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July 1, 2008

Solid Waste Section

Asheville Regional Office

**CLOSURE AND POST-CLOSURE PLAN
LINCOLN COUNTY C&D LANDFILL - PHASE II
LINCOLN COUNTY, NORTH CAROLINA**

S&ME Project No. 1356-08-109

Prepared for:
Lincoln County
5291 Crouse Road
Crouse, North Carolina, 28033

Prepared by:
S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273

June 26, 2008

APPROVED DOCUMENT
Division of Waste Management
Solid Waste Section
Date **September 15, 2009** By **LY Frost**



Celebrating 35 Years
1973 . 2008

June 26, 2008

Lincoln County
5291 Crouse Road
Crouse, North Carolina 28033

Attention: Mrs. Nancy Rickard, Solid Waste Manager

**Reference: Lincoln County C&D Landfill – Phase II
Closure and Post Closure Plan**
Lincoln County, North Carolina
S&ME Project No. 1356-08-109

Dear Mrs. Rickard:

S&ME, Inc. (S&ME) is pleased to submit this Closure and Post Closure Plan for the Lincoln County C&D Landfill – Phase II. This work was completed in general accordance with S&ME Proposal No. 1356-20230-08. This report includes a closure plan, post-closure plan, and cost estimates for closure and post-closure activities that meet the requirements of rule .0547 of the 15A NCAC 13B Standards for existing C&D landfills remaining in operation after July 1, 2008.

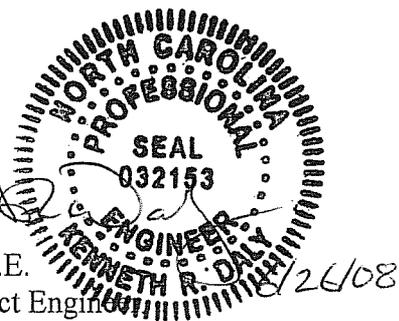
S&ME appreciates the continued opportunity to support Lincoln County with this Closure and Post Closure Plan. We trust this information is responsive to your needs at this time. If you have questions regarding this document or desire our assistance further, please do not hesitate to contact us.

Respectfully submitted,

S&ME, Inc.

Julie R. Petersen, P.G.
Project Manager

Ken Daly, P.E.
Senior Project Engineer



Senior Reviewed by: Jason S. Reeves, P.E., Senior Engineer

c: Larry Frost – NCDENR – Asheville Regional Office (2 copies)

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1. INTRODUCTION

1.1 Introduction

The following Closure and Post-Closure Plan was prepared for the Lincoln County Construction and Demolition (C&D) Landfill – Phase II to establish criteria for closure requirements and for post-closure compliance. This Closure and Post-Closure Plan was prepared in accordance with Title 15A Subchapter 13B of the North Carolina Administrative Code (NCAC). Rules .0531 through .0547 regulate the siting, design, construction, operation, closure and post-closure of C&D Landfills. More specifically, these rules require closure of C&D landfills that remain in operation after July 1, 2008 to develop closure and post closure plans in accordance with Solid Waste Management Rules, Section .0547. The information contained in this plan will be used to assist Lincoln County in the closure of active waste units and the maintenance and monitoring required during the post-closure care period.

1.2 Project Information

The Lincoln County Landfill is located on 5291 Crouse Road in Crouse, North Carolina. The existing landfill property is bordered on the north by Crouse Road and on the east, west and south by unnamed tributaries. The landfill site and surrounding vicinity are illustrated on Drawing 1 (Site Aerial Photograph) and Drawing 2 (Existing Site Conditions) in Appendix I.

The existing C&D landfill – Phase II was permitted to operate by the North Carolina Department of Environment and Natural Resources in August 2003. The landfill typically receives approximately 10,000 tons of C&D waste each year. Other waste operations on the facility property include:

- MSW landfill;
- recycling drop-off center;
- yard waste area; and
- white goods collection area.

2. CLOSURE PLAN

2.1 Cover System

The cover system has been designed to minimize storm water infiltration into the landfill and to resist erosion. The proposed final cover system will consist of the following from top to bottom:

- 18-inch thick erosion layer; and
- 18-inch thick low-permeability barrier.

The proposed cover system will be constructed over a 12-inch thick intermediate cover layer. If the landfill must be closed prior to reaching the final contours, the surface of the landfill will be sloped to a minimum of 5 percent and a maximum of 4 horizontal to 1 vertical (25 percent). Detailed discussion for the basis of the final cover system is provided in the following sections. Plans and details of the cover system are provided in Appendix I.

2.1.1 Low Permeability Barrier

2.1.1.1 Regulatory Requirement

The low-permeability barrier is designed to minimize infiltration into the landfill and to provide a sound working platform over the C&D waste prior to placement of the erosion layer. Solid waste management rules require that the low permeability barrier be based on the following three requirements:

- *“Have a permeability less than or equal to the permeability of any base liner system or the in-situ subsoils underlying the landfill, or...”*
- *“... the permeability specified for the final cover in the effective permit, or...”*
- *a permeability no greater than 1×10^{-5} cm/sec, whichever is less.”*

2.1.1.2 Base Grade Subsoils

Review of the borings performed for the Hydrogeologic Evaluation for the C&D Landfill Phase II indicate that the base grade subsoils for the C&D Landfill – Phase II consist of sandy silts (ML). Borings performed inside the landfill footprint (B-16 through B-20) were used to evaluate the landfill’s subsoils. The following table lists the borings, the approximate base grade elevation at the boring location and the soil classification at base grade.

<u>Boring Location</u>	<u>Approximate Base Grade Elev. (ft-msl)</u>	<u>Approximate Depth (bls) at time of boring (ft)</u>	<u>Soil Description at Base Grade</u>
B-16	870	12	Sandy Silt
B-17	873	36	Sandy Silt
B-18	869	26	Sandy Silt
B-19	862	21	Sandy Silt
B-20/OW-20	867	24	Sandy Silt

A copy of boring logs, the summary of laboratory test data table, and a figure depicting boring locations were taken from the Hydrogeologic Evaluation and included in Appendix II.

Review of the laboratory test data performed during the Hydrogeologic Evaluation for the C&D landfill Phase II indicates that undisturbed falling head permeability tests were not performed on the samples. However, similar soils were encountered during the Hydrogeologic Evaluation for the MSW Landfill – Phase III and undisturbed falling head permeability tests were performed on the similar soils.

Three falling head permeability tests were performed on the MSW – Phase III soils similar in soil classification and depth to the C&D – Phase II soils. The following borings from the MSW – Phase III Hydrogeologic Evaluation are similar in soil classification and depth and were used as comparable soils to the C&D – Phase II base grade subsoils. The summary table of laboratory test data from the MSW landfill – Phase III is included in Appendix II.

Boring Location	Sample Depth (ft-bls)	Soil Description	Hydraulic Conductivity K (cm/sec)
B-23	23-25	Sandy Silt	8.1×10^{-5}
B-25	23-25	Sandy Silt	6.4×10^{-5}
B-26	18-20	Sandy Silt	4.4×10^{-5}

Based on our previous experience at this site, the on-site soils are generally consistent, and it is reasonable to compare similar soil types across the site. Based on the data above and our experience with this site, the base grade subsoils for the C&D Landfill – Phase II are estimated to have a permeability greater than 1×10^{-5} cm/sec, therefore the low permeability barrier will have a permeability of 1×10^{-5} cm/sec or less.

2.1.2 Erosion Layer

The erosion layer consists of soil capable of supporting plant growth, prohibiting vector intrusion, and protecting the underlying low-permeability barrier from damage from drying and from freezing. The top 6 inches of the erosion layer will have an organic content capable of supporting vegetation. The proposed cover system erosion layer will consist of an 18-inch thick soil layer.

The cover system will be planted with grass to stabilize the cover soils, minimize erosion, and reduce cover system maintenance. The soil will be prepared by fertilizing, amending the soil, and seeding in accordance with the North Carolina Erosion and Sediment Control Guidelines.

2.2 Gas Venting System

Based on the typically inert nature of C&D waste, (i.e. lower organic content and potential for organic decomposition and landfill gas formation) the potential for landfill gas generation is anticipated to be low. However as a contingency and consistent with

C&D landfill rules a passive gas venting system is proposed with the final cover system. Passive gas vents will be spaced at a frequency of approximately 1 per acre. The passive gas vents will consist of a perforated high density polyethylene (HDPE) pipe extending from the waste through the cover; a gravel zone surrounding the HDPE pipe; and a geocomposite gas venting layer over a limited zone around the vent pipe. A passive gas vent detail is illustrated on the drawings provided in Appendix I.

2.3 Storm Water Management Systems

The proposed landfill is designed with a network of various storm water controls and conveyances to manage storm water during active operations, over interim cover soils, and upon final closure. Upon landfill closure, storm water will be collected and conveyed through a network of drainage benches and down-drain pipes to the perimeter surface water management system. Plans and details illustrating the storm water management system are provided in Appendix I.

2.4 Largest Area Requiring Cover System

The overall landfill footprint is 7.5 acres. The estimated largest area requiring cover system construction is approximately 7.5 acres.

2.5 Estimated Maximum Waste Inventory

Including the estimated waste in place to date and the proposed lifetime projection, the estimated maximum waste inventory is approximately 359,101 cubic yards. The waste in place estimate is provided in Appendix III.

2.6 Closure Schedule

Prior to closure of any area, the County shall notify NCDENR, Division of Waste Management that a notice of intent to close the area has been placed in the Operating Record.

The County shall begin closure activities of each area no later than 30 days after the date on which the area receives the known final receipt of wastes. If the area has remaining capacity and there is a reasonable likelihood that the area will receive additional wastes, the area will be closed no later than one year after the most recent receipt of wastes. If an extension beyond the one-year deadline for beginning closure is required, the County will demonstrate to NCDENR that the area has the capacity to receive additional wastes and the County has taken and will continue to take the steps necessary to prevent threats to human health and the environment from the unclosed area.

The County shall complete closure activities of each area in accordance with the closure plan within 180 days following the beginning of closure. If an extension of the closure period is required, the County will demonstrate to NCDENR that closure will, of necessity, take longer than 180 days and County has taken and will continue to take the steps to prevent threats to human health and the environment from the unclosed area.

Following closure of each area, the County shall notify the Division that a certification, signed by the Engineer verifying that closure has been completed in accordance with the Closure Plan, has been placed in the Operating Record.

Following closure of all units, the County shall record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search, and notify the Division that the notation has been recorded, and a copy has been placed in the operating record. The notation on the deed shall in perpetuity notify any potential purchaser of the property that:

- The land has been used as a landfill facility; and
- Its use is restricted under the Closure Plan approved by the Division.

The County may request permission from the Division to remove the notation from the deed if all wastes are removed from the facility.

2.7 Financial Assurance

The County has prepared a detailed written estimate, in current dollars, of the cost of hiring a third party to close the largest area at any time during the active life of the facility. A copy of the closure cost estimate is included as Appendix IV and shall be placed in the facility Operating Record.

The largest area to be closed at any one time is approximately 7.5 acres. The cost estimate includes the following items:

- mobilization/demobilization;
- final cover system;
- erosion and sedimentation control devices;
- passive landfill gas controls;
- final landscaping;
- engineering, construction management, and construction quality assurance (CQA); and
- administration (including announcements, deeds, and fees).

The cost estimate assumes that the soils required for the final closure are available on-site.

During the active life of the landfill, the County shall annually adjust the closure cost estimate for inflation within 30 days after the close of the local government's fiscal year and before submission of updated information to the Division. The County shall increase the closure cost estimate and the amount of financial assurance provided if changes to the closure plan or facility conditions increase the maximum cost of closure at any time during the remaining active life.

The County may reduce the closure cost estimate and the amount of financial assurance if the cost estimate exceeds the maximum cost of closure at any time during the remaining

life of the landfill. Prior to any reduction of the closure cost estimate by the County, a written justification for the reduction shall be submitted to NCDENR, Division of Waste Management. No reduction of the closure cost estimate shall be allowed without Division approval. The reduction justification and the NCDENR approval shall be placed in the facility Operating Record. The County shall establish financial assurance for closure of the landfill unit in compliance with Rule .0546.

3. POST-CLOSURE PLAN

3.1 General

The Post-Closure Plan outlines the monitoring and maintenance activities intended to maintain cover system integrity during the post-closure period. The post-closure period is a minimum of 30 years. During the post-closure period the landfill cover system and related facilities must be monitored and maintained.

3.2 Maintenance Activities

Maintenance required for the final cover is anticipated to be minimal. The vegetative cover shall be mowed a minimum of once a year. The vegetative cover shall be amended and fertilized as needed to maintain healthy vegetation. Depressions in the cover that pond water or otherwise impair the function of the final cover will be filled and/or regraded. Areas subject to regrading will be revegetated. Animal burrows and eroded areas should be filled in with compacted soil and reseeded. If vegetative cover is not adequate in a particular area, fertilizer should be applied and the area re seeded in order to re-establish vegetation. Insecticides may be used to eliminate insect populations that are detrimental to the vegetation. Any deep-rooted or woody vegetation that may have established itself on the cover soil will be removed.

3.3 Monitoring Activities

Post-closure monitoring will be conducted quarterly for the first two years and semi-annually thereafter for the remainder of the post-closure period. The following cover system and landfill components will be monitored:

- security measures such as fences, gates, locks, and other measures that control site and facility access;
- surface water management systems for signs of erosion, sedimentation, and condition;
- cover system for signs of erosion;
- cover system for evidence of settlement or subsidence;
- condition and/or presence of vegetation (for distressed or dying vegetation, woody vegetation with potential to penetrate the low permeability barrier);
- condition of the landfill gas system (passive vents); and
- condition of the groundwater monitoring system.

Post closure monitoring will be documented on post-closure monitoring forms. Post-Closure Monitoring Form sheets are provided in Appendix V. Completed post-closure monitoring forms will be maintained in the facilities operating record.

3.3.1 Groundwater Monitoring

Groundwater monitoring will be conducted consistent with the approved Groundwater Monitoring Plan during the post-closure period. Consistent with current landfill operations, it is anticipated that groundwater monitoring will be conducted during the facility's regularly scheduled semi-annual sampling events. Groundwater monitoring

results will be provided in regular compliance monitoring reports submitted to the Solid Waste Section.

3.3.2 Surface Water Monitoring

Surface water monitoring will be conducted consistent with the facility Water Quality Monitoring Plan during the post-closure period. Consistent with current landfill operations, it is anticipated that surface water monitoring will be conducted during the facility's regularly scheduled semi-annual sampling events. Surface water monitoring results will be provided in regular compliance monitoring reports submitted to the Solid Waste Section.

3.4 Facility Contact

The post-closure maintenance of the landfill will be the responsibility of the Lincoln County Public Works Department. Correspondence should be directed to:

Mrs. Nancy Rickard, Solid Waste Manager
5291 Crouse Road
Crouse, NC 28033
(704) 732-9030
nrickard@lincolncounty.org

The landfill physical address and office information are the same as above.

