

Carmen Johnson
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54-04 Permit No.

MEMORANDUM

TO: Distribution

February 13, 2003

FR: Jim Whitty – URSD

RE: SUMMARY OF DISCUSSION WITH JIM BARBER OF NCDENR –
WEDNESDAY, FEBRUARY 12, 2003
DUPONT KINSTON, NORTH CAROLINA FACILITY

I received a telephone call from Mr. Jim Barber of the NCDENR at approximately 5:00 p.m. to discuss items listed on a February 6, 2003 email relative to the C&D and Ash Landfill closure projects at the DuPont Kinston facility.

A summary of discussion points is listed below with respect to each individual area (C&D Landfill/Ash Landfill).

C&D Landfill

I updated Jim on the status of the C&D landfill closure project, and informed him that Shamrock was going to be performing a thickness verification across the surface of the C&D landfill, since the elevations did not reach the final elevations presented on the design drawings. I further stated that the current grades on the top of the C&D landfill were approximately 2.5 percent (which is less than the 5.0 percent presented on the final grading plan).

I asked Jim if it was necessary to reach the grades presented on the final grading plan, or would it be sufficient to have the 24 inches of cover over the entire area. Jim said that 24 inches of cover is sufficient for this project. Relative to the grades on the C&D landfill, Jim is satisfied with the current grades of 2.5 percent as long as no ponding occurs on the surface.

Ash Landfill

I discussed the current schedule for the Ash Landfill closure design. That is, I informed Jim that we would be forwarding a design package to his attention on Friday, February 21, 2003. Based on this date, I asked Jim if he would consider sitting down with us in person or on a conference call to walk through the design package. Jim stated that he would favor a conference call, and that we should call him after he receives the package to schedule this discussion.

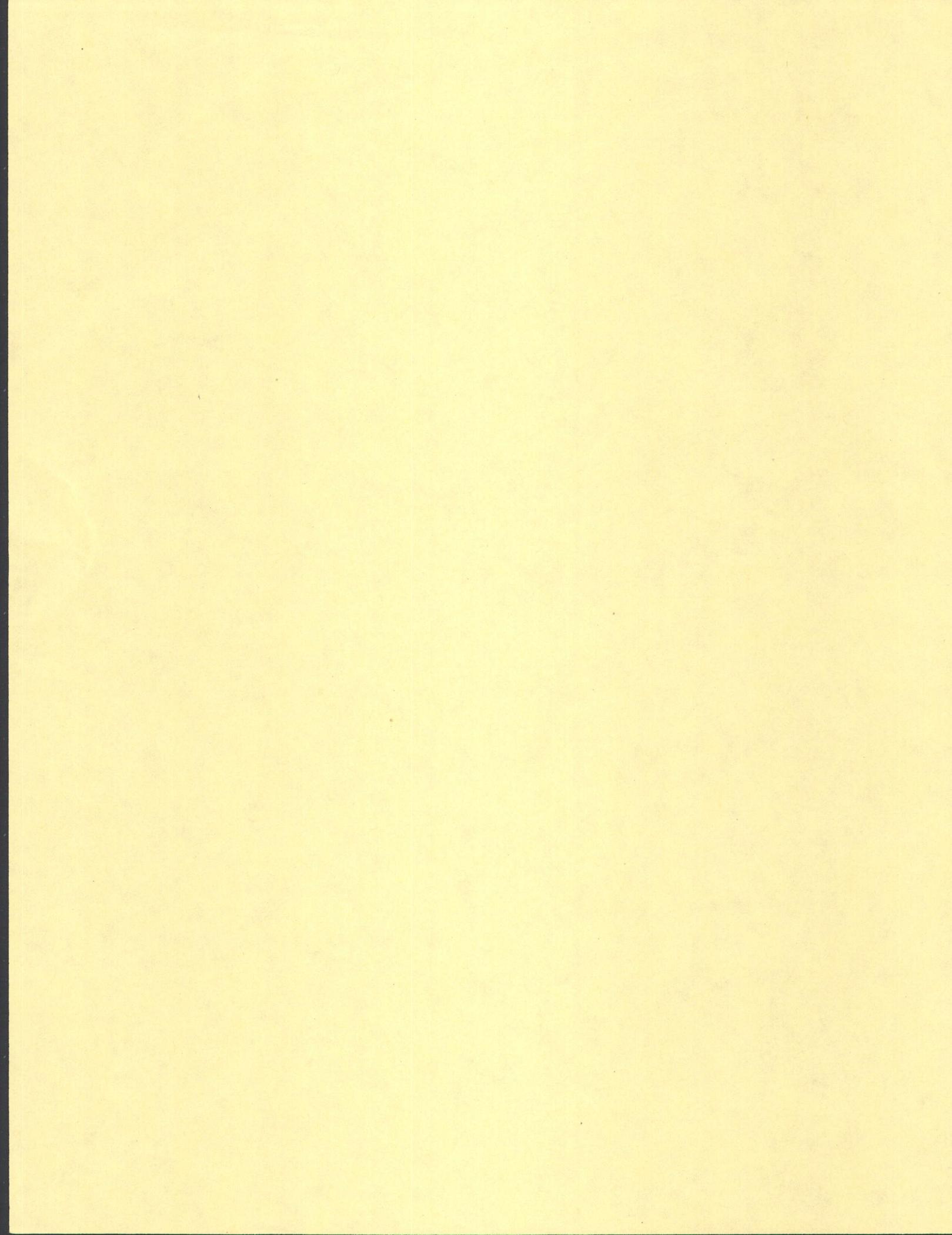
The discussion then progressed to the sludge within the Ash Landfill. I informed Jim that the sludge effectively has no shear strength, and based on the status of the final grading plan, that the sludge most likely will be unable to support this mass of cover/fill (on the order of 10 feet in thickness to make the final grades) in one placement event. The reason/concern of the design team is the potential for a bearing capacity failure of the

sludge if it is loaded too quickly. A bearing capacity failure could result in a blowout along the slope closest to the existing access road (adjacent to and east of the Ash Landfill). As a result, we will likely propose a 'staged fill' approach, where a certain thickness of fill will be placed, then fill placement would stop for a period of time (weeks or months) until the sludge would be able to sufficiently consolidate/strengthen under the new loading condition. The next stage would then be placed and the procedure repeated until final grades are reached, or until a sufficient slope is constructed to minimize the potential for ponding of surface water.

The 'staged fill' approach will significantly lengthen the time required to complete fill placement over the sludge, and the closure would not be completed on the Ash Landfill on or before July 1, 2003. Would this scenario be acceptable to Jim and the NCDENR?

Jim understood the complexities of dealing with a very low strength sludge material, and is comfortable with closure activities continuing beyond the current July 1, 2003 deadline. Jim did, however, request that at least 24 inches of cover exist above the ash and sludge in the Ash Landfill at every stage, and that grades promote runoff from the landfill; that is, no ponding water should exist.

Distribution: Jim Barber – NCDENR
John Crowder – NCDENR
Steve Shoemaker – CRG
Andrew Alcazar – CRG
Doug Fletcher – CRG
Louis Barrow – Kinston
James Proctor – Kinston
James Henderson – URSD
Mac Bonner – URSD



Carmen Johnson
Trac/Perm/Co ID # 54-04
Date / /
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**CONSTRUCTION AND DEMOLITION
LANDFILL
SOIL COVER – FINAL DESIGN
REPORT
DuPont Kinston
Kinston, North Carolina**

November 2002

Project No. 18983688.00012
504307

Prepared by



CORPORATE REMEDIATION GROUP
*An Alliance between
DuPont and URS Diamond*

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

54-04



CONSTRUCTION AND DEMOLITION
LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA

Date: November 2002

Project No.: 18983688.00012

Prepared for
DuPont Kinston Plant
Highway 11 N
Kinston, NC 28501

Prepared by



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- Appendix A Technical Specifications
- Appendix B C&D Landfill Test Pit Logs
- Appendix C Construction Drawings (Attached Separately)
- Appendix D Borrow Area Soil Geotechnical Results

1.0 INTRODUCTION

This Design Report provides information to be used during closure of the DuPont Kinston Construction and Demolition (C&D) Landfill located at the DuPont Kinston Plant in Kinston, North Carolina. Closure is being performed according to the requirements as reviewed and mutually agreed between the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management and the E.I. du Pont de Nemours and Company (DuPont) Kinston Plant (facility) located in Lenoir County.

Closure Design has been advanced in accordance with applicable NCDENR and Erosion and Sedimentation (E&S) Control requirements. Conformance with these requirements will serve to ensure the long-term performance of the constructed remedy.

1.1 Report Organization

This Design Report has been organized as follows:

- Section 1.0 presents the report organization and objectives;
- Section 2.0 summarizes the previous investigations and reports and provides site background;
- Section 3.0 details the soil cover design;
- Section 4.0 presents the closure schedule.

1.2 Design Report Supporting Information

The following support materials for the closure design are included in this report:

- *Technical Specifications*
Materials and construction procedures required to properly construct the design are documented in Technical Specifications, included in Appendix A.
- *C&D Landfill Test Pit Logs*
Field test pit logs implemented to map the Landfill's existing cover thickness are presented in Appendix B.
- *Construction Drawings*
Construction Drawings are presented in Appendix C.
- *Borrow Area Soil Geotechnical Results*
Geotechnical results from the borrow area soils investigation are presented in Appendix D.
- *Erosion and Sediment Control Plan*
The Erosion and Sediment Control Plan describes measures for management of stormwater, mitigation of erosion and control of sediment migration. This Plan is being submitted separately to the North Carolina Department of Environment, Health and Natural Resources, Land Quality Section.

The proposed Kinston C&D Landfill design is based on currently accepted geotechnical and environmental engineering principles and practices.

2.0 BACKGROUND INFORMATION

This section provides a description of the site location and history. It also summarizes existing site information.

2.1 Site Location

The facility is located northeast of Kinston, North Carolina, on North Carolina Highway 11. It is located on approximately 650 acres and is bounded by the Neuse River on the south and southeast; North Carolina Highway 11 on the north and northwest; and farmland on the north, northeast, and southwest.

2.2 Site History

The DuPont Kinston Plant began operations in 1953 and continues to manufacture *Dacron*[®] polyester resin and fibers. The facility consists of several buildings that contribute to the manufacturing of *Dacron*[®] polyester fibers. *Dacron*[®] polyester production is accomplished using one of the following two chemical processes; dimethyl terephthalate (DMT) and ethylene glycol, or terephthalic acid (TPA) and ethylene glycol. Water is produced as a by-product from the TPA process, while methanol is a by-product of the DMT process.

2.3 Existing Site Information

The environmental setting of the facility is described in detail in the RCRA Facility Assessment (CH2M-Hill, 1993), the Confirmatory Sampling Work Plan (DERS 1996), the Confirmatory Sampling Report (DERS, 1997), and the RCRA Facility Investigation Phase I Report (CRG, 2000).

3.0 FINAL SITE REMEDIATION DESIGN

The proposed cap system consists of natural soil components and was designed to meet NCDENR requirements while serving to protect the environment.

3.1 Soil Cover Description

As detailed in Section 02200 of the Technical Specifications, cover soil will be placed above existing grade (in areas where existing cover soil is less than the required 24-inch thick minimum) to achieve the required cover thickness of a 24-inch thick soil cover layer. Cover soils will be amended to meet required organic content and pH requirements, which will facilitate the establishment of a good vegetative stand. Seeding requirements for the vegetative layer are discussed in Section 02930 of the Technical Specifications.

A test pit investigation was performed in October, 2002 to map the thickness of existing cover on the C&D Landfill. Areas were identified which met or exceeded the 24-inch thick soil cover requirement and do not require additional cover soil. These areas are identified on the Drawings as located around the perimeter of the Landfill and without proposed cover soil during construction. The Technical Specifications are presented in Appendix A. Test pit logs for the C&D Landfill are presented in Appendix B.

3.2 Cap System – Grading Plan

The proposed final grading plan was developed to facilitate drainage of storm water from the cap system and achieve the required 24-inch thick soil cover layer. Additionally minimum slopes of 5%, or 20 Horizontal to 1 Vertical [20H:1V], and maximum slopes of 33% [3H:1V] were established. The Landfill will be graded to conform to current conditions and direct storm water to existing perimeter drainage ditches. The C&D Landfill Grading Plan is presented with the Construction Drawings in Appendix C.

3.3 Availability and Suitability of Final Cover Material

A borrow source investigation was conducted concurrently with the C&D Landfill cap investigation in October, 2002. This investigation determined that sufficient soil quantities are present in the proposed borrow area to support soil cover construction. Construction of the borrow area sediment basin will provide sufficient quantities of soil for C&D Landfill closure. The sediment basin has been designed with sufficient capacity to support borrow area development during the subsequent closure of the Ash Landfill, which is adjacent to the C&D Landfill.

Soil types present at the borrow area included silty sands (SM) to clayey sands (SC) as encountered in the borrow area test pits. Fines content generally increased with depth. These soils are considered candidate materials for the cap system. Section 02200 of the Technical Specifications incorporates the use of on-site borrow materials in the soil cover. Borrow area soil geotechnical results are presented in Appendix D.

3.4 Stormwater Management / Erosion and Sediment Control

Management of stormwater is described in the Erosion and Sediment Control Plan, which has been prepared separately for submittal to the North Carolina Department of Environment, Health and Natural Resources, Land Quality Section.

4.0 REMEDIATION SCHEDULE

DuPont anticipates the implementation of C&D Landfill soil cover construction during the fourth quarter of 2002 with potential additional work proceeding into the first quarter of 2003.

5.0 REFERENCES

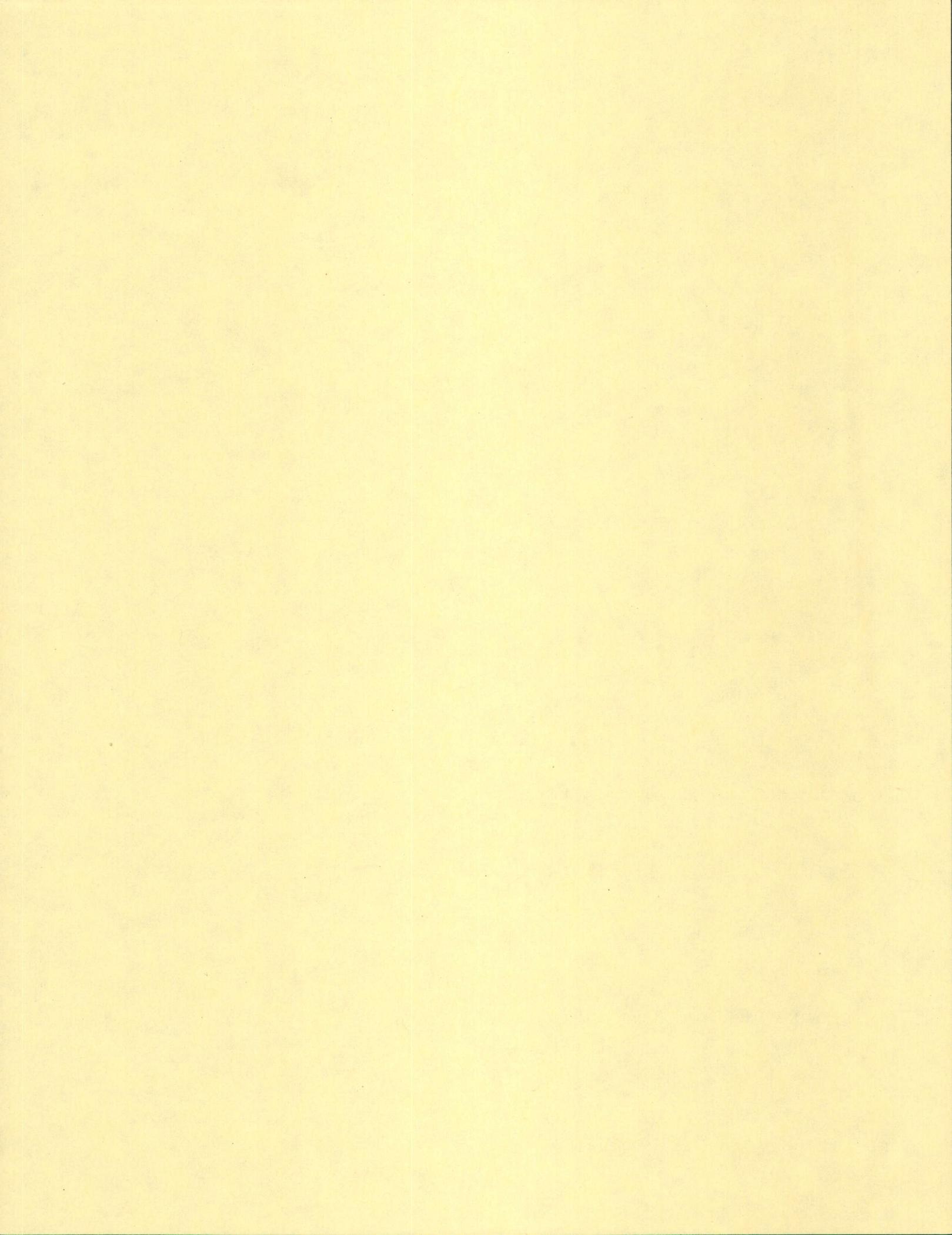
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DERS, 1997. *Confirmatory Sampling Report, DuPont Kinston Plant.* June 1997.



APPENDIX A
TECHNICAL SPECIFICATIONS

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TECHNICAL SPECIFICATIONS
C&D LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA

November 8, 2002

Project No. 18983688.00012



CORPORATE REMEDIATION GROUP
*An Alliance between
DuPont and The W-C Diamond Group*

Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

**Kinston C&D Landfill
Soil Cover Construction
Final Design**

List of Specifications

Division 1 – General Requirements

- 01010 - Summary of Work
- 01025 - Measurement and Payment
- 01050 - Field Engineering
- 01440 - Contractor Quality Control

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

This section includes a brief description of the major construction activities included under this contract. Individual activities are more thoroughly described in subsequent sections of the Specifications. The Contractor shall be responsible for ensuring that sufficient equipment, labor, and materials, including health and safety and quality control provisions, are supplied to execute all work activities for final acceptance.

- A. Location of Work.** The Work of this Contract is located at the DuPont Kinston Plant located along Route 11 in Kinston, North Carolina. A location map is provided with the Drawings.

1.2 GENERAL REQUIREMENTS

As minimum requirements, the Contractor shall observe and follow all appropriate and relevant procedures identified in applicable federal, state, and local rules and regulations in conducting the work. Other applicable regulations not explicitly included in these Specifications shall be adhered to in conducting the work. The Contractor shall be responsible for contacting and informing the proper federal, state, and local agencies of the nature and timing of work on-site (including, if necessary, transportation of materials off the site for off-site disposal as needed and schedule for hauling of clean fill to the site) and for securing all necessary (and otherwise not obtained by DuPont) and applicable permits required to construct the work covered by this contract.

- A. Existing Features.** The Contractor shall protect and maintain survey and grid stakes and any other items as directed in the field by the Construction Manager against damage from equipment and vehicular traffic. Any damage shall be repaired by the Contractor at no expense to DuPont.
- B. Utilities.** The Contractor shall protect utility lines or appurtenances that are to remain. Utility locations have been shown on the Contract Drawings based on previously obtained information and have not been field verified. It is the Contractor's responsibility to locate or verify existing utilities on-site and to coordinate utility location with Kinston Plant Personnel. Any damage shall be repaired by the Contractor at no expense to DuPont. The State of North Carolina provides a construction alert system (One-Call) for utilities at 1-800-632-4949.

