Date: 6-2-11

Reviewed By: GARY L. WEEKLEY, PE

Drive Tube Mold Volume Factor: 0.0333

FIELD DENSITY TEST RESULTS BY DRIVE TUBE METHOD
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc.Project No. J11-7577-01

		DRIVE TUBE				MOISTURE DETERMINATION											
Field Density Test Number	Proctor Number	Wet Weight Sample & Mold (pounds)	Mold Weight (pounds)	Wet Weight Sample (pounds)	Wet Density (pcf)	Field Test	Wet Weight Moisture Sample (grams)	Dry Weight Moisture Sample (grams)	Weight of Moisture (grams)	Moisture Content	Percent Moisture wet of Optimum (%)	Dry Density (pcf)	% Compaction (%)	Required Compaction (%)	P/F	Lift Number (1 through 3)	GRID
CD-51	CTP-2-1	5.46	1.37	4.09	122.8	F	200.5	159.0	41.5	26.1	5.8	97.4	95.4	95	p	3	West side of Area 2
CD-52	CTP-2-1	5.48	1.37	4.11	123.4	F	200.0	158.6	41.4	26.1	5.8	97.9	95.9	95	p	3	West side of Area 2
CD-53	CTP-2-1	5.45	1.37	4.08	122.5	F	200.1	160.2	39.9	24.9	4.6	98.1	96.1	95	P	3	West side of Area 2
CD-54	CTP-2-1	5.49	1.37	4.12	123.7	F	200.3	158.9	41.4	26.1	5.8	98.2	96.1	95	P	3	West side of Area 2

Proctor No.	Maximum Dry Density PCF	Optimum Moisture Content %
CTP-2-1	102.1	20.3