3.5 Post-Closure Planned Use

Following closure operations, the landfill will be closed and grass will be planted and maintained. Lincoln County will maintain control of, and limit access to the facility. No post-closure use is proposed at this time. In the event the post-closure planned use is changed, the County shall obtain prior approval from NCDENR.

3.6 Certification

Consistent with regulations, the end of the closure-post closure period must be certified by a registered professional engineer. To accomplish certification over the required 30 year duration, a registered professional engineer will prepare annual certifications. The annual certifications will document that the cover system has been monitored and maintained in accordance with the Post-Closure Plan. The annual certifications shall be based on observations and results documented on regular post-closure monitoring reports, maintenance records, and compliance monitoring reports maintained in the operating record.

3.7 Financial Assurance

The County has prepared a cost estimate, in current dollars, of hiring a third party to conduct post-closure care for the facility. The post-closure cost estimate accounts for annual and periodic costs as described above over the post-closure care period. A copy of the post-closure cost estimate is included as Appendix VI and will be maintained in the facility Operating Record.

The County will adjust the post-closure cost estimate annually for inflation within 30 days after the close of the local government's fiscal year and before submission of updated information to the Division. The County will increase the post-closure care cost estimate and the amount of financial assurance provided if changes in the post-closure plan or facility conditions increase the estimated costs of post-closure care.

The County may reduce the post-closure cost estimate and the amount of financial assurance provided if the cost estimate exceeds the maximum costs of post-closure care remaining over the post-closure care period. Prior to any reduction of the post-closure cost estimate by the County, a written justification for the reduction shall be submitted to NCDENR, Division of Waste Management. No reduction of the post-closure cost estimate shall be allowed without Division approval. The reduction justification and NCDENR approval shall be placed in the Operating Record.

4. REFERENCES

S&ME, Inc., "Construction Plan Application Construction and Demolition (C&D) Landfill – Phase II, Lincoln County, North Carolina," S&ME Project No. 1356-97-285I, July 16, 2002.

S&ME, Inc., "Application for Permit to Operate C&D Landfill – Phase II, Lincoln County, North Carolina" S&ME Project No. 1356-97-285I, July 16, 2003.

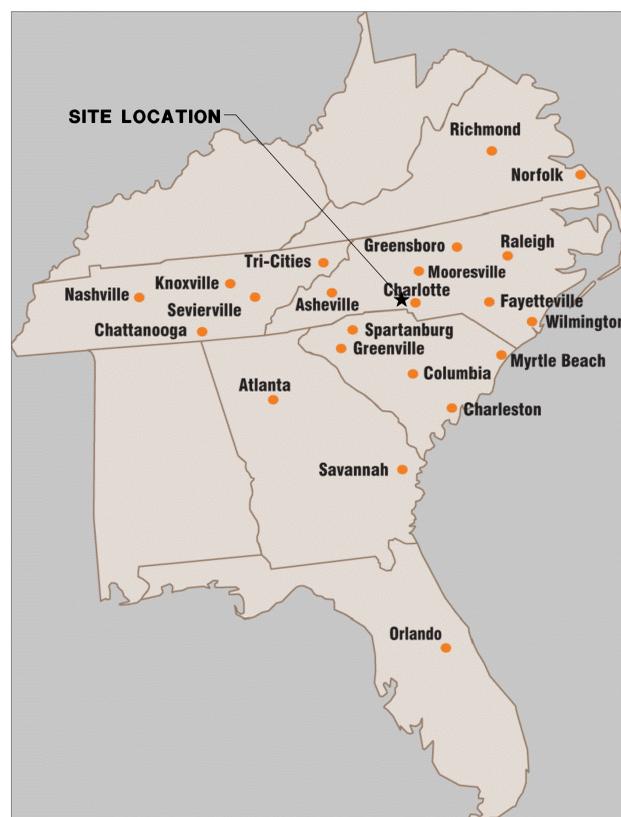
S&ME, Inc., "Design Hydrogeologic Study, Lincoln County Landfill Phase III, Crouse North Carolina," S&ME Project No. 1356-03-255A, August 20, 2004.

APPENDIX I – COVER SYSTEM PLANS AND DETAILS

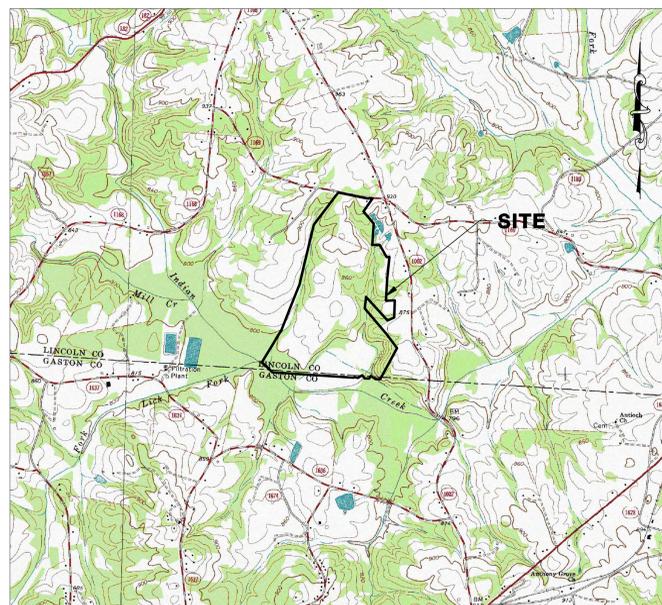
CLOSURE AND POST - CLOSURE PLAN

PERMIT NO. 55-03

LINCOLN COUNTY C&D LANDFILL CROUSE, NORTH CAROLINA JUNE, 2008



LOCATION / S&ME OFFICE MAP
NOT TO SCALE

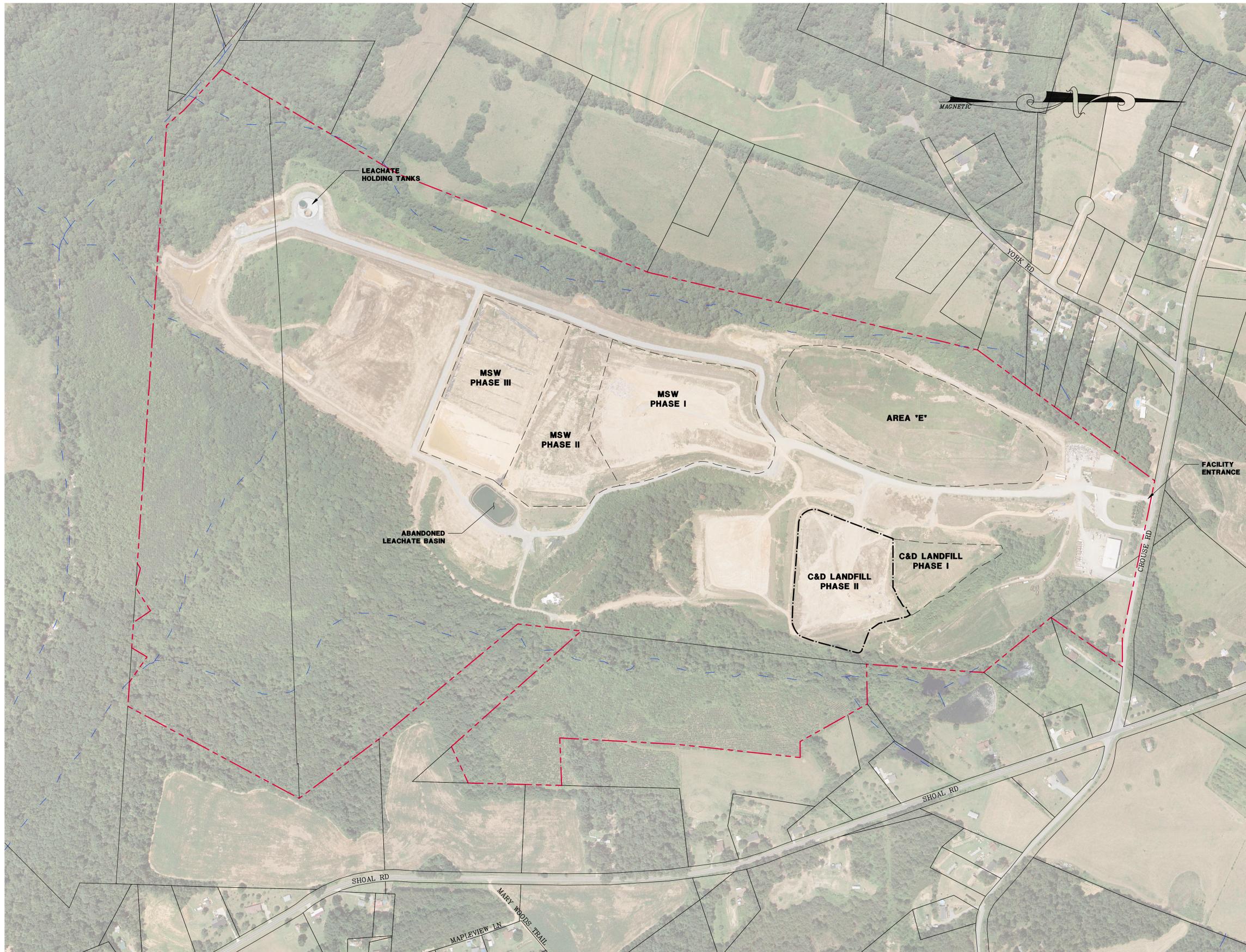


SITE VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS

DRAWING	TITLE
1	SITE AERIAL PHOTOGRAPH
2	EXISTING CONDITIONS
3	CLOSURE PLAN
4	STORMWATER MANAGEMENT PLAN
5	DETAILS SHEET 1 OF 2
6	DETAILS SHEET 2 OF 2





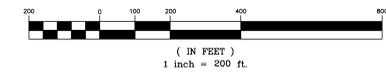
LEGEND

- FACILITY PROPERTY BOUNDARY
- ADJACENT PROPERTY BOUNDARY
- C&D PHASE II LANDFILL BOUNDARY (NOTE 1)
- EXISTING LANDFILL BOUNDARY
- STREAM

NOTES:

1. C&D LANDFILL AND MSW BOUNDARY OBTAINED FROM "SITE DEVELOPMENT PLAN" DATED 4-21-08

GRAPHIC SCALE



REFERENCE:
AERIAL PHOTOGRAPHY PERFORMED ON JUNE 14, 2007. PROVIDED BY SANBORN, LLC. GIS DATA WAS OBTAINED FROM THE LINCOLN COUNTY GEOGRAPHIC INFORMATION SYSTEMS (GIS) DEPARTMENT.

LINCOLN COUNTY
5991 CROUSE ROAD
CROUSE, NC 28033

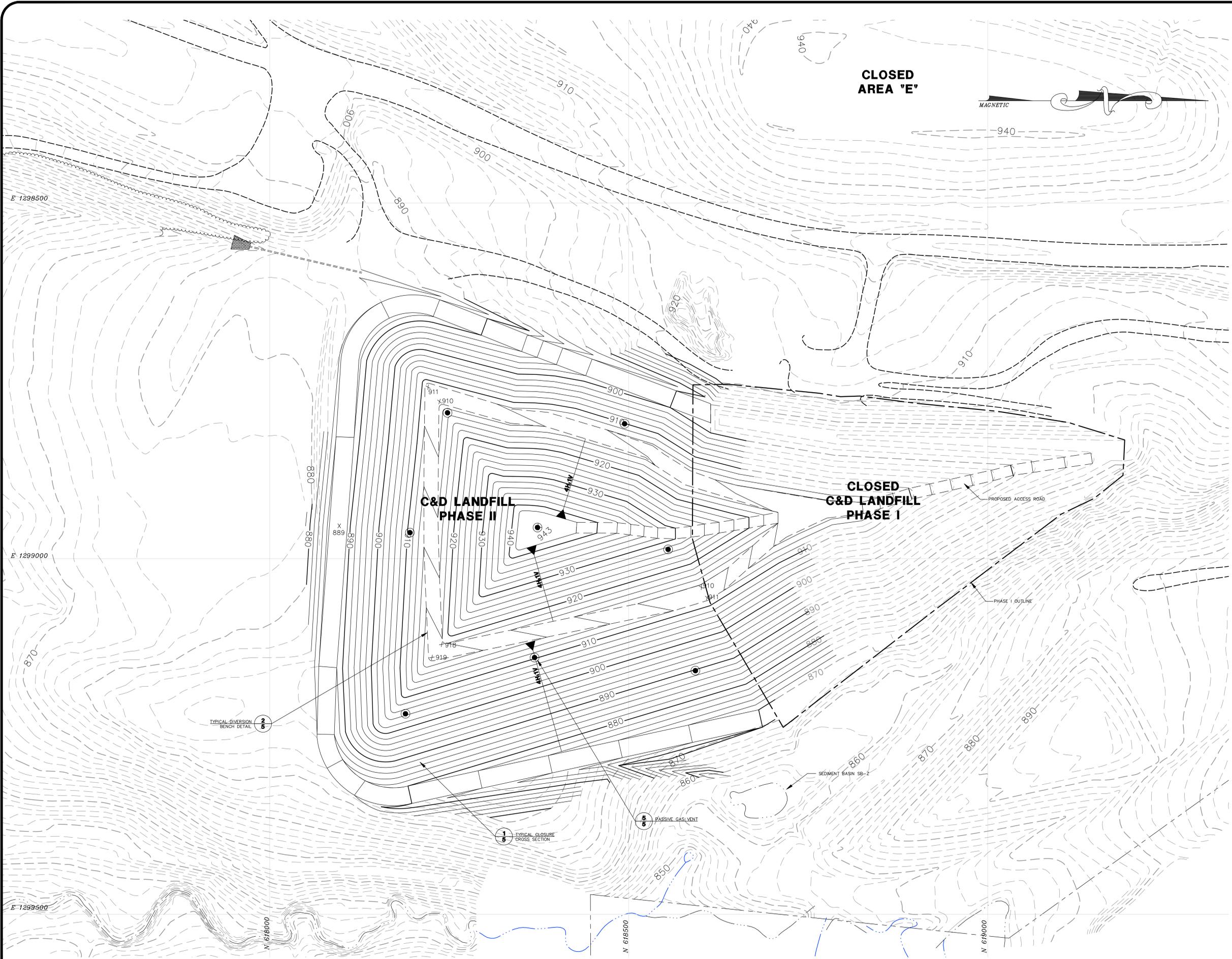


NO.	DATE	DESCRIPTION	BY

SITE AERIAL PHOTOGRAPH
LINCOLN COUNTY C&D LANDFILL - PHASE II
CROUSE, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: SRD
DESIGNED BY:	APPROVED BY: [Signature]
PROJECT NUMBER: 1356-08-109	DATE: 06/26/08
DRAWING NO.: 1	OF: 6

DRAWING PARTIAL TO LINCOLN COUNTY GIS DATABASE FOR CROUSE PLANNING SET OF A SITE AERIAL PHOTOGRAPH



CLOSED AREA 'E'

MAGNETIC



C&D LANDFILL PHASE II

C&D LANDFILL PHASE I

PROPOSED ACCESS ROAD

PHASE 1 OUTLINE

SEDIMENT BASIN SB-2

PASSIVE GAS VENT

TYPICAL DIVERSION BENCH DETAIL 2/5

TYPICAL CLOSURE CROSS SECTION 1/6

LEGEND

- - - - - EXISTING GRADE
- PROPOSED GRADE
- PROPERTY LINE
- STREAM
- PASSIVE GAS VENT

GRAPHIC SCALE



(IN FEET)
1 inch = 50 ft.