1.3 MATERIALS AND EQUIPMENT

Materials and equipment shall be provided in sufficient quantities for required construction activities. Materials and equipment shall not be stored or used in such a manner as to create unsafe conditions, and shall meet requirements of applicable codes and the approval of the Construction Manager and the Design Engineer.

1.4 DESCRIPTION OF WORK

The project generally includes construction of the following: an engineered soil cover to be constructed from on-site borrow for the C&D Landfill; drainage diversion ditches; sediment basin; and temporary erosion control measures during construction. In addition, the Contractor shall be responsible for soil excavation, hauling and placement (from the borrow area), borrow area grading and restoration, and C&D landfill area soil amendment and vegetation establishment.

The Contractor shall be responsible for providing all testing services, temporary facilities and related materials and equipment for the performance of the described work. The Contractor shall be responsible for the construction and installation of all temporary erosion and sediment control structures prior to full-scale earth disturbance or earth moving activities and maintenance of these controls throughout construction. The Contractor shall coordinate with Plant and local government transportation officials and be responsible for coordination of traffic flow resulting from site work and for road repairs as may be deemed necessary by these transportation officials.

The soil cover will be installed, tested, and ready for continuous service. Repairs, replacements, and restoration as a result of damages resulting from construction operations will be performed by the Contractor. All materials, equipment, and incidentals which are reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the contract documents or not, will be furnished.

1.5 WORK TO BE PERFORMED

The major construction activities included are summarized below.

A. Temporary Site Facilities

Maintenance of temporary site facilities (as required by the Contractor) including, staging areas, Contractor offices, security and communication operations, personnel and equipment decontamination facilities, project signs during the performance period of the Contract, and removal of same at the completion of construction activities.

B. Temporary Site Utilities

This provision includes the operation and maintenance of all temporary site utilities (as required by the Contractor) including telephone, electricity, water, and sanitation.

C. Contractor Quality Control Plan

The Contractor shall develop and implement the Contractor Quality Control Plan, as identified in subsequent sections of the specifications. Four (4) copies of this plan shall be submitted to the Construction Manager within 10 days after Notice to Proceed.

The Contractor shall also develop and implement all other plans required under this Contract and under applicable federal, state, and local laws.

D. Establishment of Temporary and Permanent Erosion and Sediment Control Measures

This activity includes the installation of sediment fence, rock check dams and rock filter outlets, sediment basin and associated structures, temporary diversions, erosion control blankets, stabilized construction entrance, drainage ditch diversions, etc.

E. Clearing and Grubbing

Activities associated with clearing and grubbing of the site, as required for project execution.

F. Soil Cover Construction – C&D Landfill Area

Construction of soil cover including grading, compaction, cover soil amendment, and vegetation establishment via seeding and mulching and erosion control blanket installation.

G. Sediment Basin – Borrow Area

Construction of sediment basin and discharge structures, including grading and vegetation establishment via seeding and mulching of the sediment basin embankments, as needed.

H. Drainage Diversions - Borrow Area

Activities associated with construction of drainage diversions, including grading and seeding or placement of riprap, as needed.

I. Quality Control

Maintain a quality control program to ensure that all operations performed by the Contractor and all subcontractors are completed in accordance with the provisions of this Contract.

J. Safety

Provide required safety for both personnel and equipment.

K. Project Documentation

Document all work, including work associated with health and safety, quality control, field engineering, and as-built documentation.

L. Project Closeout

Activities include, but are not limited to: decontamination and removal of all Contractor equipment, removal of all temporary construction facilities as directed by the Construction Manager, disconnection and restoration of all temporary utilities, and transfer of all records, drawings, and other project-related material to the Construction Manager.

All other activities to satisfactorily complete all work covered by the Technical Specifications, any drawings not specifically discussed but necessary for the project construction and final acceptance.

All other work required by DuPont under the terms of this Contract.

1.6 CONSTRUCTION SEQUENCE

The major construction sequence (as detailed in the design drawings) shall be adhered to by the Contractor during project execution.

1.7 LIMITATIONS TO CONSTRUCTION SEQUENCE

Construction under this contract must be coordinated with the Construction Manager and DuPont and accomplished in a logical order to allow construction to be completed within the schedule time allowed by the contract documents. The following limitations apply to the construction sequence for work under this contract:

- A.** Miscellaneous inert debris currently located at the Construction and Demolition (C&D) Landfill shall be consolidated in the center of the landfill for disposal beneath the constructed soil cover. Additionally, existing piping, concrete inlets, and appurtenant materials to be disposed of from the proposed sediment basin outlet area will be disposed of underneath the Constructed cap or disposed of offsite if required by the DuPont Plant.
- B.** Access to and traffic flow through adjacent roadways shall be maintained throughout construction including Plant gravel and dirt roadways.
- C.** Site erosion and sediment control structures shall be constructed prior to initiation of full-scale site disturbance.

- D. Construction activity shall be limited to 12 hours a day during daylight hours. Work shall not be conducted overnight, unless written approval is provided by the Construction Manager. Plant requirements may include daily work permits which shall be coordinated with Plant personnel.

1.8 WORK BY OTHERS

Health and Safety procedures to be adhered to during project execution have been prepared by DuPont and are including herein. The Contractor shall be responsible for compliance with these procedures.

PART 2 – MATERIALS

NOT APPLICABLE.

PART 3 – EXECUTION

NOT APPLICABLE.

[END OF SECTION]

**DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 – GENERAL

1.1 SCOPE

- A.** All contract prices included on the Bid Form will be full compensation for all labor, materials, tools, equipment and incidentals necessary to complete the Work as shown on the Drawings and specified in the Contract Documents to be performed under this Contract.
- B.** The items listed below refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items necessary for the completion of the Work.
- C.** Each lump sum and unit bid price will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's indirects, including, but not limited to, all applicable taxes, insurance fees, management and site supervision, overhead and profit for each separately identified item.

In addition, each lump sum and unit bid price shall include costs for appurtenant work that is not included in the pay items but required for project execution. Such work shall include, but is not limited to, permits and associated work products; implementation and updating of any special procedures required by the Contractor to complete the work; photographs; Project Safety Analysis (PSA); appropriate medical surveillance program including all required physical examinations; health and safety including PPE; daily "tailgate meetings"; dust control; odor control; vector control; traffic control; project meetings and progress reporting; construction scheduling and schedules; work plan/shop drawings/ certification/ test/sample submittals; maintaining and preparing project record documents and drawings; cleanup; and collection and disposal of sanitary sewage wastes.

- D.** Restoration of the project area is not a separate pay item, but is considered to be an integral part of the Work under the Contract, and all contract bid prices include the cost of restoration necessitated by the work related to that bid item. Restoration includes existing structures and property, stabilized roads, drainage ditches, ground areas, bridges which are altered, removed, or damaged during construction. Cleanup is an integral part of restoration.
- E.** Measurement and Payment for work directed by DuPont to be performed beyond the limits specified herein or shown on the Contract Drawings shall be made at the unit bid prices identified in the Bid Form, as applicable.

- F. Submit to DuPont a Schedule of Values allocated to the various portions of the Work as listed in the Bid Form, within 15 days after the effective date of the Agreement.
- G. Upon request of DuPont, support the values with data, which will substantiate their correctness.
- H. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.2 PAY ITEMS

A. Item 1 - Mobilization/Demobilization

Work Included: This work includes, but is not limited to; transportation and supply of equipment to and from the site; setup of construction operations; constructing staging areas and facilities; installing, equipping and maintaining all field office trailers (as utilized by the Contractor), site security, safety equipment and clothing, and utility services.

Measurement: Lump Sum.

Payment: The payment shall be based on the completion of the mobilization and demobilization as determined by the Construction Manager with fifty (50) percent of the payment to follow completion and acceptance of the mobilization and fifty (50) percent to follow the completion and acceptance of the demobilization. This item shall be no greater than 15% of the contract value.

B. Item 2 - Site Preparation

Work Included: This work includes clearing the site of all vegetation, in designated areas, and preparation of the site for Construction prior to earthwork operations. This item includes removal and disposal of piping, concrete inlets, etc from the proposed Sediment Basin installation area and protection of existing features.

Measurement: Lump Sum.

Payment: The payment shall be made when the work is completed and accepted by the Construction Manager.

C. Item 3 – Erosion and Sediment Control and Maintenance

Work Included: Work includes, but is not limited to, all labor, equipment, and materials necessary for the construction of temporary and permanent erosion and sediment control measures including: sediment fence; sediment fence filter outlets; erosion control blanket, sediment basin installation and grading, basin outlet protection and basin structures; and including the maintenance of these control measures through Final Acceptance of Work. Work also includes seeding and mulching of areas disturbed during construction, which do not require soil amendment. Soil amendment, seeding and mulching of the C&D Landfill cover and Sediment Basin are not included in this item, but are included under separate bid items elsewhere.

Measurement: Lump sum.

Payment: Sixty (60) percent of the payment shall be made when the erosion and sedimentation control measures initial installation has been completed as determined by the Construction Manager. The remaining 40 percent of the payment shall be made upon Final Acceptance of the Work.

D. Item 4 – On-Site Cover Soil

Work Included: The work includes all permits and associated work products, royalties, taxes, equipment, materials, and labor required for physical testing (in accordance with SECTIONS: EARTHWORK AND CONTRACTOR QUALITY CONTROL), accessing, excavating, grading, hauling, staging, handling, placing, and compacting on-site cover soil in accordance with the Specifications and Drawings.

Measurement: Unit price per cubic yard.

Payment: The payment shall be made on a cubic yard basis, as determined by a survey of the final grades by the Contractor. Progress payments will be made based on an estimate of in-place quantities as determined by the Construction Manager. Final payment shall be made based on a survey of final grades compared to existing grades (as presented in the Drawing 3 and surveyed by the East Group, PA in October, 2002).

E. Item 5 – Soil Amendment, Seeding and Mulching

Work Included: This work includes all labor, equipment, and material necessary to perform soil amendment, seed, and mulch the C&D landfill surface, borrow areas sediment basin, and other disturbance areas and establish a stand of grass in accordance with the Specifications.

Measurement: Unit price per acre.

Payment: The payment shall be on a per acre basis, as determined by survey as approved by the Construction Manager.

F. Item 6 – Survey and Field Engineering

Work Included: This work includes all labor, equipment, and materials necessary to perform surveying (including, but not limited to, the construction layout, grade verification, pay quantity verification, and as-built record drawings) associated with construction of the Work and in accordance with SECTIONS: FIELD ENGINEERING AND CONTRACTOR QUALITY CONTROL.

Measurement: Lump Sum.

Payment: The payment shall be made on a progress basis, based on the percentage of work completed as determined by the Construction Manager.

G. Item 7 – Contractor Quality Control

Work Included: This work includes all labor, equipment, and materials required to prepare and implement the Contractor's quality control plan to monitor and control the quality of construction throughout the life of the project in accordance with SECTIONS: EARTHWORK AND CONTRACTOR QUALITY CONTROL. This item includes QC Plan preparation and documentation submittal.

Measurement: Lump Sum.

Payment: The payment shall be made on a progress basis, based on the percentage of work completed as determined by the Construction Manager.

1.3 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule of values on an 8½" by 11" or 8½" by 14" white paper; Contractor's standard forms and automated printout will be considered for approval by DuPont upon Contractor's request. Identify the schedule with:

1. Title of Project and Location
2. Engineer and Project Number
3. Name and Address of Contractor
4. Contract Designation

5. Date of Submission

An example schedule of values is provided with this Specification.

- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction. At a minimum, the component parts listed in the Bid Form shall be used.
- C. Identify each line item with the number and title of the respective major section of the Specifications.
- D. For each major line item, list sub-values of major products or operations under the item.
- E. For the various portions of the Work:
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 - 2. No payment shall be made for stored materials.
 - 3. The sum of all values listed in the schedule shall equal the Total Contract Sum.

1.4 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
- B. The unit quantity for bulk materials shall include an allowance for normal waste.
- C. The unit values for the materials shall be broken into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of the invoices for component material shall be included with the payment request in which the material first appears.
 - 3. Paid invoices shall be provided with the second payment request in which the material appears or no payment shall be allowed and/or may be deleted from the request.
- D. The installed input value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 - MATERIALS

NOT APPLICABLE.

PART 3 - EXECUTION

NOT APPLICABLE.

[END OF SECTION]

**DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01050
FIELD ENGINEERING**

PART 1 - GENERAL

1.1 SCOPE

- A.** The Contractor shall be responsible for providing certified survey work required to execute the project.
- B.** The Contractor shall provide civil, structural, or other professional engineering services specified or required to execute the Contractor's construction methods.
- C.** The Contractor shall provide record drawings to be used for determining work quantities and documenting construction. The Contractor shall provide such surveys and computations necessary to determine the quantities of their work performed or placed during each period for which a progress payment is to be made. Failure to do so will result in the stop of work until such surveys and computations are submitted.

1.2 RELATED WORK

- A.** Section 01010: Summary of Work.
- B.** Section 01025: Measurement and Payment.

1.3 QUALIFICATIONS OF SURVEYOR

The Contractor shall retain the services a Surveyor who is Licensed in the State of North Carolina and who meets the Kinston Plant health and safety requirements.

1.4 SUBMITTALS

- A.** The Contractor shall submit documentation to verify the accuracy of field engineering work during project Progress Meetings, and at any time per the request of the Construction Manager or Engineer.
- B.** Topographic maps shall be provided in electronic format (i.e. AutoCAD Release 2000) and reproducible paper prints. All elevation and horizontal information in the AutoCAD file shall be in the same horizontal and vertical datums provided on the Contract Drawings. All entries in the AutoCAD file shall be placed on layers named adequately to describe the entity being mapped.

- C. All original field notes, computations, and other survey records developed for the purposes of layout, original, progress, and final surveys shall be recorded in duplicated field books, the original pages of which shall be furnished promptly in ring binders to the Construction Manager with Daily Work Activity Summary Reports and shall be used by the Construction Manager to the extent necessary in determining the proper amounts of progress and final payments. All original surveyor notes, records, and calculations used/developed by the licensed surveyor shall be submitted to the Engineer upon project completion. All data shall be submitted in a bound book organized chronologically and fully indexed.
- D. Description and recovery sketches of all permanent control survey monuments established during the Contract.

PART 2 - MATERIALS

2.1 Permanent Bench Marks

Contractor is required to supply Permanent Bench Marks (PBMs) for the survey. The PBMs should be made of solid brass with machine-knurled stem and ribbed plastic expansion plug (1/2" diameter, 1-3/4" long) or equal.

PART 3 - EXECUTION

3.1 SURVEY REFERENCE POINTS

- A. References shall be set and measurements taken using standard accepted surveying methods and equipment.
- B. Existing basic horizontal and vertical control points for the project are those designated on the drawings.
- C. The Contractor shall locate and protect control points prior to starting the work and preserve all permanent reference points during construction. The Contractor shall report to the Construction Manager and Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or interference from construction activities. The Contractor shall not make changes or relocations without prior written notice to the Engineer. The Contractor shall immediately direct the surveyor to correctly replace project control points should they become lost or destroyed.

3.2 PROJECT SURVEY REQUIREMENTS

- A. The Contractor shall lay out his work and shall make all measurements in connection with the project coordinate system (Plant Grid) indicated on the drawings. The accuracy of all survey layout data shall be ± 0.1 foot horizontal and vertical. The Contractor shall furnish all stakes, templates, platforms, equipment, tools, and materials and labor as may be required in laying out any part of the work. The Contractor shall execute the work to the lines and grades established or indicated and shall maintain and preserve all stakes and other control points until authorized to remove them by the Construction Manager. If such marks are destroyed by or through negligence of the Contractor prior to their authorized removal, they may be replaced by the Construction Manager at his discretion and at no additional cost to the owner.
- B. The Contractor shall make such surveys and computations as are necessary to determine the quantities of their work performed or placed during each period for which a progress payment is to be made.
- C. The cross-sectional average end area method shall be used to calculate the in-place volumes. The Contractor may use other methods utilizing computer software to calculate in-place volumes with prior written approval of the Construction Manager. All quantity calculations shall be provided to the Engineer in a form that will allow the quantities to be checked with field conditions. All data points, cross-sections or similar information associated with computer generated quantities shall be provided (hard copy and electronic format).
- D. The Construction Manager or his designee will make such computations as are necessary to verify the quantities of work performed or in place. Quantity surveys made by the Contractor shall be made in the presence of a representative of the Construction Manager. The accuracy of quantity survey points shall be ± 0.1 foot horizontal and vertical.
- E. The Contractor shall make the following surveys of the site:
 - 1. Construction areas prior to initiation of construction activities (including topography). Construction areas shall include (but not be limited to) the C&D Landfill and Borrow Area. The Contractor may utilize existing site survey information indicated in the Drawings provided that the information is verified by the Contractor prior to initiation of field activities and following acceptance by the Construction Manager. The Contractor shall provide written acceptance of existing site survey information if he elects to use it.
 - 2. C&D Landfill construction areas following the installation of cover soil.
 - 3. Borrow area construction areas following borrow area development.

- F. The Contractor shall survey all surface and subsurface facilities installed as part of the project including, but not limited to, stormwater management features (including ditches, ditch outlet features, etc), and other site features that define the work performed.
- G. The Contractor shall provide all measurements, reference marks, lines, and grades necessary to maintain and establish a grid system.

[END OF SECTION]

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01440
CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.1 CODES, RULES, PERMITS AND FEES

A. General

1. All construction shall conform to the current editions of the codes, regulations, specifications and standards in Paragraph: Standards, as well as applicable federal, state and local laws, regulations, codes, and ordinances.
2. The Contractor shall give all necessary notices, obtain all permits (except as otherwise noted herein) and pay all governmental taxes, fees, and other costs in connection with the work, file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction, obtain all required Certificates of Inspection and Approval for the work and deliver same to the Construction Manager, except as otherwise noted herein.
3. Contractor Quality Control (CQC). The Contractor shall establish and maintain an effective Quality Control Program. The Contractor shall develop a Contractor Quality Control (CQC) Plan in accordance with Paragraph 3.2B - Contractor's Proposed CQC Plan. The Contractor shall submit the CQC Plan to the Construction Manager within 10 working days of Notice of Award.
4. Sufficient inspections and tests of all items of work, including that of subcontractors, to ensure conformance to applicable Drawings and Specifications and with respect to the quality of materials, workmanship, construction, functional performance, and identification shall be performed on a continuing basis. Contractors shall furnish qualified personnel, appropriate facilities, instruments, and testing devices necessary for the performance of the QC function. The controls shall be adequate to cover all construction operations both on and off site, shall be linked to the proposed construction sequence and shall be coordinated by the Contractor's QC personnel.

B. Included Items

The Contractors shall include in the work, without extra cost to the Owner, all labor, materials, services, apparatus, and drawings required to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings, and/or specified.

1.2 RELATED WORK

The following work specified herein is, or may be, related to the performance of quality control (QC) by the Contractor:

- A. Section 01010: Summary of Work.
- B. Section 02200: Earthwork.
- C. Section 02700: Drainage Controls.
- D. Section 02930: Seeding.