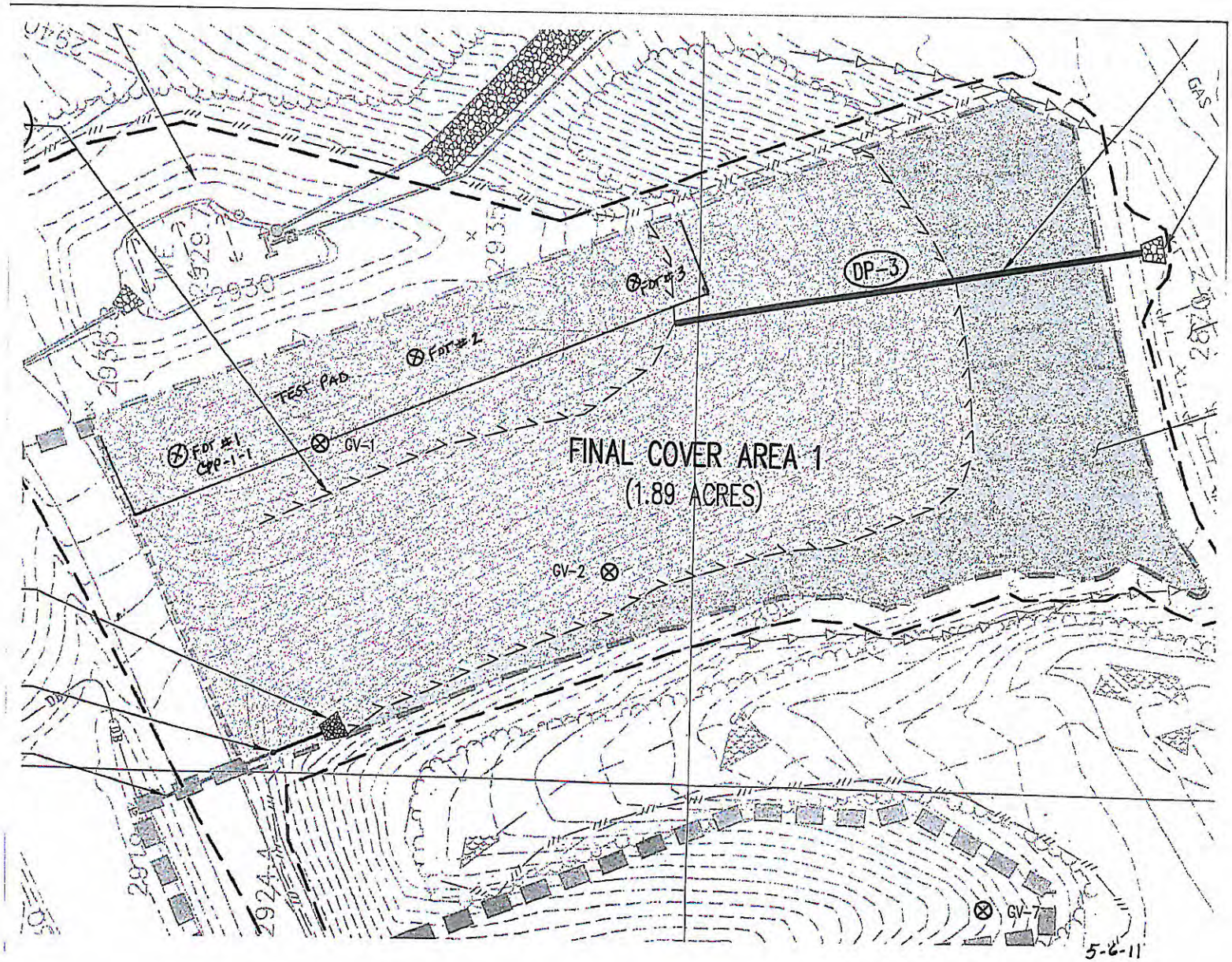
Technician: RONNIE MIZELLE

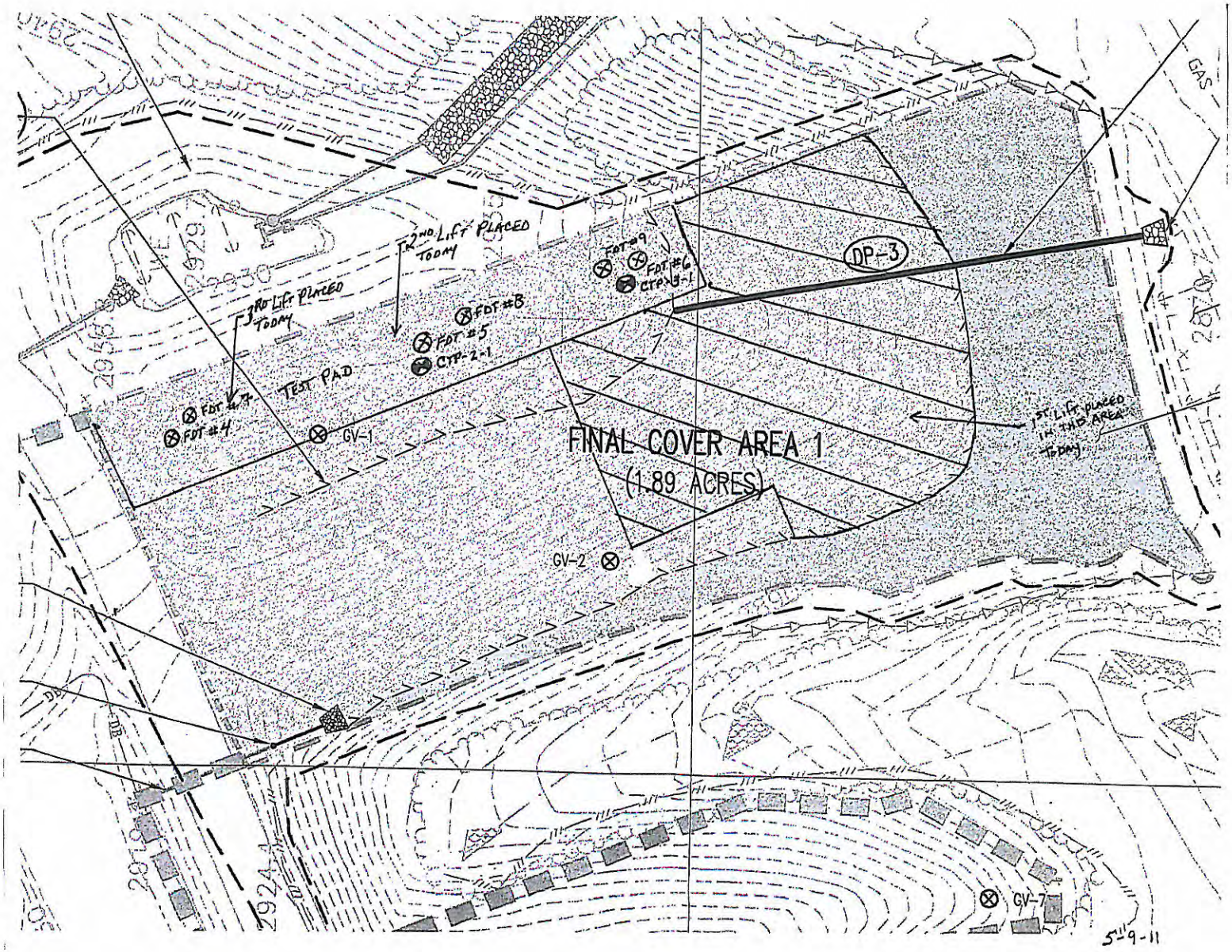
Date: 6-3-11

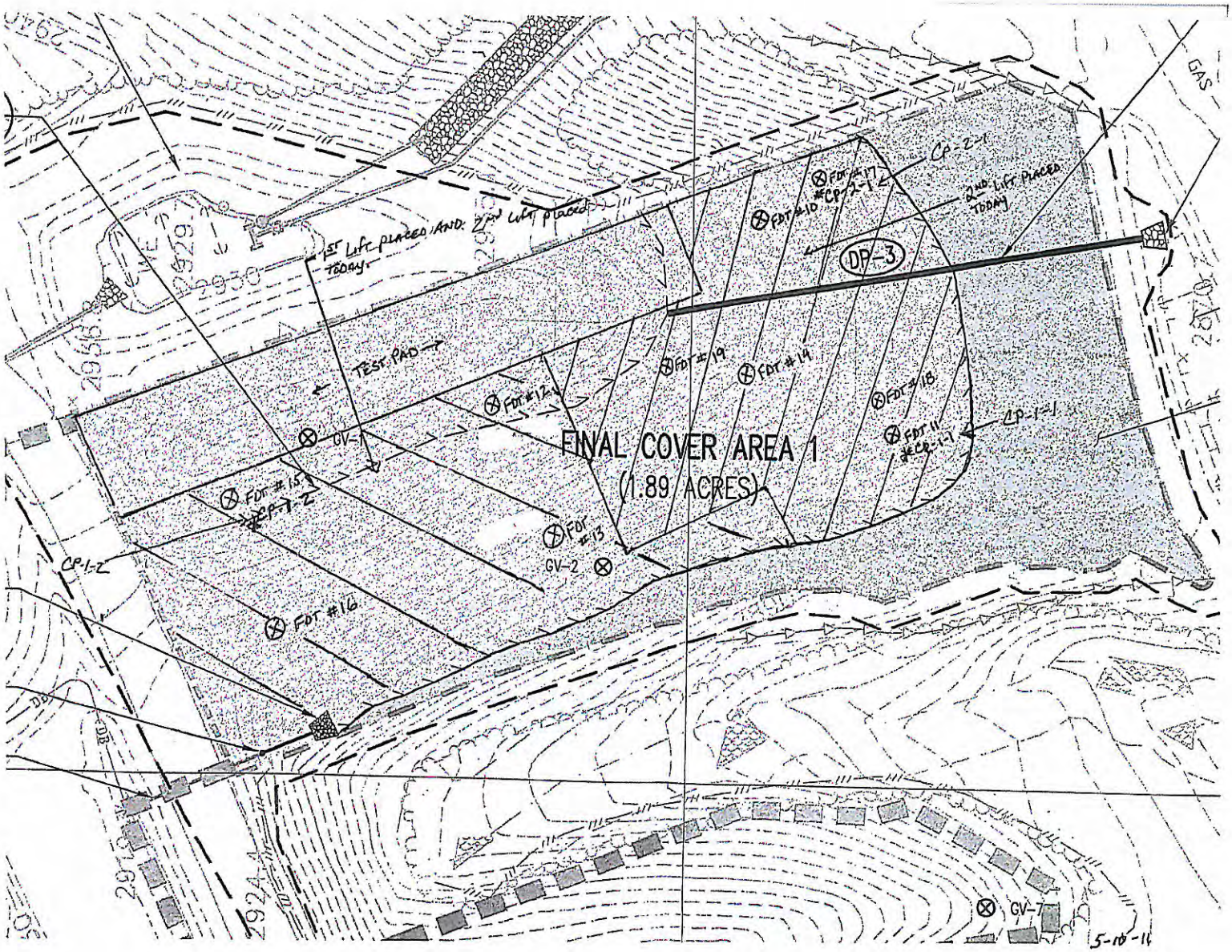
Reviewed By: GARY L. WEEKLEY, PE

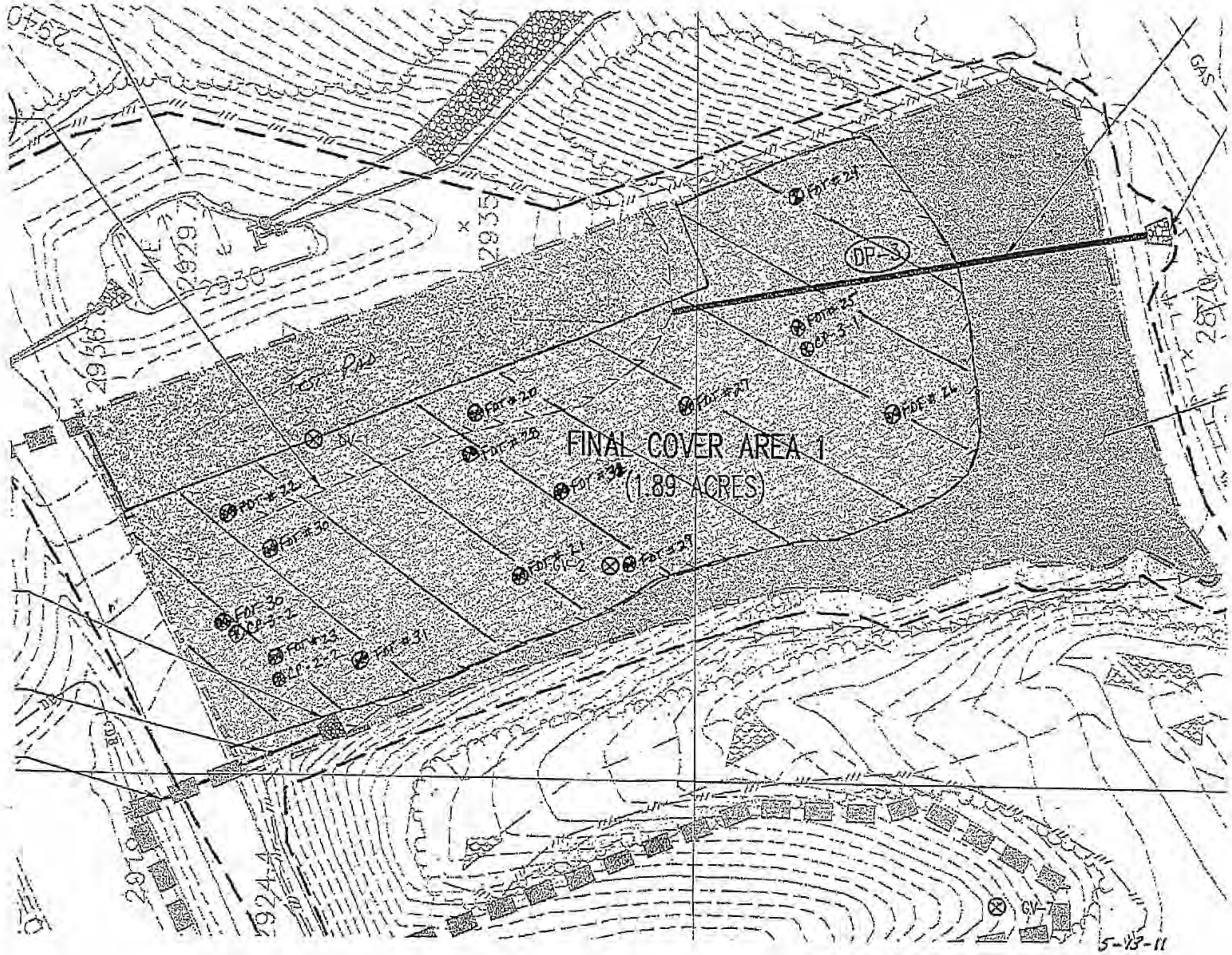
Drive Tube Mold Volume Factor: 0.0333

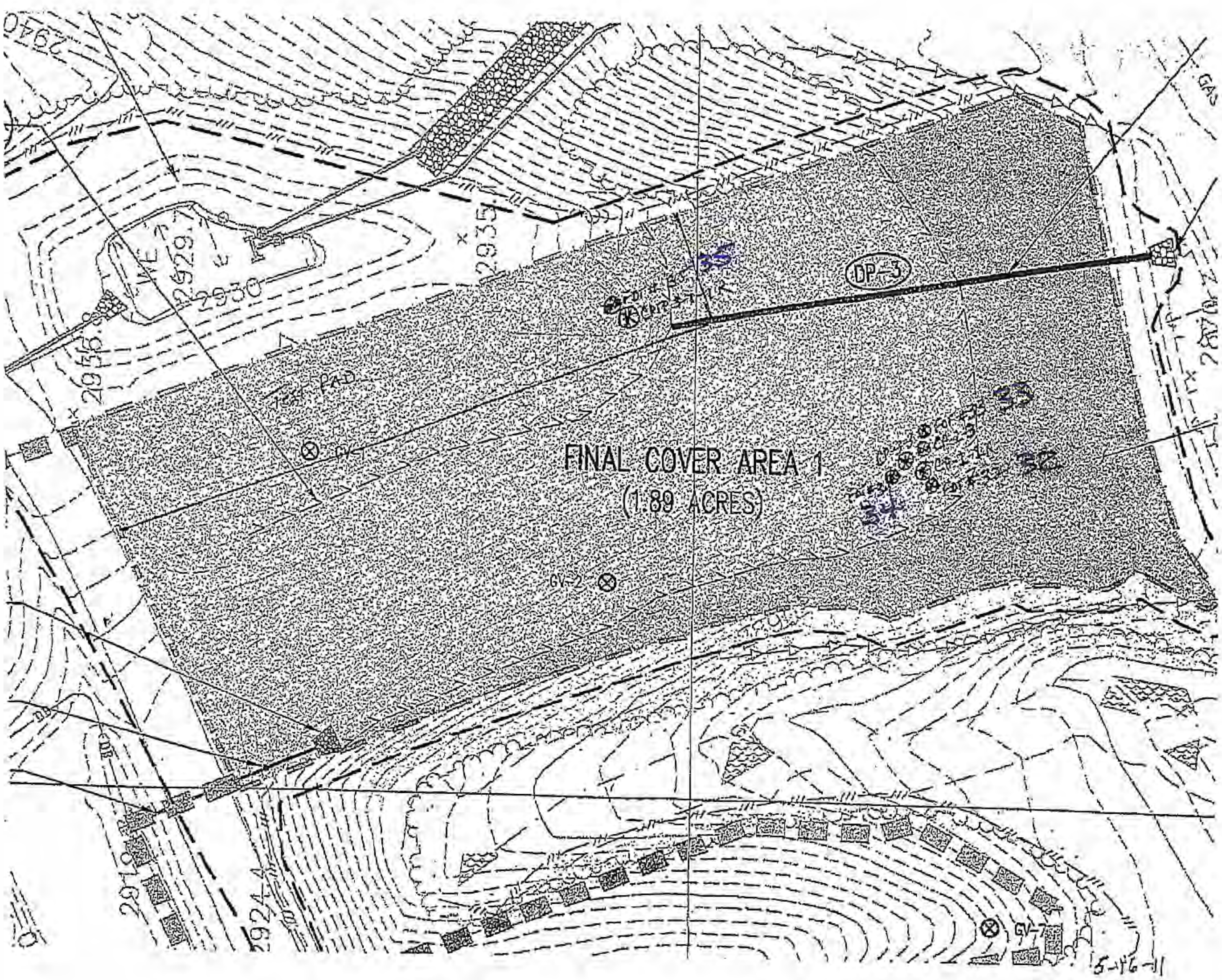
FIELD SAMPLING & TESTING SKETCHES


FINAL COVER AREA 1
(1.89 ACRES)
DP-3
FDT #3
FDT #2
FDT #1
CPP-1-1
TEST PAD
GV-1
GV-2
GV-7
GAS
2930
2924
5-6-11

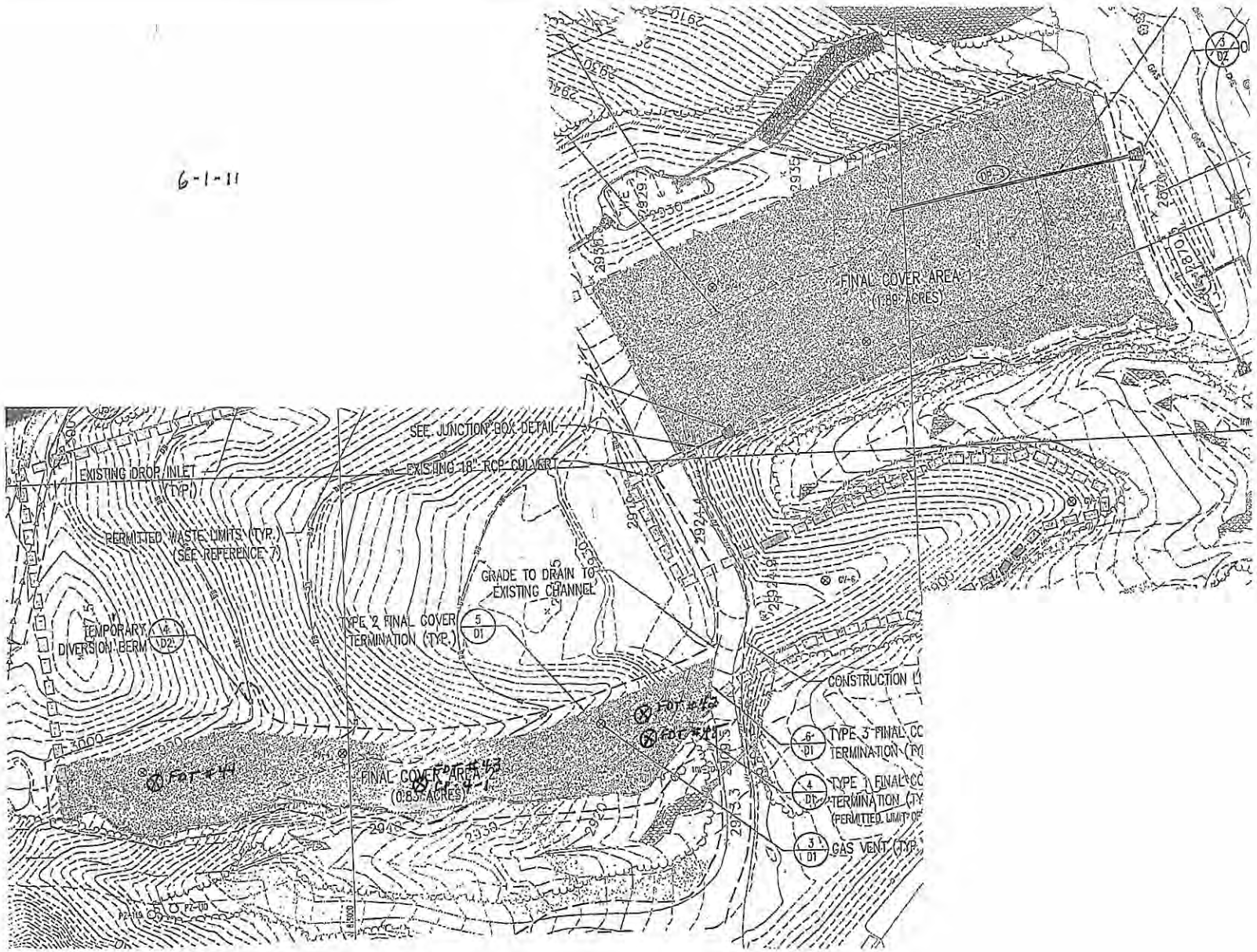

FINAL COVER AREA 1
(1.89 ACRES)
DP-3
GAS
2ND LIFT PLACED TODAY
3RD LIFT PLACED TODAY
TEST PAD
FDT #8
FDT #5
CTP-2-1
FDT #9
FDT #6
CTP-1-1
FDT #4
GV-1
GV-2
GV-7
1ST LIFT PLACED IN THIS AREA TODAY
5-19-11


FINAL COVER AREA 1
(1.89 ACRES)
DP-3
1ST LIFT PLACED AND 2ND LIFT PLACED TODAY.
2ND. LIFT PLACED TODAY
TEST PAD
GV-1
GV-2
GV-7
FDT #12
FDT #13
FDT #14
FDT #15
FDT #16
FDT #17
FDT #18
FDT #19
FDT #10
FDT #11
CP-2-1
CP-1-2
CP-1-1
CP-2-2
GAS
5-10-11

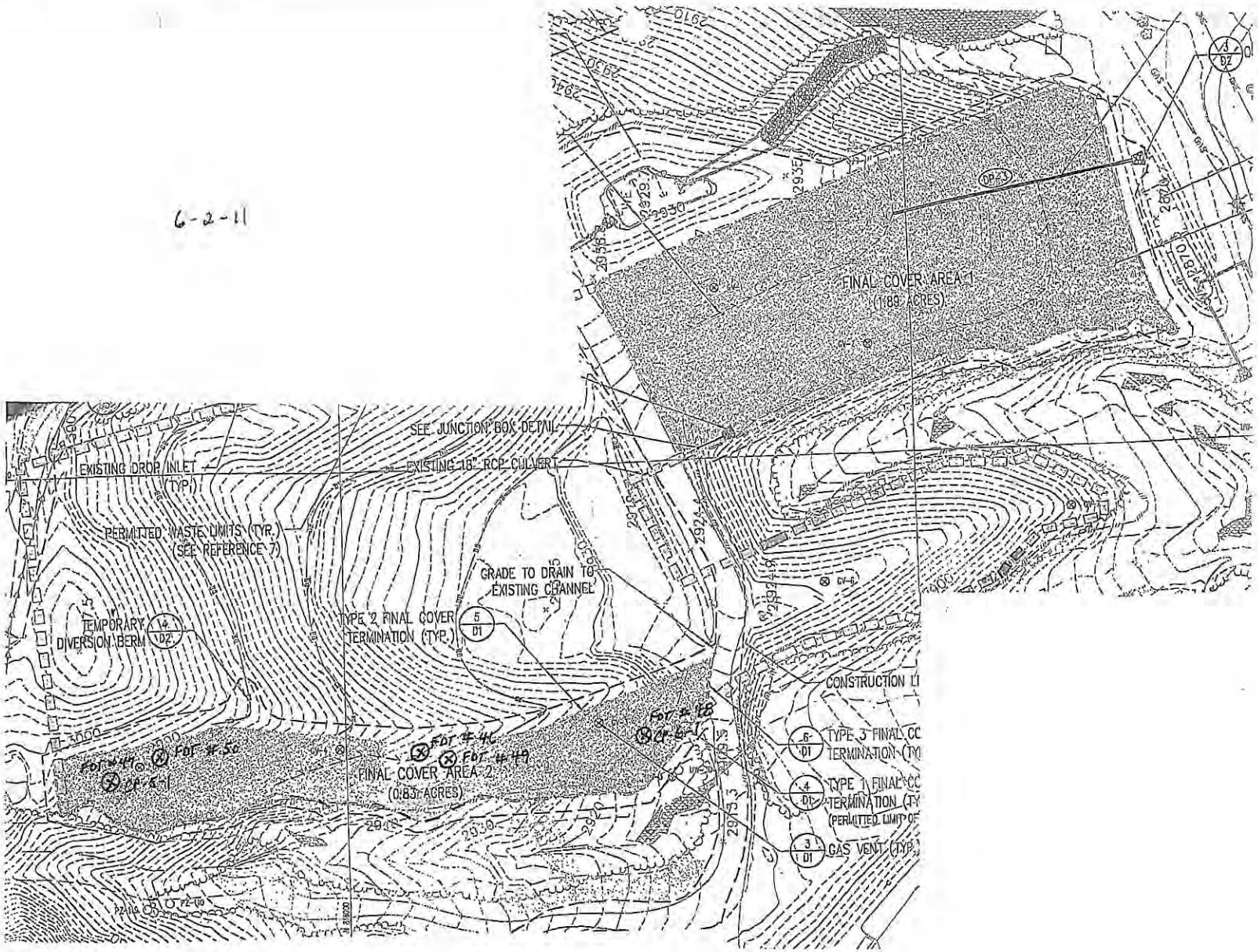

FINAL COVER AREA 1
(1.89 ACRES)
DP-3
GAS
GV-1
GV-7
2935
2930
2929
5-13-11


FINAL COVER AREA 1
(1.89 ACRES)
DP-3
GV-2
GV-7
GAS
2935
2930
2929.7
2956
2924.4
2940
2910
35
33
32
34
5-16-11

6-1-11


FINAL COVER AREA 1
(1.89 ACRES)
SEE JUNCTION BOX DETAIL
EXISTING 18" RCP CULVERT
EXISTING DROP INLET (TYP.)
PERMITTED WASTE LIMITS (TYP.) (SEE REFERENCE 7)
GRADE TO DRAIN TO EXISTING CHANNEL
TEMPORARY DIVERSION BERM
TYPE 2 FINAL COVER TERMINATION (TYP.)
FOT #44
FOT #43
FOT #42
FINAL COVER AREA 2
(0.85 ACRES)
CONSTRUCTION
TYPE 3 FINAL CC
TERMINATION (TY
TYPE 1 FINAL CC
TERMINATION (TY
(PERMITTED LIMIT OF
GAS VENT (TYP.

6-2-11


FINAL COVER AREA 1
(1.89 ACRES)
SEE JUNCTION BOX DETAIL
EXISTING DROP INLET (TYP.)
EXISTING 18" RCP CULVERT
PERMITTED WASTE LIMITS (TYP.) (SEE REFERENCE 7)
GRADE TO DRAIN TO EXISTING CHANNEL
TEMPORARY DIVERSION BERM
TYPE 2 FINAL COVER TERMINATION (TYP.)
FDT #4C
FDT #4B
FDT #4A
FDT #5C
CP-5
CP-6
FINAL COVER AREA 2
(0.83 ACRES)
CONSTRUCTION LI
TYPE 3 FINAL CC
TERMINATION (TY
TYPE 1 FINAL CC
TERMINATION (TY
(PERMITTED LIMIT OF
GAS VENT (TYP.)


FINAL COVER AREA 1
(1.89 ACRES)
DP-3
GV-1
GV-2
GV-7
FDT #51
FDT #52
FDT #53
Add'l Material To Make 2:1 Slope
Box Culvert Installed
6-3-11

LABORATORY TEST RESULTS

SOIL LINER

HYDRAULIC CONDUCTIVITY TEST RESULTS

SUMMARY OF HYDRAULIC CONDUCTIVITY TEST RESULTS
PHASES I & II CLOSURE EVENT NO. 1

AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc. Project No. J11-7577-01

Hydraulic Conductivity Test Sample Number[1]	Sample Type	Lift Number (1 to 3)[2]	Laboratory Hydraulic Conductivity Test Result cm/sec	Pass / Fail
Test Pad:				
TPCP-1-1	Undisturbed	1	3.5 E-07	Pass
CTP-1-1	Remolded	1	1.6 E-07	Pass
TPCP-2-1	Undisturbed	2	1.1 E-06	Pass
CTP-2-1	Remolded	2	1.0 E-06	Pass
TPCP-3-1	Undisturbed	3	4.5 E-05	Fail
TPCP-3-1A	Undisturbed	3	5.9 E-05	Fail
TPCP-3-1R	Undisturbed	3	8.0 E-07	Pass
CTP-3-1	Remolded	3	8.7 E-06	Pass
Phase I				
CP-1-1-1	Undisturbed	1	2.8 E-05	Fail
CP-1-1-1R	Undisturbed	1	2.3 E-07	Pass
CP-1-1-2	Undisturbed	1	1.1 E-06	Pass
CP-1-2-1	Undisturbed	2	1.7 E-06	Pass
CP-1-2-2	Undisturbed	2	5.3 E-07	Pass
CP-1-2-3[3]	Undisturbed	2	3.9 E-07	Pass
CP-1-3-1	Undisturbed	3	1.8 E-07	Pass
CP-1-3-2	Undisturbed	3	5.2 E-07	Pass
CP-1-3-3[3]	Undisturbed	3	9.9 E-07	Pass
Phase II				
CP-2-1-1	Undisturbed	1	2.6 E-07	Pass
CP-2-2-1	Undisturbed	2	4.7 E-07	Pass
CP-2-3-1	Undisturbed	3	1.5 E-06	Pass

2 HYDRAULIC CONDUCTIVITY SAMPLES REQUIRED PER LIFT FOR PHASE 1

1 HYDRAULIC CONDUCTIVITY SAMPLE REQUIRED PER LIFT FOR PHASE 2

[1] Hydraulic Conductivity sample designation: CP - Phase No. - Lift No. - Sample No.

[2] Lift 1 is on the bottom and Lift 3 is on the top of 18-inch thick compacted cap layer.

[3] Samples were from replacement layers after reworking Lift 1 area that failed initially.

BLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFIL ASES I & II CLOSURE EVENT N	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-2-11		

SAMPLE NO.	BW-1	SAMPLE LOCATION:	ONSITE BORROW
TYPE	REMOLDED	SAMPLE DESCRIPTION:	DARK BROWN FI-MED SANDY CLAYEY SILT

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.999	7.617	2.983	7.577
Sample Diameter	2.850	7.239	2.863	7.272
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 166.8 DW= 127.8	30.5	WW= 235.2 DW= 176.3	33.4
Sample Wet Weight (grams)	567.3		578.5	
Wet Density (pcf)	113.0		114.8	
Dry Density (pcf)	86.5		86.0	
Saturation (%) ASSUMED SG= 2.7	87		94	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-6-11	9:36:34		7.5	1.67	20.8	10			
	5-6-11	9:45:11	0:08:37	4.7	1.79	20.8	5	5.9E-07	0.981	5.8E-07
	5-6-11	9:45:39	0:09:05	4.6	1.79	20.8	5	5.9E-07	0.981	5.8E-07
	5-6-11	9:46:10	0:09:36	4.5	1.79	20.8	5	5.8E-07	0.981	5.7E-07
	5-6-11	9:46:43	0:10:09	4.4	1.80	20.8	5	5.8E-07	0.981	5.7E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 5.7E-07 cm/sec

% COMPACTION OF STD. PROCTOR MAX. DRY DENSITY (ASTM D 698): 94.7

% WETTER THAN OPTIMUM MOISTURE CONTENT (ASTM D 698): +3.4

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFIL ASES I & II CLOSURE EVENT N	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-2-11		

SAMPLE NO.	BW-2	SAMPLE LOCATION:	ONSITE BORROW
TYPE	REMOLDED	SAMPLE DESCRIPTION:	DARK BROWN FI-MED SANDY CLAYEY SILT

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	3.002	7.625	2.985	7.582
Sample Diameter	2.850	7.239	2.857	7.257
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 83.0 DW= 65.1	27.5	WW= 162.0 DW= 123.6	31.1
Sample Wet Weight (grams)	578.4		589.7	
Wet Density (pcf)	115.1		117.4	
Dry Density (pcf)	90.2		89.6	
Saturation (%) ASSUMED SG= 2.7	86		95	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-6-11	9:36:30		7.5	1.67	20.8	10			
	5-6-11	9:45:04	0:08:34	6.3	1.72	20.8	8	2.1E-07	0.981	2.0E-07
	5-6-11	9:46:03	0:09:33	6.2	1.72	20.8	8	2.0E-07	0.981	2.0E-07
	5-6-11	9:47:07	0:10:37	6.1	1.73	20.8	8	2.0E-07	0.981	2.0E-07
	5-6-11	9:48:11	0:11:41	6.0	1.73	20.8	7	2.0E-07	0.981	1.9E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 2.0E-07 cm/sec

% COMPACTION OF STD. PROCTOR MAX. DRY DENSITY (ASTM D 698): 94.9

% WETTER THAN OPTIMUM MOISTURE CONTENT (ASTM D 698): +3.2

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-6-11		

SAMPLE NO.	CTP-1-1	SAMPLE LOCATION:	TEST PAD LIFT 1
TYPE	REMOLDED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.997	7.612	2.941	7.470
Sample Diameter	2.850	7.239	2.855	7.252
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 162.8 DW= 135.3	20.3	WW= 220.5 DW= 181.3	21.6
Sample Wet Weight (grams)	623.9		631.6	
Wet Density (pcf)	124.3		127.8	
Dry Density (pcf)	103.3		105.1	
Saturation (%) ASSUMED SG= 2.7	87		97	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-7-11	4:50:46		7.5	1.67	20.8	10			
	6-7-11	5:01:45	0:10:59	6.3	1.72	20.8	8	1.6E-07	0.981	1.6E-07
	6-7-11	5:02:42	0:11:56	6.2	1.72	20.8	8	1.6E-07	0.981	1.6E-07
	6-7-11	5:03:46	0:13:00	6.1	1.73	20.8	8	1.6E-07	0.981	1.6E-07
	6-7-11	5:04:49	0:14:03	6.0	1.73	20.8	8	1.6E-07	0.981	1.6E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.6E-07 cm/sec

% COMPACTION OF STD. PROCTOR MAX. DRY DENSITY (ASTM D 698): 94.4

% WETTER THAN OPTIMUM MOISTURE CONTENT (ASTM D 698): +3.0

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-6-11		

SAMPLE NO.	CTP-2-1	SAMPLE LOCATION:	TEST PAD LIFT 2
TYPE	REMOLDED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	3.001	7.623	3.010	7.645
Sample Diameter	2.850	7.239	2.861	7.267
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 140.1 DW= 113.7	23.2	WW= 274.9 DW= 215.9	27.3
Sample Wet Weight (grams)	601.1		616.8	
Wet Density (pcf)	119.6		121.4	
Dry Density (pcf)	97.1		95.4	
Saturation (%) ASSUMED SG= 2.7	85		96	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-7-11	4:11:28		7.4	1.57	20.8	10			
	6-7-11	4:14:23	0:02:55	5.5	1.65	20.8	7	1.0E-06	0.981	1.0E-06
	6-7-11	4:14:45	0:03:17	5.3	1.66	20.8	6	1.1E-06	0.981	1.0E-06
	6-7-11	4:15:09	0:03:41	5.1	1.66	20.8	6	1.1E-06	0.981	1.0E-06
	6-7-11	4:15:34	0:04:06	4.9	1.67	20.8	6	1.1E-06	0.981	1.0E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.0E-06 cm/sec

% COMPACTION OF STD. PROCTOR MAX. DRY DENSITY (ASTM D 698): 95.1

% WETTER THAN OPTIMUM MOISTURE CONTENT (ASTM D 698): +2.9

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-6-11		

SAMPLE NO.	CTP-3-1	SAMPLE LOCATION:	TEST PAD LIFT 3
TYPE	REMOLDED	SAMPLE DESCRIPTION:	BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	3.002	7.625	3.047	7.739
Sample Diameter	2.850	7.239	2.866	7.280
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 82.7 DW= 67.8	22.0	WW= 215.8 DW= 170.9	26.3
Sample Wet Weight (grams)	600.3		623.4	
Wet Density (pcf)	119.4		120.8	
Dry Density (pcf)	97.9		95.7	
Saturation (%) ASSUMED SG= 2.7	82		93	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-7-11	5:17:02		4.6	1.69	20.8	5			
	6-7-11	5:17:16	0:00:14	4.0	1.71	20.8	4	7.7E-06	0.981	7.6E-06
	6-7-11	5:17:31	0:00:29	3.5	1.73	20.8	3	7.7E-06	0.981	7.6E-06
	6-7-11	5:17:32	0:00:30	3.0	1.75	20.8	2	1.3E-05	0.981	1.2E-05
	6-7-11	5:18:26	0:01:24	2.5	1.77	20.8	2	7.4E-06	0.981	7.3E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 8.7E-06 cm/sec

% COMPACTION OF STD. PROCTOR MAX. DRY DENSITY (ASTM D 698): 95.0

% WETTER THAN OPTIMUM MOISTURE CONTENT (ASTM D 698): +3.0

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-6-11		

SAMPLE NO.	TPCP-1-1	SAMPLE LOCATION:	TEST PAD LIFT 1
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.829	7.186	2.858	7.259
Sample Diameter	2.855	7.252	2.855	7.252
Length/Diameter Ratio		0.99		
Moisture Content (%)	WW= 145.9 DW= 114.6	27.3	WW= 215.9 DW= 168.0	28.5
Sample Wet Weight (grams)	563.6		566.9	
Wet Density (pcf)	118.6		118.0	
Dry Density (pcf)	93.1		91.8	
Saturation (%) ASSUMED SG= 2.7	91		92	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-9-11	2:44:06		7.1	1.58	21.0	10			
	5-9-11	2:55:40	0:11:34	4.7	1.68	21.0	6	3.7E-07	0.976	3.6E-07
	5-9-11	2:56:34	0:12:28	4.6	1.69	21.0	5	3.6E-07	0.976	3.5E-07
	5-9-11	2:57:20	0:13:14	4.5	1.69	21.0	5	3.6E-07	0.976	3.5E-07
	5-9-11	2:58:09	0:14:03	4.4	1.69	21.0	5	3.6E-07	0.976	3.5E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 3.5E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-10-11		

SAMPLE NO.	TPCP-2-1	SAMPLE LOCATION:	TEST PAD LIFT 2
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.941	7.470	2.946	7.483
Sample Diameter	2.864	7.275	2.843	7.221
Length/Diameter Ratio		1.03		
Moisture Content (%)	WW= 95.5 DW= 81.5	17.2	WW= 189.2 DW= 156.8	20.7
Sample Wet Weight (grams)	582.4		596.3	
Wet Density (pcf)	117.1		121.5	
Dry Density (pcf)	99.9		100.7	
Saturation (%) ASSUMED SG= 2.7	68		83	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-18-11	2:45:00		4.6	1.79	21.0	5			
	5-18-11	2:46:38	0:01:38	4.0	1.81	21.0	4	1.1E-06	0.976	1.1E-06
	5-18-11	2:47:15	0:02:15	3.8	1.82	21.0	4	1.1E-06	0.976	1.1E-06
	5-18-11	2:47:42	0:02:42	3.7	1.83	21.0	3	1.1E-06	0.976	1.1E-06
	5-18-11	2:48:05	0:03:05	3.6	1.83	21.0	3	1.1E-06	0.976	1.1E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.1E-06 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

AVERY COUNTY C&D LANDFILL

PROJECT:	PHASES I & II CLISURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-10-11		

SAMPLE NO.	TPCP-3-1	SAMPLE LOCATION:	TEST PAD LIFT 3
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.908	7.386	2.942	7.473
Sample Diameter	2.860	7.264	2.859	7.262
Length/Diameter Ratio		1.02		
Moisture Content (%)	WW= 138.3 DW= 112.6	22.8	WW= 189.2 DW= 151.0	25.3
Sample Wet Weight (grams)	575.7		599.1	
Wet Density (pcf)	117.4		120.8	
Dry Density (pcf)	95.6		96.4	
Saturation (%) ASSUMED SG= 2.7	81		91	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Chamber Pressure (psi)	80.2	Influent Pressure (psi)	70.2	Effluent Pressure (psi)	70	B-Value	0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
5-11-11	3:25:55	3:27:35	100	1.0	23.0	2.0	22.0	40.092	37.726	21.1	5	4.6E-05	0.974	4.5E-05
5-11-11	3:27:35	3:29:23	108	2.0	22.0	3.0	21.0	37.726	35.361	21.1	5	4.6E-05	0.974	4.5E-05
5-11-11	3:29:23	3:31:18	115	3.0	21.0	4.0	20.0	35.361	32.995	21.1	5	4.6E-05	0.974	4.5E-05
5-11-11	3:31:18	3:33:20	122	4.0	20.0	5.0	19.0	32.995	30.629	21.1	5	4.7E-05	0.974	4.5E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 4.5E-05 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

AVERY COUNTY C&D LANDFILL

PROJECT: PHASES I & II CLISURE EVENT NO. 1 TESTED BY: JOHN MATHEW

PROJECT NO.: J11-7577-01 CHECKED BY: PAUL YARBER

DATE RECEIVED: 5-11-11

SAMPLE NO. TPCP-3-1A SAMPLE LOCATION: TEST PAD LIFT 3

TYPE UNDISTURBED SAMPLE DESCRIPTION: DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.898	7.361	2.924	7.427
Sample Diameter	2.859	7.262	2.858	7.259
Length/Diameter Ratio		1.01		
Moisture Content (%)	WW= 151.6 DW= 120.6	25.7	WW= 204.6 DW= 159.5	28.3
Sample Wet Weight (grams)	552.1		578.2	
Wet Density (pcf)	113.1		117.4	
Dry Density (pcf)	89.9		91.5	
Saturation (%) ASSUMED SG= 2.7	79		91	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Chamber Pressure (psi) 80.2 | Influent Pressure (psi) 70.2 | Effluent Pressure (psi) 70 | B-Value 0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
5-12-11	3:56:30	3:57:45	75	1.0	23.0	2.0	22.0	40.092	37.726	21.5	5	6.2E-05	0.965	5.9E-05
5-12-11	3:57:45	3:59:05	80	2.0	22.0	3.0	21.0	37.726	35.361	21.5	5	6.1E-05	0.965	5.9E-05
5-12-11	3:59:05	4:00:31	86	3.0	21.0	4.0	20.0	35.361	32.995	21.5	5	6.1E-05	0.965	5.9E-05
5-12-11	4:00:31	4:02:04	93	4.0	20.0	5.0	19.0	32.995	30.629	21.5	5	6.1E-05	0.965	5.9E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 5.9E-05 cm/sec

BLB INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-18-11		

SAMPLE NO.	TPCP-3-1R	SAMPLE LOCATION:	TEST PAD - REWORKED LIFT 3
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.898	7.361	2.876	7.305
Sample Diameter	2.853	7.247	2.861	7.267
Length/Diameter Ratio		1.02		
Moisture Content (%)	WW= 155.4 DW= 123.6	25.7	WW= 221.8 DW= 176.2	25.9
Sample Wet Weight (grams)	586.1		586.8	
Wet Density (pcf)	120.5		120.9	
Dry Density (pcf)	95.9		96.0	
Saturation (%) ASSUMED SG= 2.7	92		93	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-19-11	3:08:00		7.3	1.68	21.0	10			
	5-19-11	3:10:24	0:02:24	6.0	1.73	21.0	8	8.1E-07	0.976	7.9E-07
	5-19-11	3:10:51	0:02:51	5.8	1.74	21.0	7	8.1E-07	0.976	7.9E-07
	5-19-11	3:11:17	0:03:17	5.6	1.75	21.0	7	8.1E-07	0.976	7.9E-07
	5-19-11	3:11:50	0:03:50	5.4	1.76	21.0	7	8.0E-07	0.976	7.8E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 7.9E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

AVERY COUNTY C&D LANDFILL

PROJECT:	PHASES I & II CLISURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-12-11		

SAMPLE NO.	CP-1-1-1	SAMPLE LOCATION:	PHASE I, LIFT 1
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.932	7.447	2.955	7.506
Sample Diameter	2.859	7.262	2.858	7.259
Length/Diameter Ratio		1.03		
Moisture Content (%)	WW= 152.3 DW= 126.5	20.4	WW= 186.9 DW= 148.3	26.0
Sample Wet Weight (grams)	579.2		602.4	
Wet Density (pcf)	117.2		121.1	
Dry Density (pcf)	97.4		96.1	
Saturation (%) ASSUMED SG= 2.7	75		93	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Chamber Pressure (psi)	80.2	Influent Pressure (psi)	70.2	Effluent Pressure (psi)	70	B-Value	0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
5-13-11	2:54:40	2:57:22	162	1.0	23.0	2.0	22.0	40.092	37.726	20.6	5	2.9E-05	0.986	2.8E-05
5-13-11	2:57:22	3:00:12	170	2.0	22.0	3.0	21.0	37.726	35.361	20.6	5	2.9E-05	0.986	2.9E-05
5-13-11	3:00:12	3:03:16	184	3.0	21.0	4.0	20.0	35.361	32.995	20.6	5	2.9E-05	0.986	2.8E-05
5-13-11	3:03:16	3:06:35	199	4.0	20.0	5.0	19.0	32.995	30.629	20.6	5	2.9E-05	0.986	2.8E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 2.8E-05 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-18-11		

SAMPLE NO.	CP-1-1-1R	SAMPLE LOCATION:	PHASE I, LIFT 1 REWORKED
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.876	7.305	2.840	7.214
Sample Diameter	2.861	7.267	2.846	7.229
Length/Diameter Ratio		1.01		
Moisture Content (%)	WW= 184.3 DW= 141.3	30.4	WW= 222.0 DW= 171.0	29.8
Sample Wet Weight (grams)	572.3		571.9	
Wet Density (pcf)	117.9		120.6	
Dry Density (pcf)	90.4		92.9	
Saturation (%) ASSUMED SG= 2.7	95		99	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-19-11	2:35:30		7.2	1.68	21.0	10			
	5-19-11	2:42:17	0:06:47	6.1	1.73	21.0	8	2.4E-07	0.976	2.4E-07
	5-19-11	2:43:15	0:07:45	6.0	1.73	21.0	8	2.3E-07	0.976	2.3E-07
	5-19-11	2:44:10	0:08:40	5.9	1.74	21.0	8	2.3E-07	0.976	2.2E-07
	5-19-11	2:45:06	0:09:36	5.8	1.74	21.0	7	2.2E-07	0.976	2.2E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 2.3E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-12-11		

SAMPLE NO.	CP-1-1-2	SAMPLE LOCATION:	PHASE I, LIFT 1
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.953	7.501	2.923	7.424
Sample Diameter	2.856	7.254	2.834	7.198
Length/Diameter Ratio		1.03		
Moisture Content (%)	WW= 137.9 DW= 109.0	26.5	WW= 194.1 DW= 156.0	24.4
Sample Wet Weight (grams)	598.1		607.7	
Wet Density (pcf)	120.4		125.6	
Dry Density (pcf)	95.2		100.9	
Saturation (%) ASSUMED SG= 2.7	93		98	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-13-11	2:30:01		4.6	1.79	21.0	5			
	5-13-11	2:31:36	0:01:35	4.0	1.81	21.0	4	1.2E-06	0.976	1.1E-06
	5-13-11	2:32:15	0:02:14	3.8	1.82	21.0	4	1.1E-06	0.976	1.1E-06
	5-13-11	2:32:34	0:02:33	3.7	1.83	21.0	4	1.2E-06	0.976	1.1E-06
	5-13-11	2:32:55	0:02:54	3.6	1.83	21.0	3	1.2E-06	0.976	1.1E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.1E-06 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	**AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1**	TESTED BY:	**JOHN MATHEW**
PROJECT NO.:	**J11-7577-01**	CHECKED BY:	**PAUL YARBER**
DATE RECEIVED:	**5-12-11**		

SAMPLE NO.	**CP-1-2-1**	SAMPLE LOCATION:	**PHASE I, LIFT 2**
TYPE	**UNDISTURBED**	SAMPLE DESCRIPTION:	**BROWN CLAYEY SILTY FI.-MED. SAND**

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.974	7.554	2.962	7.523
Sample Diameter	2.856	7.254	2.860	7.264
Length/Diameter Ratio		1.04		
Moisture Content (%)	WW= 144.7 DW= 115.9	24.8	WW= 234.9 DW= 184.8	27.1
Sample Wet Weight (grams)	593.4		607.0	
Wet Density (pcf)	118.7		121.5	
Dry Density (pcf)	95.0		95.6	
Saturation (%) ASSUMED SG= 2.7	87		96	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-13-11	2:40:53		4.6	1.79	21.0	5			
	5-13-11	2:42:19	0:01:26	3.8	1.82	21.0	4	1.8E-06	0.976	1.7E-06
	5-13-11	2:42:46	0:01:53	3.6	1.83	21.0	3	1.8E-06	0.976	1.7E-06
	5-13-11	2:43:21	0:02:28	3.4	1.84	21.0	3	1.7E-06	0.976	1.7E-06
	5-13-11	2:43:59	0:03:06	3.2	1.85	21.0	3	1.7E-06	0.976	1.7E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.7E-06 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-19-11		