REFERENCE: TOPOGRAPHIC FEATURES OBTAINED THROUGH AERIAL PHOTOGRAMMETRIC METHODS. TOPOGRAPHIC FEATURES PREPARED BY SPATIAL DATA CONSULTANTS, INC. OF HIGH POINT, NORTH CAROLINA. GROUND CONTROL PROVIDED BY SHUTTLES SURVEYING, P.A. LOCATED IN MARION, NORTH CAROLINA. NORTH BASED ON GPS OBSERVATIONS AND GRID MONUMENTATION. TOPOGRAPHIC SURVEY OF THE LINCOLN COUNTY LANDFILL PROJECT, LINCOLN COUNTY, NORTH CAROLINA DATE: MAY 31, 2001.

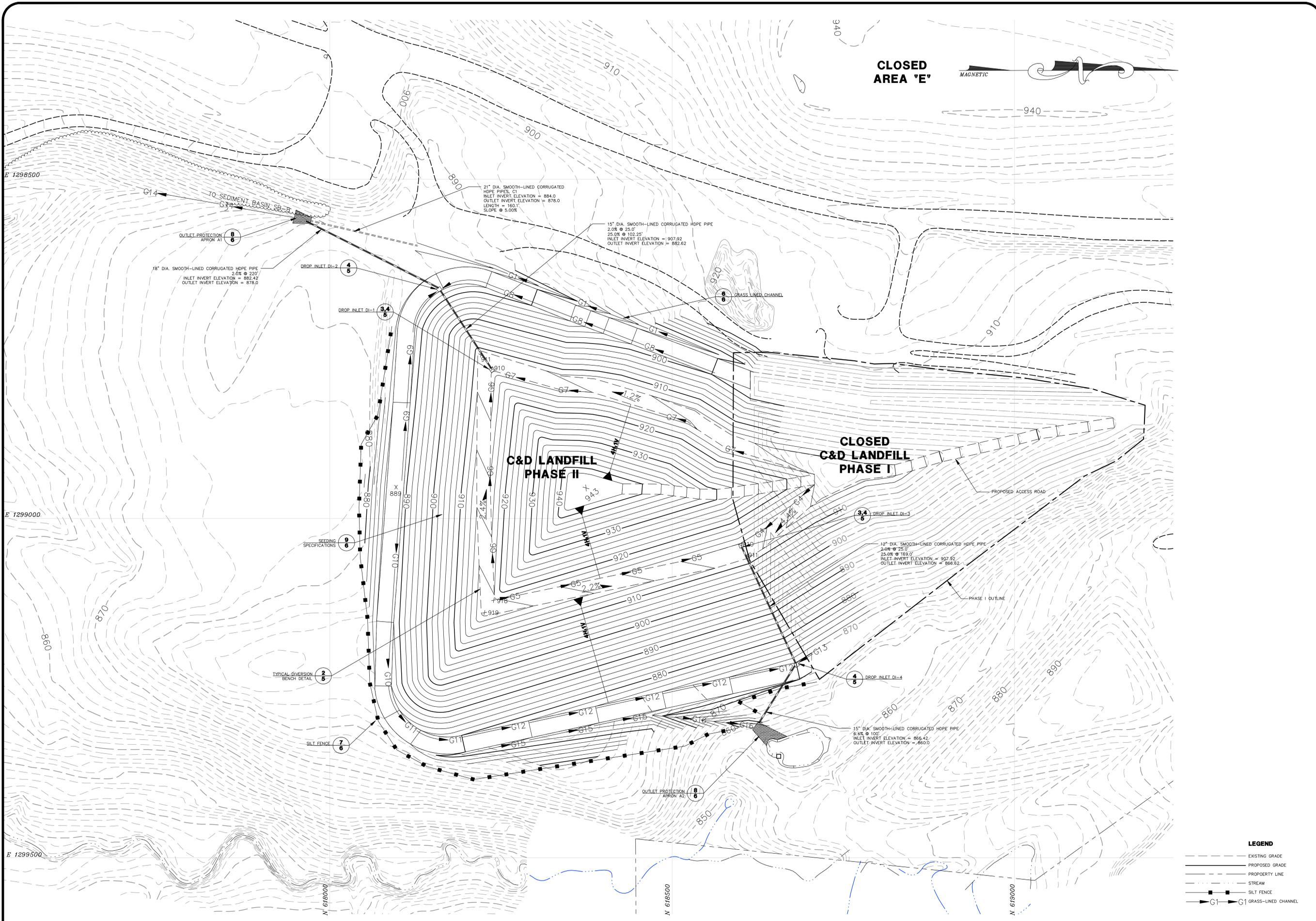
LINCOLN COUNTY
5291 CROUSE ROAD
CROUSE, NC 28033



NO.	DATE	DESCRIPTION	BY

CLOSURE PLAN	
LINCOLN COUNTY C&D LANDFILL PHASE II	
CROUSE, NORTH CAROLINA	
DESIGNED BY: CJLS	CHECKED BY: SRO
DESIGNED BY: CJLS	APPROVED BY: KCB
PROJECT NUMBER: 1356-08-109	DATE: 06/26/08
SCALE: AS SHOWN	DATE: 06/26/08
DRAWING: 3	OF: 6

DRAWING PART OF LINCOLN COUNTY C&D LANDFILL PHASE II CLOSURE PLAN SHEET 3 OF 6 CLOSURE PLAN



CLOSED AREA 'E'



21" DIA. SMOOTH-LINED CORRUGATED HOPE PIPES, G1
INLET INVERT ELEVATION = 884.0
OUTLET INVERT ELEVATION = 878.0
LENGTH = 160.1'
SLOPE @ 5.00%

15" DIA. SMOOTH-LINED CORRUGATED HOPE PIPE
2.0% @ 25.0'
25.0% @ 102.25'
INLET INVERT ELEVATION = 1907.92
OUTLET INVERT ELEVATION = 882.62

18" DIA. SMOOTH-LINED CORRUGATED HOPE PIPE
2.0% @ 220'
INLET INVERT ELEVATION = 882.42
OUTLET INVERT ELEVATION = 878.0

12" DIA. SMOOTH-LINED CORRUGATED HOPE PIPE
2.0% @ 25.0'
25.0% @ 169.0'
INLET INVERT ELEVATION = 907.52
OUTLET INVERT ELEVATION = 886.82

15" DIA. SMOOTH-LINED CORRUGATED HOPE PIPE
6.4% @ 100'
INLET INVERT ELEVATION = 866.42
OUTLET INVERT ELEVATION = 860.0

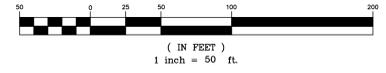
C&D LANDFILL PHASE II

CLOSED C&D LANDFILL PHASE I

LEGEND

- EXISTING GRADE
- - - PROPOSED GRADE
- - - - - PROPERTY LINE
- STREAM
- SILT FENCE
- G1 --- GRASS-LINED CHANNEL

GRAPHIC SCALE



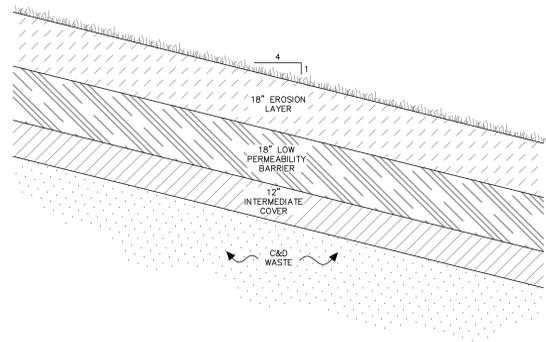
REFERENCE: TOPOGRAPHIC FEATURES OBTAINED THROUGH AERIAL PHOTOGRAMMETRIC METHODS. TOPOGRAPHIC FEATURES PREPARED BY SPATIAL DATA CONSULTANTS, INC. OF HIGH POINT, NORTH CAROLINA. GROUND CONTROL PROVIDED BY SHUTTLES SURVEYING, P.A. LOCATED IN MARION, NORTH CAROLINA. NORTH BASED ON GPS OBSERVATIONS AND GRID MONUMENTATION. TOPOGRAPHIC SURVEY OF THE LINCOLN COUNTY LANDFILL PROJECT, LINCOLN COUNTY, NORTH CAROLINA DATE: MAY 31, 2001.



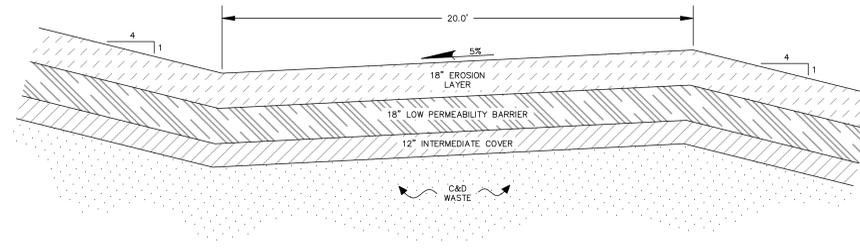
NO.	DATE	DESCRIPTION	BY

STORMWATER MANAGEMENT PLAN	
LINCOLN COUNTY C&D LANDFILL PHASE II	
CROUSE, NORTH CAROLINA	
DRAWN BY: CLD	CHECKED BY: SRO
DESIGNED BY: CJLS	APPROVED BY: KID
PROJECT NUMBER 1356-08-109	
SCALE: AS SHOWN	DATE: 06/26/08
DRAWING: 4	OF: 6

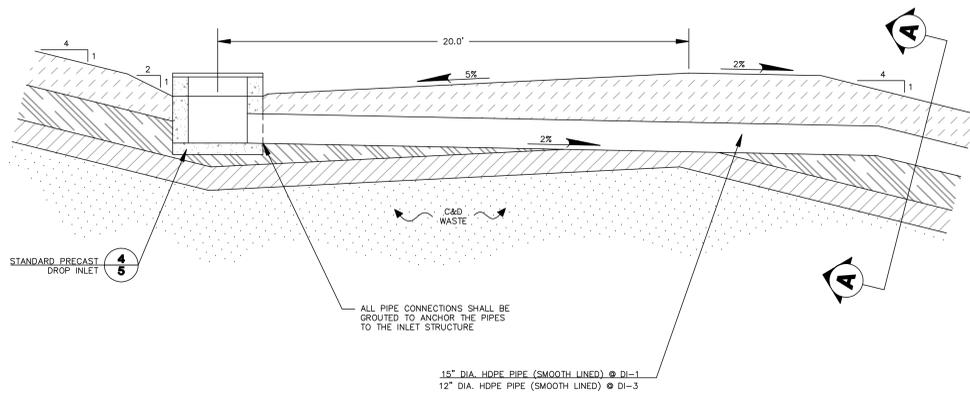
DRAWING PART OF LINCOLN COUNTY C&D LANDFILL PHASE II STORMWATER MANAGEMENT PLAN



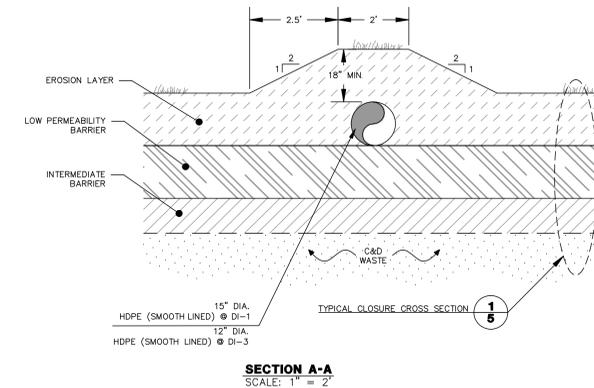
1
5 TYPICAL CLOSURE CROSS SECTION
SCALE: 1" = 2"



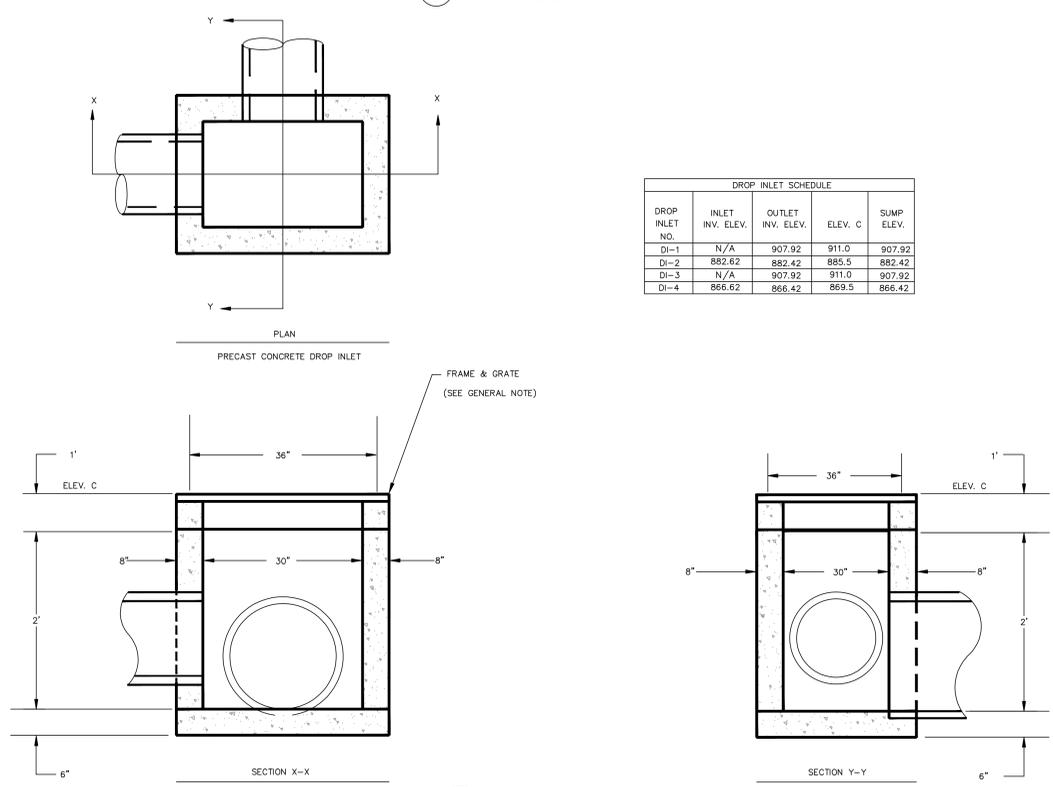
2
5 TYPICAL DIVERSION BENCH DETAIL
SCALE: 1" = 3"



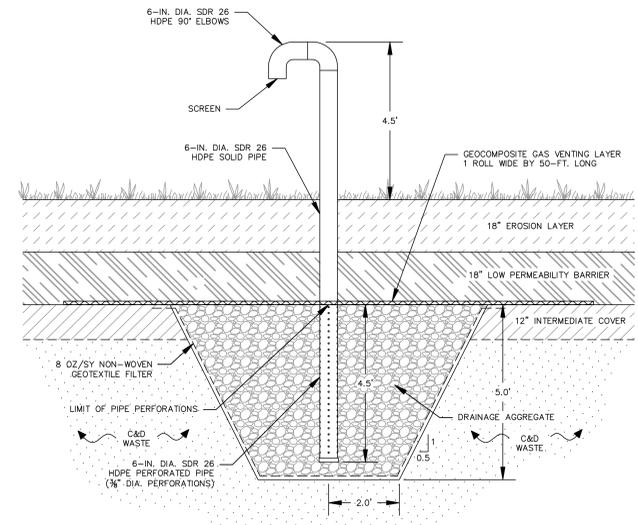
3
5 DROP INLET DETAIL (4H : 1V SLOPE)
SCALE: 1" = 3"



SECTION A-A
SCALE: 1" = 2"



4
5 STANDARD PRECAST DROP INLET
SCALE: N.T.S.



