

**PROJECT MANUAL
FOR THE
GEORGETOWN COUNTY
CLASS THREE LANDFILL CELLS 8-12 &
CLASS TWO LANDFILL CLOSURE PROJECT**

PROJECT BID #18-041



MAY 2018



**Georgetown County
Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project
Bid #18-041**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>SUBJECT</u> |
|---|---|
| DIVISION 0 – BIDDING AND CONTRACT DOCUMENTS | |
| 00001 | Title Page |
| 00003 | Table of Contents |
| 00010 | Request for Bids |
| 00100 | Instructions to Bidders |
| 00300 | Bid Form |
| | Acknowledgement of Principal |
| | Exhibit A - Acknowledgement of Addenda |
| | Exhibit B – Intent to Respond |
| | Exhibit C - Non-Collusion Affidavit |
| | Exhibit D - Substitute IRS FormW-9 |
| | Exhibit E - Indemnification |
| | Exhibit F - List of Subcontractors |
| | Exhibit G - Statement of Experience |
| | Exhibit H - Unit Price Bid |
| | Exhibit I – Local Resident Vendor Certification |
| | Exhibit J - Exceptions Page Form |
| 00400 | Bid Bond |
| 00500 | Contract |
| 00600 | Performance Bond |
| 00601 | Labor and Material Payment Bond |
| 00700 | General Conditions (EJCDC) |
| 00750 | Summary Schedule and Key Milestones |
| 00800 | Supplementary Conditions |
| 00900 | Information Available to Bidders |
| DIVISION 1 – GENERAL REQUIREMENTS | |
| 01010 | Summary of Work |
| 01025 | Measurement and Payment |
| 01026 | Schedule of Values |
| 01027 | Application for Payment |
| 01030 | Special Project Procedures |
| 01036 | Change Order Procedures |
| 01050 | Field Engineering |
| 01055 | Duties, Responsibilities And Limitations Of Authority Of Resident Project Representative |
| 01200 | Project Meetings |
| 01310 | Construction Schedules |
| 01340 | Shop Drawings, Product Data, Working Drawings, and Samples |
| 01380 | Construction Photographs |
| 01400 | Construction Quality Assurance/Quality Control Plan (CQA Plan) |
| 01510 | Temporary Utilities |
| 01590 | Field Offices and Vehicles |
| 01600 | Material and Equipment |
| 01630 | Substitutions and Product Options |
| 01700 | Contract Closeout |
| 01720 | Project Record Documents |

01740 Warranties and Bonds

DIVISION 2 – SITE WORK

02100 Site Preparation
02200 Excavation, Backfill, and Compaction
02271 Fabric Cushion
02272 Filter Fabric
02274 Geocomposite Drainage Net
02275 Compacted Soil Liner
02276 Erosion and Sedimentation Control
02277 Geosynthetic Clay Liner
02290 Final Cover
02505 Crushed Stone Paving
02589 Geomembrane Leak Location Survey
02605 Precast Concrete Manholes and Structures
02612 Reinforced Concrete Pipe and Fittings
02623 High Density Polyethylene (HDPE) Pipe
02625 Corrugated Polyethylene Pipe
02700 Protective Cover
02776 Textured High Density Polyethylene (HDPE) Liner
02820 Guardrail
02901 Miscellaneous Work and Cleanup
02985 Stabilization
03350 Fabric Formed Concrete

DIVISION 3 – CONCRETE (NOT USED)

DIVISION 4 – MASONRY (NOT USED)

DIVISION 5 – METALS (NOT USED)

DIVISION 6 – WOOD AND PLASTICS (NOT USED)

DIVISION 7 – THERMAL AND MOISTURE PROTECTION (NOT USED)

DIVISION 8 – DOORS AND WINDOWS (NOT USED)

DIVISION 9 – FINISHES (NOT USED)

DIVISION 10 – SPECIALTIES (NOT USED)

DIVISION 11 – EQUIPMENT (NOT USED)

DIVISION 12 – FURNISHINGS (NOT USED)

DIVISION 13 – SPECIAL CONSTRUCTION (NOT USED)

DIVISION 14 – CONVEYING SYSTEM (NOT USED)

DIVISION 15 – MECHANICAL (NOT USED)

DIVISION 16 – ELECTRICAL (NOT USED)

DRAWINGS

SHEET 1 FACILITY LAYOUT AND LIMIT OF CONSTRUCTION
SHEET 2 ON SITE BORROW AREA DEVELOPMENT PLAN
SHEET 3 CLASS THREE LANDFILL EXISTING CONDITIONS
SHEET 4 CLASS THREE LANDFILL BOTTOM OF COMPOSITE
LINER SYSTEM GRADES
SHEET 5 CLASS THREE LANDFILL TOP OF PROTECTIVE COVER
GRADES AND LEACHATE COLLECTION PIPING SYSTEM PLAN
SHEET 6 CLASS TWO LANDFILL FINAL COVER
SHEET 7 DETAILS
SHEET 8 DETAILS