SAMPLE NO.	CP-1-2-2	SAMPLE LOCATION:	PHASE 1, LIFT 2
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.915	7.404	2.954	7.503
Sample Diameter	2.860	7.264	2.842	7.219
Length/Diameter Ratio		1.02		
Moisture Content (%)	WW= 152.0 DW= 119.0	27.7	WW= 207.5 DW= 157.7	31.6
Sample Wet Weight (grams)	581.9		590.6	
Wet Density (pcf)	118.4		120.1	
Dry Density (pcf)	92.7		91.2	
Saturation (%) ASSUMED SG= 2.7	92		101	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-20-11	2:59:16		7.4	1.67	21.1	10			
	5-20-11	3:01:36	0:02:20	6.5	1.71	21.1	8	5.6E-07	0.974	5.5E-07
	5-20-11	3:01:55	0:02:39	6.4	1.72	21.1	8	5.6E-07	0.974	5.4E-07
	5-20-11	3:02:14	0:02:58	6.3	1.72	21.1	8	5.5E-07	0.974	5.4E-07
	5-20-11	3:02:35	0:03:19	6.2	1.72	21.1	8	5.4E-07	0.974	5.3E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 5.4E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	**AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1**	TESTED BY:	**JOHN MATHEW**
PROJECT NO.:	**J11-7577-01**	CHECKED BY:	**PAUL YARBER**
DATE RECEIVED:	**5-18-11**		

SAMPLE NO.	**CP-1-2-3**	SAMPLE LOCATION:	**PHASE 1, LIFT 2 REWORK FOR REPAIR OF CP-1-1**
TYPE	**UNDISTURBED**	SAMPLE DESCRIPTION:	**DARK BROWN CLAYEY SILTY FI.-MED. SAND**

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.899	7.363	2.883	7.323
Sample Diameter	2.859	7.262	2.854	7.249
Length/Diameter Ratio		1.01		
Moisture Content (%)	WW= 171.9 DW= 139.2	23.5	WW= 208.4 DW= 164.1	27.0
Sample Wet Weight (grams)	593.5		599.4	
Wet Density (pcf)	121.5		123.8	
Dry Density (pcf)	98.4		97.5	
Saturation (%) ASSUMED SG= 2.7	89		100	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-19-11	2:48:17		7.3	1.68	21.0	10			
	5-19-11	2:55:28	0:07:11	5.5	1.75	21.0	7	4.0E-07	0.976	3.9E-07
	5-19-11	2:55:59	0:07:42	5.4	1.76	21.0	7	4.0E-07	0.976	3.9E-07
	5-19-11	2:56:41	0:08:24	5.3	1.76	21.0	6	3.9E-07	0.976	3.8E-07
	5-19-11	2:57:23	0:09:06	5.2	1.76	21.0	6	3.8E-07	0.976	3.8E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 3.8E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-19-11		

SAMPLE NO.	CP-1-3-1	SAMPLE LOCATION:	PHASE 1, LIFT 3
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.925	7.430	2.912	7.396
Sample Diameter	2.860	7.264	2.851	7.242
Length/Diameter Ratio		1.02		
Moisture Content (%)	WW= 159.4 DW= 128.6	24.0	WW= 356.1 DW= 282.3	26.1
Sample Wet Weight (grams)	598.4		606.1	
Wet Density (pcf)	121.3		124.2	
Dry Density (pcf)	97.9		98.5	
Saturation (%) ASSUMED SG= 2.7	90		99	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-20-11	3:10:30		7.4	1.67	21.1	10			
	5-20-11	3:17:20	0:06:50	6.5	1.71	21.1	8	1.9E-07	0.974	1.8E-07
	5-20-11	3:18:12	0:07:42	6.4	1.72	21.1	8	1.9E-07	0.974	1.8E-07
	5-20-11	3:19:05	0:08:35	6.3	1.72	21.1	8	1.9E-07	0.974	1.8E-07
	5-20-11	3:20:08	0:09:38	6.2	1.72	21.1	8	1.8E-07	0.974	1.8E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.8E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	5-19-11		

SAMPLE NO.	CP-1-3-2	SAMPLE LOCATION:	PHASE 1, LIFT 3
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.863	7.272	2.850	7.239
Sample Diameter	2.857	7.257	2.856	7.254
Length/Diameter Ratio		1.00		
Moisture Content (%)	WW= 151.3 DW= 118.4	27.8	WW= 196.1 DW= 153.8	27.5
Sample Wet Weight (grams)	571.0		581.6	
Wet Density (pcf)	118.5		121.4	
Dry Density (pcf)	92.7		95.2	
Saturation (%) ASSUMED SG= 2.7	92		96	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-20-11	3:23:15		7.3	1.68	21.1	10			
	5-20-11	3:25:21	0:02:06	6.5	1.71	21.1	9	5.4E-07	0.974	5.2E-07
	5-20-11	3:25:38	0:02:23	6.4	1.72	21.1	8	5.4E-07	0.974	5.2E-07
	5-20-11	3:25:58	0:02:43	6.3	1.72	21.1	8	5.3E-07	0.974	5.1E-07
	5-20-11	3:26:18	0:03:03	6.2	1.72	21.1	8	5.2E-07	0.974	5.1E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 5.2E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	**AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1**	TESTED BY:	**JOHN MATHEW**
PROJECT NO.:	**J11-7577-01**	CHECKED BY:	**PAUL YARBER**
DATE RECEIVED:	**5-18-11**		

SAMPLE NO.	**CP-1-3-3**	SAMPLE LOCATION:	**PHASE 1, LIFT 3 REWORK FOR REPAIR OF CP-1-1-1**
TYPE	**UNDISTURBED**	SAMPLE DESCRIPTION:	**DARK BROWN CLAYEY SILTY FI.-MED. SAND**

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.869	7.287	2.872	7.295
Sample Diameter	2.852	7.244	2.862	7.269
Length/Diameter Ratio		1.01		
Moisture Content (%)	WW= 182.4 DW= 147.9	23.3	WW= 198.0 DW= 158.4	25.0
Sample Wet Weight (grams)	584.3		597.3	
Wet Density (pcf)	121.4		123.2	
Dry Density (pcf)	98.5		98.5	
Saturation (%) ASSUMED SG= 2.7	89		95	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	80	Influent Pressure (psi)	70	Effluent Pressure (psi)	70	B-Value	0.96

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	5-19-11	2:55:30		7.2	1.58	21.0	10			
	5-19-11	2:57:14	0:01:44	6.0	1.63	21.0	8	1.0E-06	0.976	1.0E-06
	5-19-11	2:57:53	0:02:23	5.6	1.64	21.0	7	1.0E-06	0.976	1.0E-06
	5-19-11	2:58:34	0:03:04	5.3	1.66	21.0	7	1.0E-06	0.976	9.7E-07
	5-19-11	2:59:12	0:03:42	5.0	1.67	21.0	6	1.0E-06	0.976	9.7E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 9.9E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	6-3-11		

SAMPLE NO.	CP-2-1-1	SAMPLE LOCATION:	PHASE 2, LIFT 1
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.774	7.046	2.750	6.985
Sample Diameter	2.851	7.242	2.851	7.242
Length/Diameter Ratio		0.97		
Moisture Content (%)	WW= 128.8 DW= 100.6	28.0	WW= 141.2 DW= 109.0	29.5
Sample Wet Weight (grams)	534.5		540.5	
Wet Density (pcf)	115.0		117.3	
Dry Density (pcf)	89.8		90.5	
Saturation (%) ASSUMED SG= 2.7	86		93	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	70	Influent Pressure (psi)	60	Effluent Pressure (psi)	60	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-6-11	9:11:05		7.1	1.69	20.8	10			
	6-6-11	9:15:57	0:04:52	6.2	1.72	20.8	8	2.7E-07	0.981	2.6E-07
	6-6-11	9:16:39	0:05:34	6.1	1.73	20.8	8	2.6E-07	0.981	2.6E-07
	6-6-11	9:17:23	0:06:18	6.0	1.73	20.8	8	2.6E-07	0.981	2.5E-07
	6-6-11	9:18:06	0:07:01	5.9	1.74	20.8	8	2.5E-07	0.981	2.5E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 2.5E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	6-3-11		

SAMPLE NO.	CP-2-2-1	SAMPLE LOCATION:	PHASE 2, LIFT 2
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.928	7.437	2.938	7.463
Sample Diameter	2.852	7.244	2.853	7.247
Length/Diameter Ratio		1.03		
Moisture Content (%)	WW= 135.5 DW= 105.8	28.1	WW= 96.6 DW= 71.7	34.7
Sample Wet Weight (grams)	565.6		578.5	
Wet Density (pcf)	115.2		117.3	
Dry Density (pcf)	89.9		87.1	
Saturation (%) ASSUMED SG= 2.7	87		100	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	70	Influent Pressure (psi)	60	Effluent Pressure (psi)	60	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-6-11	8:56:08		7.4	1.67	20.8	10			
	6-6-11	8:58:28	0:02:20	6.6	1.71	20.8	9	4.9E-07	0.981	4.8E-07
	6-6-11	8:58:49	0:02:41	6.5	1.71	20.8	8	4.8E-07	0.981	4.7E-07
	6-6-11	8:59:09	0:03:01	6.4	1.72	20.8	8	4.8E-07	0.981	4.7E-07
	6-6-11	8:59:31	0:03:23	6.3	1.72	20.8	8	4.8E-07	0.981	4.7E-07

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 4.7E-07 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	AVERY COUNTY C&D LANDFILL PHASES I & II CLOSURE EVENT NO. 1	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-7577-01	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	6-3-11		

SAMPLE NO.	CP-2-3-1	SAMPLE LOCATION:	PHASE 2, LIFT 3
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	DARK BROWN CLAYEY SILTY FI.-MED. SAND

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.878	7.310	2.890	7.341
Sample Diameter	2.853	7.247	2.853	7.247
Length/Diameter Ratio		1.01		
Moisture Content (%)	WW= 168.4 DW= 136.1	23.7	WW= 248.4 DW= 189.8	30.9
Sample Wet Weight (grams)	565.8		581.7	
Wet Density (pcf)	117.2		119.9	
Dry Density (pcf)	94.7		91.6	
Saturation (%) ASSUMED SG= 2.7	82		99	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

(PERMOMETER)

Chamber Pressure (psi)	70	Influent Pressure (psi)	60	Effluent Pressure (psi)	60	B-Value	0.95

Reset (Y/N)	Date	Clock Time	Elapsed Time	HA_{OUT} (cm)	HA_{IN} (cm)	Temp °C	Gradient	K (cm/sec)	Temp Correction	$K_{20°C}$ (cm/sec)
Y	6-6-11	8:35:17		4.5	1.79	20.8	5			
	6-6-11	8:36:32	0:01:15	3.9	1.82	20.8	4	1.5E-06	0.981	1.5E-06
	6-6-11	8:36:58	0:01:41	3.7	1.83	20.8	4	1.6E-06	0.981	1.5E-06
	6-6-11	8:37:32	0:02:15	3.5	1.83	20.8	3	1.5E-06	0.981	1.5E-06
	6-6-11	8:37:55	0:02:38	3.4	1.84	20.8	3	1.5E-06	0.981	1.5E-06

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 1.5E-06 cm/sec

LABORATORY TEST RESULTS

SOIL LINER BORROW AREA & TEST STRIP

SUMMARY OF LABORATORY TEST RESULTS FOR SOIL LINER
PHASES I & II CLOSURE EVENT NO. 1

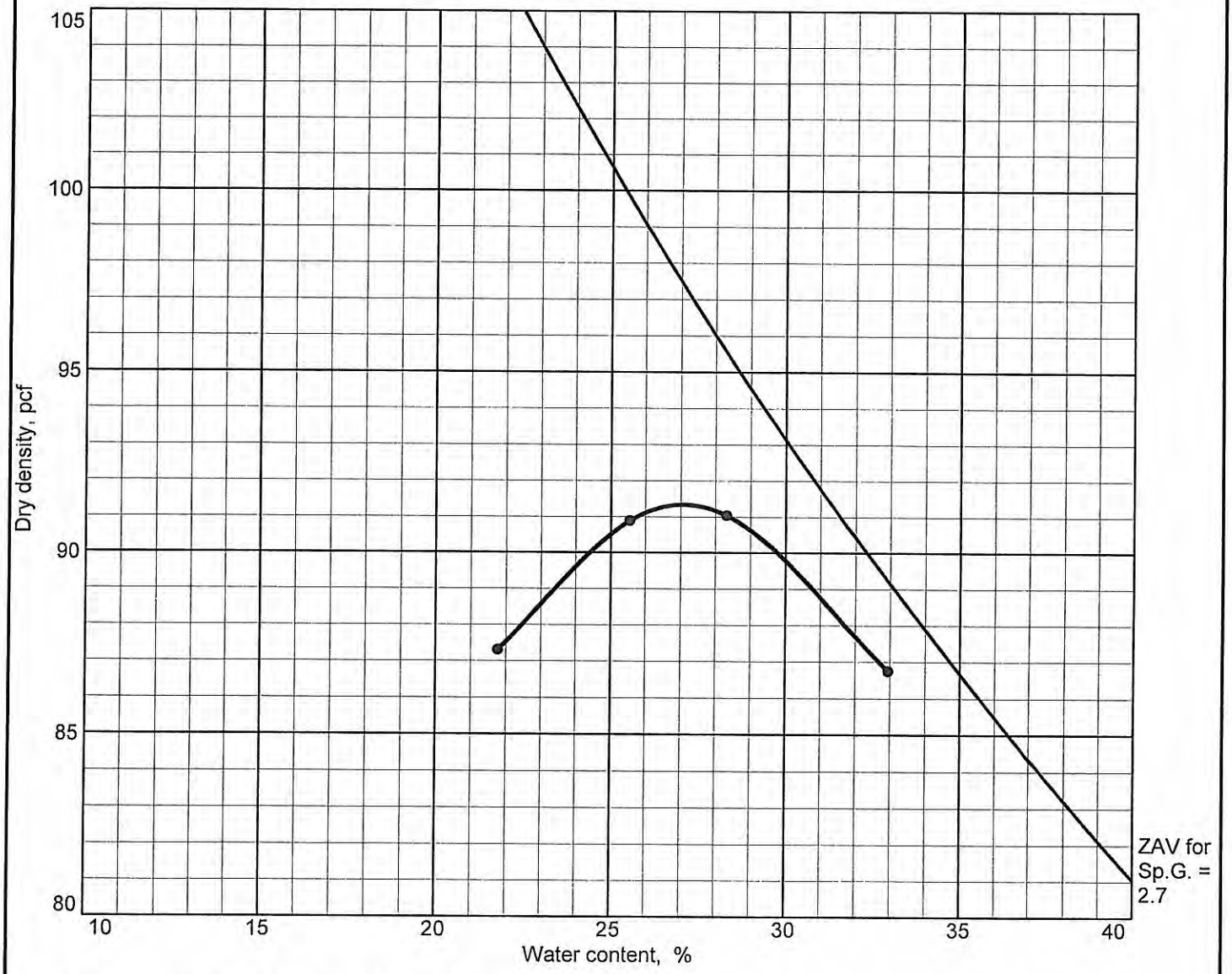
AVERY COUNTY C&D LANDFILL
AVERY COUNTY, NORTH CAROLINA

Bunnell-Lammons Engineering, Inc. Project No. J11-7577-01

Phase I = 1.89 Acres, Phase II = 0.83 Acre

SAMPLE NUMBER	MATERIAL DESCRIPTION (USCS)	MOISTURE CONTENT (IN SITU)	GRAVEL CONTENT	SAND CONTENT	SILT & CLAY CONTENT	ATTERBERG LIMITS		PROCTOR PARAMETERS		REMOLD PARAMETERS		REMOLDED HYDRAULIC CONDUCTIVITY (PERMEABILITY)
						LIQUID LIMIT	PLASTICITY INDEX	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE CONTENT	DRY DENSITY (% COMPACTION)	MOISTURE CONTENT (% WET OF OPT.)	
		%	%	%	%	%	%	pcf	%	%	%	cm/s
BW-1	Dark brown fine-medium sandy clayey SILT (MH)	32.7	1.4	40.0	58.6	63	26	91.3	27.1	86.5 (94.7)	30.5 (+3.4)	5.7 E-07
BW-2	Dark brown fine-medium sandy clayey SILT (MH)	28.0	3.9	40.4	55.7	51	18	95.0	24.3	90.2 (94.9)	27.5 (+3.2)	2.0 E-07
BW-3	Dark brown clayey silty fi. - med. SAND (SM)	---	1.6	53.9	44.5	48	10	97.9	24.5	---	---	---
BW-4	Brown clayey silty fi.-med. SAND (SM)	23.1	1.3	54.6	44.1	42	7	---	---	---	---	---
TPCP-1-1	Dark brown clayey silty fi. - med. SAND (SM)	27.3	3.7	60.9	35.4	49	14	---	---	---	---	---
CTP-1-1	Dark brown clayey silty fi.-med. SAND (SM)	20.3	0.7	55.1	44.2	55	17	109.1	17.3	94.6	3.0	1.6E-07
TPCP-2-1	Dark brown clayey silty fi.-med. SAND (SM)	17.2	2.2	52.1	45.7	45	12	---	---	---	---	---
CTP-2-1	Dark brown clayey silty fi.-med. SAND (SM)	23.2	4.8	57.6	37.6	49	13	102.1	20.3	95.1	2.9	1.0E-06
TPCP-3-1	Dark brown clayey silty fi.-med. SAND (SM)	22.8	---	---	---	---	---	---	---	---	---	---
TPCP-3-1A	Dark brown clayey silty fi.-med. SAND (SM)	25.7	---	---	---	---	---	---	---	---	---	---
TPCP-3-1R	Dark brown clayey silty fi.-med. SAND (SM)	25.7	0.8	59.3	39.9	47	11	---	---	---	---	---
CTP-3-1	Brown clayey silty fi.-med. SAND (SM)	22.0	2.9	62.3	34.8	45	9	103.0	19.0	95.0	3.0	8.7E-06