5
6 PASSIVE GAS VENT DETAIL
SCALE: 1" = 2"

DROP INLET SCHEDULE				
DROP INLET NO.	INLET INV. ELEV.	OUTLET INV. ELEV.	ELEV. C	SUMP ELEV.
DI-1	N/A	907.92	911.0	907.92
DI-2	882.62	882.42	885.5	882.42
DI-3	N/A	907.92	911.0	907.92
DI-4	866.62	866.42	869.5	866.42



NO.	DATE	DESCRIPTION	BY

DETAILS (SHEET 1 OF 2)	
LINCOLN COUNTY C&D LANDFILL - PHASE II CROUSE, NORTH CAROLINA	
DRAWN BY: JRP	CHECKED BY: SRD
DESIGNED BY: JRP	APPROVED BY: KTB
PROJECT NUMBER: 1356-08-109	DATE: 06/26/08
SCALE: AS SHOWN	DATE: 06/26/08
DRAWING: 5	OF: 6

DEFINITION:

A CHANNEL WITH VEGETATIVE LINING CONSTRUCTED TO DESIGN CROSS SECTION AND GRADE FOR CONVEYANCE OF RUNOFF.

PURPOSE:

TO CONVEY AND DISPOSE OF CONCENTRATED SURFACE RUNOFF WITHOUT DAMAGE FROM EROSION, DEPOSITION, OR FLOODING.

CONSTRUCTION SPECIFICATIONS:

- REMOVE ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTABLE MATERIAL FROM THE FOUNDATION AREA AND DISPOSE OF PROPERLY.
- EXCAVATE THE CHANNEL AND SHAPE IT TO DIMENSIONS SHOWN ON THE PLANS PLUS A 0.2-FT OVERCUT AROUND THE CHANNEL PERIMETER TO ALLOW FOR BUILDING DURING SEEDBED PREPARATIONS AND SOO BUILDUP.
- REMOVE AND PROPERLY DISPOSE OF ALL EXCESS SOIL SO THAT SURFACE WATER MAY ENTER THE CHANNEL FREELY.
- THE PROCEDURE USED TO ESTABLISH GRASS IN THE CHANNEL WILL DEPEND UPON THE SEVERITY OF THE CONDITIONS AND SELECTION OF SPECIES. PROTECT THE CHANNEL WITH MULCH OR A TEMPORARY LINER SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD (SEE SEEDING SPECIFICATIONS).
- APPLY LIME, FERTILIZER AND SEED BEFORE LAYING THE NET (WITHOUT MULCH) OR MAT (WITH MULCH OR SYNTHETIC). IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND THE FERTILIZER AND SEED CAN BE SPRAYED ON AFTERWARD, OTHERWISE APPLY SEED AND FERTILIZER BEFORE INSTALLATION.
- START LAYING THE NET OR MAT FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL IT DOWN THE GRADE. ALLOW NETTING TO LAY LOOSELY ON THE SOIL BUT WITHOUT WRINKLES--DO NOT STRETCH.
- TO SECURE THE NET, BURY THE UPSLOPE END IN A SLOT OR TRENCH NO LESS THAN 6 INCHES DEEP. COVER WITH SOIL, AND TAMP FIRMLY. STAPLE THE NET EVERY 12 INCHES ACROSS THE TOP END AND EVERY 3 FT AROUND THE EDGES AND BOTTOM. WHERE 2 STRIPS OF

NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF NETTING OR MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER OR EVERY 3 FT IF THE STRIP IS NOT WIDER THAN 6 FEET. DO NOT STRETCH THE NET/MAT WHEN APPLYING STAPLES.

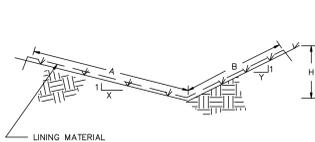
- STAPLES SHOULD BE THE "U"-SHAPE TYPE AND 4" TO 6" LONG (DEPENDS ON SOIL CONDITIONS).
- TO JOIN ENDS OF TWO STRIPS OF NETTING, CUT A TRENCH TO ANCHOR THE END OF THE DOWN GRADIENT NET. OVERLAP THE END OF THE PREVIOUS ROLL 18 INCHES AND STAPLE EVERY 12 INCHES JUST BELOW THE ANCHOR SLOT.
- TO JOIN ENDS OF TWO STRIPS OF MATTING, OVERLAP THE UPGRADIENT STRIP OVER THE DOWNGRADIENT ONE AT LEAST 4 INCHES. STAPLE THE OVERLAP AT THE ENDS AND EVERY 12 INCHES ALONG THE CENTER OF THE OVERLAP.

NOTE:
NETTING AND MATTING PRODUCTS SHOULD BE INSTALLED ACCORDING TO MANUFACTURERS' GUIDELINES. IF THE MANUFACTURER DOES NOT PROVIDE GUIDELINES, THE ABOVE GUIDELINES FOR NETTING AND MATTING MAY BE USED.

MAINTENANCE:
DURING THE ESTABLISHMENT PERIOD, CHECK GRASS-LINED CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL. CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY AND EVIDENCE OF PIPING OR SCOUR HOLES.

REMOVE ALL SIGNIFICANT SEDIMENT ACCUMULATIONS TO MAINTAIN THE DESIGN CARRYING CAPACITY. KEEP THE GRASS IN A HEALTHY, VIGOROUS CONDITION AT ALL TIMES, SINCE IT IS THE PRIMARY EROSION PROTECTION FOR THE CHANNEL (SEE SEEDING SPECIFICATIONS).
INSPECT ALL MULCHES PERIODICALLY, AND AFTER RAINSTORMS TO CHECK FOR HILL EROSION, DISLOCATION, OR FAILURE. WHERE EROSION IS OBSERVED, APPLY ADDITIONAL MULCH. IF WASHOUT OCCURS, REPAIR THE SLOPE GRADE, RESEED, AND REINSTALL MULCH. CONTINUE INSPECTIONS UNTIL VEGETATION IS FIRMLY ESTABLISHED.

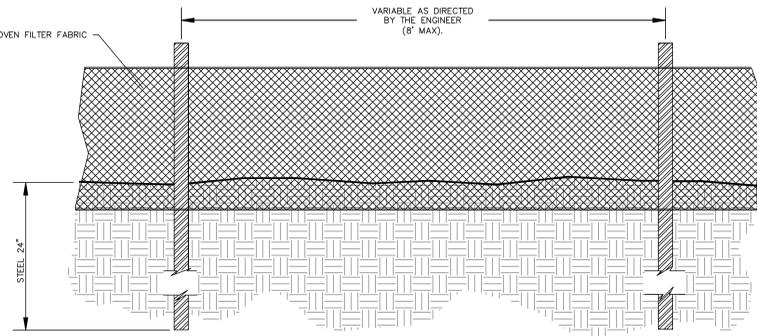
REFERENCE:
NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.



CHANNELS SHALL BE LINED WITH NORTH AMERICAN GREEN EROSION CONTROL LINING OR SYNTHETIC INDUSTRIES TURF REINFORCEMENT MATS OR ENGINEER APPROVED EQUIVALENT.

CHANNEL TYPE	LINING MATERIAL	CHANNEL HEIGHT H (FT)	SIDE SLOPE		A	B
			Y	X		
G1	SC250	2	3	3	3.00	3.00
G4	NONE	1	20	4	N/A	N/A
G5	DS75	1	4	20	2.00	9.00
G6	DS75	1	20	4	9.00	2.00
G7	NONE	1	4	20	N/A	N/A
G8	DS75	1.5	3	3	3.00	3.00
G9	NONE	1.5	3	3	N/A	N/A
G10	DS75	1.5	3	3	3.00	3.00
G11	DS75	1.5	3	3	3.00	3.00
G12	SC250	1.5	3	3	3.75	3.75
G13	NONE	1.5	3	3	N/A	N/A
G14	NONE	2	3	3	N/A	N/A
G15	DS75	1	3	3	2.75	2.75
G16	SC250	2	2	2	2.00	2.00

8 GRASS-LINED CHANNEL DETAIL
SCALE: N.T.S.



- GENERAL NOTES:**
- PREFABRICATED SILT FENCE IS NOT ACCEPTABLE ON THIS PROJECT.
 - STEEL POSTS SHALL BE USED ON THIS PROJECT INSTEAD OF WOOD POSTS.
 - FILTER FABRIC FENCE SHALL BE A MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
 - WOVEN FILTER FABRIC SHALL BE USED WHERE SILT FENCE IS TO REMAIN FOR A PERIOD OF MORE THAN 30 DAYS.
 - STEEL POSTS SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.
 - TURN SILT FENCE UP SLOPE AT ENDS.
 - SILT FENCE SHALL BE STANDARD STRENGTH FILTER FABRIC WITH WIRE MESH REINFORCEMENT OR EXTRA STRENGTH FILTER FABRIC.
 - WHEN FABRIC IS USED WITH WIRE MESH, 8" CENTERED POSTS MAY BE USED.
 - THE USE OF SILT FENCE IN AREAS OF CONCENTRATED FLOW IS INAPPROPRIATE.
- MAINTENANCE NOTES:**
- INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
 - SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
 - REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT.
 - REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
- REFERENCE:**
6.62.7 NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, 2006

7 SILT FENCE DETAIL
SCALE: N.T.S.

DEFINITION:

A STRUCTURE DESIGNED TO CONTROL EROSION AT THE INLET OR OUTLET OF A CHANNEL OR CONDUIT.

PURPOSE:

TO PREVENT EROSION AT THE OUTLET OF A CHANNEL OR CONDUIT BY REDUCING THE VELOCITY OF FLOW AND DISSIPATING THE ENERGY.

CONSTRUCTION SPECIFICATIONS:

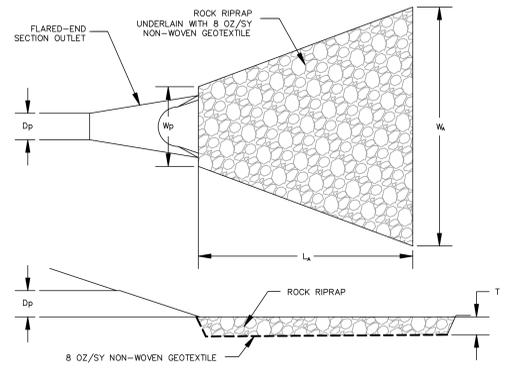
- ENSURE THAT THE SUBGRADE FOR THE FILTER AND RIPRAP FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING DISTURBED MATERIAL. LOW AREAS IN THE SUBGRADE ON UNDISTURBED SOIL MAY ALSO BE FILLED BY INCREASING THE RIPRAP THICKNESS.
- THE RIPRAP AND GRAVEL FILTER MUST CONFORM TO THE SPECIFIED GRADING LIMITS SHOWN ON THE PLANS.
- FILTER CLOTH, WHEN USED, MUST MEET DESIGN REQUIREMENTS AND BE PROPERLY PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION. REPAIR ANY DAMAGE BY REMOVING THE RIPRAP AND PLACING ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA. ALL CONNECTING JOINTS SHOULD OVERLAP SO THE TOP LAYER IS ABOVE THE DOWNSTREAM LAYER A MINIMUM OF 1 FT. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER CLOTH.
- RIPRAP MAY BE PLACED BY EQUIPMENT, BUT TAKE CARE TO AVOID DAMAGING THE FILTER.
- THE MINIMUM THICKNESS OF THE RIPRAP SHOULD BE 1.5 TIMES THE MAXIMUM STONE DIAMETER.
- RIPRAP MAY BE FIELD STONE OR ROUGH QUARRY STONE. IT SHOULD BE HARD, ANGULAR, HIGHLY WEATHER-RESISTANT AND WELL GRADED.
- CONSTRUCT THE APRON ON ZERO GRADE WITH NO OVERFILL AT THE END. MAKE THE TOP OF THE RIPRAP AT THE DOWNSTREAM END LEVEL WITH THE RECEIVING AREA OR SLIGHTLY BELOW IT.
- ENSURE THAT THE APRON IS PROPERLY ALIGNED WITH THE RECEIVING STREAM AND PREFERABLY STRAIGHT THROUGHOUT ITS LENGTH. IF A CURVE IS NEEDED TO FIT SITE CONDITIONS, PLACE IN THE UPPER SECTION OF THE APRON.
- IMMEDIATELY AFTER CONSTRUCTION, STABILIZE ALL DISTURBED AREAS WITH VEGETATION.

MAINTENANCE:

INSPECT RIPRAP OUTLET STRUCTURES WEEKLY AND AFTER SIGNIFICANT (3 INCH OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

REFERENCE:

6.41.5 NC EROSION AND SEDIMENTATION CONTROL PLANNING AND DESIGN MANUAL, 2006



ALL RIPRAP SHALL BE NCDOT CLASSES OR ENGINEER APPROVED.

SUMMARY OF PROTECTION APRONS

DISCHARGE PIPE LOCATION	Dp (FT)	Lp (FT)	Wp (FT)	Wt (FT)	T (IN)	Dpr (IN)	Dpr (IN)	NCDOT CLASS
A1	3.75	14	27	38	3/2	3	8	B
A2	N/A	36	27	27	3/2	3	20	2

8 OUTLET PROTECTION APRON
SCALE: N.T.S.

DEFINITION:

CONTROLLING RUNOFF AND EROSION ON DISTURBED AREAS BY ESTABLISHING PERENNIAL VEGETATIVE COVER WITH SEED.