1.3 SUBMITTALS

The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

1.4 STANDARDS

- A. All references to standards in the Contract Documents shall always imply the latest issue in effect, including all amendments and errata at the time bids are taken, of said standards unless otherwise stated.
- B. Abbreviations for various organizations which may be used in these Specifications are as follows:

<u>Abbreviation</u>	<u>Organization</u>
AAN	American Association of Nurseries
AASHTO	American Association of State Highway and Transportation Officials
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ACS	American Chemical Society
AGA	American Gas Association
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BOCA	Building Officials Code Administration
CRSI	Concrete Reinforcing Steel Institute

DOT	Department of Transportation
FS	Federal Specification
IEEE	Institute of Electrical and Electronic Engineers
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NBFU	National Bureau of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NICET	National Institute of Certification of Engineering Technicians
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Act of 1970
UL	Underwriters' Laboratories
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey

1.5 VERIFICATION OF DIMENSIONS

Contractors shall be responsible for field verification of all dimensions of existing facilities and other items which are shown on the Drawings.

1.6 TESTING OF MATERIALS

- A. The Construction Manager reserves the right to perform tests on materials and equipment.
- B. Contractors shall submit materials for testing, taking into consideration when the materials will be incorporated in the work and the capabilities and capacities of the testing laboratory.
- C. The Contractor shall furnish to the Construction Manager, at no additional cost to the Owner, duplicate certified copies of all routine tests made by the mill, shop, or factory at which material or equipment has been fabricated or manufactured for the project.

PART 2 – MATERIALS

NOT APPLICABLE.

PART 3 – EXECUTION

3.1 GENERAL

The Contractor is responsible for QC and shall establish and maintain an effective QC system. The QC system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

3.2 QUALITY CONTROL PLAN

A. General

The Contractor shall furnish for review by the Construction Manager, not later than 10 working days after Notice of Award, the CQC Plan. The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the CQC Plan.

B. Contractor's Proposed CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers and purchasing agents:

1. A description of the QC organization. The QC Contractor shall include a QC Supervisor who shall report directly to the Contractor's Project Manager, who in turn, shall report directly to the manager responsible for corporate QC in the Contractor's organization.
2. The name, qualifications, duties, responsibilities, and authorities of each person assigned a QC function.
3. The Contractor's manager of corporate QC shall document the responsibilities and authority of the QC Supervisor, including authority to stop work that is not in compliance with the contract. The QC Supervisor shall issue letters of direction to all other various QC representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to the Construction Manager.
4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers and purchasing agents.
5. Control, verification, acceptance, and submittal of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person or qualified testing laboratory responsible for each test.

6. Location and availability of test facilities and equipment. Procedures for advance notice and coordination of special inspections and tests where required.
7. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
8. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
9. Reporting procedures, including proposed reporting formats and who will prepare, sign, and submit the reports.
10. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the Specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

C. Acceptance of Plan

Acceptance of the CQC Plan is required prior to the start of construction. Acceptance is conditional and will be based on satisfactory performance during the construction. The Construction Manager reserves the right to require the Contractor to make changes in his CQC plan and operations including removal or addition of personnel, as necessary, to obtain the quality specified at no additional costs to the Owner.

D. Notification of Changes

After acceptance of the CQC plan, the Contractor shall notify the Construction Manager in writing a minimum of 5 working days prior to any proposed change. Proposed changes are subject to acceptance by the Construction Manager.

3.3 COORDINATION MEETING

The Contractor together with the Contractor's QC Contractor shall meet with the Construction Manager and discuss the QC system after the Preconstruction Conference, before the start of construction, and prior to acceptance of the CQC Plan by the Construction Manager. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of the Contractor's management and QC Contractor with the Construction Manager's Quality Assurance. Minutes of the meeting shall be prepared by the Construction Manager and signed by the attending parties. The minutes shall become

a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

A. QC Supervisor

The QC Contractor shall identify an individual within their organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. This QC Supervisor shall be on the site a minimum of 1 day per week and attend the pre-construction meeting and all construction progress meetings. The QC Supervisor shall be a graduate civil/geotechnical engineer, or a graduate of construction management with a minimum of 5 years construction experience on earthwork projects similar to this contract.

B. QC Staff

Following are the minimum requirements for the QC staff. The QC staff will be at the site of work at all times during construction activities and they will have complete authority to take any action necessary to ensure compliance with the contract. Any member of the QC staff shall be a graduate civil/geotechnical engineer with a minimum of 2 years construction experience on earthwork projects similar to this contract. These minimum requirements will not necessarily assure an adequate staff to meet the QC requirements at all times during construction. The actual strength of the QC staff may vary during any specific work period to cover the needs of the work period. When necessary for a proper QC organization, the Contractor will add additional staff. This listing of minimum staff in no way relieves the Contractor of meeting the basic requirements of quality construction in accordance with contract requirements. All QC staff members shall be subject to acceptance by the Construction Manager.

A staff shall be maintained under the direction of the QC Supervisor to perform all QC activities. The staff must be of sufficient size to ensure adequate QC coverage of all work phases, work shifts, and work crews involved in the construction. During cap construction, the Independent QC Contractor shall provide adequate personnel, to perform the QC functions required by these specifications. These personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities. The QC plan will clearly state the duties and responsibilities of each staff member.

C. Organizational Changes

The Contractor shall obtain Construction Manager's written acceptance before replacing any member of the QC staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

3.5 CONTROL

The CQC is the means by which the Contractor assures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication, and will be linked to the proposed construction sequence. The controls shall include at least 3 phases of control to be conducted by the QC Supervisor for all definable features of work, as follows:

A. Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work and shall include:

1. A review of each paragraph of applicable specifications.
2. A review of the contract plans.
3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
4. A check to assure that provisions have been made to provide required control inspection and testing.
5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawing or submitted data, and are properly stored.
7. A review of the appropriate activity hazard analysis to assure safety requirements are met.
8. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that phase of work.
9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Construction Manager.
10. The Construction Manager shall be notified at least 48 hours in advance of beginning any of the required action of the preparatory phase. This phase shall include a meeting conducted by the QC Supervisor and attended by the superintendent, other QC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the QC Supervisor and attached to the daily QC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

B. Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

1. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
2. Verification of full contract compliance. Verify required control inspection and testing.
3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels as appropriate.
4. Resolve all differences.
5. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
6. The Construction Manager shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the QC Supervisor and attached to the daily QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
7. The initial phase should be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

C. Follow-up Phase

Daily checks shall be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. Each check performed shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.

D. Additional Preparatory and Initial Phases

Additional preparatory and initial phases may be conducted on the same definable features of work as determined by the Construction Manager if the quality of ongoing work is unacceptable; or if there are changes in the applicable QC staff or in the on-site production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity.

3.6 TESTS

A. Testing Procedure

The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. **Table 1 (attached) provides a summary of the minimum QC**

testing requirements. Table 1 shall not supersede the requirements of each specification and is provided solely to assist the Contractor in preparing the CQC Plan and understanding the general scope of QC testing. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of an offsite industry-recognized testing laboratory. A list of tests to be performed shall be furnished as a part of the CQC plan. The list shall give the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. The Contractor's QC Contractor shall perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.
2. Verify that facilities and testing equipment are available and comply with testing standards.
3. Check test instrument calibration data against certified standards.
4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
5. Results of all tests taken, both passing and failing tests, will be recorded on the QC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. Actual test reports may be submitted later, if approved by the Construction Manager, with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the Construction Manager. Failure to submit timely test reports, as stated, may result in nonpayment for related work performed and disapproval of the test facility for this contract.

B. Testing Laboratories

1. **Capability Check.** The Construction Manager reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques.
2. **Capability Recheck.** If the selected laboratory fails the capability check, the Contractor will be assessed the actual cost for the recheck to reimburse the Owner for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7 COMPLETION INSPECTIONS

A. Contractor's Completion Inspection

Based upon the Construction Manager's concurrence that the Contractor's work is nearing substantial completion, and at least 15 working days prior to prefinal inspection, the Contractor's superintendent and QC Supervisor shall conduct a

detailed inspection. The Construction Manager shall be notified of the inspection date in order that he may participate, if he so elects. The work shall be inspected for conformance to the Drawings and Specifications, quality, workmanship, and completeness. The Contractor shall prepare an itemized list of work not properly completed, inferior workmanship, or not conforming to Drawings and Specifications. The list shall also include outstanding administrative items such as as-built drawings. The list shall be included in the documentation and submitted to the Construction Manager within 5 working days after conducting this inspection with an estimated date for correction of each deficiency.

B. Pre-Final Inspection

The Contractor's superintendent and QC Supervisor, and other primary management person and the Construction Manager will be in attendance at this inspection. The pre-final inspection will be formally scheduled by the Construction Manager based upon written notice from the Contractor. This notice will be given to the Construction Manager at least 15 working days prior to the pre-final inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining contract work, will be complete and acceptable by the date scheduled for the pre-final inspection. Failure of the Contractor to have all contract work completed and accepted prior to this inspection will be cause for the Construction Manager to bill the Contractor for the Owner's additional inspection costs. At this inspection the Construction Manager will develop a specific list of incomplete and/or unacceptable work performed under the contract and will furnish this list to the Contractor. Failure of the Construction Manager to detect and list all incomplete and/or unacceptable work during this inspection will not relieve the Contractor from performing all work required by and in accordance with the Contract Documents.

C. Final Acceptance Inspection

The Contractor's QC personnel, his superintendent and other primary management person and the Construction Manager will be in attendance at this inspection. The final acceptance inspection will be formally scheduled by the Construction Manager based upon written notice from the Contractor. This notice will be given to the Construction Manager at least 15 working days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Construction Manager to bill the Contractor for the Owner's additional inspection costs.

3.8 DOCUMENTATION

The Contractor shall maintain current records of QC operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall be on an acceptable form and shall include factual evidence that required QC activities and/or tests have been performed, including but not limited to the following:

- A.** Contractor/subcontractors and their area of responsibility.
- B.** Operating plant/equipment with hours worked, idle, or down for repair.
- C.** Work performed today, giving location, description, and by whom.
- D.** Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
- E.** Material received with statement as to its acceptability and storage.
- F.** Identify submittals reviewed, with contract reference, by whom, and action taken.
- G.** Off-site surveillance activities, including actions taken.
- H.** Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- I.** List instructions given/received and conflicts in plans and/or specifications.
- J.** Contractor's verification statement.
- K.** These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and 2 copies of these records in report form shall be furnished to the Construction Manager on the first work day following the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, 2 reports shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the QC Supervisor. The

report from the QC Supervisor shall include copies of test reports and copies of reports prepared by all QC personnel.

3.9 ENFORCEMENT

The Contractor shall stop work on any item or feature, pending satisfactory correction of any deficiency noted by his QC staff or by the Construction Manager. Construction shall not proceed upon any feature of work containing incorrect work. Notations on QC reports will not be acceptable as a substitution for other written reports by the Contractor, if required.

3.10 NOTIFICATION OF NONCOMPLIANCE

The Construction Manager will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Construction Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

[END OF SECTION]

**TABLE 1
SUMMARY TABLE OF SOIL TESTING**

<u>COMPONENT</u>	<u>REQUIRED TEST</u>	<u>MINIMUM QC FREQUENCY</u>	<u>ACCEPTANCE CRITERIA</u>
On-Site Amended Cover Soil	Organic Content (ASTM D 2974)	Advance Test: 1 every 5,000 cy Constr Test: 1 every 5,000 cy	3% < org. content < 20%
	pH	Advance Test: 1 every 5,000 cy Constr Test: 1 every 5,000 cy	6.0 < pH < 7.5
	Moisture Content (ASTM D 2216)	Advance Test: 1 every 5,000 cy	N/A
	Laboratory Classification (ASTM D 2487)	Advance Test: 1 every 5,000 cy	Soil classification SW, SP, SC, SM, ML, and CL
	Visual Field Classification (ASTM D 2488)	Constr Test: 1 per 200 ft centers per lift	Maximum particle size of 3 inches
	Grade Verification	Vertical elevations on a 50-foot grid and at all slope changes	± 0.15 feet



**Kinston C&D Landfill
Soil Cover Construction
Final Design**

List of Specifications (cont.)

Division 2 - Site Work

- 02100 - Site Preparation
- 02200 - Earthwork
- 02270 - Erosion Control Measures
- 02700 - Drainage Controls
- 02930 - Seeding

**DIVISION 2 - SITE WORK
SECTION 02100
SITE PREPARATION**

PART 1 - GENERAL

1.1 SCOPE

The work discussed in this section shall consist of all activities necessary to prepare the site for full-scale earthmoving operations including, but not limited to, clearing, grubbing, utility identification and location, and installation of erosion and sedimentation controls.

1.2 RELATED WORK

The following work specified herein is, or may be, related to site preparation:

- A. Section 01010: Summary of Work.
- B. Section 01025: Measurement and Payment.
- C. Section 02200: Earthwork.
- D. Section 02270: Erosion Control Measures.
- E. Section 02700: Drainage Controls.
- F. Section 02930: Seeding.

1.3 DEFINITIONS

A. Clearing

Clearing, where required to install all project features and where designated on the Drawings, shall consist of the felling, trimming, and cutting of trees into sections and the disposal of trees, vegetation, downed timber, snags, brush and debris occurring in the areas to be cleared. Clearing shall also include the removal and disposal of structures that obstruct, encroach upon, or otherwise obstruct the work. Grubbing shall be performed where required to implement C&D Landfill soil cover construction and for borrow area development.

B. Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter and matted roots. Grubbing shall be performed where required to implement C&D Landfill soil cover construction and for borrow area development.

PART 2 - MATERIALS

NOT APPLICABLE.

PART 3 - EXECUTION

3.1 CLEARING

Trees, shrubs, vegetation, downed timber, snags, brush, and debris in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees and vegetation to be left standing shall be protected from damage due to clearing, grubbing, and construction operations by the erection of barriers or by such other means as required. Existing utilities must be identified, located, and protected by the Contractor.

3.2 GRUBBING

Material to be grubbed together with logs and other organic debris not suitable for foundation purposes shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas that are excavated. Depressions made by grubbing shall be filled with suitable structural fill and compacted as defined in SECTION: EARTHWORK to make the surface conform with the original adjacent surface of the ground.

3.3 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

All felled trees (less than 8-inch diameter), shrubs, downed timber, snags, brush, stumps, roots, logs, rotten wood, and other vegetative refuse shall be chipped or shredded. Chipped and shredded, cleared and grubbed material shall be stockpiled on-site in a location designated by the Construction Manager. Chipped material may be used as mulch in areas approved by the Construction Manager. Under no circumstances shall the Contractor or his subcontractors remove from the site or sell grubbed material or material taken from the clearing areas.

3.4 EROSION AND SEDIMENTATION CONTROLS

Prior to any earth disturbing activity, the Contractor shall install erosion and sedimentation control measures in accordance with SECTION: EROSION AND SEDIMENT CONTROL MEASURES. Erosion and sedimentation control measures shall include, but not be limited to, temporary diversion ditches, rock check dams, silt fence, and sediment basins.

[END OF SECTION]

**DIVISION 2 - SITE WORK
SECTION 02200
EARTHWORK**

PART 1 - GENERAL

1.1 SCOPE

A. General

The work covered by this section consists of furnishing all labor and equipment, and performing all earthwork necessary to place fill and construct the soil cover in accordance with the lines, grades, and dimensions shown on the Drawings and in accordance with these Specifications. The Contractor shall be aware that any excavation into the existing ground surface at the Construction and Demolition (C&D) Landfill Area could potentially result in uncovering previously disposed of C&D material.

B. Borrow Source

The Contractor shall utilize the designated on-site borrow area (indicated on the Drawings) to obtain specified soils for soil cover construction. The Contractor shall be responsible for obtaining all necessary permits (including plant required permits) required to obtain onsite borrow.

1.2 RELATED WORK

The following work specified herein is, or may be, related to earthwork:

- A. Section 01010: Summary of Work.
- B. Section 01025: Measurement and Payment.
- C. Section 01050: Field Engineering.
- D. Section 01440: Contractor Quality Control.
- E. Section 02100: Site Preparation.
- F. Section 02270: Erosion Control Measures.
- G. Section 02700: Drainage Controls.
- H. Section 02930: Seeding.

1.3 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

American Society for Testing and Materials (ASTM)

ASTM D 422	Method for Particle-Size Analysis of Soils.
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³).
ASTM D 1140	Test Method for Amount of Material in Soils Finer Than the No. 200 Sieve.
ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
ASTM D 2167	Test Method for Density and Unit Weight for Soil in Place by the Rubber Balloon Method.
ASTM D 2216	Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
ASTM D 2487	Classification of Soils for Engineering Purposes.
ASTM D 2488	Practice for Description and Identification of Soils (Visual-Manual Procedure).
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D 2974	Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Materials.
ASTM D 3017	Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D 4253	Test Method for Maximum Index Density and Unit Weight of Soils Using Vibratory Table.
ASTM D 4254	Test Method for Minimum Index Density and Unit Weight of Soils Using Vibratory Table.
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS

- A. The Contractor shall submit the results of all testing performed in connection with quality control requirements of this Specification to the Construction Manager. Test results from advance testing shall be submitted at least 5 days in advance of delivery of the representative material to the site.

PART 2 - MATERIALS

2.1 COVER SOIL

Cover Soil shall be excavated from the designated on-site borrow source.

PART 3 - EXECUTION

3.1 GENERAL

The work to be performed under this Section shall be in accordance with the Drawings and as specified herein. The work under this Section shall include, but not limited to excavation of borrow area and installation of borrow area sediment basin, diversion ditches, and associated erosion control measures, and final grading of the borrow area and C&D Landfill.

A. Protection of Existing Utilities Structures

Existing utility lines that are to be retained, the locations of which are made known to the Contractor prior to excavation, shall be protected from damage during excavation and backfilling. If damaged during any construction activity, the existing utilities shall be repaired by the Contractor at no cost to DuPont. In the event that the Contractor damages any existing utility lines that are not shown, or the locations of which have not been made known, the Contractor shall immediately report the damage to the Construction Manager. If determined that repairs are to be made by the Contractor, such repairs will be made and the contract modified. When utility lines that are to be removed or relocated are encountered within the area of operations, the Contractor shall coordinate removal or relocation with all affected parties and shall acquire all necessary permits.

B. Landfill Structures

Landfill structures including, but not limited to, existing monitoring wells shall be carefully maintained and protected during placement of fill. If these structures are damaged during the placement of fill, the Contractor shall repair any damaged structure to the approval of the Construction Manager at no additional cost to DuPont.

C. A "Pass" Defined

A complete pass shall consist of the coverage of the entire lift to be compacted with the roller specified. The equipment shall be operated so that the strip being traversed by the roller shall overlap the rolled adjacent strip not less than 1 foot. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously.

D. Maintain Drainage

During construction, embankments and excavations shall be kept shaped and drained. Ditches along the cap shall be maintained in such a manner as to drain effectively at all times. Where ruts occur in the fill, the fill shall be brought to grade, reshaped if required, and recompacted prior to placing additional fill. The storage or stockpiling of materials on the cap will not be permitted.

E. Finished Surface

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth graded. The finished surfaces shall be reasonably smooth, compacted, and free from irregular surface changes, vegetation (except topsoil), and debris. The degree of finish shall be ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified. The finished surface shall be not more than 0.15 foot above or below the established grade or approved cross section and shall be free of depressed areas where water would pond. All areas shall be finished so as to drain readily.

F. Haul Roads

Haul roads shall be located, designed and constructed by the Contractor to maintain the intended traffic, to be free draining, and shall be maintained in good condition throughout their use. Haul roads shall not be constructed by cutting into the existing ground surface.

G. Protection of Existing Monitoring Wells

Existing monitoring wells are present throughout the site. Any monitoring wells or other structures not shown on the Drawings which are located during construction activities should be reported to the Construction Manager for evaluation. The existing monitoring wells and any other monitoring wells encountered should not be disturbed in any manner.