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH		32.7		63	26	1.4	58.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 91.3 pcf Optimum moisture = 27.1 %	Dark brown fi.-med. sandy clayey SILT

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

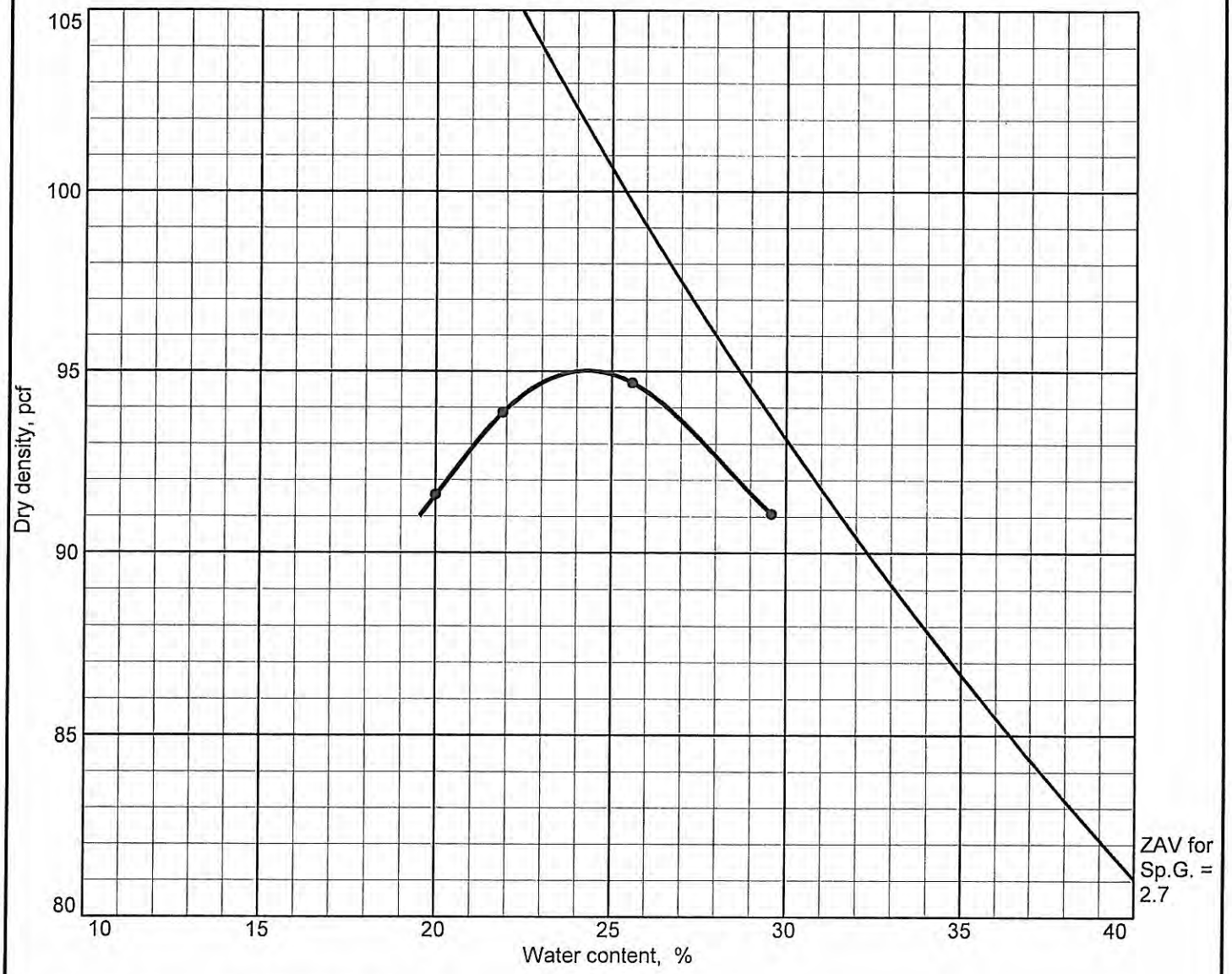
● **Source:** Borrow **Sample No.:** BW-1

Bunnell Lammons Engineering, Inc.
Greenville, SC

Remarks:

Figure

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH		28.0		51	18	3.9	55.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 95.0 pcf Optimum moisture = 24.3 %	Dark brown fi.-med. sandy clayey SILT

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

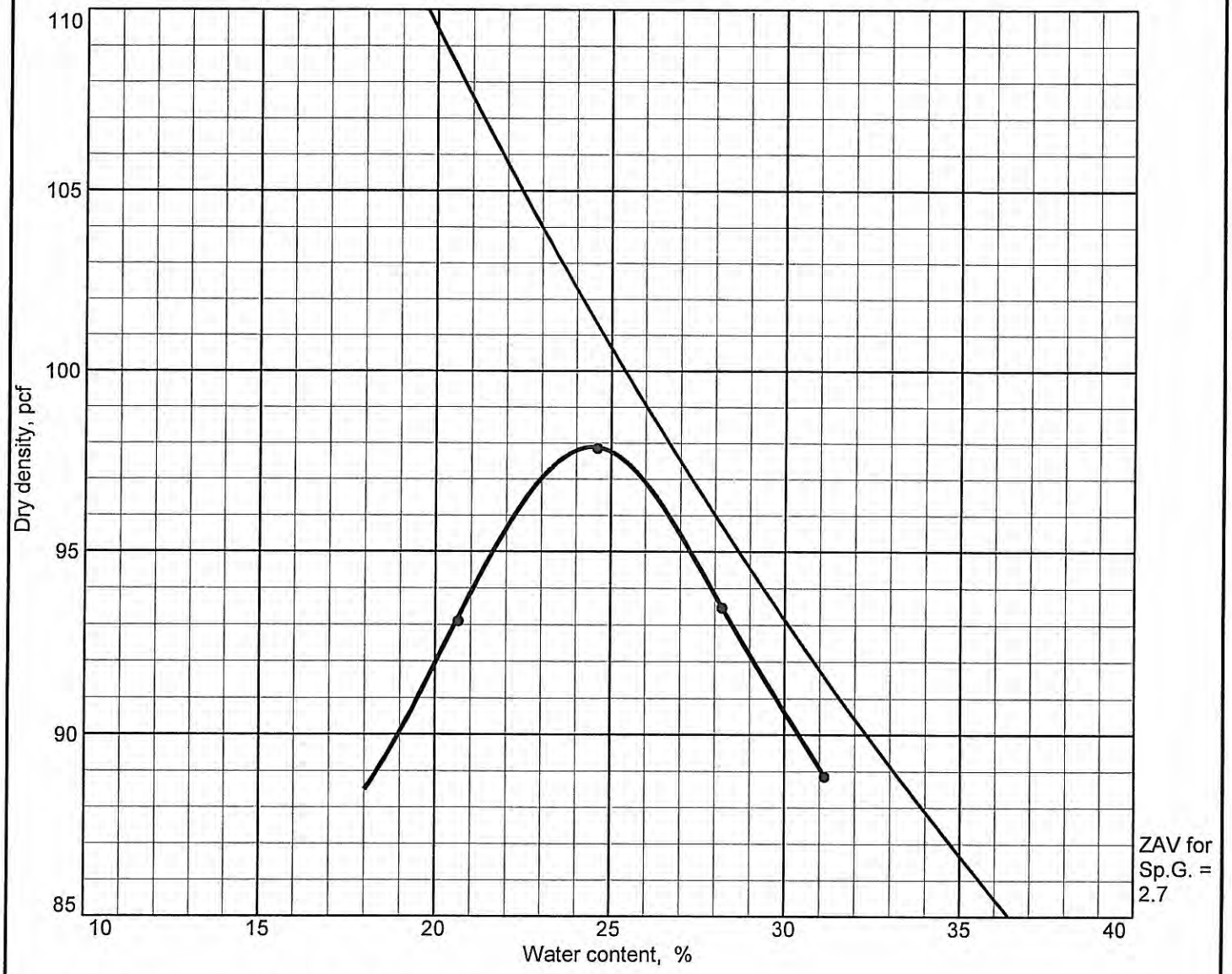
● **Source:** Borrow **Sample No.:** BW-2

Remarks:

Bunnell Lammons Engineering, Inc.
Greenville, SC

Figure

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	SM				48	10	0.0	44.5

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 97.9 pcf Optimum moisture = 24.5 %	Dark brown clayey silty fi.-med. SAND

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

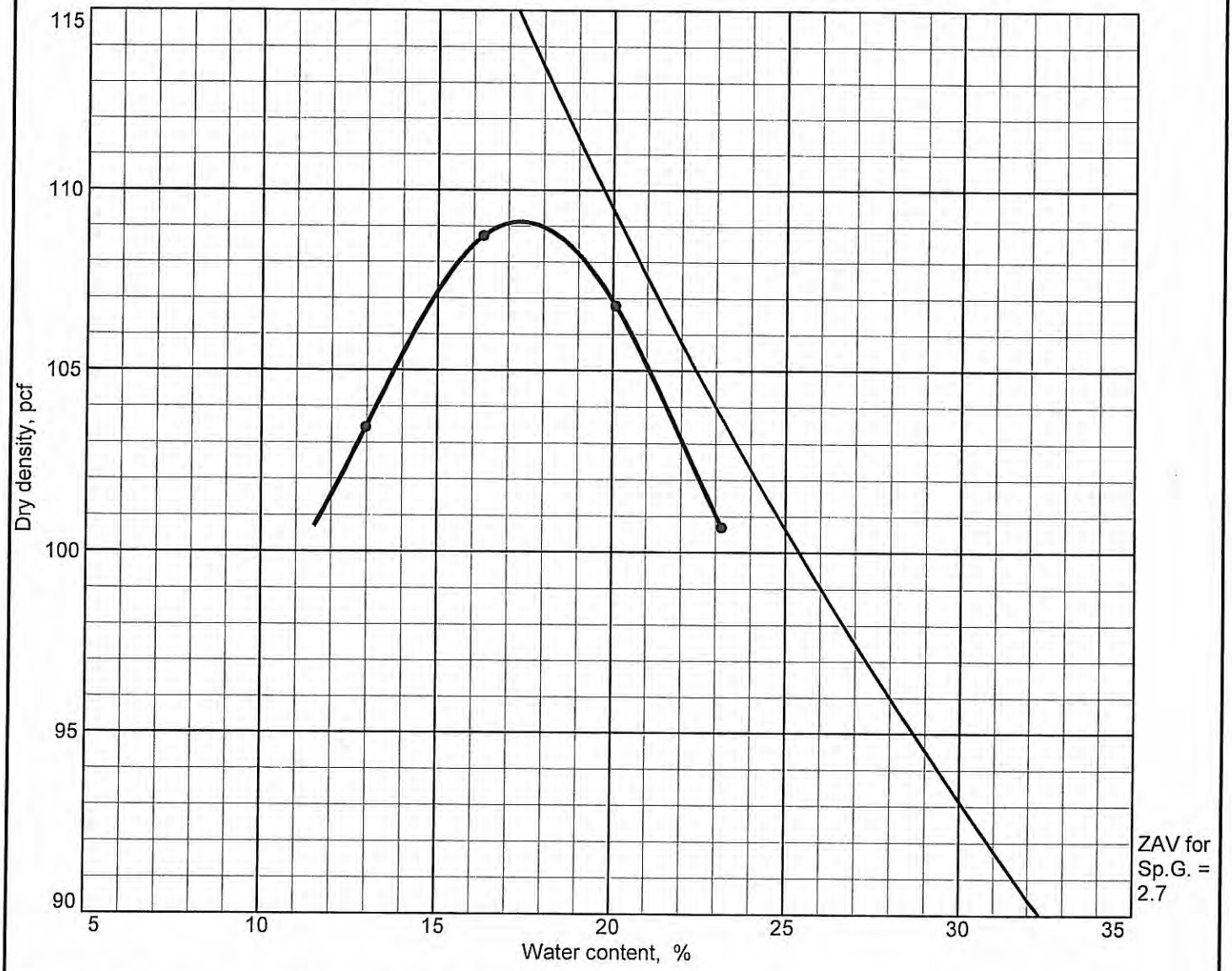
● **Source:** Borrow **Sample No.:** BW-3

Remarks:

Bunnell Lammons Engineering, Inc.
Greenville, SC

Figure

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	SM				55	17	0.0	44.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 109.1 pcf Optimum moisture = 17.3 %	Dark brown clayey silty fi.-med. SAND

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

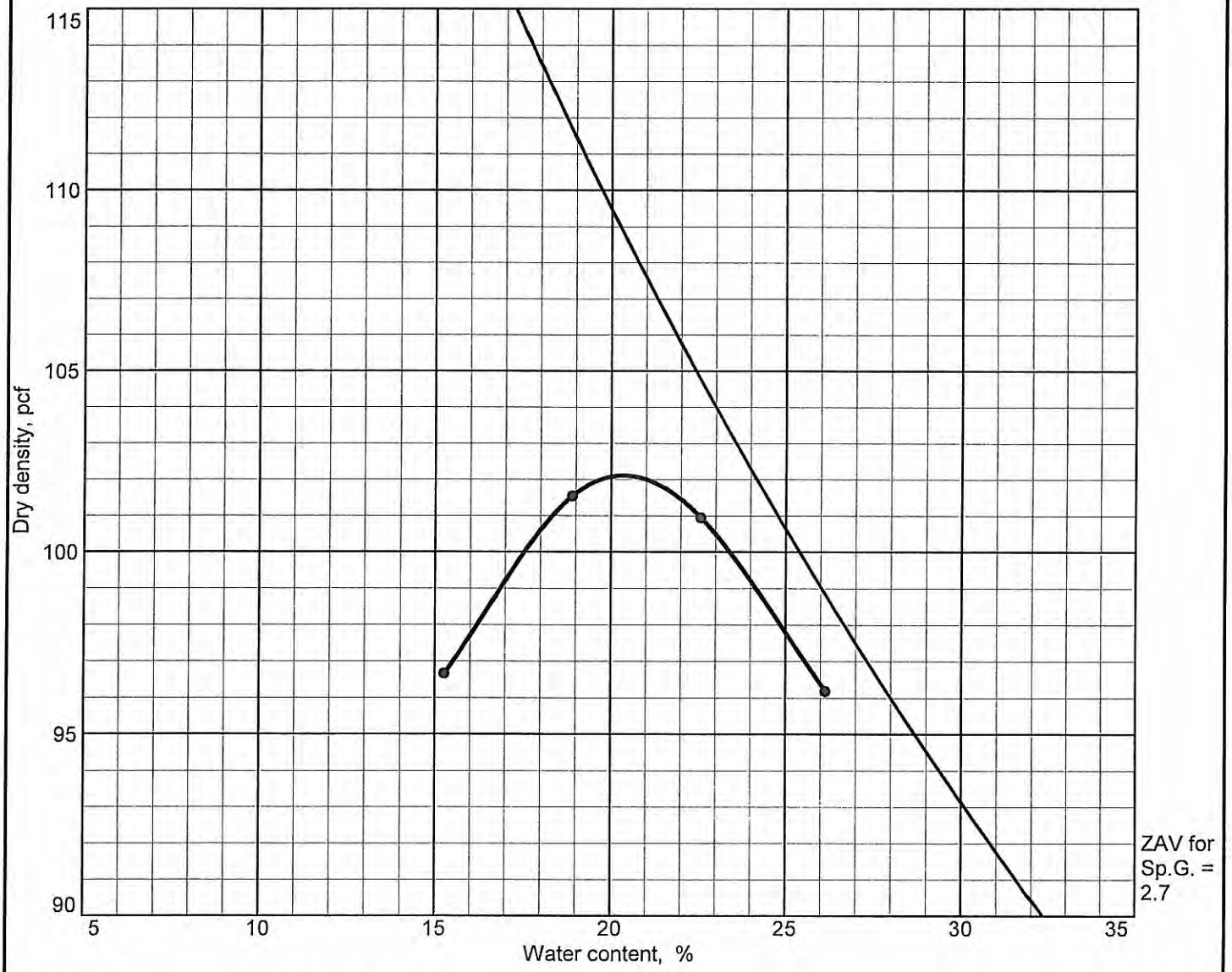
● **Source:** Cap **Sample No.:** CTP-1-1

Remarks:

Bunnell Lammons Engineering, Inc.
Greenville, SC

Figure

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	SM				49	13	3.2	37.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 102.1 pcf Optimum moisture = 20.3 %	Dark brown clayey silty fi.-med. SAND