PURPOSE:

TO REDUCE EROSION AND DECREASE SEDIMENT YIELD FROM DISTURBED AREAS, AND TO PERMANENTLY STABILIZE SUCH AREAS IN A MANNER THAT IS ECONOMICAL, ADAPTS TO SITE CONDITIONS, AND ALLOWS SELECTION OF THE MOST APPROPRIATE PLANT MATERIALS.

SPECIFICATIONS:

- SEEDBED REQUIREMENTS**
ESTABLISHMENT OF VEGETATION SHOULD NOT BE ATTEMPTED ON SITES THAT ARE UNSUITABLE DUE TO EXCESSIVE SOIL COMPACTION, INAPPROPRIATE SOIL TEXTURE, POOR DRAINAGE, CONCENTRATED OVERLAND FLOW, OR STEEPNESS OF SLOPE UNTIL MEASURES HAVE BEEN TAKEN TO CORRECT THESE PROBLEMS.
- TO MAINTAIN A GOOD STAND OF VEGETATION, THE SOIL MUST MEET CERTAIN MINIMUM REQUIREMENTS AS A GROWTH MEDIUM. THE EXISTING SOIL SHOULD HAVE THESE CRITERIA:
- ENOUGH FINE-GRAINED (SILT AND CLAY) MATERIAL TO MAINTAIN ADEQUATE MOISTURE AND NUTRIENT SUPPLY (AVAILABLE WATER CAPACITY OF AT LEAST .05 INCHES WATER TO 1 INCH OF SOIL).
 - SUFFICIENT PORE SPACE TO PERMIT ROOT PENETRATION.
 - SUFFICIENT DEPTH OF SOIL TO PROVIDE AN ADEQUATE ROOT ZONE. THE DEPTH TO ROCK OR IMPERMEABLE LAYERS SUCH AS HARDPAN SHOULD BE 12 INCHES OR MORE, EXCEPT ON SLOPES STEEPER THAN 2:1 WHERE THE ADDITION OF SOIL IS NOT FEASIBLE.
 - A FAVORABLE PH RANGE FOR PLANT GROWTH, USUALLY 6.0 - 6.5.
 - FREE FROM LARGE ROOTS, BRANCHES, STONES, LARGE CLOUDS OF EARTH, OR TRASH OF ANY KIND. CLOUDS AND STONES MAY BE LEFT ON SLOPES STEEPER THAN 3:1 IF THEY ARE TO BE HYDRO SEEDED.

IF ANY OF THE ABOVE CRITERIA ARE NOT MET - I.E., IF EXISTING SOIL IS TOO COARSE, DENSE, SHALLOW OR ACIDIC TO FOSTER VEGETATION - SPECIAL AMENDMENTS ARE REQUIRED. THE SOIL CONDITIONS DESCRIBED BELOW MAY BE BENEFICIAL OR, PREFERABLY, TOPSOIL MAY BE APPLIED.

SEEDBED PREPARATION
INSTALL NECESSARY MECHANICAL EROSION AND SEDIMENTATION CONTROL PRACTICES BEFORE SEEDING, AND COMPLETE GRADING ACCORDING TO THE APPROVED PLAN.

LIME AND FERTILIZER NEEDS SHOULD BE DETERMINED BY SOIL TESTS, DIRECTIONS, SAMPLE CARTONS, AND INFORMATION SHEETS ARE AVAILABLE THROUGH COUNTY AGRICULTURAL EXTENSION OFFICES. TESTING IS ALSO DONE BY COMMERCIAL LABORATORIES.

WHEN SOIL TESTS RESULTS ARE NOT AVAILABLE, FOLLOW RATES SUGGESTED IN THE SEEDING SPECIFICATIONS SHOWN AT RIGHT. APPLICATION RATES USUALLY FALL INTO THE FOLLOWING RANGES:

- GROUND AGRICULTURAL LIMESTONE: LIGHT-TEXTURED, SANDY SOILS: 1 TO 1-1/2 TONS/ACRE; HEAVY-TEXTURED, CLAYEY SOILS: 2-3 TONS/ACRE
- FERTILIZER: GRASSES: 800-1200 LB/ACRE OF 10-10-10 (OR THE EQUIVALENT); GRASS-LEGUME MIXTURES: 800-1200 LB/ACRE OF 5-10-10 (OR THE EQUIVALENT)

APPLY LIME AND FERTILIZER EVENLY AND INCORPORATE INTO THE TOP 4-6 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS. OPERATE MACHINERY ON THE CONTOUR. WHEN USING A HYDRO SEEDER, APPLY LIME AND FERTILIZER TO A ROUGH, LOOSE SURFACE.

ROUGHEN SURFACES PRIOR TO SEEDING.
COMPLETE SEEDBED PREPARATION BY BREAKING UP LARGE CLOUDS AND RAKING INTO A SMOOTH, UNIFORM SURFACE (SLOPES LESS THAN 5:1). FILL IN OR LEVEL DEPRESSIONS THAT CAN COLLECT WATER. BROADCAST SEED INTO A FRESHLY LOOSENEED SEEDBED THAT HAS NOT BEEN SEALED BY RAINFALL.

SEEDING
SEEDING DATES GIVEN IN THE SEEDING MIXTURE SPECIFICATIONS ARE DESIGNATED AS "BEST" OR "POSSIBLE". SEEDINGS PROPERLY CARRIED OUT WITHIN THE "BEST" DATES HAVE A HIGH PROBABILITY OF SUCCESS. IT IS ALSO POSSIBLE TO HAVE SATISFACTORY ESTABLISHMENT WHEN SEEDING OUTSIDE THESE DATES. HOWEVER, AS YOU DEVIATE FROM THEM, THE PROBABILITY OF FAILURE INCREASES RAPIDLY. SEEDING ON THE LAST DATE SHOWN UNDER "POSSIBLE" MAY REDUCE CHANCES OF SUCCESS BY 30-50%. ALWAYS TAKE THIS INTO ACCOUNT IN SCHEDULING LAND-DISTURBING ACTIVITIES.

USE CERTIFIED SEED FOR PERMANENT SEEDING WHENEVER POSSIBLE.

LABELING OF NON-CERTIFIED SEED IS ALSO REQUIRED BY LAW. LABELS CONTAIN IMPORTANT INFORMATION ON SEED PURITY, GERMINATION, AND PRESENCE OF WOOD SEEDS. SEEDS MUST MEET STATE STANDARDS FOR CONTENT OF NOXIOUS WEEDS. DO NOT ACCEPT SEED CONTAINING "PROHIBITED" NOXIOUS WEED SEED.

INOCULATE LEGUME SEED WITH THE RHIZOBIUM BACTERIA APPROPRIATE TO THE SPECIES OF LEGUME. APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DROP-TYPE SPREADER, DRILL, CULTIPACKER SEEDER, OR HYDRO SEEDER ON A FIRM, FRIABLE SEEDBED.

WHEN USING A DRILL OR CULTIPACKER SEEDER, PLANT SMALL GRAINS NO MORE THAN 1/2 INCH DEEP, GRASSES AND LEGUMES NO MORE THAN 1/2 INCH. EQUIPMENT SHOULD BE CALIBRATED IN THE FIELD FOR THE DESIRED SEEDING RATE.

WHEN USING BROADCAST-SEEDING METHODS, SUBDIVIDE THE AREA INTO WORKABLE SECTIONS AND DETERMINE THE AMOUNT OF SEED NEEDED FOR EACH SECTION. APPLY ONE-HALF THE SEED WHILE MOVING BACK AND FORTH ACROSS THE AREA, MAKING A UNIFORM PATTERN; THEN APPLY THE SECOND HALF IN THE SAME WAY, BUT MOVING AT RIGHT ANGLES TO THE FIRST PASS.

MULCH ALL PLANTINGS IMMEDIATELY AFTER SEEDING.
HYDRO SEEDING
SURFACE ROUGHENING IS PARTICULARLY IMPORTANT WHEN HYDRO SEEDING, AS A ROUGHENED SLOPE WILL PROVIDE SOME NATURAL COVERAGE FOR LIME, FERTILIZER, AND SEED. THE SURFACE SHOULD NOT BE COMPACTED OR SMOOTH. FINE SEEDBED PREPARATION IS NOT NECESSARY FOR HYDRO SEEDING OPERATIONS: LARGE CLOUDS, STONES, AND IRREGULARITIES PROVIDE CAVITIES IN WHICH SEEDS CAN LODGE.

RATE OF WOOD FIBER (CELLULOSE) APPLICATION SHOULD BE AT LEAST 2,000 LB/ACRE.
APPLY LEGUME INOCULANTS AT FOUR TIMES THE RECOMMENDED RATE WHEN ADDING INOCULANT TO A HYDRO SEEDER SLURRY.

IF A MACHINERY BREAKDOWN OF 1/2 TO 2 HOURS OCCURS, ADD 50% MORE SEED TO THE TANK, BASED ON THE PROPORTION OF THE SLURRY REMAINING. THIS SHOULD COMPENSATE FOR DAMAGE TO SEED. BEYOND 2 HOURS, A FULL RATE OF NEW SEED MAY BE NECESSARY.

LIME IS NOT NORMALLY APPLIED WITH A HYDRAULIC SEEDER BECAUSE IT IS ABRASIVE. IT CAN BE BLOWN ONTO STEEP SLOPES IN DRY FORM.

MAINTENANCE
GENERALLY A STAND OF VEGETATION CANNOT BE DETERMINED TO BE FULLY ESTABLISHED UNTIL SOIL COVER HAS BEEN MAINTAINED FOR ONE FULL YEAR FROM PLANTING. INSPECT SEEDER AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEEDINGS WITHIN THE SAME SEASON, IF POSSIBLE.

RESEEDING--IF A STAND HAS INADEQUATE COVER, RE-EVALUATE CHOICE OF PLANT MATERIALS AND QUANTITIES OF LIME AND FERTILIZER. RE-ESTABLISH THE STAND AFTER SEEDBED PREPARATION OR OVER-SEED THE STAND. CONSIDER SEEDING TEMPORARY, ANNUAL SPECIES IF THE TIME OF YEAR IS NOT APPROPRIATE FOR PERMANENT SEEDING.

IF VEGETATION FAILS TO GROW, SOIL MUST BE TESTED TO DETERMINE IF ADDITIV OR NUTRIENT IMBALANCE IS THE PROBLEM. FULL ESTABLISHMENT USUALLY REQUIRES RE-FERTILIZATION IN THE SECOND GROWING SEASON. FINE TURF REQUIRES ANNUAL MAINTENANCE FERTILIZATION. USE SOIL TESTS IF POSSIBLE OR FOLLOW THE GUIDELINES GIVEN FOR THE SPECIFIC SEEDING MIXTURE.

TEMPORARY SEEDING SPECIFICATIONS

SEEDING MIXTURE (FALL)
SPECIES: RYE GRASS (*SECALE CEREALE*)
RATE (LB/ACRE): 120

SEEDING MIXTURE (LATE WINTER-EARLY SPRING)
SPECIES: RYE GRASS (*SECALE CEREALE*)
ANNUAL (KOREAN) LESPEDEZA (*KUMMEROWIA STIPULACEA*)
RATE (LB/ACRE): 120

SEEDING MIXTURE (SUMMER)
SPECIES: GERMAN MILLET (*SETARIA ITALICA*)
RATE (LB/ACRE): 40

SEEDING DATES (PIEDMONT)
FALL: AUG. 15 - DEC. 30
LATE WINTER (EARLY SPRING): JAN. 1 - MAY 1, LATE
SUMMER: MAY 1 - AUG. 15

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 700 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4,000 LB/ACRE STRAW ANCHOR MULCH BY TACKING WITH ASPHALT, ROVING OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
RE-FERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, RE-FERTILIZE AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

PURSUANT TO G.S. 113A-57(2), THE ANGLE FOR GRADED SLOPES AND FILLS SHALL BE NO GREATER THAN THE ANGLE THAT CAN BE RETAINED BY VEGETATIVE COVER OR OTHER ADEQUATE EROSION-CONTROL DEVICES OR STRUCTURES. IN ANY EVENT, SLOPES LEFT EXPOSED WILL, WITHIN 21 CALENDAR DAYS OF COMPLETION OF ANY PHASE OF GRADING, BE PLANTED OR OTHERWISE PROVIDED WITH TEMPORARY OR PERMANENT GROUND COVER, DEVICES, OR STRUCTURES SUFFICIENT TO RESTRAIN EROSION.

PURSUANT TO G.S. 113A-57(3), PROVISIONS FOR PERMANENT GROUND COVER SUFFICIENT TO RESTRAIN EROSION MUST BE ACCOMPLISHED FOR ALL DISTURBED AREAS WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS (WHICHEVER IS SHORTER) FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT.

*REF: 6.10 A.B AND C, NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, 2006

PERMANENT SEEDING SPECIFICATIONS

SEEDING MIXTURE

SPECIES	RATE (LB/ACRE)
TALL FESCUE (<i>FESTUCA ARUNDINACEA</i>) (GRASS LINED CHANNELS)	200
TALL FESCUE (<i>FESTUCA ARUNDINACEA</i>) (OTHER AREAS)	100

NURSE PLANTS
BETWEEN MAY 1 AND AUG. 15, ADD 10 LB/ACRE GERMAN MILLET (*SETARIA ITALICA*) OR 15 LB/ACRE SUDAN GRASS. PRIOR TO MAY 1 OR AFTER AUG. 15, ADD 40 LB/ACRE RYE GRASS (*FESTUCA ARUNDINACEA*).

SEEDING DATES

FALL:	BEST	POSSIBLE
	AUG. 25 - SEPT. 15	AUG. 20 - OCT. 25
LATE WINTER:	FEB. 15 - MAR. 21	FEB. 1 - APR. 15

FALL IS BEST FOR TALL FESCUE (*FESTUCA ARUNDINACEA*) AND LATE WINTER OR SUMMER FOR LESPEDEZA. OVER SEEDING OF KOBE LESPEDEZA (*KUMMEROWIA STRIATA*) OVER FALL-SEEDED TALL FESCUE IS VERY EFFECTIVE.

SOIL AMENDMENTS
APPLY LIME AND FERTILIZER ACCORDING TO SOIL TESTS, OR APPLY 4,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 1,000 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4,000-5,000 LB/ACRE GRAIN STRAW OR EQUIVALENT COVER OF ANOTHER SUITABLE MULCHING MATERIAL. ANCHOR MULCH BY TACKING WITH ASPHALT, ROVING, OR NETTING. NETTING IS THE PREFERRED ANCHORING METHOD ON STEEP SLOPES.