3.2 BORROW AREA DEVELOPMENT

A. General

Borrow area development shall be limited to the area designated on the Construction Drawings. The Contractor shall provide all equipment and labor necessary to develop the candidate borrow area. In addition, the Contractor shall identify and be responsible for obtaining all necessary permits associated with borrow area development well in advance of the work. No schedule extension will be granted for delays caused by the permit approval process.

B. Borrow Area Development

The Contractor shall develop the candidate borrow area in a planned, orderly fashion by stripping borrow soil so that the entire area is uniformly lowered in elevation to the approximate grades shown in the Construction Drawings. The Contractor shall be responsible for implementing and maintaining all necessary erosion and sediment controls and management of stormwater during borrow area development.

If during borrow area development, unsuitable soil (i.e. material with visible staining or apparent impact from historical plant operations) is encountered, the Contractor shall consolidate unsuitable materials as directed by the Construction Manager. Borrow area development shall either be discontinued or excavation activities shall be relocated to another portion of the borrow area as directed by the Construction Manager.

The Contractor should be aware that DuPont may require access to the borrow area to perform chemical sampling in the event that unexpected sources of contamination are encountered during the course of borrow excavation. In the event such sampling is required, the Contractor shall move to another location within the borrow area to continue operations and shall not have cause to claim a delay to the project schedule.

C. Test Pits

The Contractor may conduct exploratory test pits within the candidate borrow area to establish the available thickness of suitable soils.

D. Borrow Area Soil Amendment, Final Grading, and Seeding

The Contractor shall excavate the candidate borrow area to meet the lines and grades presented in the final grading plan and as directed by the Construction Manager. The entire disturbed area shall be amended to meet pH and organic content requirements as required in Paragraph 3.5B. The entire disturbed area shall be seeded in accordance with SECTION: SEEDING. Final grading of the completed borrow area must be approved by the Construction Manager prior to

seeding. The restored borrow area shall be surveyed during the final topographic survey of the site in accordance with SECTION: FIELD ENGINEERING.

3.3 BORROW AREA EXCAVATION

A. General

Excavation shall conform to current Local, State, and Federal regulations covering safety for excavation and for construction shall be followed as applicable specifically, or by similarity of operation, or as may be necessary for personal and property safety. The Contractor must provide any shoring or bracing as necessary to properly protect workers in excavations. Approval by the Engineer of the Contractor's procedures does not relieve the Contractor of responsibility for site safety.

B. Excavation

The Contractor shall excavate to the lines and grades shown on the Drawings. Over-excavation and/or fill not shown on the Drawings or specified herein shall be at the Contractor's expense, unless approved by the Construction Manager prior to commencing such work.

C. Excavation Instability / Slopes of Excavations

The Contractor shall immediately inform the Construction Manager of any signs of instability of any excavation during the course of the project. Work shall be halted until a plan of action for construction of the work is agreed to by the Construction Manager. Excavation of all materials shall be done with excavations at a safe slope. The cut slope shall not be steeper than 2H:1V unless so noted on the plans or agreed to by the Construction Manager.

3.4 COVER SOIL PLACEMENT – C&D LANDFILL

A. General

All surface vegetation, such as brush, heavy growth of grass, and all decayed vegetative matter within the area upon which fill is to be placed shall be handled in accordance with SECTION: SITE PREPARATION, prior to fill placement.

B. Placement

The cover soil shall be placed at the location and to the lines and grades indicated on the Drawings. The Contractor shall place cover soil starting at the toe of the slope and working up the slope, perpendicular to the toe. Cover soil shall be placed in single lift in order to produce a maximum compacted lift thickness of 12 inches (or less as required in the Drawings). Each lift shall be spread uniformly on the previously compacted surface; broken up; moistened or aerated as necessary.

C. Compaction

Each lift of cover soil fill (for areas which exceed 1-foot of soil amendment thickness) shall be compacted with a minimum of 4 complete passes of a Caterpillar CS-563D vibratory soil compactor or approved equal. For areas which the installed cover soil will not exceed 1-foot, material will be tracked in place with a minimum of 4 complete passes.

3.5 COVER SOIL AMENDMENT – C&D LANDFILL

A. General

All ground areas disturbed by construction under this contract, unless otherwise specified, shall be amended to promote vegetative growth. Previously constructed grades shall be repaired, if necessary, so that the areas to be amended shall conform to the section indicated upon completion of the required amendment. The work shall be performed only during periods when beneficial results are likely to be obtained. When conditions are marginal (by reason of drought, excessive moisture, or other factors which could impact satisfactory results) the work will be stopped and shall be resumed only upon approval of the Construction Manager.

B. Amendment Procedures

The upper six inches of all disturbed areas within the C&D Landfill construction area shall be amended with an approved organic material (i.e. existing stripped borrow area topsoil, peat moss, manure, or other amendment) to provide a vegetative layer that can produce heavy growths of crops, grass or other vegetation. All areas to be amended shall be reasonably free from underlying subsoil, clay lumps, objectionable weeds, rocks, litter, brush, matted roots, toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, planting or maintenance operations. Soils from ditch bottoms, drained ponds, or eroded areas (handled when too wet or soggy) are not acceptable.

Amended soil shall have a final pH value of between 6.0 to 7.5. If the pH is not within the 6.0 to 7.5 range the Contractor shall add the material required to achieve that pH balance. Amended soil shall contain from 3 to 20 percent organic matter as determined by loss on ignition in accordance with ASTM D 2974. If the organic matter is not within the 3 to 20 range the Contractor shall add sufficient amendments to achieve the required organic content.

3.6 QUALITY CONTROL TESTING

A. General

1. **Sampling and Testing:** All quality control sampling and testing shall be performed by the Contractor at the Contractor's expense and as specified herein. Soil testing shall be provided by the Contractor's independent testing laboratory. The Construction Manager shall have the option to select test locations; otherwise, test locations must be approved by the Construction Manager. The Construction Manager will require additional tests beyond the minimum required to be performed whenever materials or construction are questionable. The Contractor should note that quality assurance tests for acceptance may be made by and at the expense of DuPont. The Contractor, however, shall not depend on quality assurance tests for his/her control of operations. Discrepancies between test results obtained by the Independent QC Contractor and the Construction Manager will be resolved to the Construction Manager's satisfaction prior to the Contractor performing any further work. Deficiencies in construction shall be corrected by the Contractor at no additional costs to DuPont.
2. **As-Built Surveys:** The Contractor shall submit as-built surveys of the completed C&D Landfill soil cover (amended cover soil) surface and the developed borrow area to the Construction Manager for approval prior to the final acceptance inspection. The Contractor shall submit the as-built surveys in accordance with the requirements described in SECTION: FIELD ENGINEERING.
3. **Advanced Testing:** Advance testing shall be performed in advance of delivery from the borrow source and is required to establish borrow source properties and amendment requirements and to establish control parameters for compaction.
4. **Construction Testing:** Construction testing shall be performed during fill placement to verify that the representative fill material is meeting the requirements of this Specification.

B. Advanced and Construction Testing Protocols (Onsite Borrow)

The following testing shall be performed for onsite borrow soils:

1. **Classification:** Testing shall include soil classification, moisture content, Atterberg limits, and grain size determination (sieve and hydrometer analyses) and specific gravity. These tests are described in ASTM D 2487, ASTM D 2216, ASTM D 4318, and ASTM D 422, respectively. Classification testing shall be done at a rate specified in Table 1 of SECTION: CONTRACTOR QUALITY CONTROL. Samples shall be representative of the material placed. Copies of all advance test results for classification shall be furnished to the Construction Manager 5 days in advance of the time the representative materials are to be used on the site.

2. **Grade Verification:** The Contractor shall monitor the depth of the compacted layers during placement and verify that the required grades are reached. Grade verification shall be performed by the Contractor as indicated and at the rate specified in Table 1 of SECTION: CONTRACTOR QUALITY CONTROL.

[END OF SECTION]

DIVISION 2 - SITE WORK
SECTION 02270
EROSION CONTROL MEASURES

PART 1 - GENERAL

1.1 SCOPE

- A. The work shall include the furnishing and application of materials and labor required to construct erosion control measures in accordance with these Specifications and within the lines, grades, and dimensions shown on the Drawings, and the Erosion and Sediment Control Plan.
- B. Construction of the following erosion controls is covered in this section: Reinforced Sediment Fence, Stone Outlets, Riprap Protection, Erosion Control Blanket, and Sediment Basin.
- C. The quantity of temporary erosion controls shown on the Drawings may be increased or decreased at the direction of the Engineer based upon actual conditions which occur during the construction of the project. Such variations in quantity shall not be considered as alterations in the details of construction or a change in the character of work.

1.2 RELATED WORK

The following work specified herein is, or may be, related to the construction of erosion control measures:

- A. Section 01025: Measurement and Payment.
- B. Section 01440: Contractor Quality Control.
- C. Section 02100: Site Preparation.
- D. Section 02200: Earthwork.
- E. Section 02700: Drainage Controls.
- F. Section 02930: Seeding.

1.3 REFERENCES

The publications listed below form a part of this Technical Specification to the extent referenced. The publications are referenced in the text by basic designation only.

- A. State of North Carolina – Sedimentation Control Commission – *Erosion and Sediment Control Planning and Design Manual (Manual)*, September 1, 1988.

B. American Society of Testing and Materials (ASTM)

ASTM C 136	Sieve Analysis of Fine and Coarse Aggregate.
ASTM D 123-93	Terminology Relating to Textile Materials.
ASTM D 488-98	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM D 3776-85	Test Methods for Mass Per Unit Area of Geotextile.
ASTM D 3786-87	Test Method for Hydraulic Bursting Strength of Knitted Goods and Non-woven Fabrics: Diaphragm Bursting Strength Tester Method.
ASTM D 4354-96	Practice for Sampling of Geotextiles for Testing.
ASTM D 4355-92	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
ASTM D 4491-99	Test Method for Water Permeability of Geotextiles by Permittivity
ASTM D 4632-91	Test Method for Grab Breaking Load and Elongation of Geotextiles.
ASTM D 4751-87	Test Method for Determining the Apparent Opening Size of a Geotextile.
ASTM D 4759-88	Test Method for Determining the Specification Conformance of Geosynthetics

1.4 DEFINITIONS

A. Reinforced Sediment Fence

A temporary sediment barrier consisting of a sediment trapping geotextile fence that reduces the off-site transport of sediment via ponding of runoff allowing sediment to filter out on the upstream side of the fence.

B. Riprap

Specially selected and graded quarried stone placed in ditches and on slopes to prevent erosion.

C. Temporary Gravel Construction Entrance/Exit

A stabilized pad of aggregate placed over a geotextile to reduce the amount of soil and mud tracked off site by construction related traffic.

D. Erosion Control Blanket (ECB)

A temporary, degradable rolled erosion control product made of natural fibers attached to synthetic netting and used to protect newly seeded areas from environmental forces such as wind, rain and intense sunlight, and to enhance the growth of vegetation.

E. Sediment Basin

A settling pond used to collect sediment-laden runoff and trap sediment while discharging clean water through an outlet structure.

F. Stone Outlets

A small rock dam constructed at low points along the reinforced sediment fence, installed to prevent damage to the sediment fence at drainage points along the barrier.

1.5 SUBMITTALS

In accordance with SECTION: SUBMITTALS, the Contractor shall submit the following items to DuPont for approval:

A. Geotextile

1. Descriptive data on geotextile material including manufacturer's specifications and material sample.
2. Certified material property data sheets for the geotextile from the manufacturer indicating the material meets the specifications herein.
3. Manufacturer's installation procedures for the geotextile for approval by DuPont.

B. Riprap

All data on the rock fill material including, but not limited to, proposed source of riprap and sieve analysis results, or DOT certification on each type of riprap material used.

C. Erosion Control Blanket (ECB)

1. Descriptive data on erosion control ditch lining material including manufacturer's specifications and material sample.
2. Certified material property data sheets for the ECB from the manufacturer indicating the material meets the specifications herein.
3. Manufacturer's installation procedures for the ECB for approval by DuPont.

D. Reinforced Sediment Fence

Certified material property data sheets for the reinforced sediment fence material indicating the material meets the specifications herein.

PART 2 - MATERIALS

2.1 REINFORCED SEDIMENT FENCE

Reinforced sediment fence shall conform to the requirements specified on the Drawings.

2.2 RIPRAP

A. Rock Ditch Protection

Riprap for ditch protection shall conform to the size requirements specified on the Drawings.

B. Temporary Gravel Construction Entrance/Exit

Riprap for the Temporary Gravel Construction Entrance/Exit shall conform to the size requirements specified on the Drawings.

C. Stone Outlets

Riprap for the stone outlets shall conform to the size requirements specified on the Drawings.

2.3 EROSION CONTROL BLANKET (ECB)

A. Grass-Lined Ditch and Slope Protection

ECB shall be a machine-produced mat of straw, wood fibers, coconut or other natural material. The ECB shall be of uniform thickness with matting material evenly distributed and attached to single continuous synthetic photo-degradable netting with a UV resistant netting on top of the natural materials. The ECB shall conform to the requirements specified on the Drawings.

B. Staples

ECB shall be anchored with "U"-shaped 11-gauge wire staples with a minimum top width of 1 inch and length of 8 inches, or as specified by the manufacturer and approved by DuPont.

2.4 GEOTEXTILE

The geotextile shall be a needle-punched non-woven geotextile composed of either a polyester or polypropylene fabric and have a minimum fabric weight of eight ounces per

square yard as determined by ASTM D 3776. The geotextile shall be used in all areas designated for geotextile.

2.5 GEOTEXTILE SECURING PINS

Geotextile securing pins, or alternate securing method, shall be as recommended by the geotextile manufacturer.

2.6 COVER SOIL

Cover soil shall be as specified in SECTION: EARTHWORK.

PART 3 - EXECUTION

3.1 GENERAL

A. Delivery, Storage and Handling

Delivery, storage and handling of materials mentioned in this Technical Specification shall comply with the manufacturer's recommendations.

B. Erosion Control

The Contractor shall implement erosion control measures in accordance with the requirements of this section before and during performance of work within this section. Maintenance of erosion control measures shall be in accordance with Paragraph: Field Quality Control.

C. Dust Control

The Contractor shall implement dust control measures in accordance with the drawing requirements. Sprinkling shall be considered an acceptable form of dust control. The Contractor shall be responsible for obtaining water including all required DuPont Kinston Plant and NC DENR approval and permitting requirements.

3.2 PERFORMANCE

A. Site Preparation

Surfaces of ditches and slopes shall conform to the lines, grades, and cross-sections shown on the Drawings and finished to a smooth and even condition with all debris, roots, stones, and clods greater than three inches in diameter raked out or removed prior to the placement of erosion control measures as applicable. Correct subgrade irregularities exceeding previously specified limit to DuPont's satisfaction either by removing or adding material as required, followed by rolling until satisfactorily compacted.

B. Reinforced Sediment Fence Installation

1. Reinforced sediment fence shall be constructed before upslope land disturbance begins.
2. All reinforced sediment fence shall be placed as close to the contour as possible so that water will not concentrate at low points in the fence and so that small swales or depressions which may carry small concentrated flows to the reinforced sediment fence are dissipated along its length.
3. To prevent water ponded by the reinforced sediment fence from flowing around the ends, each end shall be constructed upslope so that the ends are at a higher elevation.
4. Where possible, reinforced sediment fence shall be placed on the flattest area available, offset a minimum distance of five feet from the upstream slope.
5. Where possible, vegetation shall be preserved for five feet (or as much as possible) upslope from the sediment fence. If vegetation is removed, it shall be re-established within seven days from the installation of the reinforced sediment fence.
6. The height of the reinforced sediment fence stake shall not exceed 18 inches above the original ground surface.
7. The reinforced sediment fence shall be placed in a trench cut a minimum of eight inches deep. The trench shall be cut with a trencher, cable laying machine, or other suitable device which will ensure an adequately uniform trench depth.
8. The reinforced sediment fence shall be placed with the stakes on the downslope side of the geotextile. Excess material shall lay on the bottom of the trench. The trench shall be backfilled and compacted in accordance with SECTION: EARTHWORK.
9. Seams between sections of reinforced sediment fence shall be overlapped a minimum of 18 inches with the end stakes of each section wrapped together before driving into the ground.
10. Reinforced sediment fence shall allow runoff to pass only as diffuse flow through the geotextile. If runoff overtops the reinforced sediment fence, flows under or around the ends, or in any other way becomes a concentrated flow, the following shall be performed, as approved by the Construction Manager: i) accumulated sediment shall be removed, and/or ii) a stone outlet shall be installed.
11. Upslope areas shall be permanently stabilized prior to removing the reinforced sediment fence.
12. The wire support mesh shall be fastened securely behind the geotextile on the upslope side of the stake. The wire shall extend into the trench a minimum of 2 inches and extend a maximum of 30 inches above the original ground surface.

C. Riprap Installation

1. Prior to placing riprap, geotextile, in accordance with paragraph 2.4, shall be installed to the lines and grades indicated on the drawings.
2. Stone for "riprap" shall be placed in such a manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids, and shall be constructed within the specified tolerance to the lines and grades shown on the Drawings or as staked in the field.
3. Riprap shall be placed to its full course thickness at one operation and in such a manner as to avoid damaging the geotextile and to minimize segregation of the riprap. The larger stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified.
4. Should accidental damage occur to the geotextile during rock fill placement, carefully remove the rock fill and make repairs to the geotextile in accordance with the manufacturer's recommendations. All repairs will be made to the satisfaction of DuPont and at no additional expense.
5. Do not operate construction equipment directly on the geotextile during riprap placement.

D. Temporary Gravel Construction Entrance/Exit

1. The Temporary Gravel Construction Entrance/Exit shall be installed as soon as practicable once mobilization begins.
2. Dimensions of the entrance shall be as indicated on the Drawings.
3. A geotextile, in accordance with paragraph 2.4, shall be placed over the entrance subgrade prior to placing aggregate.
4. Top dressing of additional stone shall be applied as conditions demand. Mud spilled, dropped, washed or tracked onto public roads, or any surface where runoff is not checked by sediment controls, shall be removed immediately. Removal shall be accomplished by scraping or sweeping.
5. Construction entrances shall not be relied upon to remove mud from vehicles and prevent off-site tracking. Vehicles that enter and leave the construction site shall be restricted from muddy areas.

E. Erosion Control Blanket (ECB) Installation

ECB shall be placed as indicated on the Drawings and as specified below:

1. Grass-Lined Slope Protection
 - a. Prepare soil before installing blankets, including application of lime, fertilizer, seed, and mulch.
 - b. Begin at the top of the slope by anchoring the blanket in a

6-inch deep by 6-inch deep wide trench. Backfill and compact the trench after stapling.

- c. Roll the blankets down the slope.
 - d. Staple pattern shall be per manufacturer's recommendations.
 - e. The edges of parallel blankets shall be stapled with approximately 2 inches of overlap.
 - f. When blankets must be spliced down the slope, place blankets end over end (shingle style) with approximately 4 inches of overlap. Staple through overlapped area, approximately 12 inches apart.
2. Adjustments
If any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, Contractor shall immediately make satisfactory repairs.