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

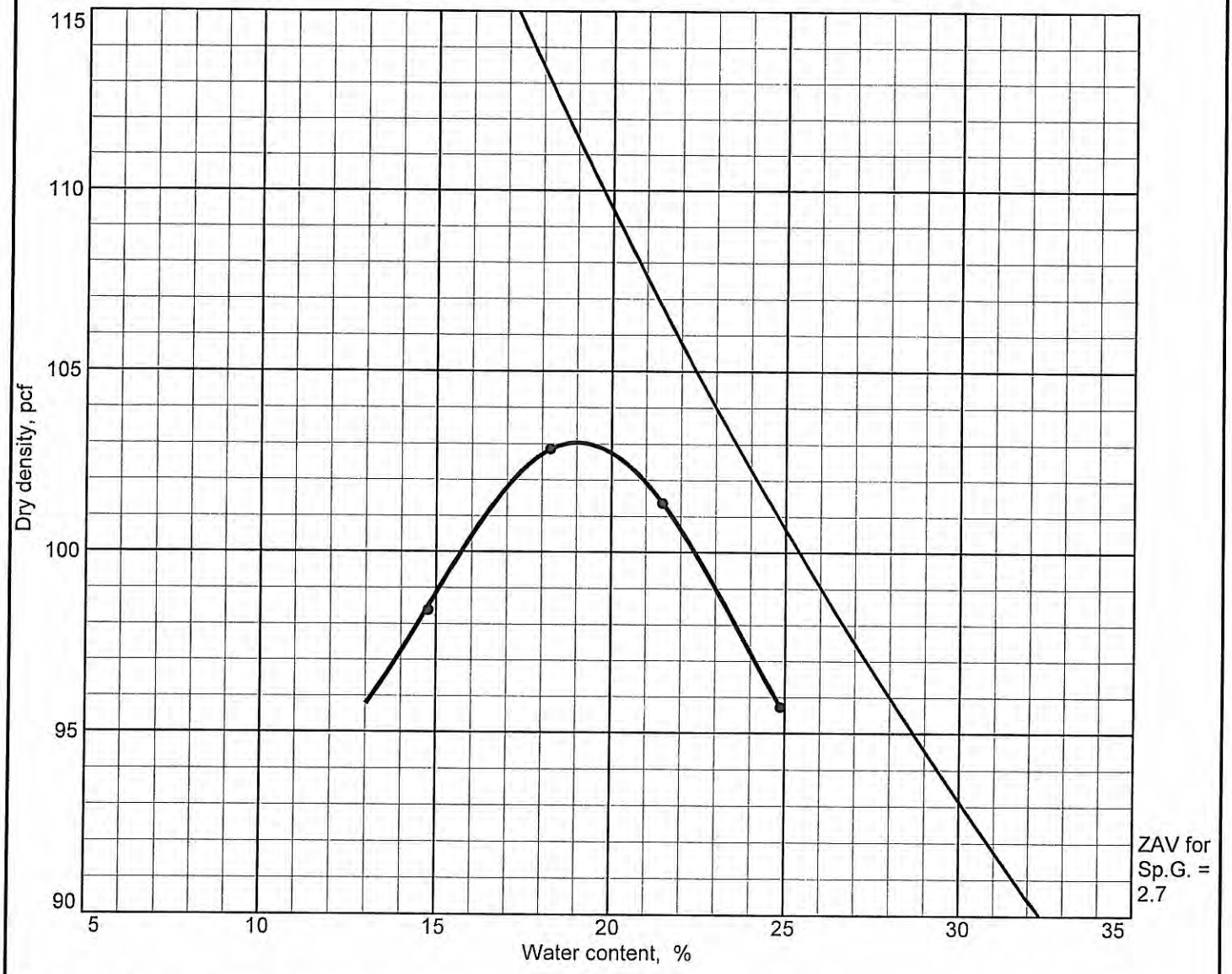
● **Source:** Cap **Sample No.:** CTP-2-1

Bunnell Lammons Engineering, Inc.
Greenville, SC

Remarks:

Figure

MOISTURE DENSITY RELATIONSHIP



Test specification: ASTM D 698-00a Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	SM				45	9	2.2	34.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 103.0 pcf Optimum moisture = 19.0 %	Brown clayey silty fi.-med. SAND

Project No. J11-7577-01 **Client:** M & M Construction
Project: Avery County C & D Landfill

● **Source:** Cap **Sample No.:** CTP-3-1

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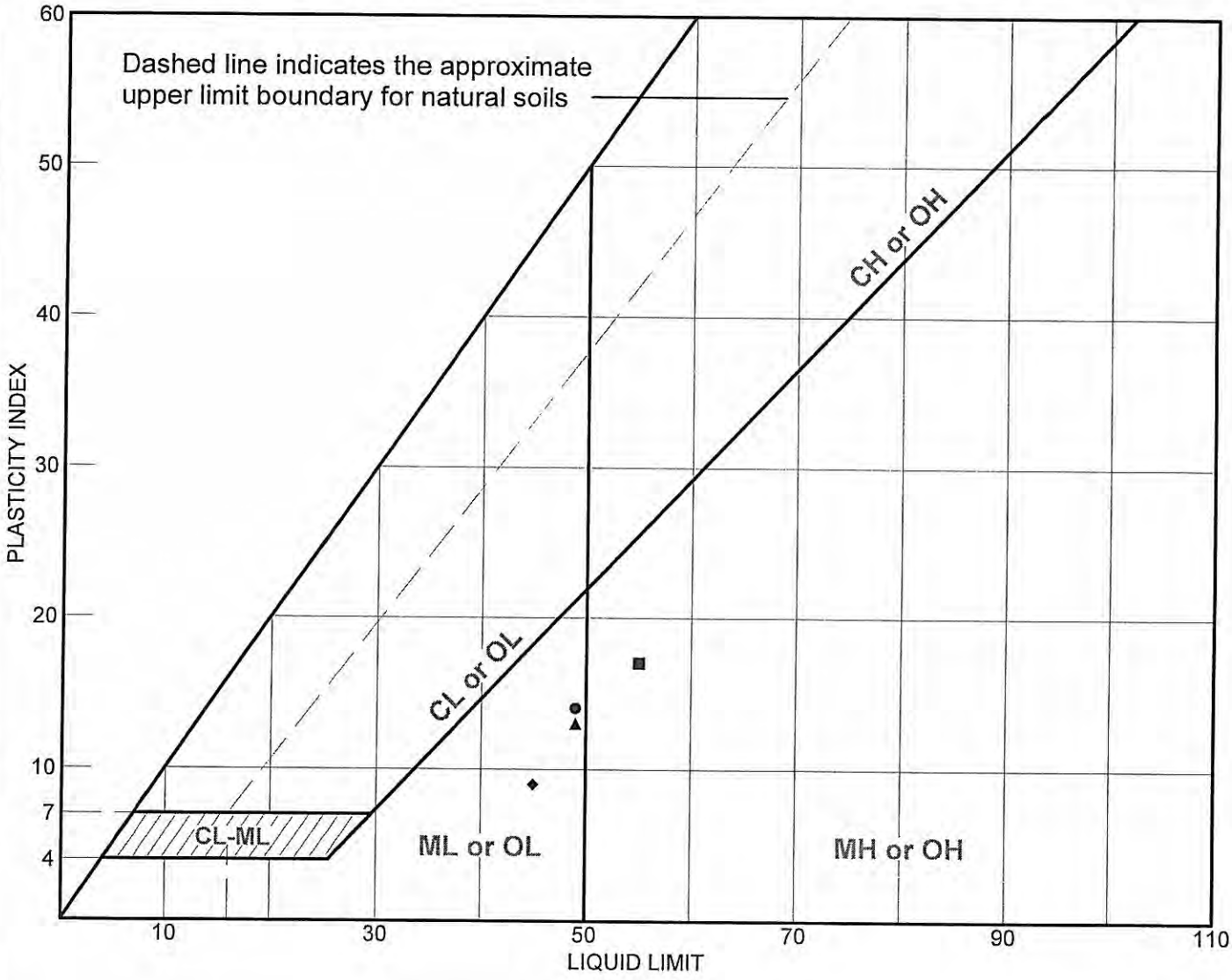
Greenville, SC

Remarks:

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Test Pad	TPCP-1-1			35	49	14	SM
■	Cap	CTP-1-1			38	55	17	SM
▲	Cap	CTP-2-1			36	49	13	SM
◆	Cap	CTP-3-1			36	45	9	SM

LIQUID AND PLASTIC LIMITS TEST REPORT

Bunnell Lammons Engineering, Inc.

Greenville, SC

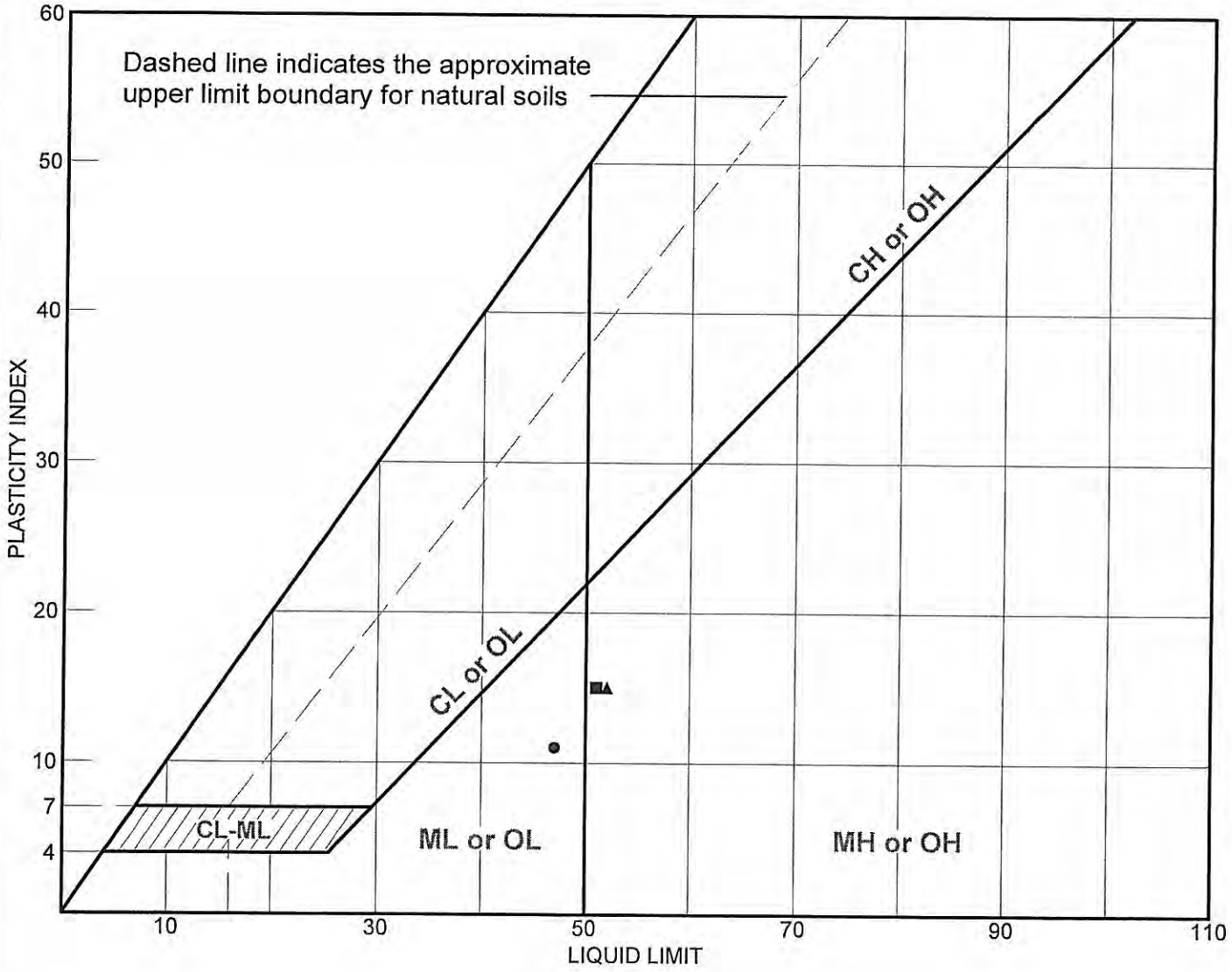
Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Test Pad	TPCP-3-1R			36	47	11	SM
■	Cap	CP-1-1-1R			36	51	15	SM
▲	Cap	CP-1-3-1			37	52	15	SM

LIQUID AND PLASTIC LIMITS TEST REPORT

Bunnell Lammons Engineering, Inc.

Greenville, SC

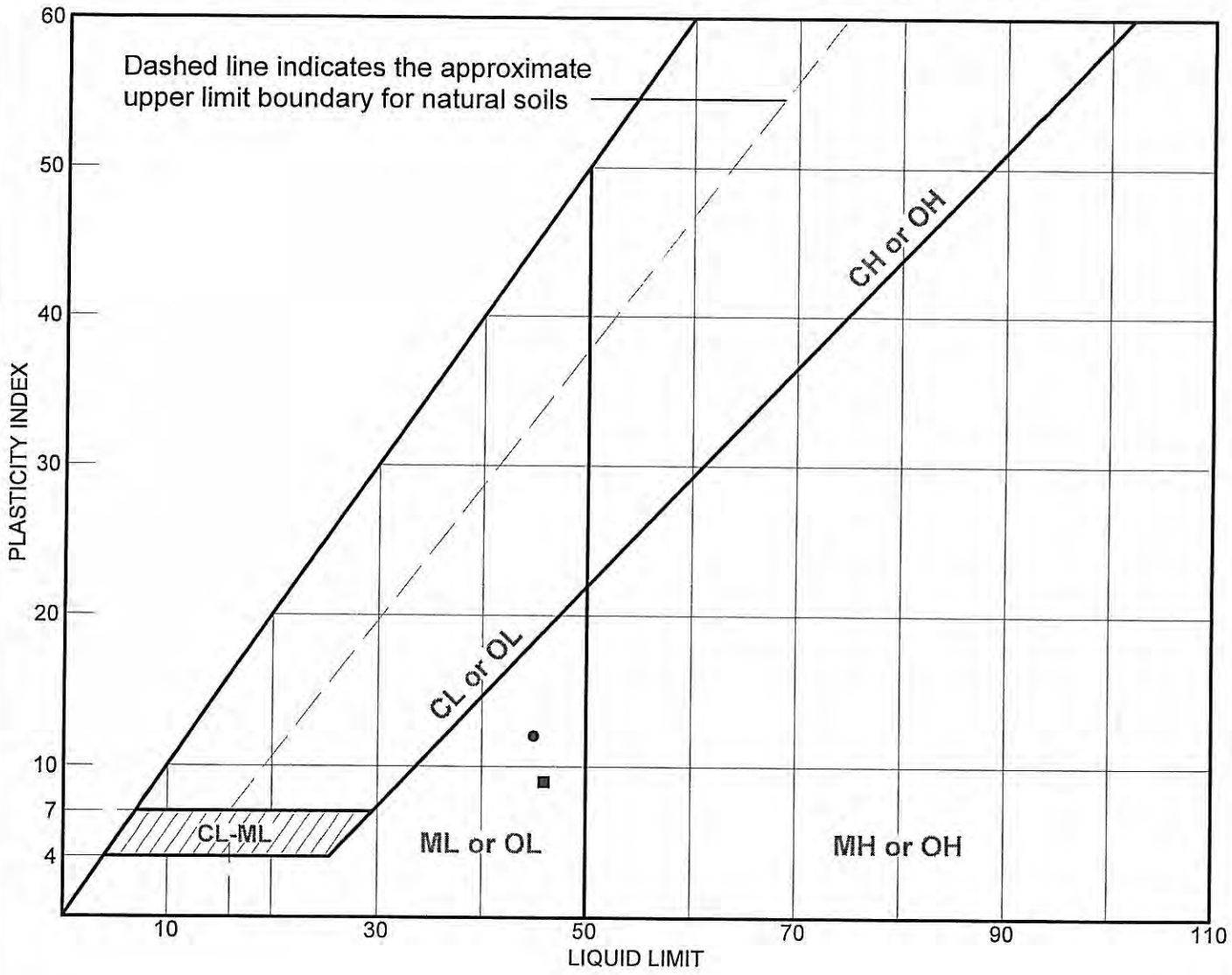
Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Test Pad	TPCP-2-1			33	45	12	SM
■	Cap	CP-1-2-1			37	46	9	SM

LIQUID AND PLASTIC LIMITS TEST REPORT

Bunnell Lammons Engineering, Inc.