MAINTENANCE
RE-FERTILIZE IN THE SECOND YEAR UNLESS GROWTH IS FULLY ADEQUATE. MAY BE MOWED ONCE OR TWICE A YEAR, BUT MOWING IS NOT NECESSARY. RESEED, FERTILIZE, AND MULCH DAMAGED AREAS IMMEDIATELY.

PURSUANT TO G.S. 113A-57(3), PROVISIONS FOR PERMANENT GROUND COVER SUFFICIENT TO RESTRAIN EROSION MUST BE ACCOMPLISHED FOR ALL DISTURBED AREAS WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS (WHICHEVER IS SHORTER) FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT.

REFERENCE:
6.11L NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, 2006

9 SEEDING SPECIFICATIONS



NO.	DATE	DESCRIPTION	BY

DETAILS (SHEET 2 OF 2)
LINCOLN COUNTY C&D LANDFILL - PHASE II
CROUSE, NORTH CAROLINA

DRAWN BY: CLD	CHECKED BY: SR
DESIGNED BY: JMB	APPROVED BY: [Signature]
PROJECT NUMBER: 1356-08-109	DATE: 06/26/08
SCALE: AS SHOWN	DATE: 06/26/08
DRAWING OF: 6	OF: 6

APPENDIX II – BASE GRADE SUBSOIL EVALUATION

The following information provided in Appendix II was obtained from:

S&ME, Inc., "Construction Plan Application Construction and Demolition (C&D) Landfill – Phase II, Lincoln County, North Carolina," S&ME Project No. 1356-97-285I, July 16, 2002.

BORING LOGS:

B-16

B-17

B-18

B-19

B-20/OW-20

TABLE:

Summary of Laboratory Test Data (Table 4)

FIGURE:

Groundwater Surface Map (Sheet 2 of 13)

The following information provided in Appendix II was obtained from:

S&ME, Inc., "Design Hydrogeologic Study, Lincoln County Landfill Phase III, Crouse North Carolina," S&ME Project No. 1356-03-255A, August 20, 2004.

TABLE:

Summary of Laboratory Test Data (Table 7)



**ENGINEERING • TESTING
ENVIRONMENTAL SERVICES**

S&ME, Inc
9751 Southern Pine Blvd
Charlotte, NC 28273
Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: Lincoln County C&D Landfill - Phase II		Boring No. B-16 Sheet No. 1 of 1
Location: Crouse, North Carolina	Number: 1356-97-285I	

Boring Depth (ft): 45.0	Elevation (ft): 882.8	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/22/02
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Logged By: Julie Petersen	Water Level: 34.7 ft bls at 24-hr.	Drilling Method: 3/4" H.S.A.
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Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot)		
					0	50	100
880	5		RESIDUUM: Reddish Brown Slightly Sandy SILT with Weathered Feldspar and Manganese Staining		17		
875	10		SAPROLITE: Yellowish Red Slightly Sandy SILT with Weathered Feldspar and Manganese Staining (ML)		14		
870	15		SAPROLITE: Yellowish Tan Slightly Sandy SILT with Weathered Feldspar and Manganese Staining		20		
865	20				30		
860	25				33		
855	30		SAPROLITE: Yellowish Tan Micaceous Medium to Fine Sandy SILT with Weathered Feldspar, Manganese Staining and Rock Fragments		77		
850	35		PARTIALLY WEATHERD ROCK: When Sampled Becomes Yellowish Tan Micaceous Medium to Fine Sandy SILT with Rock Fragments	▽	50/4		>>
845	40		AUGER REFUSAL AT 45 FT BLS	▽	50/5		>>
840	45				50/2		>>

BORING LOG WITH WELL - WELLOGS.GPJ LAGWGN01.GDT 6/23/08



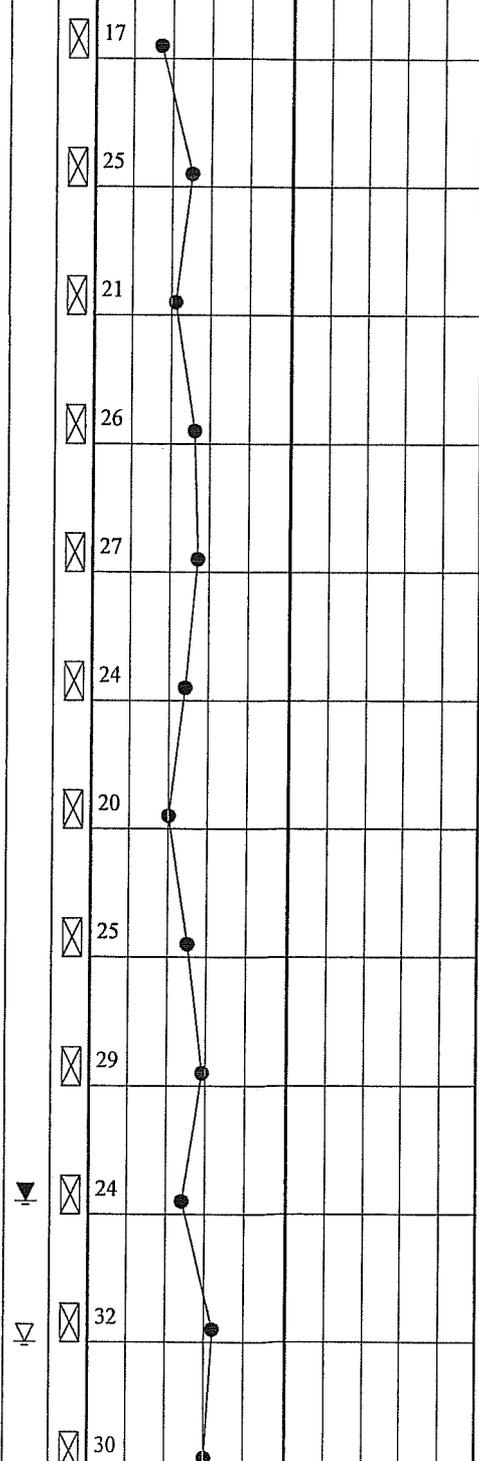
S&ME, Inc
 9751 Southern Pine Blvd
 Charlotte, NC 28273
 Telephone: 704-523-4726
 Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
 2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: Lincoln County C&D Landfill - Phase II		Boring No. B-17	
Location: Crouse, North Carolina	Number: 1356-97-285I		
Boring Depth (ft): 90.0	Elevation (ft): 909.2	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/23/02
Logged By: Julie Petersen		Water Level: 49.5 ft bls at 24-hr.	Drilling Method: 3¼" H.S.A.

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot)		
					0	50	100
905	5		GRASS/ROOTMAT/TOPSOIL				
			RESIDUUM: Brownish Red Slightly Micaceous Fine Sandy SILT with Manganese Staining (ML)				
900	10		SAPROLITE: Reddish Brown Micaceous Slightly Sandy SILT with Weathered Feldspar, Manganese Staining and Intermittent Quartz Seams.				
895	15						
890	20						
885	25						
880	30						
875	35						
870	40						
865	45						
860	50						
855	55						
850							

BORING LOG WITH WELL WELLOGS.GPJ LAGWGN01.GDT 6/23/08





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Project: Lincoln County C&D Landfill - Phase II		Boring No. B-17 Sheet No. 2 of 2
Location: Crouse, North Carolina	Number: 1356-97-2851	

Boring Depth (ft): 90.0	Elevation (ft): 909.2	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/23/02
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Logged By: Julie Petersen	Water Level: 49.5 ft bls at 24-hr.	Drilling Method: 3/4" H.S.A.
----------------------------------	---	-------------------------------------

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot)		
					0	50	100
845	65						
840	70				44		
835	75				24		
830	80		SAPROLITE: Reddish Brown Micaceous Medium to Fine Sandy SILT with Weathered Feldspar, Manganese Staining and Rock Fragments		52		
825	85				75		
820	90		PARTIALLY WEATHERED ROCK: When sampled becomes Reddish Brown Medium to Fine Sandy SILT with Rock Fragments BORING TERMINATED AT 90 FT BLS.		50/5		>>

BORING LOG WITH WELL WELLOGS.GPJ LAGWGN01.GDT 6/23/08



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 2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

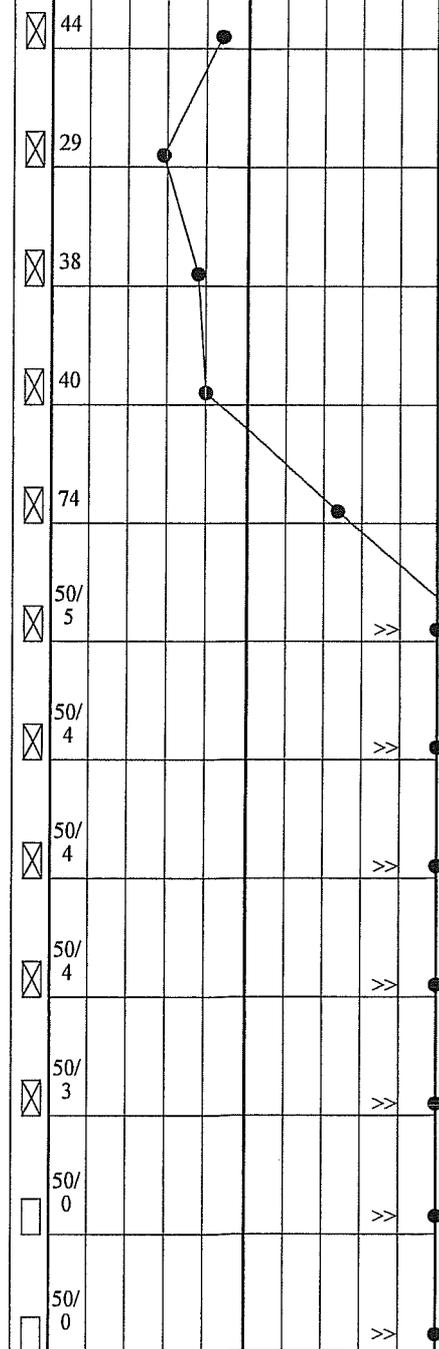
Project: Lincoln County C&D Landfill - Phase II		Boring No. B-18	
Location: Crouse, North Carolina	Number: 1356-97-285I		

Boring Depth (ft): 63.5	Elevation (ft): 894.8	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/25/02
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Logged By: Julie Petersen	Water Level: 51.3 ft bls at 24-hr.	Drilling Method: 3/4" H.S.A.
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Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot)		
					0	50	100
890	5		GRASS/ROOTMAT/TOPSOIL				
885	10		SAPROLITE: Brownish Red Medium to Fine Sandy SILT with Weathered Feldspar and Manganese Staining				
880	15		SAPROLITE: Reddish Brown Micaceous Medium to Fine Sandy SILT with Manganese Staining and Rock Fragments				
875	20						
870	25						
865	30		PARTIALLY WEATHERED ROCK: When Sampled Becomes Reddish Brown to Grey Micaceous Medium to Fine Sandy SILT with Weathered Feldspar, Manganese Staining and Rock Fragments				
860	35						
855	40						
850	45						
845	50		PARTIALLY WEATHERED ROCK: When Sampled Becomes Brownish Tan Medium to Fine Sandy SILT with Manganese Staining and Rock Fragments				
840	55		AUGER REFUSAL AT 63.5 FT BLS				
835	60						

BORING LOG WITH WELL WELLOGS.GPJ LAGWGN01.GDT 6/23/08



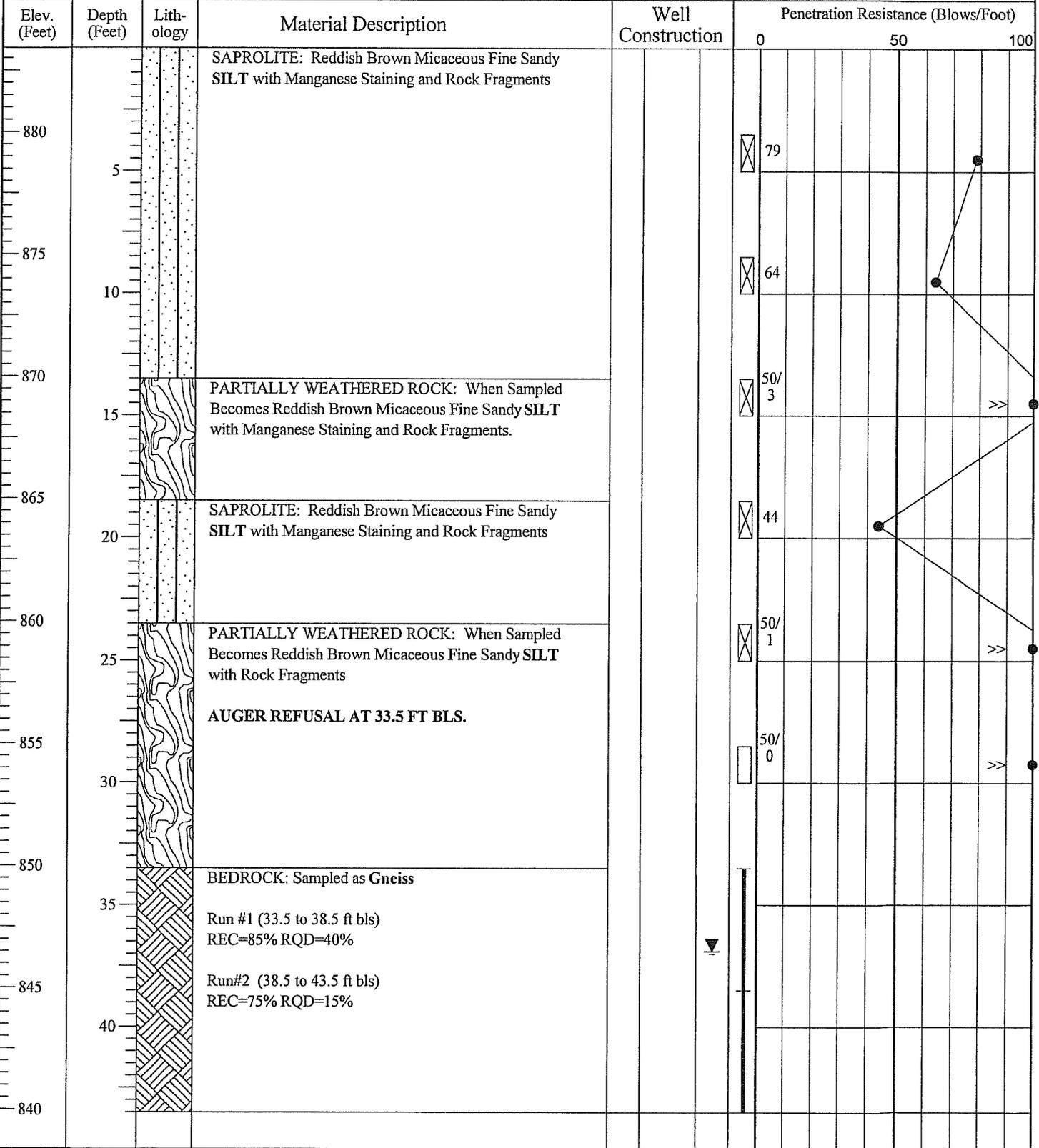


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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
 2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: Lincoln County C&D Landfill - Phase II		Boring No. B-19	
Location: Crouse, North Carolina	Number: 1356-97-285I		

Boring Depth (ft): 43.5	Elevation (ft): 883.4	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/25/02
Logged By: Julie Petersen		Water Level: 36.9 ft bls at 24-hr	Drilling Method: 3 1/4" H.S.A.