F. Geotextile Placement

1. Geotextile shall be placed on the prepared surface within the areas and to the limits shown on the Drawings or as directed by the Construction Manager
2. The geotextile shall be maintained free of dirt, mud, or any other foreign materials at all times. Rolls which are contaminated with these materials shall be cleaned or replaced by the Contractor at no additional cost to DuPont.
3. The Contractor shall deploy the geotextile carefully such that the geotextile and underlying materials are not damaged. All faulty or damaged geotextile shall be replaced.
4. Geotextile shall be placed on the prepared surface in a fairly loose and unstretched condition to minimize shifting, puncture and/or tearing. All adjacent roll edges and roll ends shall be overlapped a minimum of 18-inches. The direction of the fabric laying operation shall be up and down the slope, and overlap direction at roll ends shall be upslope over downslope. All geotextile edges and ends shall be continuously heat tacked
5. Precautions shall be taken to protect the integrity of the geotextile. If the geotextile is damaged, the damaged area shall be covered by an additional layer of geotextile which extends a minimum of 12-inches beyond the damaged area in all directions and shall be placed over the damaged geotextile.
6. Prior to and during installation, the geotextile may be exposed to sunlight for a period not exceeding fourteen days. When possible the geotextile should be covered on the same day it is installed.
7. All geotextile installations shall be subject to the approval of the Construction Manager before covering.

G. Construction of Sediment Basin

1. Sediment Basin shall be constructed and operational before upslope land disturbance begins.
2. The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat.
3. Fill material used for the embankment shall be obtained from borrow area material and shall be free of roots or other woody vegetation as well as oversized stones, rocks, organic material or other objectionable material. The embankment shall be compacted while it is being constructed in accordance with the requirements of SECTION: EARTHWORK.
4. Temporary seeding shall be established on all areas of the sediment basin.
5. The basin shall be permanently stabilized following construction including soil amendment, seeding and mulching in accordance with SECTIONS: EARTHWORK AND SEEDING.

3.3 FIELD QUALITY CONTROL

A. Inspection of Erosion Controls

The integrity of the erosion control devices shall be maintained as long as they are necessary to contain sediment runoff associated with the work to be performed. Erosion controls shall be inspected, as indicated on the Drawings.

[END OF SECTION]

DIVISION 2 - SITE WORK
SECTION 02700
DRAINAGE CONTROLS

PART 1 - GENERAL

1.1 SCOPE

The work shall include the furnishing and application of materials and labor required to construct site surface water drainage controls in accordance with these Specifications and within the lines, grades, and dimensions shown on the Drawings. Construction of the following drainage controls is covered in this section: corrugated metal pipe, corrugated plastic pipe, drainage ditches, and culverts as indicated on the Drawings and as specified herein.

1.2 RELATED WORK

The following work specified herein is, or may be, related to the construction of waterways:

- A. Section 01025: Measurement and Payment.
- B. Section 01440: Contractor Quality Control.
- C. Section 02100: Site Preparation.
- D. Section 02200: Earthwork.
- E. Section 02270: Erosion Control Measures.
- F. Section 02930: Seeding.

1.3 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referenced in the text by basic designation only.

- A. State of North Carolina – Sedimentation Control Commission – *Erosion and Sediment Control Planning and Design Manual (Manual)*, September 1, 1988.
- B. American Society of Testing and Materials (ASTM)

ASTM A 90 Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

ASTM A 239 Standard Test Method for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel articles by the Preece Test (Copper Sulfate Dip).

ASTM D 751	Standard Test Methods for Coated Fabrics.
ASTM D 1505	Standard Test Method for Density of Plastics by the Density Gradient Technique.
ASTM D 3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

1.4 DEFINITIONS

- A. Culverts / Corrugated Plastic Pipe / Corrugated Metal Pipe**
Pipe constructed to convey stormwater underground in areas where drainage of surface water is undesirable or impracticable such as across roadways or embankments.
- B. Drainage Ditch**
Unless otherwise specifically qualified herein, a constructed channel which conveys or is designed to convey surface water.
- C. Temporary Diversion**
A temporary diversion is an earthen dike and/or swale used to direct sediment laden runoff to an appropriate erosion control structure.

1.5 SUBMITTALS

- A. Backfill**
As obtained from onsite borrow.
- B. Geotextile**
As required under SECTION: GEOTEXTILE of these specifications.
- C. Culverts / Corrugated Plastic Pipe / Corrugated Metal Pipe**
Contractor shall provide certification that culvert pipe provided meets the requirements as specified herein.

PART 2 - MATERIALS

2.1 BACKFILL

Backfill shall meet the requirements as specified in SECTIONS: EARTHWORK and CONTRACTOR QUALITY CONTROL and as approved by DuPont.

2.2 GEOTEXTILE

Geotextile shall meet to the requirements as specified in SECTION: GEOTEXTILE.

2.3 CULVERTS / CORRUGATED PLASTIC PIPE / CORRUGATED METAL PIPE

Corrugated Plastic Pipe and Fittings: The pipe used shall be high density, high molecular weight, solid-wall polyethylene pipe (HDPE) Advanced Drainage System (ADS) N-12[®], or equal, smooth interior pipe with pro-link watertight (WT) fittings or equal, as indicated on the Drawings. All pipe and pipe fittings shall comply with the H20 DOT load rating.

Corrugated Metal Pipe and Fittings: Pipe shall be as indicated on the drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Erosion Control

The Contractor shall implement erosion control measures in accordance with the requirements of this section before and during performance of work within this Section and in accordance with SECTION: EROSION CONTROL MEASURES.

3.2 PERFORMANCE

A. Earthwork

The Contractor shall conduct all earthwork required to construct drainage controls to the lines and grades indicated on the Drawings or as otherwise required by DuPont:

1. During construction of the drainage controls, the Contractor shall conduct excavation and filling in a manner and sequence that will provide proper drainage at all times.
2. The Contractor shall grade the drainage ditches and temporary diversions to the lines and grades shown on the Drawings and maintain a tolerance of not more than 0.1 foot above or below the indicated grade, less specified topsoil or riprap thickness.
3. Construction of the drainage ditches shall be smooth and free from irregularities.
4. The Contractor shall correct all surface irregularities that exceed specified tolerance limits either by removing or adding materials as required.

5. Backfill, as specified, shall be placed and compacted to give complete vertical and lateral support for the culverts as detailed in the Drawings. Culverts shall be installed in full accordance with the manufacturer's recommendations.

B. Geotextile Placement

Geotextile placement shall be performed as specified in SECTION: GEOTEXTILE.

C. Culvert Pipe Installation

1. Culvert pipe shall be installed at the locations, lines, and grades shown on the Drawings. All culvert pipe shall be installed plus or minus one tenth of a foot (± 0.1 ft.).
2. Handling and storage of the pipe and fittings shall be in accordance with the manufacturers recommendations.
3. Sections of pipe shall be connected as approved by the Construction Manager. Under no circumstances shall crowbars alone be used nor shall motor driven equipment be used for the purpose of drawing culvert sections together.
4. Backfill
 - a. After the pipe has been placed, material as detailed in the Drawings, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding six inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of the pipe. Consult the trench detail in the design drawings for more detail.
 - b. Each layer shall be thoroughly compacted with mechanical tampers or rammers. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. This method of filling and compacting shall continue until the fill has reached an elevation of at least twelve inches above the top of the pipe.
 - c. No equipment shall be operated over the pipe until 12-inches of compacted cover material has been installed over the pipe. Pipe damaged thereby shall be replaced by the Contractor at no additional cost to DuPont.

D. Corrections

Correct subgrade irregularities exceeding previously specified limit to the Construction Manager's satisfaction either by removing or adding material as required, followed by rolling until satisfactorily compacted.

3.3 FIELD QUALITY CONTROL

A. Surface Tolerance

Check finished subgrade along the length of the drainage ditch for smoothness and elevation through survey or a method approved by the Construction Manager.

[END OF SECTION]

DIVISION 2 - SITE WORK
SECTION 02930
SEEDING

PART 1 - GENERAL

1.1 SCOPE

The work covered by this section consists of furnishing all materials, labor and equipment, and performing all operations necessary to establish and, for a period of one year after written approval of the completed soil cover construction by DuPont, maintain a satisfactory stand of grass over all disturbed areas in accordance with these Technical Specifications.

- A. Permanent seeding shall include the seedbed preparation, seeding, and the establishment of perennial vegetation used to permanently stabilize soil, minimize sediment pollution, reduce runoff by promoting infiltration, and provide stormwater quality benefits offered by dense vegetation.
- B. Temporary seeding grasses that are quick growing shall be seeded and mulched to provide prompt, temporary soil stabilization. Temporary seeding shall be applied on exposed soil where additional work (grading, etc.) is not scheduled for more than 20 days. Permanent seeding shall be applied if the areas will be idle for more than a year.

1.2 RELATED WORK

The following work specified herein is, or may be, related to seeding:

- A. Section 01010: Summary of Work.
- B. Section 01025: Measurement and Payment.
- C. Section 02200: Earthwork.
- D. Section 02270: Erosion Control Measures.

1.3 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by the basic designation only.

- A. State of North Carolina – Sedimentation Control Commission – *Erosion and Sediment Control Planning and Design Manual (Manual)*, September 1, 1988.
- B. American Society for Testing and Materials (ASTM)

ASTM D 2974-87

Test Method for Moisture, Ash and Organic Matter of Peat and other Organic Materials

1.4 SUBMITTALS

In accordance with SECTION: SUBMITTALS, the Contractor shall submit the following to the Construction Manager as indicated.

A. Test Reports

The Contractor shall submit laboratory test reports (i.e. soil analysis) of the borrow area cover soil to the Construction Manager for approval. Laboratory reports shall recommend both grade and application rates of fertilizer, lime and such other soil supplements as required. The laboratory tests shall include an organic content analysis (ASTM D 2974) on the proposed cover soil.

B. Soil Supplement Product Certification

The Contractor shall submit for review certificates which confirm or certify that the soil supplements have a guaranteed analysis in conformity with the DuPont-approved laboratory soil supplement recommendations report.

C. Seed Certification

The Contractor shall submit for review certificates or certifying tags indicating seed mixture, seed purity percentage, seed germination percentage and weed seed content percentage to certify conformity with the specifications.

PART 2 - MATERIALS

2.1 SEED MIXTURES

State certified seed of the latest season's crop shall be provided in the original sealed packages bearing the producers guaranteed analysis for percentages of germination, pure seed, inert matter, and weed seed. Labels shall be in accordance with the state's requirements. Bulk quantities of seed shall be labeled as described above. Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy or otherwise damaged seed shall be rejected.

The mixing of seed shall be performed by the seed supplier prior to delivery on site. All legume seed shall be inoculated with the required bacterial culture prior to delivery to the site.

A. Permanent Seed Mixture

The Contractor shall utilize seed mix in accordance with Table 6.11b (and the required seeding dates) of the *Manual*. Seeding mix No. 5CP shall be utilized in accordance with the following schedule:

Minimum Seed specification:

<u>Species</u>	<u>Rate (lb/acre)</u>
Penasacola Bahiagrass	50
Sericea Lespedeza	30
Common Bermudagrass	10
German millet	10

B. Temporary Seed Mixture

The Contractor shall utilize seed mix in accordance with Table 6.10a-6.10c of the *Manual* in accordance with the season of the year and as recommended in the Table.

Minimum Seed specification (late winter / early spring):

<u>Species</u>	<u>Rate (lb/acre)</u>
Rye	120
Annual Lespedeza (Kobe)	50

Minimum Seed specification (summer):

<u>Species</u>	<u>Rate (lb/acre)</u>
German millet	40

Minimum Seed specification (fall):

<u>Species</u>	<u>Rate (lb/acre)</u>
Rye (grain)	120

2.2 SOIL AMENDMENTS

Soil amendments shall consist of lime and fertilizer meeting the following requirements.

A. Limestone

Lime shall be pulverized agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 95 percent will pass a 20-mesh sieve, at least 60 percent will pass a 60-mesh sieve, and, at least 50 percent will pass a 100-mesh screen. Lime shall be in accordance with soil test requirements and to correct the pH to 6.0 to 7.5.

B. Fertilizer

Fertilizer shall be in accordance with soil test requirements. Fertilizer shall be commercial grade, free flowing, low in salts, uniform in composition and conforming to applicable state fertilizer laws. The fertilizer shall be commercial fertilizer containing the plant nutrients of Nitrogen (N), available phosphoric acid (P₂O₅), and soluble potash (K₂O) at the rates determined by tests on the soil.

Bagged fertilizer shall display the following information on the bag or on a sticker or tag attached to the bag: net weight, brand and grade, guaranteed analysis, and name and address of manufacturer. Bulk fertilizer (dry or liquid) shall be accompanied by a statement from the manufacturer that contains the same information required for the bagged fertilizer.

2.3 MULCH / EROSION CONTROL BLANKET

The Contractor shall use native grass hay or straw on all surfaces with slopes less than 3 horizontal to 1 vertical (3H:1V). All slopes equal to or steeper than 3H:1V, and drainage ditches as shown on the Drawings, will require an erosion control blanket.

A. Straw or Hay Mulch

Straw or hay mulch shall be unrotted small grain straw or hay applied. Mulch materials shall be relatively free of weeds, mold, decomposed material, brittle weed mat, and shall be free of noxious weeds such as; thistles, Johnsongrass, and quackgrass.

B. Erosion Control Blanket

Erosion control blanket shall be as specified in SECTION: EROSION CONTROL MEASURES.

PART 3 - EXECUTION

3.1 GENERAL

A. Cover Soil

The Contractor shall submit results of the soil test on the borrow area cover soils to the Construction Manager.

B. Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for each bulk delivery.

C. Inspection

The Contractor's Independent Quality Control (QC) Contractor shall inspect seed as it is delivered to the job site to verify conformity to type and quality of seed specified in accordance with Paragraph: Materials. The Contractor's QC Contractor shall inspect soil amendments to verify conformance to specified requirements. Unacceptable materials shall be removed from the job site.

D. Storage

Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment materials shall not be stored with other landscape materials.

E. Material Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

3.2 PREPARATION OF SEEDBED

A. General

The Contractor shall place cover soil and establish finish grades in accordance with the SECTION: EARTHWORK.

B. Temporary Seeding

In accordance with a method approved by the Construction Manager, the Contractor shall roughen the ground surface to a depth of one inch prior to temporary seeding. Temporary seed shall be mulched as described in Paragraph 3.4.

C. Soil Supplements

The Contractor shall incorporate lime, fertilizer, and organic soil amendments into the soil in accordance with the recommendations of the soil test results. During seedbed preparation, the lime and fertilizer shall be worked into the soil with a disk harrow, spring-tooth harrow or other approved field implements to a depth of 3 inches. On slopes steeper than 5% (i.e., 20H:1V) the soil shall be worked parallel to (across) the slope.

3.3 PLANTING SEED

A. General

Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause shall be reworked to restore the ground condition previously specified. Seed shall be planted at the rate specified in PART 2 - MATERIALS.

B. Seeding Dates – Permanent Seeding

1. The Contractor shall prepare the seedbed and perform permanent seeding between March 1 to May 31 or August 1 to October 15, and in compliance with seeding dates as specified in the *Manual*.

2. From October 15 to March 1, the Contractor shall prepare the seedbed, add the required quantities of lime and fertilizer as recommended by the soil test, then mulch and anchor. The Contractor shall broadcast the permanent seed mixture at a rate 50 percent greater than the rates specified in PART 2 – MATERIALS. The Contractor will be required to reseed (after March 1) as required in Paragraph 3.4D.

C. Seeding Dates – Temporary Seeding

1. Areas that will not be graded or reworked for 20 days or more will require temporary seeding. These idle areas shall be seeded as soon as possible after disturbance/grading but at maximum within 7 days of the last disturbance operation in the idle area. Temporary seeding shall be applied between March 1 to November 1. From November 1 through March 1, the Contractor shall use mulch only, or dormant seeding practices as described above.

D. Method

Seed planting shall be accomplished by:

1. *Hydroseeding*

The Contractor shall accomplish seeding and fertilizing, by hydroseed application. Seed and fertilizer with other soil conditions in the amount per acre designated, shall be combined with water to provide a slurry, and hydraulic application shall be performed in such manner that the liquid carrier will uniformly distribute the material over the entire area to be seeded at rates not less than indicated herein. No seeding following compaction shall be done. The seeded area shall be watered after seeding and the soil moistened to a depth of 2 to 4 inches.

2. *Manual Seeding*

Small areas (approximately one-half acre or smaller) may be seeded and mulched manually or as directed by the Construction Manager.

3.4 MULCHING

Mulching shall be performed by the Contractor on the same day as planting seed.

A. Straw or Hay Mulch

1. Applying Mulch

Straw or hay mulch shall be spread uniformly in a continuous blanket over the seeded areas, applied at the rate of 2 tons per acre. The mulch shall be spread in such a manner as to prevent bunching. Mulching shall be started on the windward side of relatively flat areas or on the upper part of a steep slope and continued uniformly until the area is covered.

2. Securing Mulch

Immediately following the spreading of the mulch, paper fiber mulch overspray shall be sprayed over straw or hay mulch. When sprayed over the mulch the fibers form an absorbent cover, allowing percolation of water to the underlying soil. The recycled paper shall be applied at a minimum rate of 800 pounds per acre or more if recommended by the manufacturer. The mulch shall be mixed with water so as to produce a homogeneous slurry which shall be applied under pressure by hydraulic seeding equipment. The mix shall be constantly agitated during application to keep the ingredients thoroughly mixed. Alternatively, the material shall be anchored securely into the soil a minimum of 3 inches by means of a mulch anchoring machine equipped with large coultter-type discs spaced on approximate 8-inch centers. Edges of the discs shall be dull to prevent cutting of the mulching, and equipment operation shall be such as to embed the mulch to the required depth of 3 inches. In areas where equipment cannot be used, mulch shall be secured by shallow covering of each area or by embedding with approved hand methods, including straight-bladed spade with dulled edge.

B. Erosion Control Blanket

1. Straw or hay mulch shall be applied as indicated above.
2. Erosion control blankets (ECB) shall be installed on all slopes of 3H:1V or steeper and in grass lined drainage ditch bottoms and to the limits indicated on the drawings in accordance with the procedures specified in SECTION: EROSION CONTROL MEASURES for erosion control blanket.