Greenville, SC

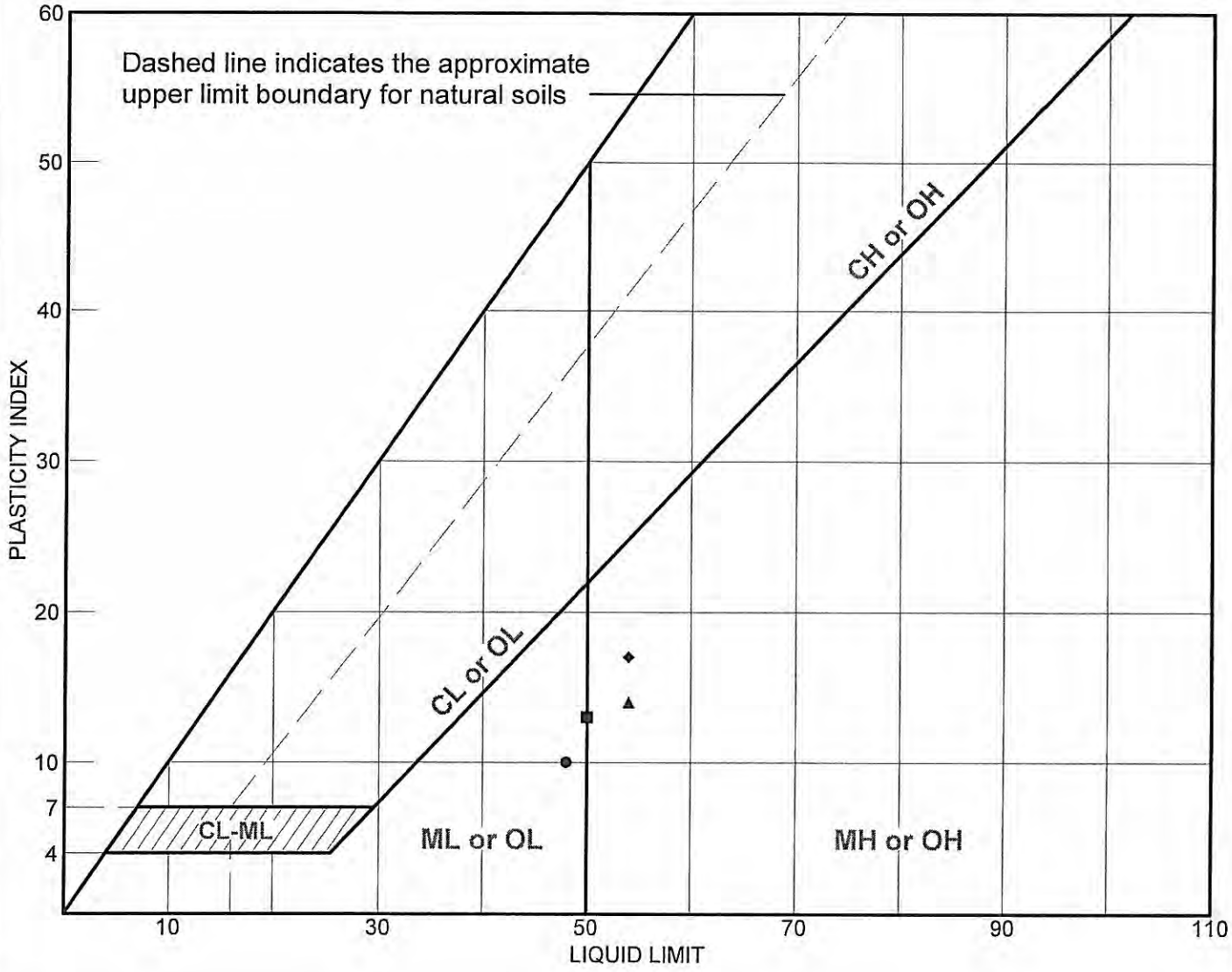
Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Borrow	BW-3			38	48	10	SM
■	Cap	CP-2-1-1			37	50	13	SM
▲	Cap	CP-2-2-1			40	54	14	SM
◆	Cap	CP-2-3-1			37	54	17	SM

LIQUID AND PLASTIC LIMITS TEST REPORT **Bunnell Lammons Engineering, Inc.** **Greenville, SC**	**Client:** M & M Construction **Project:** Avery County C & D Landfill **Project No.:** J11-7577-01 **Figure**

Particle Size Distribution Report

	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	3.7	4.1	19.3	37.5	35.4	
□	0.0	0.0	0.7	4.5	17.2	33.4	44.2	
△	0.0	0.0	4.8	3.9	18.3	35.4	37.6	
◇	0.0	0.0	2.9	3.2	20.4	38.7	34.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Test Pad	TPCP-1-1		Dark brown clayey silty fi.-med. SAND	SM
□	Cap	CTP-1-1		Dark brown clayey silty fi.-med. SAND	SM
△	Cap	CTP-2-1		Dark brown clayey silty fi.-med. SAND	SM
◇	Cap	CTP-3-1		Brown clayey silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

Particle Size Distribution Report

	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.8	3.5	19.3	36.5	39.9	
□	0.0	0.0	1.9	3.3	18.1	35.5	41.2	
△	0.0	0.0	1.4	2.2	15.9	31.7	48.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Test Pad	TPCP-3-1R		Dark brown clayey silty fi.-med. SAND	SM
□	Cap	CP-1-1-1R		Dark brown clayey silty fi.-med. SAND	SM
△	Cap	CP-1-3-1		Dark brown clayey silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

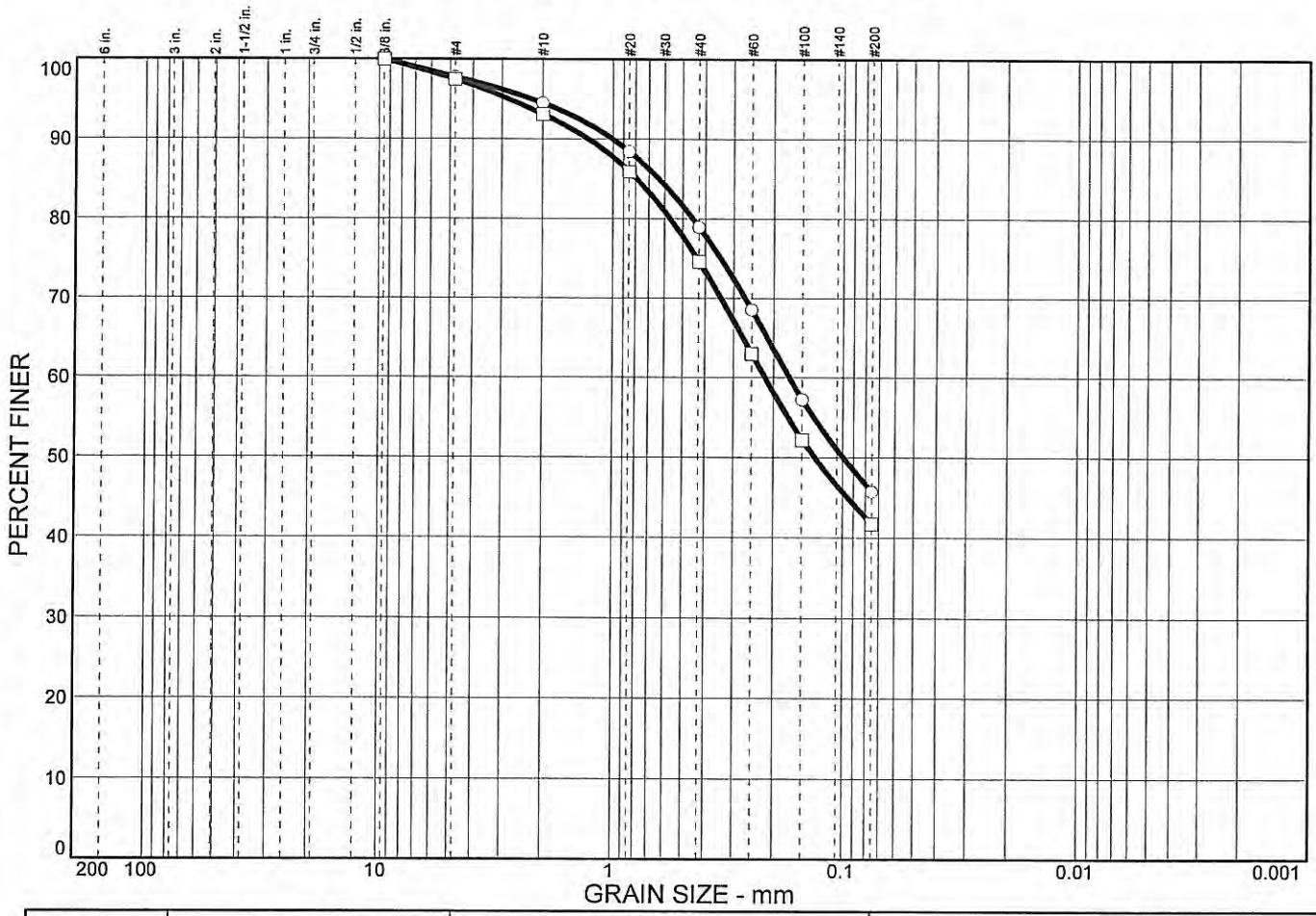
Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	2.2	3.3	15.6	33.2	45.7	
□	0.0	0.0	2.5	4.4	18.5	32.9	41.7	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Test Pad	TPCP-2-1		Dark brown clayey silty fi.-med. SAND	SM
□	Cap	CP-1-2-1		Brown silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

Particle Size Distribution Report

	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	1.6	3.9	16.2	33.8	44.5	
□	0.0	0.0	0.0	3.9	16.4	33.8	45.9	
△	0.0	0.0	0.0	4.8	14.1	36.2	44.9	
◇	0.0	0.0	2.8	3.9	17.4	35.4	40.5	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Borrow	BW-3		Dark brown clayey silty fi.-med. SAND	SM
□	Cap	CP-2-1-1		Dark brown clayey silty fi.-med. SAND	SM
△	Cap	CP-2-2-1		Dark brown clayey silty fi.-med. SAND	SM
◇	Cap	CP-2-3-1		Brown clayey silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: M & M Construction

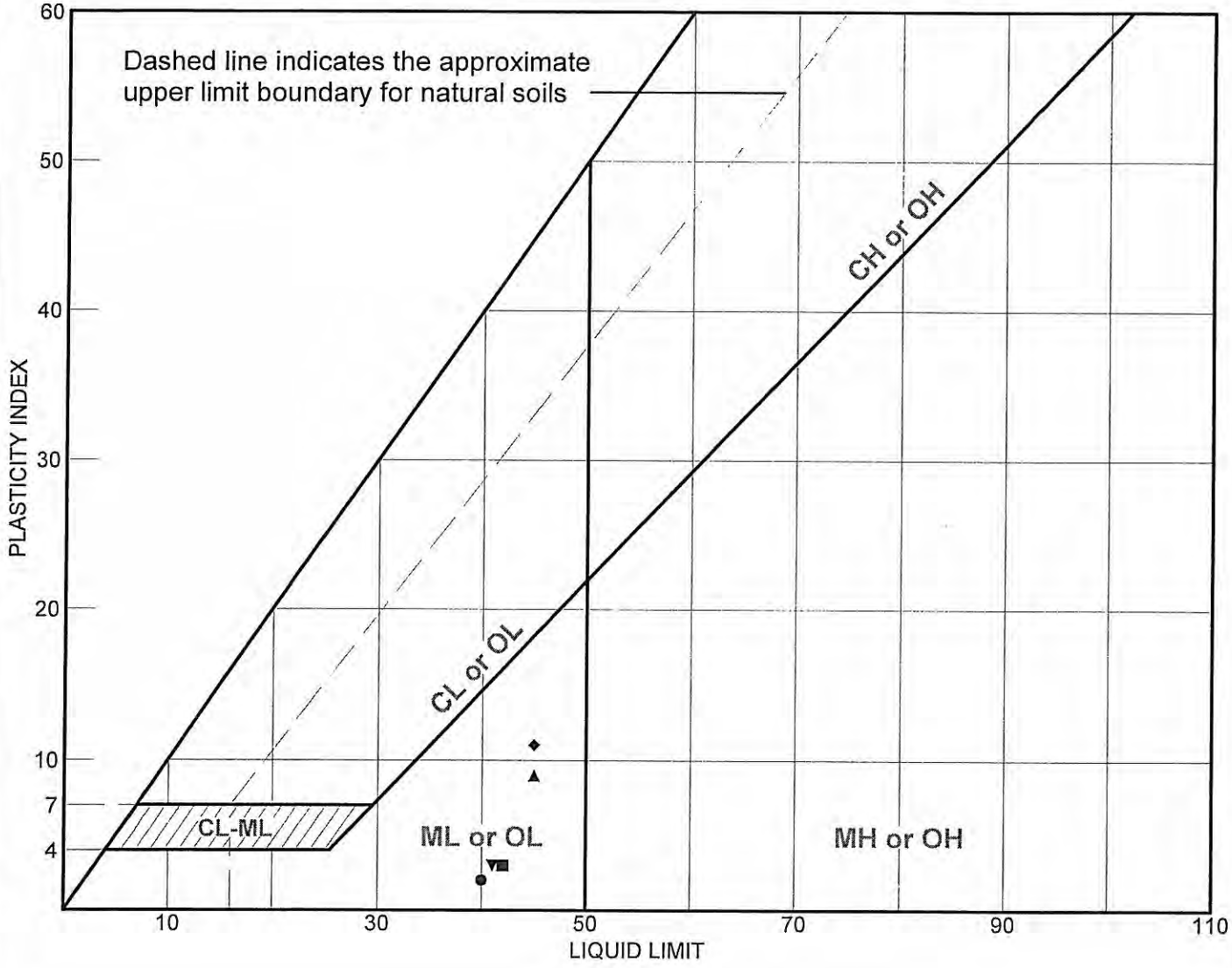
Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

VEGETATIVE SOIL COVER MATERIAL

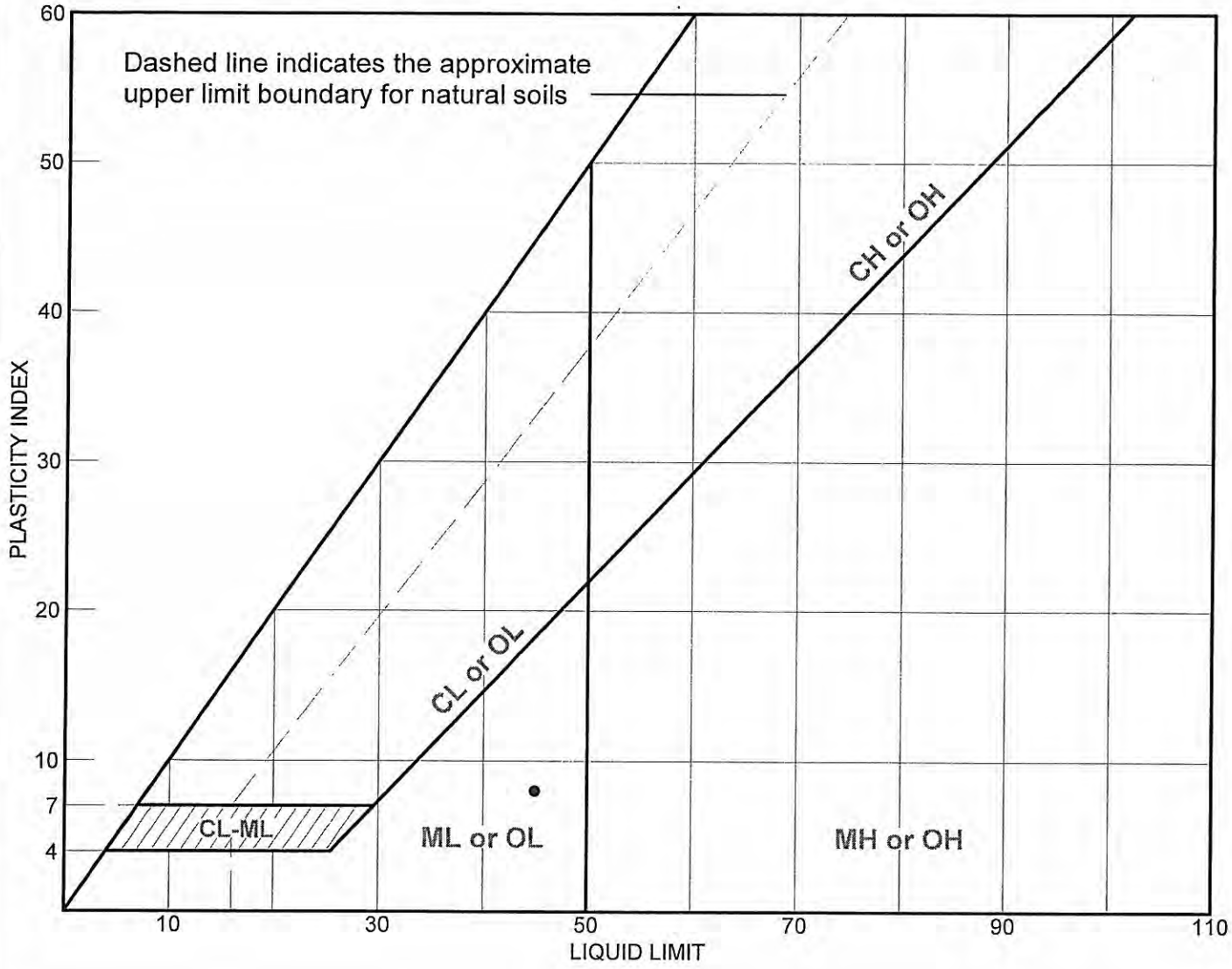
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Cover	VC-1			38	40	2	SM
■	Cover	VC-2			39	42	3	SM
▲	Cover	VC-3			36	45	9	SM
◆	Cover	VC-4			34	45	11	SM
▼	Cover	VC-5			38	41	3	SM

LIQUID AND PLASTIC LIMITS TEST REPORT **Bunnell Lammons Engineering, Inc.** **Greenville, SC**	**Client:** M & M Construction **Project:** Avery County C & D Landfill **Project No.:** J11-7577-01 **Figure**