BORING LOG WITH WELL WELLLOGS.GPJ LAGWGN01.GDT 6/23/08

Project: Lincoln County C&D Landfill - Phase II		Boring No. B-20	
Location: Crouse, North Carolina	Number: 1356-97-285I		

Boring Depth (ft): 76.5	Elevation (ft): 890.8	Driller: Jeff Fortier, NC Cert No. 3142	Date Drilled: 4/24/02
--------------------------------	------------------------------	--	------------------------------

Logged By: Julie Petersen	Water Level: 37.4 ft bls at TOB	Drilling Method: 3¼" H.S.A.
----------------------------------	--	------------------------------------

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot)		
					0	50	100
890			SAPROLITE: Reddish Brown Fine Sandy SILT with Weathered Feldspar and Manganese Staining				
885	5		SAPROLITE: Reddish Brown Micaceous Slightly Sandy SILT with Weathered Feldspar, Manganese Staining and Intermittent Quartz Seams		55		
880	10				30		
875	15				28		
870	20				34		
865	25		SAPROLITE: Reddish Brown and Grey Fine Sandy SILT with Weathered Feldspar and Manganese Staining		54		
860	30				28		
855	35				42		
850	40		SAPROLITE: Reddish Brown and Grey SILT with Manganese Staining (ML)		42		
845	45				38		
840	50		PARTIALLY WEATHERED ROCK: When Sampled becomes Grey and White Medium to Fine Sandy SILT with Manganese Staining		61		
835	55				50/5		>>
830	60		SAPROLITE: Grey and White Slightly Clayey Coarse to Fine Sandy SILT with Manganese Staining (ML)		49		
825	65		SAPROLITE: Grey and White Slightly Sandy SILT with Manganese Staining		37		
820	70		SAPROLITE: Brownish Grey and White Medium to Fine Sandy SILT with Manganese Staining		52		
815	75		PARTIALLY WEATHERED ROCK: When Sampled Becomes Brownish Grey and and White Medium to Fine Sandy SILT with Manganese Staining		50/4		>>
			AUGER REFUSAL AT 76.5 FT BLS.				

BORING LOG WITH WELL WELLLOGS.GPJ LAGWNO1.GDT 6/23/08

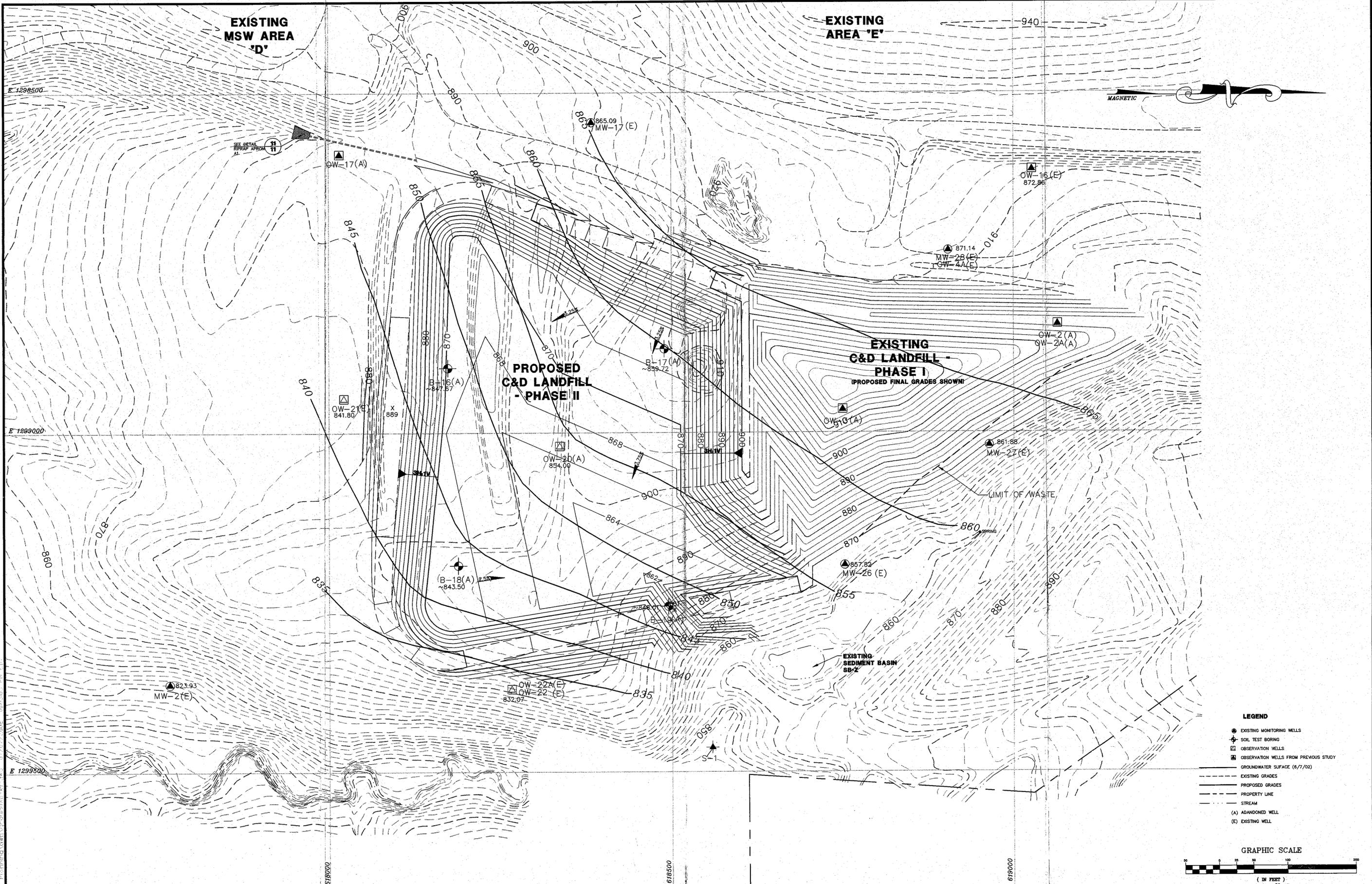
SUMMARY OF LABORATORY TEST DATA
TABLE 4

Boring No.	Sample Depth (Ft)	Sample Type *	USCS Classification	Soil Description	Hydrogeologic Unit	Natural Moisture Content (%)	% Finer No. 200	Atterberg Limits		Specific Gravity	Porosity n	Hydraulic Conductivity k (cm/sec)
								LL	PI			
B-16	8.5 to 10	SS	ML	Slightly Sandy Silt	Saprolite			40	7			
B-16	28.5 to 30	SS		Med/Fine Sandy Silt	Saprolite			NP	NP			
B-16	38.5 to 40	SS		Med/Fine Sandy Silt	PWR			NP	NP			
B-17	3.5 to 5.0	SS	ML	Fine Sandy Silt	Residuum			43	10			
B-20	48.5 to 50	SS	ML	Silt	Saprolite			35	3			
B-20	58.5 to 60	SS	ML	Slightly Clayey Coarse/Fine Sandy Silt	Saprolite		55.5			2.72		
OW-21	28.5 to 30	SS	SM	Silty Med/Fine Sand	PWR		14.5					
OW-21	33.5 to 35	SS	SM	Slightly Clayey Silty Med/Fine Sand	PWR		20			2.77		
OW-22A	8.5 to 10	SS	ML	Slightly Clayey Fine Sandy Silt	Saprolite			38	10			
OW-22A	38.5 to 40	SS		Silty Fine Sand	Saprolite			NP	NP			
OW-22A	58.5 to 60	SS	SM	Slightly Clayey Silty Coarse/Fine Sand	Saprolite		39.8			2.62		
OW-22A	78.5 to 80	SS	SM	Slightly Clayey Silty Fine Sand	Saprolite		44.6			2.71		

Note: Graphic Presentations of Results of Proctor, Grain Size, and other tests follow this summary

- * SS = Split Spoon Sample (ASTM D-1586)
- UD = Undisturbed Sample (ASTM D-1587)
- BAG = Bulk Sample
- NP = Non Plastic

JOB NAME: Lincoln Co. C&D Landfill - Ph. II
 LOCATION: Crouse, North Carolina
 JOB NUMBER: 1356-97-285I
 PAGE 1 of 1



EXISTING MSW AREA 'D'

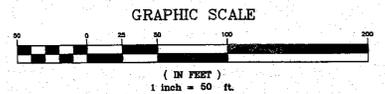
EXISTING AREA 'E'

PROPOSED C&D LANDFILL - PHASE II

EXISTING C&D LANDFILL - PHASE I
(PROPOSED FINAL GRADES SHOWN)

EXISTING SEDIMENT BASIN SB-2

- LEGEND**
- EXISTING MONITORING WELLS
 - ⊕ SOIL TEST BORING
 - OBSERVATION WELLS
 - OBSERVATION WELLS FROM PREVIOUS STUDY
 - GROUNDWATER SURFACE (6/7/02)
 - - - EXISTING GRADES
 - PROPOSED GRADES
 - - - PROPERTY LINE
 - STREAM
 - (A) ABANDONED WELL
 - (E) EXISTING WELL



NO.	DATE	DESCRIPTION	BY
1	11/8/02	ADDED ABANDONED AND EXISTING LABELS TO MONITOR WELLS	JRP

S&ME ENGINEERING & TESTING ENVIRONMENTAL SERVICES		
GROUNDWATER SURFACE MAP (6/7/02)		
LINCOLN COUNTY C&D LANDFILL - PHASE II CROUSE, NORTH CAROLINA		
SCALE: AS SHOWN	DRAWN BY: CLD	CHECKED BY:
JOB NO. 1356-97-285I	DATE: 12-20-02	SHEET 2 OF 13

D:\1356\Lincoln County\1356-97-285I\1356-97-285I.dwg 11/8/02 10:45:00 AM

Table 7 (Revised February 28, 2005)
Summary of Laboratory Test Data

Lincoln County Landfill - Phase III
S&ME Project No. 1356-03-255A

Boring No.	Sample Depth (Ft)	Sample Type *	USCS Class.	Soil Description	Hydro-geologic Unit	Natural Moisture Content (%)	% Finer No. 200	Atterberg Limits		Specific Gravity	Unit Weight (pcf)	Hydraulic Conductivity k (cm/sec)
								LL	PI			
B-23	3.5 - 5	SS	SM	Slightly Clayey Silty M/F Sand	Residuum		48.1	NP	NP			
B-23	18.5 - 20	SS	ML	Clayey M/F Sandy Silt	Saprolite		72.1	41	10			
B-23	23 - 25	UD	MH	Clayey C/F Sandy Silt	Saprolite	42.8	72.8	50	9	2.7	72.4	8.1E-05
B-23	48.5 - 50	SS	SM	Slightly Clayey Silty M/F Sand	Saprolite		44.4	NP	NP			
B-23	58.5 - 60	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		42.1	NP	NP			
B-23	93.5 - 105	SS	SM	Slightly Clayey Silty C/F Sand	PWR		41.4	NP	NP			
B-24	15 -17	UD	SM	Slightly Clayey Silty C/F Sand	Saprolite	27.4	40.8	NP	NP	2.77	90.7	1.5E-04
B-24	43.5 - 45	SS	ML	Clayey M/F Sandy Silt	Saprolite		59.5	NP	NP			
B-24	63.5 - 65	SS	MH	Slightly Clayey M/F Sandy Silt	Saprolite		54.9	53	23			
B-24	73.5 - 80	SS	SM	Slightly Clayey Silty C/F Sand	PWR		36.8	NP	NP			
B-25	23 - 25	UD	ML	Clayey C/F Sandy Silt	Saprolite	24.3	60.2	39	2	2.67	92	6.4E-05
B-25	28.5 - 30	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		48.1	NP	NP			
B-25	43.5 - 45	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		48.7	40	6			
B-25	53.5 - 55	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		48.1	NP	NP			
B-25	83.5 - 85	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		44.5	36	8			
B-26	3.5 - 5	SS	CH	M/F Sandy Silty Clay	Residuum		76.5	65	33			
B-26	13.5 - 15	SS	ML	Clayey M/F Sandy Silt	Saprolite		55.9	39	8			
B-26	18 - 20	UD	ML	Clayey M/F Sandy Silt	Saprolite	48.4	72.5	45	13	2.65	72.2	4.4E-05
B-26	38.5 - 40	SS	SM	Slightly Clayey Silty M/F Sand	Saprolite		48.3	NP	NP			
OW-27	8.5 - 10	SS	ML	Slightly Clayey M/F Sandy Silt	Saprolite		51.3	NP	NP			
OW-27	15 - 17	UD	SM	Slightly Clayey Silty C/F Sand	Saprolite	35	44.5	NP	NP	2.66	77.8	1.4E-04

Notes: SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)
BAG = Bulk Sample
NP = Non Plastic

Graphic Presentations of Results for Atterburg Limits, Grain Size, and other tests follow this summary in Appendix II
OW-6A, 7, 8 and 9 data obtained from LCLF Phase II Hydrogeologic Study. Summary of Lab Test Data for Phase II is included in App. V