C. Protection and Cleanup

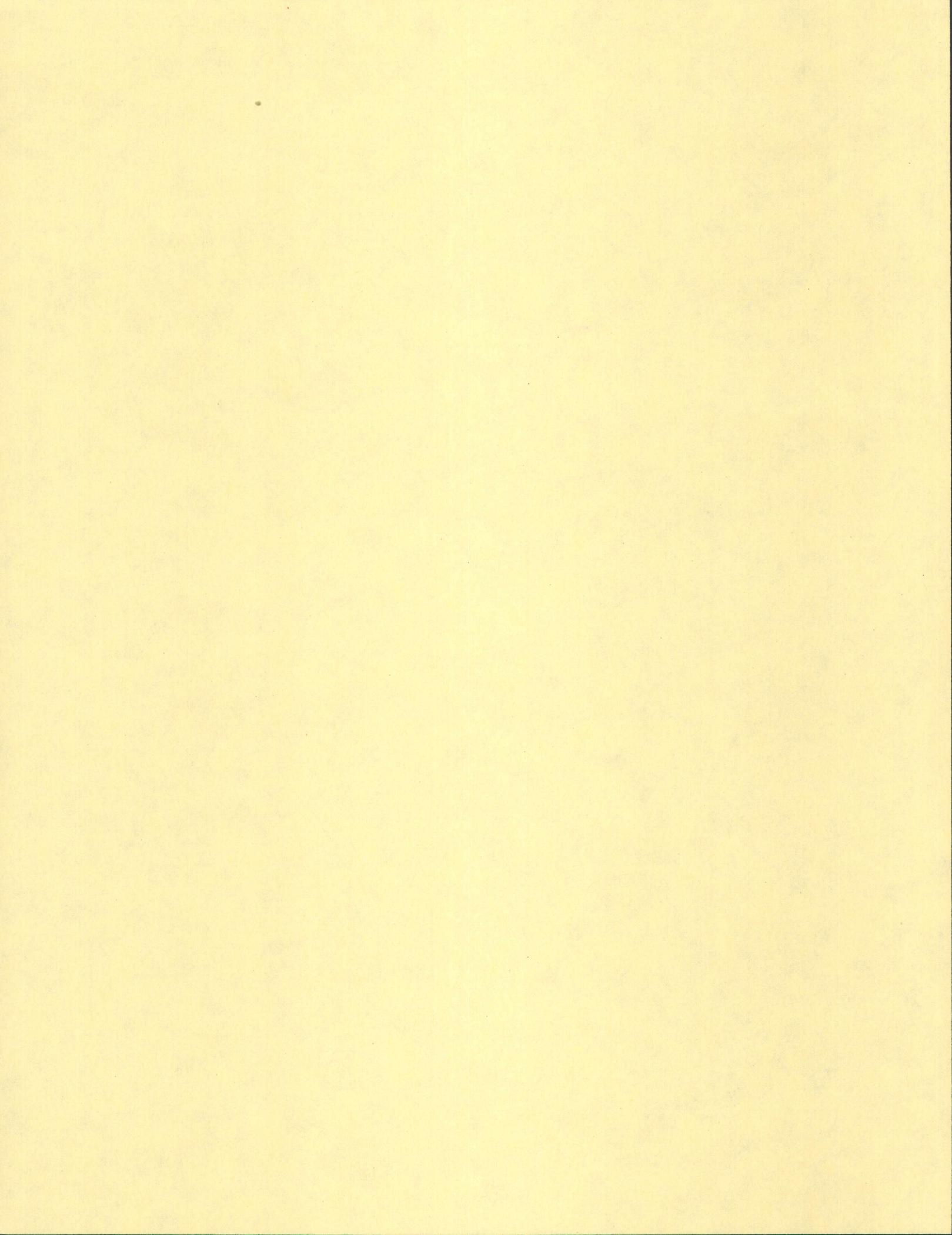
After seeding and mulching operations have been completed, barricades and approved warning signs shall be erected by the Contractor as required to provide protection against traffic and trespass. Excess material from seeding and mulching operations, and all debris, shall be cleaned up and properly disposed off site.

D. Maintenance

1. Maintenance operations shall begin immediately after seeding a given area and shall continue through construction. The Contractor shall keep seed continually moist for proper germination and water thereafter as necessary to prevent drying out or burning. The Contractor shall re-seed areas not showing a prompt catch of grass, correct depressions and irregularities and re-seed; repeat until complete (100%) coverage is obtained.
2. DuPont herein retains the right to require that the Contractor re-seed any and all areas where a satisfactory stand of grass does not exist after the first full growing season (following the final permanent seeding). A satisfactory stand of grass shall be defined as 90 percent coverage of every 5 acre area having a 3

inch stand of grass as determined by the step transect method or as otherwise defined by the Construction Manager. The step transect method estimates the percentage of vegetative cover using at least 100 systematically located observation points within the seeded area.

[END OF SECTION]



APPENDIX B

C&D LANDFILL TEST PIT LOGS

APPENDIX B
TEST PIT LOGS
C&D LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA

November 8, 2002

Project No. 18983688.00012



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FIELD TEST PIT LOG

TP-CD-01

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **2.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 2, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.7 Gray-brown medium to fine SAND, moist, (FILL)	
1.0							
2.0						1.7 to 2.0 Black SILT, moist (ASH)	
3.0							Complete at 14:15
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-02

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **2.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 2, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.2 Gray-brown to orange-tan medium to fine subangular SAND, moist (FILL)	
1.0						1.2 to 2.0 Dark brown to black SILT, soft, moist, (ASH)	
2.0							Complete at 14:30
3.0							
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-03

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	4.0 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 2, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 3.3 Orange-tan medium SAND, subangular SAND, moist (FILL); a 0.2 foot seam of clay was encountered at ground surface	
1.0							
2.0						3.3 to 4.0 Gray-green medium SAND, some silt, moist (FILL)	
3.0							
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-04

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **2.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 2, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.2 Gray-brown to orange-tan medium subangular SAND, moist (FILL)	
1.0						1.2 to 2.0 Olive-green to lt. gray CLAY, soft, moist (FILL)	
2.0							Complete at 15:10
3.0							
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-05

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **3.8 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 2, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 3.3 Orange-tan medium SAND, subangular, moist (FILL), trace fine gravel	
1.0							
2.0						3.3 to 3.8 Orange-tan CLAY, some medium sand, soft, moist (FILL)	
3.0							
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-06

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	3.8 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 2, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0							
1.0						0.0 to 2.5 Orange w/white medium SAND, trace white clay and dark brown silt, (FILL), moist	
2.0							
3.0						2.5 to 3.8 Orange w/white SAND with rebar and concrete debris (FILL)	
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-07

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **3.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 2, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.0 Brown w/brown-orange medium SAND, moist (FILL)	
1.0							
2.0						2.0 to 3.0 Brown w/brown-orange medium SAND with concrete pieces (FILL)	
3.0							
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-08

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	4.0 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 2, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.5 Orange-tan medium SAND (FILL), moist	
1.0							
2.0							
3.0						2.5 to 4.0 Orange-tan medium SAND and concrete pieces, corrugated metal pieces, and miscellaneous inert debris (FILL)	
4.0							complete at 16:30
5.0							



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FIELD TEST PIT LOG

TP-CD-09

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **4.2 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 3, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.9 Brown w/orange medium SAND, moist (FILL)	
1.0							
2.0							
3.0						2.9 to 4.2 Brown w/orange medium SAND with wood pieces and white to lt. gray silty clay, soft (FILL)	
4.0							
5.0							complete at 08:30



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FIELD TEST PIT LOG

TP-CD-10

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **5.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 3, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.1 Lt. brown w/tan medium to fine SAND, little fine angular gravel (FILL)	
1.0							
2.0							
3.0						2.1 to 5.0 Lt. brown w/tan medium to fine SAND with concrete and metal debris, as well as white to lt. gray clay, soft, moist (FILL)	
4.0							
5.0							complete at 08:55



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FIELD TEST PIT LOG

TP-CD-11

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **5.0 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 3, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.1 Orange-brown medium to fine SAND, trace debris (FILL)	
1.0							
2.0						2.1 to 5.0 Orange-brown medium to fine SAND with concrete debris (FILL)	
3.0							
4.0							
5.0							complete at 09:15



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FIELD TEST PIT LOG

TP-CD-12

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **4.2 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 3, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 4.0 Lt. brown medium SAND, moist, trace lt. gray clay and concrete (FILL)	
1.0							
2.0							
3.0							
4.0						4.0 to 4.2 Lt. Brown medium SAND w/little concrete (FILL)	
5.0							complete at 09:30



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FIELD TEST PIT LOG

TP-CD-13

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	2.5 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 3, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.5 Lt. brown w/ tan medium to fine SAND, moist, with concrete, wood, and rope debris (FILL)	
1.0							
2.0							
3.0							complete at 10:00
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-14

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	4.2 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 3, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.1 Orange-brown medium to fine SAND, trace fine gravel, ash areas (FILL)	
1.0							
2.0							
3.0						2.1 to 4.2 Olive-gray medium to fine SAND, some clay, moist, firm (FILL), increased clay content w/depth	
4.0							
5.0							complete at 10:20



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FIELD TEST PIT LOG

TP-CD-15

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	3.8 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 3, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.2 Lt. brown to tan medium to fine SAND, trace fine gravel, moist (FILL)	
1.0							
2.0						1.2 to 3.8 Black to dark brown medium to fine SAND, trace wood, concrete, and ash (FILL), moist	
3.0							
4.0							complete at 10:30
5.0							



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FIELD TEST PIT LOG

TP-CD-16

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	3.8 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 3, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 2.0 Black coarse to medium SAND, with ash moist (FILL)	
1.0							
2.0						2.0 to 3.8 Orange-brown coarse to medium SAND, little silt, wood debris encountered at 2.9 feet (FILL)	
3.0							
4.0							complete at 10:45
5.0							



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FIELD TEST PIT LOG

TP-CD-17

Project Number: **18983688** Field Book No.:
 Project Name: **DuPont Kinston** Total Depth: **2.5 feet**
 Location: **Kinston, North Carolina** Ground Surface Elevation:
 Subcontractor: **Gaskins** Date: **October 3, 2002**
 Method: **Backhoe**
 Engineer: **Mac Bonner**

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.2 Dark brown with orange medium to fine SAND, little fine gravel (FILL)	
1.0						1.2 to 2.5 Black medium to fine SAND, wood debris encountered at 2.5 feet (FILL)	
2.0							
3.0							complete at 10:55
4.0							
5.0							



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FIELD TEST PIT LOG

TP-CD-18

Project Number:	18983688	Field Book No.:	
Project Name:	DuPont Kinston	Total Depth:	2.0 feet
Location:	Kinston, North Carolina	Ground Surface Elevation:	
Subcontractor:	Gaskins	Date:	October 3, 2002
Method:	Backhoe		
Engineer:	Mac Bonner		

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.0 Lt. brown medium SAND, little fine gravel, moist (FILL)	
1.0						1.0 to 2.0 Lt. Brown medium SAND, little fine gravel and wood debris (FILL)	
2.0							complete at 13:30
3.0							
4.0							
5.0							



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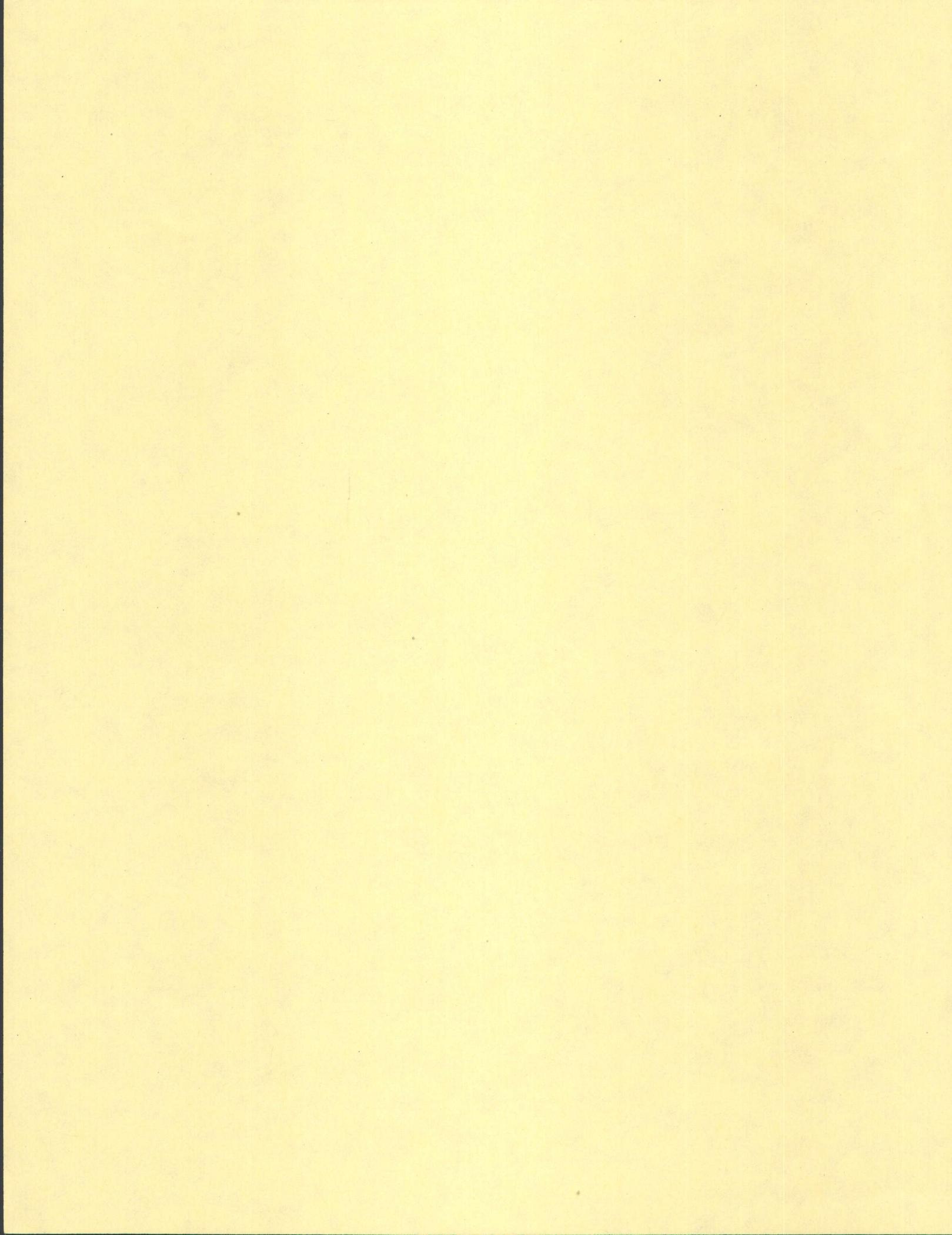
FIELD TEST PIT LOG

TP-CD-19

Project Number: 18983688	Field Book No.:
Project Name: DuPont Kinston	Total Depth: 2.0 feet
Location: Kinston, North Carolina	Ground Surface Elevation:
Subcontractor: Gaskins	Date: October 3, 2002
Method: Backhoe	
Engineer: Mac Bonner	

P.P. = Pocket Penetrometer

Depth	Samples	Sampling Method	Sample Number	Field Parameters	Methane Monitoring	Soil Description	Comments
0.0						0.0 to 1.5 Black medium SAND, some silt (Ash), moist, (FILL)	
1.0							
2.0						1.5 to 2.0 Lt. Brown medium SAND, some angular fine gravel and concrete pieces, moist (FILL)	
3.0							
4.0							
5.0							complete at 14:00



APPENDIX C

**CONSTRUCTION DRAWINGS
(ATTACHED SEPARATELY)**

APPENDIX C
CONSTRUCTION DRAWINGS
C&D LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA

November 8, 2002

Project No. 18983688.00012



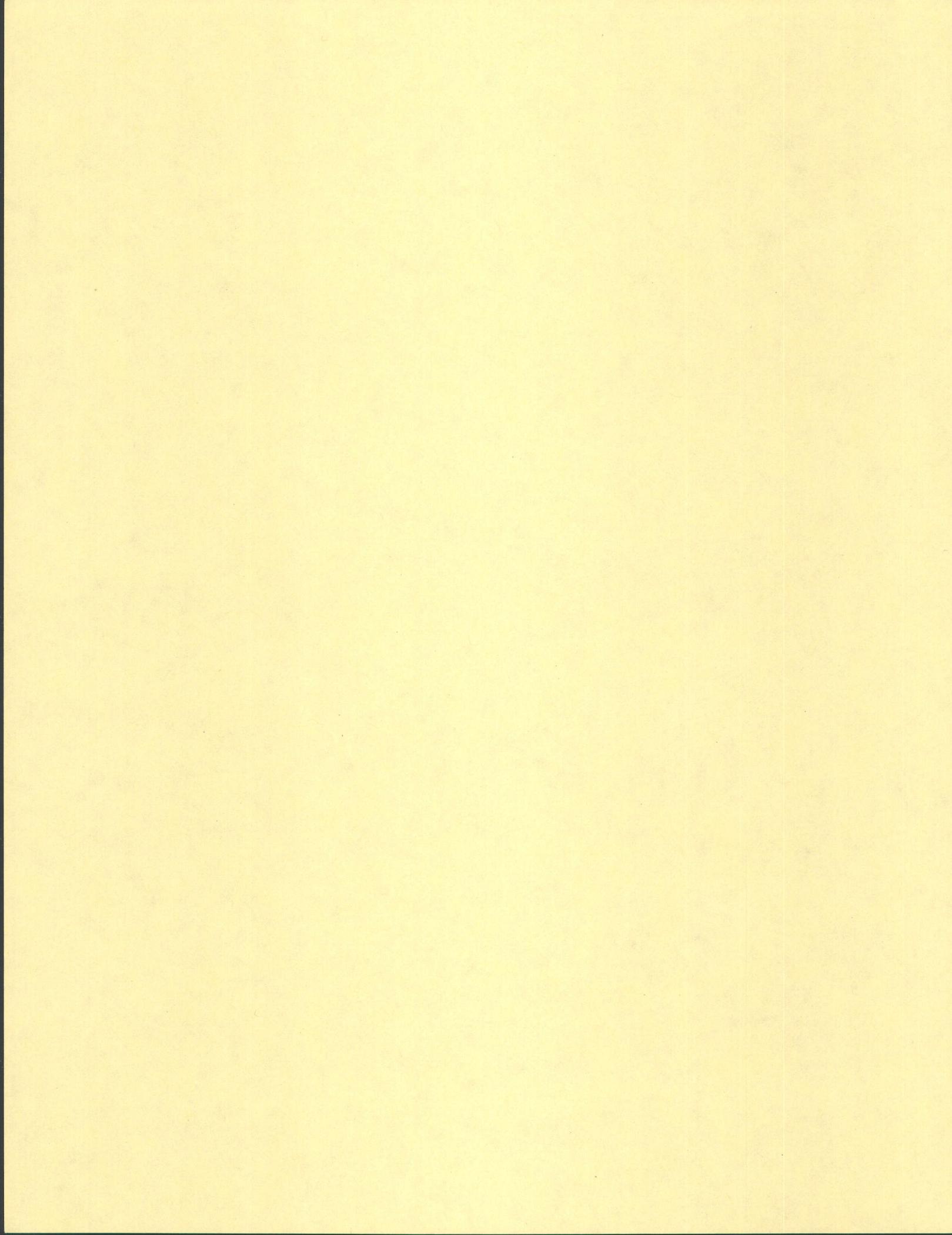
CORPORATE REMEDIATION GROUP
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DuPont and The W-C Diamond Group

Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

**LIST OF DRAWINGS
C&D LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA**

DRAWING NO.	TITLE
1	Title Sheet
2	Legend and Notes
3	Existing Conditions
4	E&S Control Plan
5	E&S Control Details
6	Grading Plan for C&D Landfill
7	Sediment Basin Plan & Details

DRAWINGS ATTACHED SEPARATELY



APPENDIX D

BORROW AREA SOIL GEOTECHNICAL RESULTS

APPENDIX D
BORROW AREA SOIL
GEOTECHNICAL RESULTS
C&D LANDFILL
SOIL COVER - FINAL DESIGN REPORT
DUPONT KINSTON
KINSTON, NORTH CAROLINA