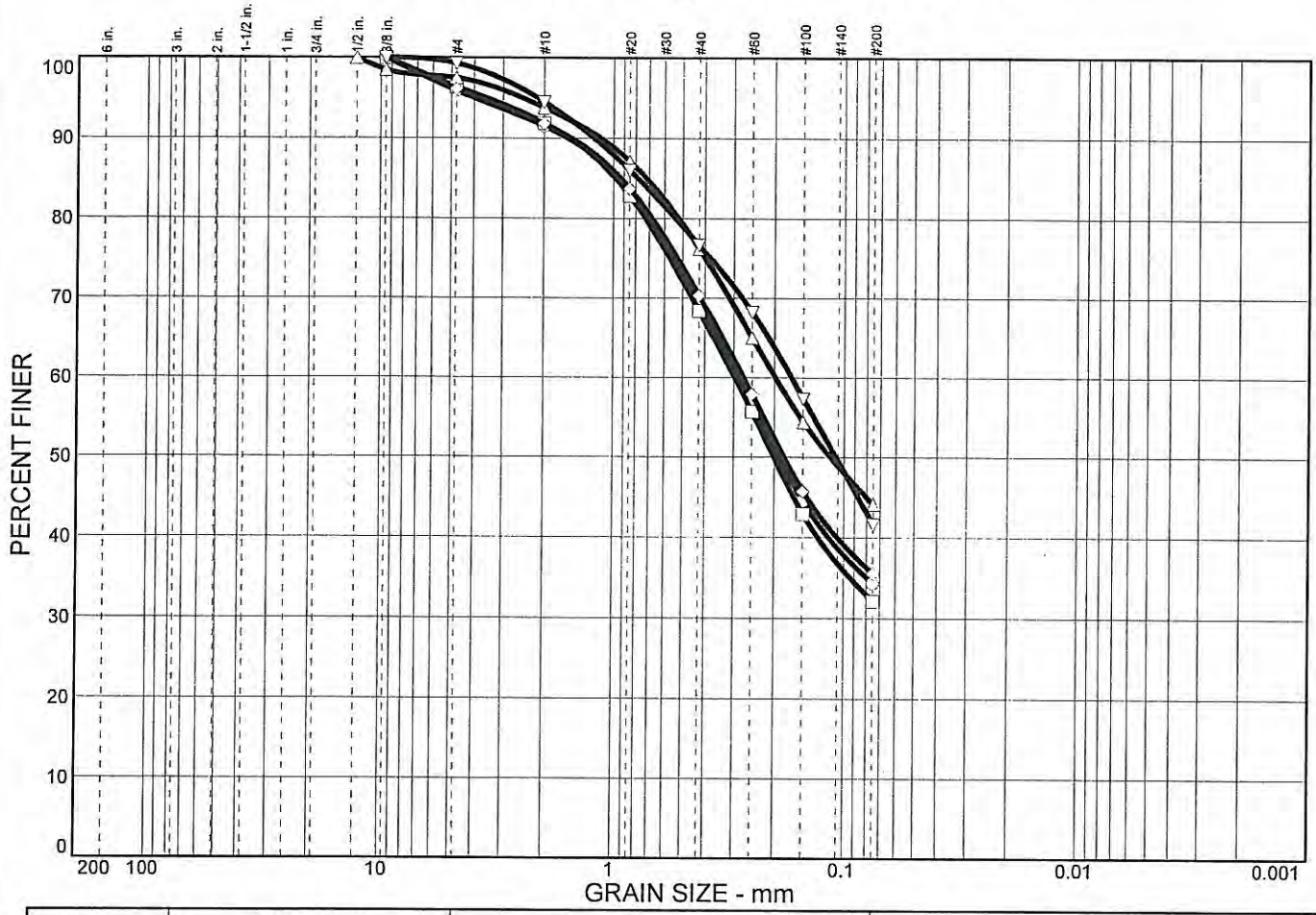
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Cover	VC-6			37	45	8	SM

LIQUID AND PLASTIC LIMITS TEST REPORT **Bunnell Lammons Engineering, Inc.** **Greenville, SC**	**Client:** M & M Construction **Project:** Avery County C & D Landfill **Project No.:** J11-7577-01 **Figure**

Particle Size Distribution Report



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	4.1	4.4	22.1	35.1	34.3	
□	0.0	0.0	3.6	4.5	23.5	36.3	32.1	
△	0.0	0.0	2.5	3.7	17.6	32.1	44.1	
◇	0.0	0.0	3.9	4.3	21.5	34.8	35.5	
▽	0.0	0.0	0.7	4.8	17.9	35.0	41.6	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Cover	VC-1		Grey & brown silty fi.-med. SAND	SM
□	Cover	VC-2		Grey & brown silty fi.-med. SAND	SM
△	Cover	VC-3		Grey & brown silty fi.-med. SAND	SM
◇	Cover	VC-4		Grey & brown silty fi.-med. SAND	SM
▽	Cover	VC-5		Grey & brown silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

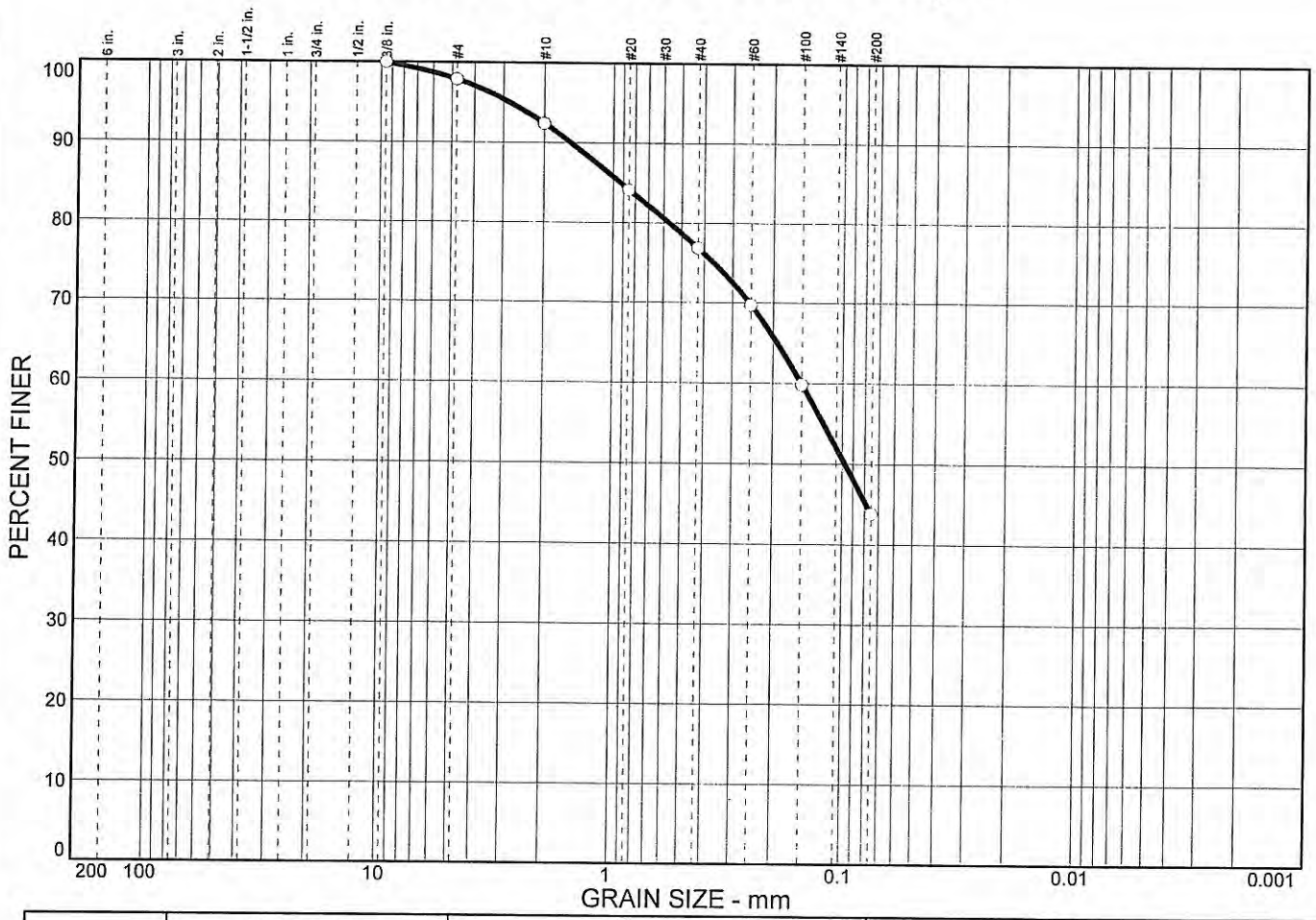
Client: M & M Construction

Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	2.1	5.5	15.6	33.0	43.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	Cover	VC-6		Grey & brown silty fi.-med. SAND	SM

Particle Size Distribution Report

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: M & M Construction

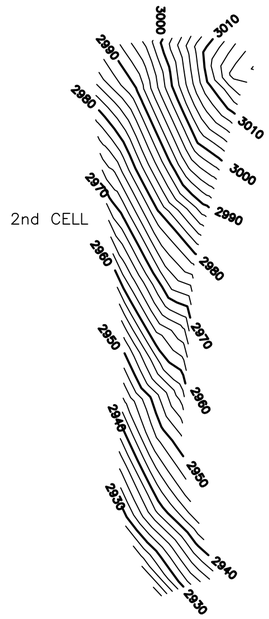
Project: Avery County C & D Landfill

Project No.: J11-7577-01

Figure

APPENDIX D

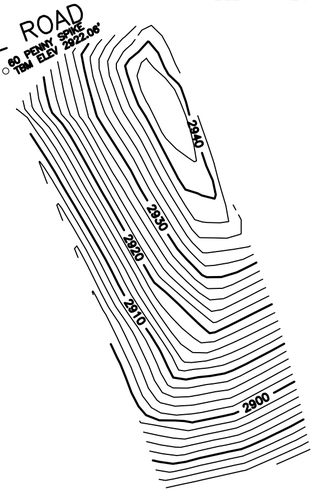
SURVEY



2nd CELL

CONTROL NAIL
N=817,834.597
E=1,121,264.009
ELEV. = 2945.889'

GRAVEL ROAD



60 PENNY SPIKE TBM ELEV 2922.06'

CONTROL NAIL
N=817,593.125
E=1,120,879.575
ELEV 2920.249'

DB 266 PG 646
DB 440 PG 2195

BRUSHY CREEK ROAD

SEE NOTE # 2

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY
RALPH E. DAUGHTRY JR. P.L.S. L-4155 ON MAY 24, 2011
THIS MEDIUM SHALL NOT BE CONSIDERED A CERTIFED DOCUMENT.
REVISED 6/02/2011 SHOTS ON CELL # 2

TITLE: A TOPOGRAPHIC SURVEY OF THE AVERY COUNTY LANDFILL

CLIENT: EGGERS CONSTRUCTION

TOWNSHIP	COUNTY	STATE
TOE RIVER	AVERY	NORTH CAROLINA

DATE:	SCALE:
MAY 24, 2011	1" = 100'

RALPH E. DAUGHTRY LAND SURVEYING
2043 TYNECASTLE HIGHWAY UNIT 2
BANNER ELK, NORTH CAROLINA 28604 PHONE: 828-898-559

100 0 100 200 300
GRAPHIC SCALE – FEET

JOB # D11035

NOTES

1. ELEVATIONS ARE NAVD 88
2. COORDINATE SYSTEM 1983
3. DATA PER BLUE RIDGE ENGINEERING PLLC AVERY LANDFILL (10075)
4. BOUNDARY TAKEN FROM DEED BOOK 440 PAGE 2195 AND DEED BOOK 266 PAGE 646
5. THIS IS A TOPOGRAPHIC SURVEY OF A PORTION OF DEED BOOK 266 PAGE 646
6. CONTOURS ARE AT 2' INTERVALS AND ELEVATIONS ARE RELATIVE TO N.A.V.D. 88

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

DATE: 15-Nov-11
BY: SAS

Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Closure Construction Cost Estimate

Item No.	Item Description	Unit	Contractor Quantity	Contractor Unit Price	Contractor Total Price	Comments
	Closure Area (Horizontal Plan) ---->	**AC**	**4.5**			
1.0	**Pre-Construction**			**Subtotal**	**$17,250.00**	
1.1	Construction Documents & Bidding	AC	5	$10k + $500/AC	$17,250.00	RSG Estimate
2.0	**Construction**				**$210,631.50**	References 1 and 2.
2.1	Surveys and Layout	AC	5	$1,500.00	$6,750.00	Site Historical Estimate
2.2	Mobilization	AC	5	$1,000.00	$4,500.00	~4% of Construction Cost
2.3	Site Preparation (repairs to intermediate cover layer)	AC	5	$2,000.00	$9,000.00	Assumed estimate for repair of erosion rills.
2.4	18" On-site Low Permeability Soil	CY	10,890	$7.60	$82,764.00	Site Historical Estimate
2.5	18" Vegetative Support Layer	CY	10,890	$5.75	$62,617.50	Site Historical Estimate
2.6	Landfill Gas Venting System	AC	5	$1,200.00	$5,400.00	Site Historical Estimate
2.7	Cap Drainage Structures (berms, piping, etc.)	AC	5	$5,000.00	$22,500.00	Site Historical Estimate
2.8	Erosion & Sediment Control (grading, silt fence, maintenance, etc.)	AC	5	$800.00	$3,600.00	Site Historical Estimate
2.9	Revegetation	AC	5	$3,000.00	$13,500.00	Site Historical Estimate
3.0	**Quality Assurance, Certification, & Deed Notation**				**$31,325.00**	
3.1	Field Monitoring	AC	5	$3,000.00	$13,500.00	RSG Estimate
3.2	Laboratory Testing	AC	5	$2,500.00	$11,250.00	RSG Estimate
3.3	Engineering Certification	AC	5	$5k + $250/AC	$6,125.00	RSG Estimate
3.4	Surveying and Deed Notation	AC	5	$100.00	$450.00	RSG Historical Estimate
4.0	**Miscellaneous Costs to Close**				**$5,625.00**	
4.1	Erosion and Stormwater Control (outside landfill footprint)	AC	5	$1,000.00	$4,500.00	RSG Historical Estimate
4.2	Engineering and Reporting	AC	5	$250.00	$1,125.00	RSG Historical Estimate
5.0	**Total Closure Costs**					
	Construction Estimate ----->				**$264,832**	(2010$)
	Cost per Acre ----->				***$58,851***	
	Total Estimate ----->				**$264,832** (2011$) (See Note 1)	

Notes:

1. All costs are presented in current dollars and should be increased at an inflation rate prescribed by the NCDENR Division of Waste Management per http://portal.ncdenr.org/web/wm/sw/financialassurance if additional review is not performed annually.
2. This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

References:

1. Avery County Construction and Demolition Landfill Phase III Permit to Construct Application by Richardson Smith Gardner & Associates, Inc. dated February 2009 with revisions through August 2009.
2. Correspondence dated March 17, 2010 regarding approval of the site suitability including lateral expansion of Phase 2 following purchase of the Lechler parcel to Mr. Buddy Norris, Avery County from Mr. Zinith Barbee, NCDENR.

Denotes values calculated in spreadsheet.

RICHARDSON SMITH GARDNER & ASSOCIATES
ENGINEERING & GEOLOGICAL SERVICES

DATE: 15-Nov-11
BY: SAS

Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Post Closure Estimate

Item	Quantity	Unit	Comments
Groundwater Monitoring			
Monitoring wells	4	wells	Reference 1
Surface water point	2	points	Reference 1
Sampling frequency	2	events	Reference 1
Field sampling, collection, and shipping	$800	per event	RSG estimate
Laboratory Analysis	$325	per well	RSG estimate
Data review, statistics, and reporting	$2,000	per event	RSG estimate
Maintenance and repair	$1,000	per well	RSG historical estimate
Subtotal Cost	**$13,500**	**per year**	
Landfill Gas Management			
Control System Vents	7	vents	Per Ref. 1 (pro-rated @ one (1) per acre)
Sub-Surface Perimeter Monitoring Probes	4	probes	Per Ref. 1
Control system monitoring, maintenance and repair	$50	per vent per year	RSG estimate
Semi-Annual Perimeter Monitoring	$50	per probe per year	RSG estimate
Subtotal Cost	**$560**	**per year**	Averaged over post-closure period
Final Cover Management			
Area of maintenance	7.19	acres	Extends to area immediately around landfill.
Mowing	$100	per acre	Site historical estimate
Erosion and sediment control maintenance	$200	per acre	Site historical estimate
Topdressing (seed & fertilizer)	$150	per acre	Site historical estimate
Vector and rodent control	$10	per acre	Site historical estimate
Maintenance Mobilization	$1,000	per year	Site historical estimate
Subtotal Cost	**$4,307**	**per year**	
Administration, Inspections, and Reporting			
Administration and record keeping	$1,000	per year	Site historical estimate
Inspection	$1,000	per year	Site historical estimate
Miscellaneous engineering	$1,500	per year	Site historical estimate
Subtotal Cost	**$3,500**	**per year**	
Subtotal Post-Closure Costs			
Estimated Average Annual Costs	$21,867	per year (2011$)	
Number of Years for Post-Closure	30	years (see Note 1)	
Cost per Acre	$3,041.29	per year	
Subtotal Post Closure Costs	**$656,007**	(2011$) (See Note 2)	
Potential Assessment and Corrective (Remedial) Action			
Minimum amount required by NCDENR Division of Waste Management	$2,000,000	lump sum	Regulatory requirement (Session Law 2011-262)
Deduct Groundwater Monitoring	$405,000	see above	Includes full post closure period. 30 years.
Deduct Landffill Gas Management	$16,785	see above	Includes full post closure period. 30 years.
Deduct Administration, Inspections, and Reporting	$105,000	see above.	Includes full post closure period. 30 years.
Subtotal Remedial Cost	**$1,473,215**	**lump sum**	
Total Post Closure and Remedial Costs	**$2,129,222**	(2011$) (See Note 2)	
Total Closure, Post Closure, and Remedial Costs	**$2,394,054**	(2011$) (See Note 2)	

Notes:
1. All costs are presented in current dollars and should be increased at an inflation rate prescribed by the NCDENR Division of Waste Management per http://portal.ncdenr.org/web/wm/sw/financialassurance if additional review is not performed annually.
2. This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

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