Table 7 (Revised February 28, 2005)
Summary of Laboratory Test Data

Lincoln County Landfill - Phase III
S&ME Project No. 1356-03-255A

Boring No.	Sample Depth (Ft)	Sample Type *	USCS Class.	Soil Description	Hydro-geologic Unit	Natural Moisture Content (%)	% Finer No. 200	Atterberg Limits		Specific Gravity	Unit Weight (pcf)	Hydraulic Conductivity k (cm/sec)
								LL	PI			
B-28	2 - 4	UD	SC	Silty Clayey M/F Sand	Residuum	18.3	45.6	36	15	2.68	109.8	1.42E-05
B-28	13.5 - 15	SS	SM	Slightly Clayey Silty C/M Sand	Saprolite		26.5	NP	NP			
OW-29A	2 - 4	UD	CL	C/F Sandy Silty Clay	Residuum	18.7	50.8	40	20	2.66	90	7.73E-07
OW-29A	13.5 - 20	SS	SM	Slightly Clayey Silty C/M Sand	Saprolite		19.5	NP	NP			
B-30	23.5 - 30	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		39.7	31	5			
B-31	2 - 4	UD	MH	Clayey Silt w/Sand	Residuum	31.6	82.2	58	22	2.75	86.6	1.09E-04
B-31	23.5 - 30	SS	ML	Clayey M/F Sandy Silt	Saprolite		60.5	43	0			
B-31	63.5 - 70	SS	SM	Sl. Clayey Silty Sand w/Gravel	Saprolite		31.5	37	5			
MW-21	38.5 - 40	SS		Silty C/F Sand w/ Gravel	PWR		25.6					
MW-22	18.5 - 20	SS		Silty C/F Sand	Saprolite		33.8					
MW-23	33.5 - 35	SS		Silty C/M Sand	Saprolite		28.4					
MW-25A	28.5 - 30	SS		Silty C/F Sand	Saprolite		41.3					
MW-25A	53.5 - 55	SS		Silty C/F Sand	Saprolite		35.7					
OW-6A	28 - 30	UD	SM	Slightly Clayey Silty C/F Sand	Saprolite	36.1	41.9			2.72	85.8	9.00E-06
OW-7	1.0 - 2.5	SS	MH	Slightly Clayey M/F Sandy Silt	Residuum	35.7		74	34	2.71		
OW-7	23.5 - 25	SS		Fine Sandy Silt	Saprolite		54.9			2.85		
OW-8	3.5 - 5	SS		M/F Sandy Silty Clay	Residuum	22.6	68.5			2.67		
OW-8	13.5 - 15	SS		Clayey M/F Sandy Silt	Saprolite		58			2.7		
OW-9	3.5 - 5	SS	MH	Slightly Clayey Fine Sandy Silt	Saprolite	45.4		60	11	2.79		
OW-9	23.5 - 25	SS	SM	Slightly Clayey Silty C/F Sand	Saprolite		33.9			2.63		
OW-9	33.5 - 35	SS	SM	Slightly Clayey Silty M/F Sand	Saprolite		47.9			2.69		

Notes: SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)
BAG = Bulk Sample
NP = Non Plastic

Graphic Presentations of Results for Atterburg Limits, Grain Size, and other tests follow this summary in Appendix II
OW-6A, 7, 8 and 9 data obtained from LCLF Phase II Hydrogeologic Study. Summary of Lab Test Data for Phase II is included in App. V

APPENDIX III – WASTE IN-PLACE ESTIMATE



PROJECT NO. 1356-08-109
 SHEET NO. 1/2
 DATE 6/26/08
 COMPUTED BY WMH
 CHECKED BY JSR

PROJECT NAME Lincoln County C&D Landfill

SUBJECT Maximum Waste In-Place Calculation

OBJECTIVE:

Estimate a maximum in-place volume of construction and demolition waste at the Lincoln County C&D landfill from the beginning of waste placement to-date. Estimate remaining Phase II capacity.

METHOD:

Historical records were used to evaluate the volume of waste in-place up until May, 2008.

CALCULATIONS:

Existing Volume: 1993–2008

Based on annual reports between 1993 and 2008 provided in Attachment 1, the amount of C & D waste up until May, 2008 was known. The volumes were determined using an assumed unit weight of 1,200 pounds per cubic yard. These quantities are summarized in the Table 1 below.

Table 1. Lincoln County C & D Waste Disposal Summary

Period	C & D Waste (tons)	C & D Waste (yd ³)
1993-1994	1,314.00	2,190.00
1994-1995	2,871.00	4,785.00
1995-1996	3,053.00	5,088.33
1996-1997	3,311.00	5,518.33
1997-1998	5,411.00	9,018.33
1998-1999	4,654.00	7,756.67
1999-2000	6,874.00	11,456.67
2000-2001	11,404.00	19,006.67
2001-2002	14,635.00	24,391.67
2002-2003	18,730.00	31,216.67
2003-2004	16,337.00	27,228.33
2004-2005	16,097.00	26,828.33
2005-2006	10,351.00	17,251.67
2006-2007	10,787.00	17,978.33
2007-2008	6,862.67	11,437.78
Total	132,691.67	221,152.78
Average Disposal Rate '93-'08(yd³/year)		14,743.52
Standard Deviation (1σ)		9,410.13
Average Disposal Rate + 1σ (yd³/year)		24,153.65
Average Disposal Rate - 1σ (yd³/year)		5,333.39



PROJECT NO. 1356-08-109
SHEET NO. 1/2
DATE 6/26/08
COMPUTED BY WMH
CHECKED BY JSR

NAME Lincoln County C&D Landfill
SUBJECT Maximum Waste In-Place Calculation

Remaining Phase II Capacity: Post-2008

The total Phase II capacity is 238,673 cubic yards. It is estimated that 100,724 cubic yards of C & D waste were placed from 2003-2008. This leaves a remaining Phase II capacity of 137,949 cubic yards.

CONCLUSIONS:

The maximum in-place waste to-date of the Lincoln County C&D Landfill is 221,152 cubic yards. The estimated waste in-place upon completion of Phase II filling is 359,101 cubic yards.

LINCOLN COUNTY SOLID WASTE

July 2007 - June 2008 (YEAR TO DATE)

	SOLID WASTE	WHITEGOODS	TIRES	C & D WASTE	YARDWASTE	RECYCLING
1993 - 1994	40,872	271	682	1,314	816	612
1994 - 1995	31,218	347	569	2,871	1,895	799
1995 - 1996	34,238	642	972	3,053	2,509	942
1996 - 1997	31,596	444	788	3,311	2,077	983
1997 - 1998	35,391	689	858	5,411	2,159	1,023
1998 - 1999	38,323	741	900	4,654	2,565	1,154
1999 - 2000	40,065	1,142	1,042	6,874	2,031	1,252
2000 - 2001	38,481	1,162	1,118	11,404	2,253	1,218
2001 - 2002	41,231	1,408	1,241	14,635	2,104	1,279
2002 - 2003	44,125	1,310	1,290	18,730	3,791	1,288
2003 - 2004	45,558	1,508	1,117	16,337	2,862	1,337
2004 - 2005	52,013	1,583	1,310	16,097	1,907	1,424
2005 - 2006	45,935	1,502	1,267	10,351	3,003	1,440
2006 - 2007	45,091	1,872	1,167	10,787	2,769	1,678
2007 - 2008	37,282.54	1,089.93	1,297.67	6,862.67	2,105.97	1,681.4
JULY 2007	3,858.64	189.41	169.4	560.11	209.43	137.39
AUG 2007	3,467.34	101.27	116.11	622.6	154.43	148.33
SEPT 2007	3,479.04	108.33	130.72	692.64	145.92	131.71
OCT 2007	3,626.23	94.52	137.53	918.5	174.65	155.14
NOV 2007	3,682.44	72.46	88.92	844.5	168.52	160.3
DEC 2007	3,942.47	75.77	113.89	764.48	232.74	180.67
JAN 2008	3,661.76	65.43	81.83	493.1	149.03	167.88
FEB 2008	3,472.7	75.4	89.01	428.95	134.43	131.46
MAR 2008	3,886.18	104.86	135.13	432.99	223.41	158.3
APR 2008	3,900.31	89.98	131.19	592.14	268.27	171.91
MAY 2008	3,987.87	112.5	103.94	512.66	245.14	138.31
JUNE 2008						

APPENDIX IV – CLOSURE COST ESTIMATE

**LINCOLN COUNTY C&D LANDFILL - PHASE II (S&ME PROJECT NO. 1356-08-109)
FINAL CLOSURE CARE COST ESTIMATE (2008 DOLLARS)**

Final Cover System

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Excavating & Screening On-Site Material (Low Permeability Only)	18,150	CY	\$ 4.10	\$ 74,415.00	S&ME Project Experience - 2008	
Borrow Area Clearing & Grubbing	1.15	Acres	\$ 4,750.00	\$ 5,462.50	S&ME Project Experience - 2008	Assume 10 foot deep borrow area of approx. 50,000 Sq. Ft
Borrow Area Silt Fence	500	LF	\$ 2.00	\$ 1,000.00	S&ME Project Experience - 2008	
18" Low Permeability Layer	18,150	CY	\$ 7.50	\$ 136,125.00	S&ME Project Experience - 2008	
18" Erosion Layer	18,150	CY	\$ 7.50	\$ 136,125.00	S&ME Project Experience - 2008	From existing on-site stockpiles
Access Road	5,914	Sq. Yd	\$ 19.50	\$ 115,323.00	S&ME Project Experience - 2008	Includes materials & installation
Gas Vent Materials (HDPE Pipe, 57 Stone, Geotextile, GCDL)	8	Pcs	\$ 1,450.00	\$ 11,600.00	Blue Max, Lee Supply, S&ME	
Gas Vent Installation	8	Pcs	\$ 725.00	\$ 5,800.00	S&ME Project Experience - 2008	Assume 50% cost of materials
Surveying	1	LS	\$ 6,000.00	\$ 6,000.00	S&ME Project Experience - 2008	Assume \$500/acre + 1 day @ \$1000 + 1 Office day @ \$1000
				\$ 491,850.50		

Sediment & Erosion Control Measures

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Silt Fencing*	1,470	LF	\$ 2.00	\$ 2,940.00	S&ME Project Experience - 2008	
Drop Inlet Catch Basin (2.5' x 2.5' x 2.0')	4	Pcs	\$ 2,500.00	\$ 10,000.00	S&ME Project Experience - 2008	Installed
12" Smooth-Lined Corrugated HDPE Pipe	174	LF	\$ 20.60	\$ 3,584.40	S&ME Project Experience - 2008	Installed
15" Smooth-Lined Corrugated HDPE Pipe	227	LF	\$ 23.30	\$ 5,289.10	S&ME Project Experience - 2008	Installed
18" Smooth-Lined Corrugated HDPE Pipe	220	LF	\$ 26.00	\$ 5,720.00	S&ME Project Experience - 2008	Installed
21" Smooth-Lined Corrugated HDPE Pipe	160	LF	\$ 29.80	\$ 4,768.00	S&ME Project Experience - 2008	Installed
Rip-Rap & Geotextile (Outlet Protection)	1	LS	\$ 4,500.00	\$ 4,500.00	S&ME Project Experience - 2008	Installed
				\$ 36,801.50		

Final Landscaping

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Seeding/Fertilizing/Mulching	7.5	Acres	\$ 2,200.00	\$ 16,500.00	S&ME Project Experience - 2008	
				\$ 16,500.00		

Mobilization & Demobilization

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Contractor Mobilization/Demobilization	1	LS	\$ 54,515.20	\$ 54,515.20	10% of total construction costs	10% of cover system, final landscaping & E&S total costs
				\$ 54,515.20		

Engineering, Construction Management & Construction Quality Assurance

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Bid & Construction Documents	1	LS	\$ 10,000.00	\$ 10,000.00	S&ME	
Certification Report	1	LS	\$ 6,000.00	\$ 6,000.00	S&ME	
CQA Testing & Documentation	8	Week	\$ 5,600.00	\$ 44,800.00	S&ME	Assumes tech @ 60 hrs/week & Engineer @ 20 hrs/week
				\$ 60,800.00		

Administration

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Announcements/Deeds/Fees	1	LS	\$ 1,000.00	\$ 1,000.00	S&ME Project Experience - 2008	
				\$ 1,000.00		

* - Indicates automated calculation of quantity value

Total Cost (2008 Dollars): \$ 661,467.20

7.5 Acres @ \$88,196/Acre 88,196

APPENDIX V – POST CLOSURE MONITORING FORM



**LINCOLN COUNTY C&D LANDFILL
POST-CLOSURE MONITORING FORM**

Date: _____ Observation Personnel: _____

Time: _____

Observed Weather Conditions: _____

<i>SITE SECURITY</i>
Condition of Fences, Gates, Locks:
Evidence of vandalism (wells, vents, protective cover damage):
Evidence of penetrations (poles, posts, stakes):
Evidence of human encroachment (trash, fire pits, tire/footprints):
General site condition:
Additional Comments:



LINCOLN COUNTY C&D LANDFILL
POST-CLOSURE MONITORING FORM

Date _____

<i>COVER SYSTEM</i>
Evidence of erosion, settlement, rutting, potholes:
Evidence of cover system intrusion (ruts, burrows, excavation):
Evidence of stressed vegetation or bare spots. Evidence of woody vegetation (small trees and/or shrubs):
Condition of storm water channels, tack-on benches, drainage swales, down drain pipes – signs of erosion or sedimentation?:
Sediment basin, sediment traps – evidence of erosion, sedimentation, sediment accumulation:
Additional Comments:



**LINCOLN COUNTY C&D LANDFILL
POST-CLOSURE MONITORING FORM**

Date _____

GAS VENTING SYSTEM & GROUNDWATER MONITORING WELLS
Evidence of damage to wells/vents or surrounding area (cracking, misalignment, missing pieces):
Evidence of cover system subsidence or upheaval near wells/vents:
Evidence of wildlife intrusion (nests, burrows, wasp nests):
Evidence of spilled liquids (well tampering/vent blowout):
GAS VENTS: Unusual conditions – belching, whistling, excessive gas (odor) production:
MONITORING WELLS: Well covers in place & secure:
Additional Comments:



LINCOLN COUNTY C&D LANDFILL
POST-CLOSURE MONITORING FORM

Date _____

<i>OTHER</i>



LINCOLN COUNTY C&D LANDFILL
POST-CLOSURE MONITORING FORM

Date _____

PHOTOGRAPHIC LOG

Photograph No.	Description
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APPENDIX VI – POST CLOSURE COST ESTIMATE

**LINCOLN COUNTY C&D LANDFILL - PHASE II (S&ME PROJECT NO. 1356-08-109)
YEARLY POST CLOSURE CARE COST ESTIMATE (2008 DOLLARS)**

Monitoring/Reporting

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Groundwater Monitoring (4 wells semi-annually)	8	Sample	\$ 500.00	\$ 4,000.00	S&ME	Includes labor & lab fees
Semi-Annual Reporting (Groundwater Reports)	2	Event	\$ 2,000.00	\$ 4,000.00	S&ME	
				\$ 8,000.00		

Maintenance (Preventive & Corrective)

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Wells (4 Groundwater Wells)	4	Well	\$ 100.00	\$ 400.00	S&ME Project Experience - 2008	
Final Cover Maintenance	7.5	Acre	\$ 1,500.00	\$ 11,250.00	S&ME Project Experience - 2008	Includes top dressing, seeding, fertilizer, E&S measures, mowing & pest control
				\$ 11,650.00		

Administration

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Total Cost</u>	<u>Source Unit Rate</u>	<u>Comment</u>
Annual Certification	1	LS	\$ 4,000.00	\$ 4,000.00	S&ME	Engineer @ 40 hours/year
Monthly Administration	12	LS	\$ 400.00	\$ 4,800.00	S&ME	Engineer @ 2 hours/month & clerical @ 2 hours/month
				\$ 8,800.00		

Total Annual Cost (2008 Dollars): \$ 28,450.00

Total Cost Over 30 years (2008 Dollars): \$ 853,500.00