November 8, 2002

Project No. 18983688.00012



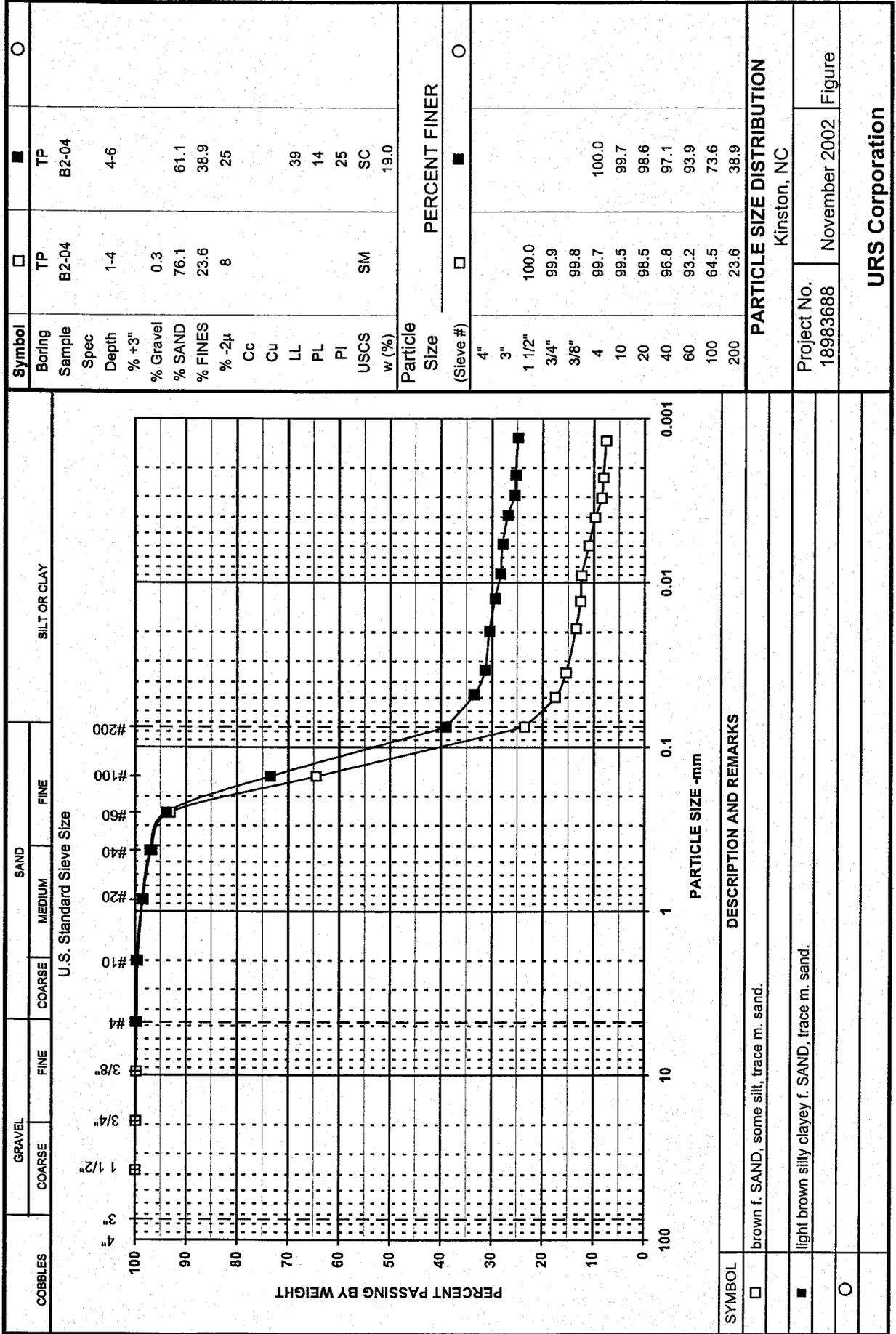
CORPORATE REMEDIATION GROUP
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Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

Kinston, NC
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS				STRENGTH Type Test (See test sheets and summaries)	COMPACTION					REMARKS					
			WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.		USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 μm (%)	ASTM STD.	OPT. WATER CONTENT (%)		MAX. DRY UNIT WGT. (pcf)	- 3/8 - 3/4	PREP wet dry		
TP	B2-04	1-4	8.0*				SM	23.6	8		CIU'	D 698-91	11.7	112.4	X		X	*(-3/8")
TP	B2-04	4-6	19.0	39	14	25	SC	38.9	25		CIU'	D 698-91	17.0	110.4	X		X	

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.



DESCRIPTION AND REMARKS

□ brown f. SAND, some silt, trace m. sand.

■ light brown silty clayey f. SAND, trace m. sand.

○

Kinston, NC

Project No. 18983688
November 2002

Figure

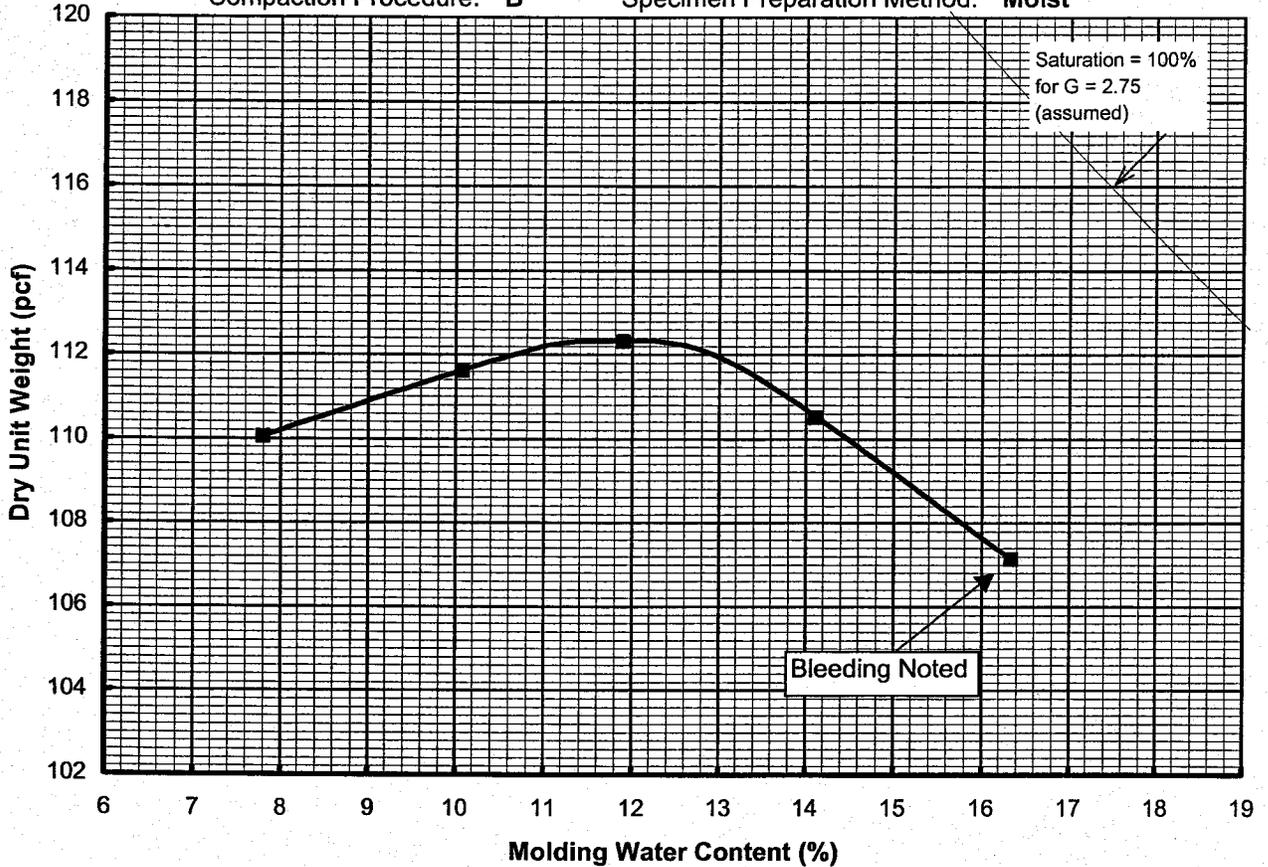
URS Corporation

COMPACTION CURVE

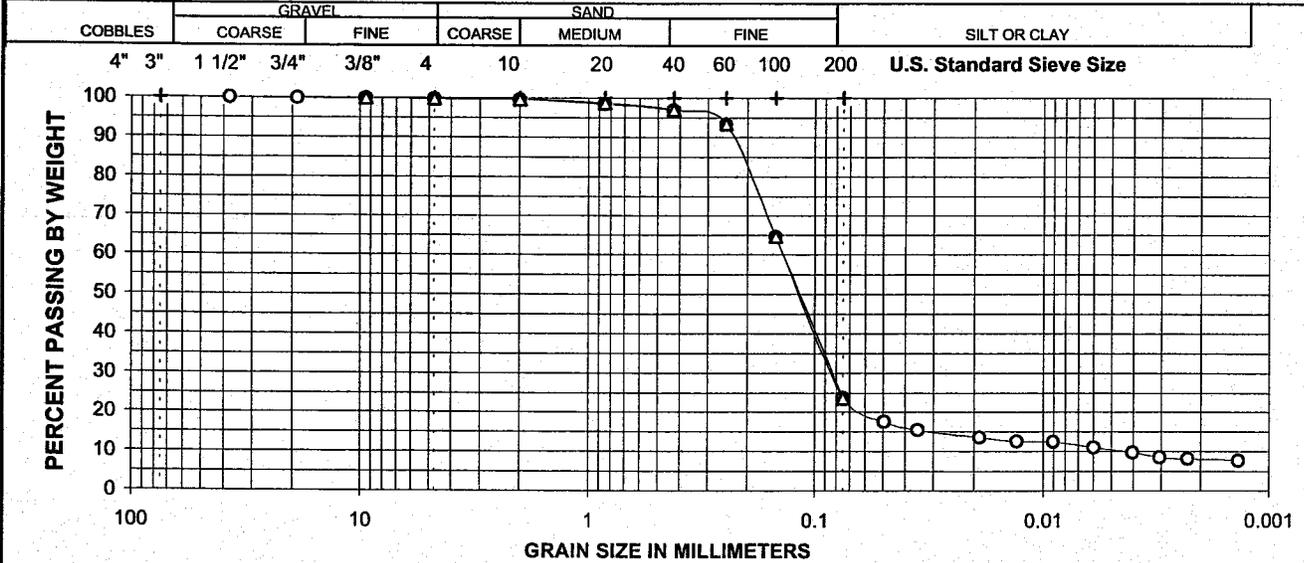
Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ○ Other Effort

Compaction Procedure: **B**

Specimen Preparation Method: **Moist**



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ○ Representative of entire sample Δ Representative of compacted specimen □ Representative of compacted specimen and entire sample

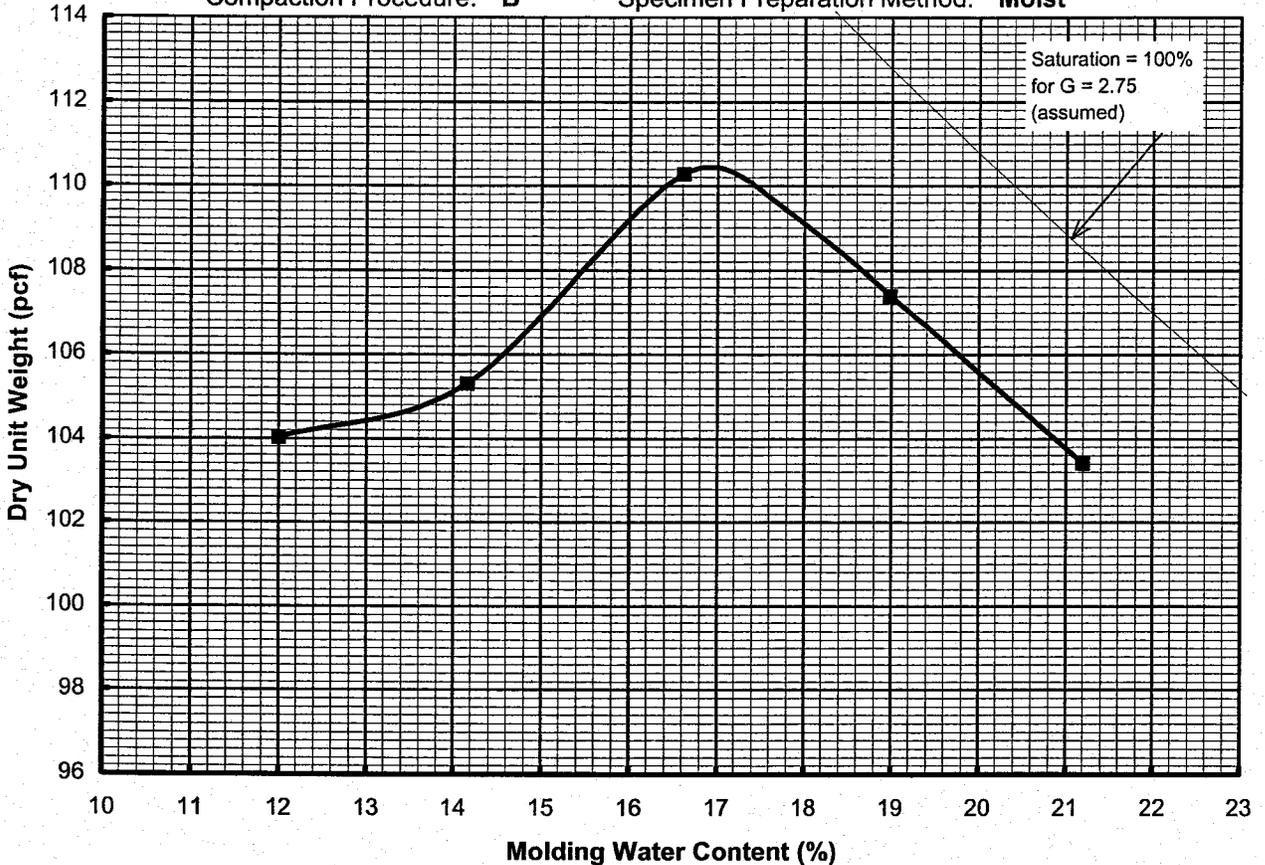
Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-B2-04		1-4	11.7	112.4			SM, brown f. SAND, some silt, trace m. sand.

PROJECT NAME: Kinston, NC PROJECT NUMBER: 18983688	COMPACTION AND INDEX PROPERTY DATA	FIGURE No.
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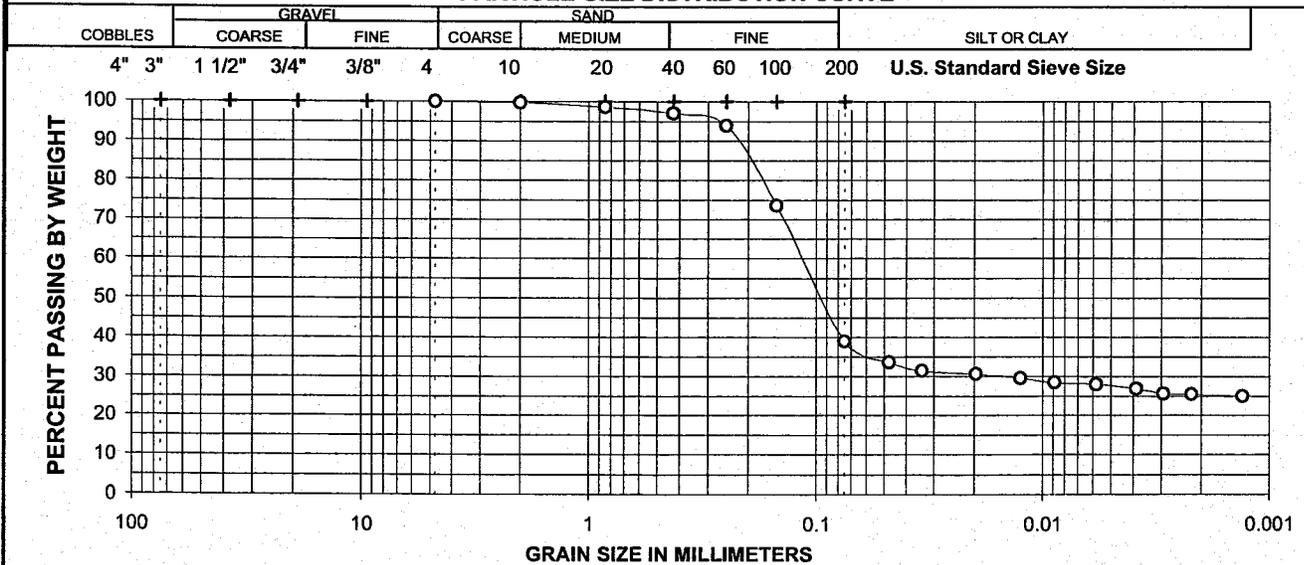
COMPACTION CURVE

Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ○ Other Effort

Compaction Procedure: **B** Specimen Preparation Method: **Moist**



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ○ Representative of entire sample △ Representative of compacted specimen □ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-B2-04		4-6	17.0	110.4	39	25	SC, light brown silty clayey f. SAND, trace m. sand.

PROJECT NAME: Kinston, NC PROJECT NUMBER: 18983688	COMPACTION AND INDEX PROPERTY DATA	FIGURE No.
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SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth Elev (ft)	USCS Group Symbol	w _c (%)	γ _{t,c} (pcf)	γ _{d,c} (pcf)	σ' _{c,max} (ksf)	σ' _{v,c} (ksf)	ε _{a,c} (%)	B factor (%)	at Peak Deviator Stress at Peak Oblivity				
												σ ₁ - σ ₃ (ksf)	σ ₁ + σ ₃ (ksf)	σ' ₁ / σ' ₃	A factor	φ' for c'=0
T2073	TP	B2-04	1-4'	SM (2.64)	11.7	113.3	101.4	0.33	0.29	0.1	98.1	1.38	2.50	3.47	-0.300	33.5
					23.2	125.9	102.2	1.2	1.00	0.8	1.1	0.65	1.10	3.92	-0.123	36.4
T2074	TP	B2-04	1-4'	SM (2.64)	11.8	113.2	101.3	0.61	0.57	0.1	96.4	1.41	2.61	3.35	-0.221	32.7
					23.5	125.6	101.7	1.1	0.99	0.4	1.1	0.85	1.48	3.75	-0.026	35.4
T2075	TP	B2-04	1-4'	SM (2.64)	11.9	113.7	101.6	0.86	0.86	0.1	97.6	1.47	2.65	3.47	-0.111	33.5
					23.2	125.9	102.2	1.0	1.00	0.6	1.1	1.06	1.81	3.85	0.055	36.0

Test No	Failure Series	Failure Criteria	Strength Envelope Summary				
			φ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	1	29.6	0.161	26.3	0.140	0.912
2	2	2	35.3	0.015	30.0	0.012	0.999

Test No	Description of Material Tested and Remarks
T2073	SM, brown f. SAND, some silt, trace m. sand.
T2074	SM, brown f. SAND, some silt, trace m. sand.
T2075	SM, brown f. SAND, some silt, trace m. sand.

Failure Criteria: 1 - Peak Deviator Stress
2 - Peak Oblivity

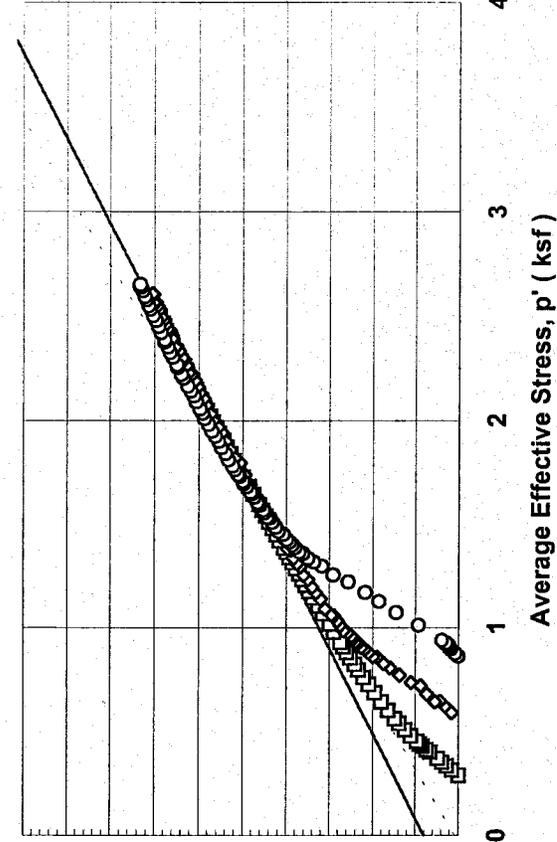
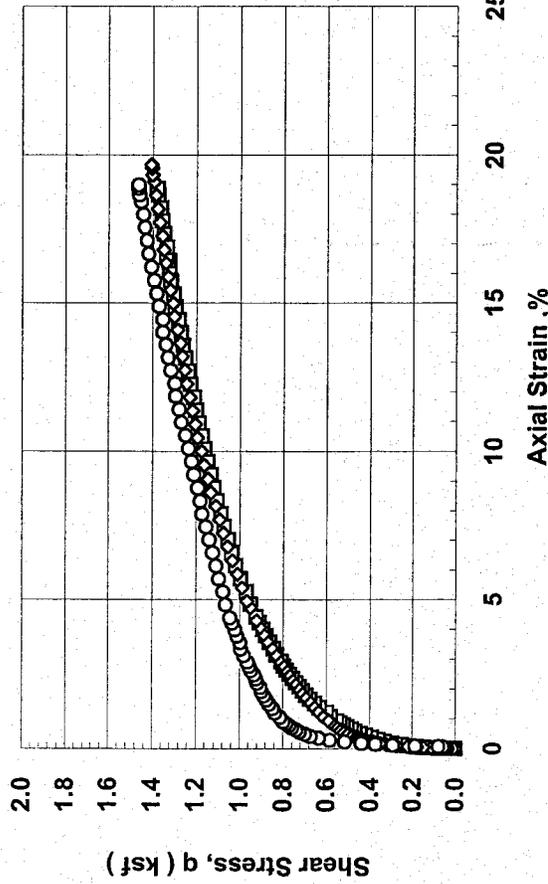
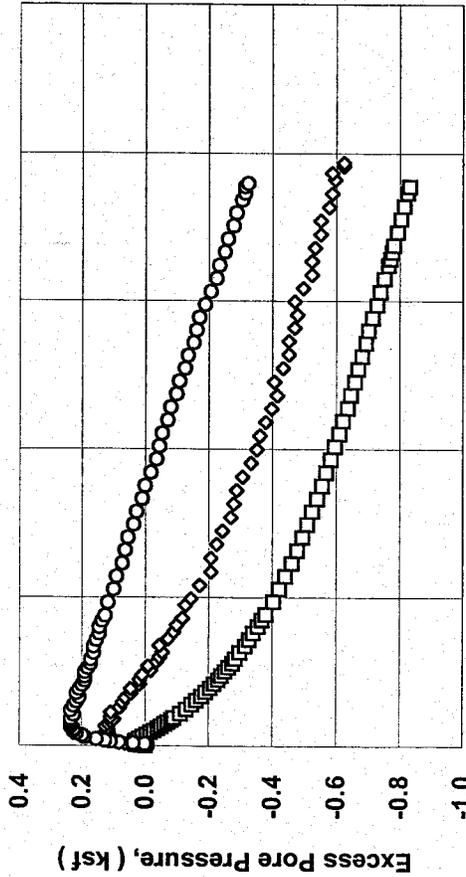
Project No. 1893688	Kingston, NC	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements B2-04 1-4' SUMMARY	October 2002
URS Corporation			

LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	W _o (%)	γ _{do} (pcf)	σ' _c (ksf)
□	T2073	TP	B2-04	1-4'	11.7	101.4	0.29
◇	T2074	TP	B2-04	1-4'	11.8	101.3	0.57
○	T2075	TP	B2-04	1-4'	11.9	101.6	0.86

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	φ' (degrees)
—	Peak Deviator Stress	0.16	29.6
---	Peak Obliquity	0.01	35.3

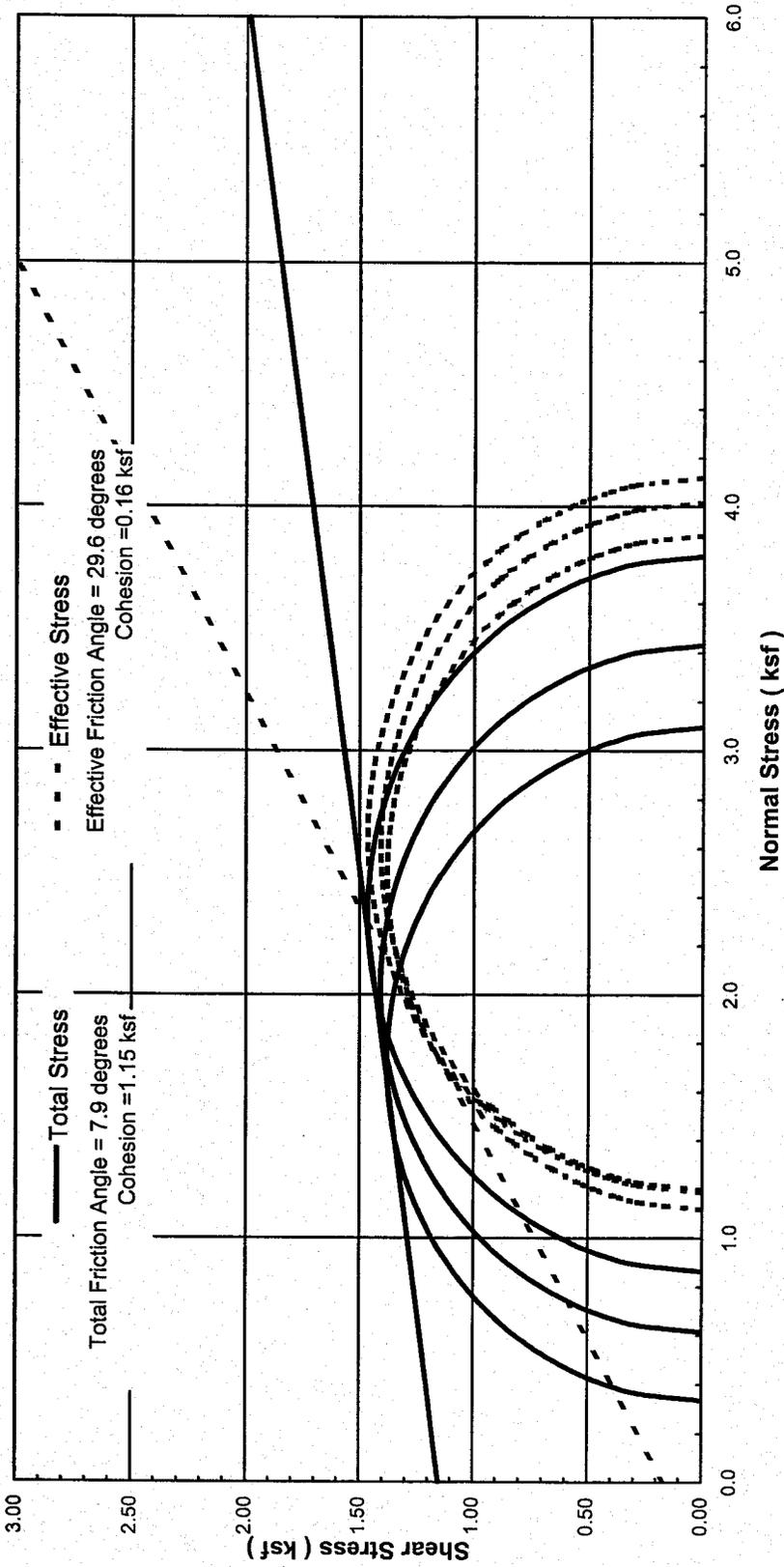


Project No. 1893688	Kingston, NC
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CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	Figure 1
B2-04 1-4' SUMMARY	October 2002

Prepared by: C. Jordan
Checked by: G. Thomas

URS Corporation



Project No.
1893688

Kingston, NC

Mohr Circles of Total
and Effective Stresses at Peak
CIU' Triaxial Test

Figure
2

URS Corporation

B2-04 1-4' SUMMARY

October 2002

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth Elev (ft)	USCS Group Symbol	w _o w _c (%)	γ _{t,o} γ _{t,c} (pcf)	γ _{d,o} γ _{d,c} (pcf)	σ' _{c,max} (ksf)	σ' _{v,c} (ksf)	ε _{a,c} ε _{v,c} (%)	B factor (%)	at Peak Deviator Stress at Peak Obliquity					
												ε _a (%)	σ ₁ - σ ₃ (ksf)	σ ₁ + σ ₃ (ksf)	σ' ₁ / σ' ₃	A factor	φ' for c'=0
T2070	TP	B2-04	4-6'	SC (2.69)	17.0 24.8	117.1 125.7	100.0 100.8	0.29 1.0	0.29 1.00	0.2 0.7	96.5 1.1	18.7 2.9	0.42 0.25	0.62 0.29	5.16 14.57	0.103 0.502	42.5 60.6
T2071	TP	B2-04	4-6'	SC (2.69)	16.8 24.0	117.2 126.6	100.4 102.1	0.58 1.0	0.58 1.00	0.6 1.7	95.8 1.1	18.4 3.5	0.58 0.44	0.93 0.65	4.21 5.23	0.188 0.415	38.0 42.8
T2072	TP	B2-04	4-6'	SC (2.69)	16.8 23.6	117.0 127.0	100.2 102.8	0.86 1.0	0.86 1.00	0.7 2.5	96.1 1.1	18.5 4.9	0.64 0.50	1.08 0.81	3.90 4.30	0.332 0.554	36.3 38.5

Test No	Description of Material Tested and Remarks
T2070	SC, light brown silty clayey f. SAND, trace m. sand.
T2071	SC, light brown silty clayey f. SAND, trace m. sand.
T2072	SC, light brown silty clayey f. SAND, trace m. sand.

Strength Envelope Summary						
Test Series	Failure Criteria	φ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	28.7	0.139	25.7	0.122	0.999
	2	29.6	0.128	26.3	0.111	0.998
Failure Criteria: 1 - Peak Deviator Stress 2 - Peak Obliquity						

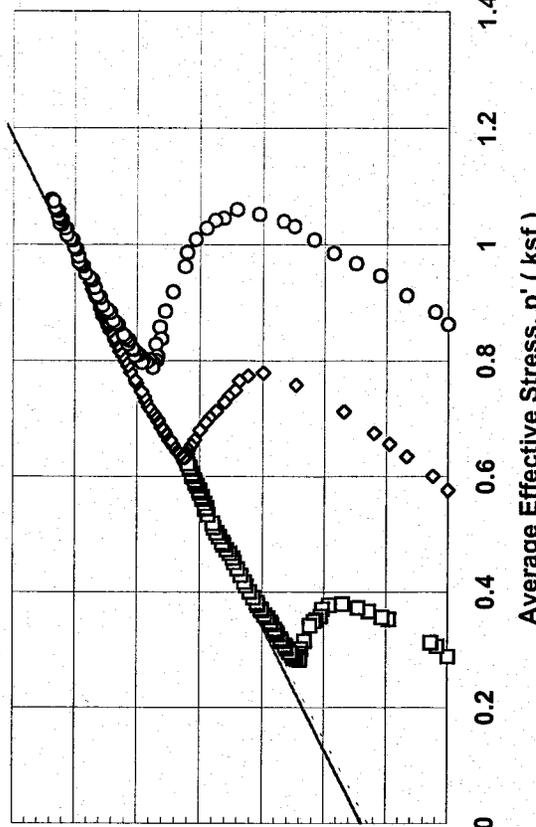
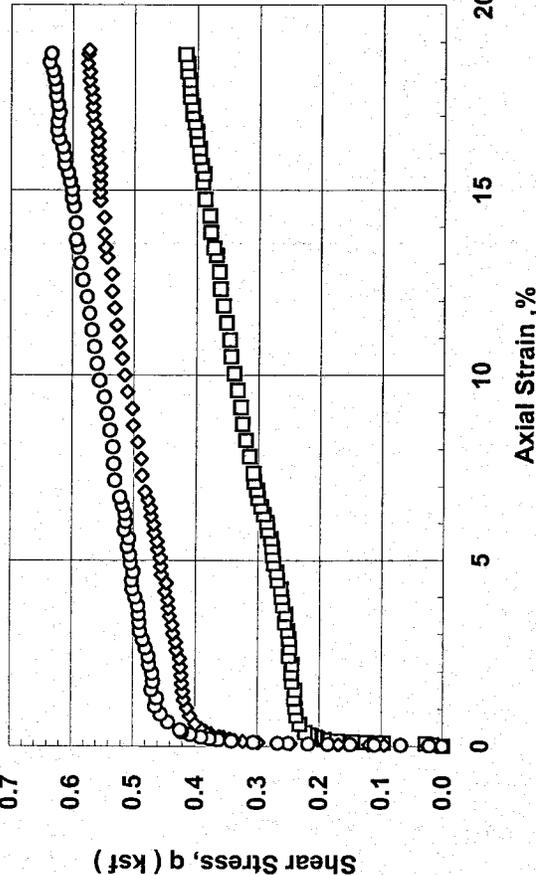
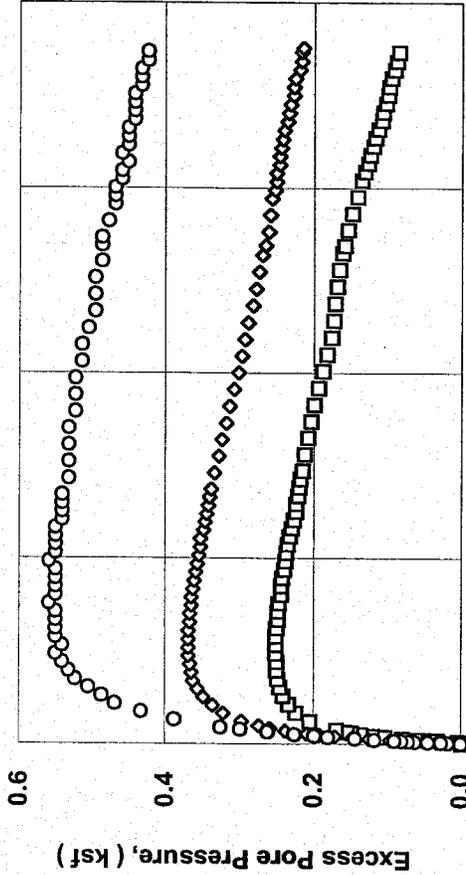
Project No. 1893688	Kingston, NC	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements B2-04 4-6' SUMMARY	October 2002
URS Corporation			

LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w _c (%)	γ _{do} (pcf)	σ' _c (ksf)
□	T2070	TP	B2-04	4-6'	17.0	100.0	0.29
◇	T2071	TP	B2-04	4-6'	16.8	100.4	0.58
○	T2072	TP	B2-04	4-6'	16.8	100.2	0.86

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	φ' (degrees)
□	Peak Deviator Stress	0.14	28.7
◇	Peak Obliquity	0.13	29.6

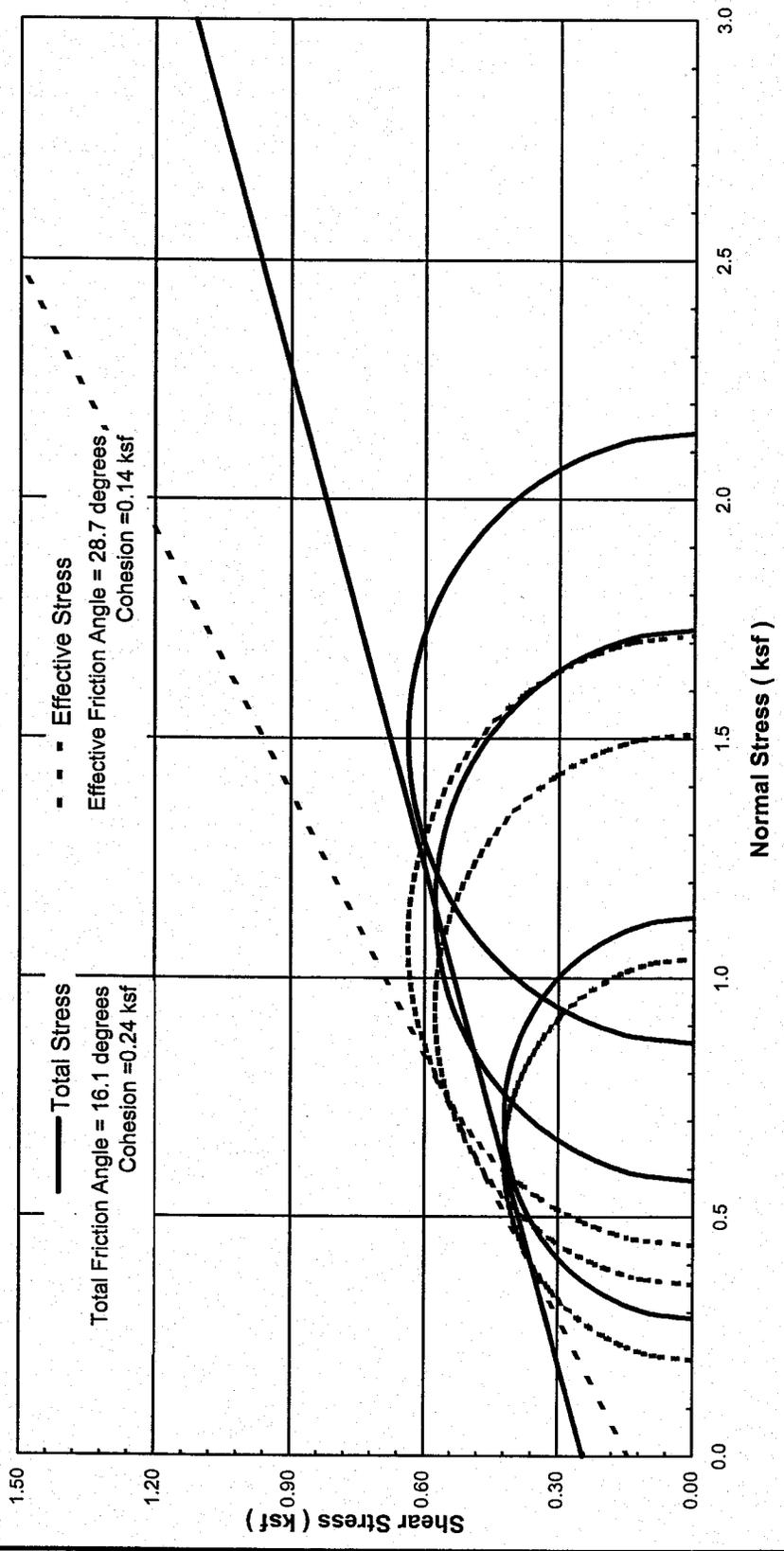


Project No. 1893688	Kingston, NC
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URS Corporation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements B2-04 4-6' SUMMARY	Figure 1
	October 2002

Prepared by: C. Jordan
Checked by: G. Thomas



Project No. 1893688	Kingston, NC	Figure 2
URS Corporation		Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test
		October 2002