END OF SECTION

**SECTION 00010
REQUEST FOR BIDS**

Time Line: Invitation for Bid #18-041

| Item | Date | Time | Location* |
|---|---------------------------------|-------------|------------------|
| Date of Issue: | Friday, May 18, 2018 | n/a | n/a |
| Mandatory Pre-Bid Site Inspection: | Wednesday, May 23, 2018 | 2:00 PM ET | Project Site |
| Inquiry Cut-Off Time: | Wednesday, June 6, 2018 | 3:00 PM ET | Suite 239 |
| Bids Must Be Received On/Before: | Wednesday, June 13, 2018 | 3:00 PM ET | Suite 239 |
| Public Bid Opening & Tabulation: | Wednesday, June 13, 2018 | 3:00 PM ET | Suite 239 |
| County Council Consideration: | Tuesday, June 26, 2018 | 5:30 PM ET | Chambers |
| Estimated Notice to Proceed Date: | Monday, July 09, 2018 | n/a | n/a |
| Contract/Project Completion: | 210 Days from NTP | n/a | n/a |

*All locations in the Old County Courthouse, 129 Screven Street, Georgetown, SC unless otherwise stated.

**Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill
Closure Project
Georgetown County, South Carolina
Bid #18-041**

Written, sealed proposals for **Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project** in Georgetown County, SC will be received by the Purchasing Office, 2nd floor, Suite 239, 129 Screven St., Georgetown, SC 29440 until cut-off time shown in the Bid Time Line above. Bids will then be publicly and promptly opened and read aloud at the designated time by the Purchasing Officer. Bids that are not in the Purchasing Officer's possession prior to the stated opening date and time will be considered NON-RESPONSIVE and returned unopened. An official authorized to bind the Bid must sign all bid documents submitted.

MAILING ADDRESS:

County of Georgetown
Post Office Drawer 421270
Georgetown SC 29442-1270
Attn: Purchasing

STREET ADDRESS:

Georgetown County Courthouse
129 Screven Street, Suite 239
Georgetown SC 29440-3641
Attn: Purchasing

One (1) unbound, reproducible ORIGINAL must be submitted in a sealed envelope and clearly marked on the outermost container as follows:

OFFEROR'S NAME
BID ITEM NAME
BID NUMBER

MANDATORY PRE-BID:

There will be a Mandatory Pre-Bid Conference and Site Inspection, which will begin promptly at 2:00PM Eastern Time on Wednesday, May 23, 2018 at the project location on the Georgetown County Landfill site. County staff and the project engineer will meet with all interested parties to review plans, answer questions and provide a site tour of the project location. The Georgetown County Solid Waste Landfill is located at 201 Landfill Road, off Browns Ferry Road (a/k/a SC-51). Only those registered in attendance will be qualified to submit proposals.



The Work Consists Of: Approximate 10-acre Class Three Landfill Expansion and approximate 15-acre Class Two Landfill Closure.

The work performed under this Contract shall include, but may not be limited to: the furnishing of all labor, materials, equipment and services, whether specifically mentioned or not, that is required to complete the Construction of the Work of the project. All requirements of Georgetown County and all pertinent administrative regulations shall apply to this project as if herein written out in full.

Each proposer shall respond as provided more specifically herein, Section 00100, Instructions to Bidders, Paragraph IV Preparation and Submission of Bids. Proposals or amendments to proposals received after the proposal deadline will be considered as "Late Proposals" and will not be considered for any cause whatsoever. The Respondent shall sign his / her proposal correctly. All offers shall be entered in ink or typewritten. Proposals may be rejected if any omissions, alteration of form, additions not called for, or any irregularities of any kind are shown. Proposal envelopes or containers with amendments or changes written on the exterior will not be considered or opened. Respondents and their authorized representatives are invited to be present at the proposal opening.

Each bidder will be responsible to make their own INDEPENDENT site inspection and become familiar with on-site conditions prior to submitting a response.

The Construction Contract will be awarded to the firm or team of firms submitting the lowest and most responsive and responsible proposal as determined by the County. Georgetown County reserves the right to reject any and all proposals for any reason at any time prior to execution of the Contract. It further reserves the right to waive any and all technicalities and formalities in the proposal process as well as accept in whole or in part such proposal or proposals where it deems it advisable in protection of the best interests of the County and to hold all proposals for examination for a period not to exceed ninety (90) calendar days. The selected Contractor is encouraged to utilize, to the extent possible, local firms and trades from within Georgetown County.

Bid Security/Bid Bonding:

- a) Each bid must be accompanied by a Bid Bond, or by a certified check payable to Georgetown County, SC, for an amount equal to five per-cent (5%) of the total base bid as a guarantee that if the bid is accepted, the required Contract will be executed within fifteen (15) days after receipt of written notice of formal award of Contract. Bids not including such a bid bond will not be considered. Bid Bonds will be returned to unsuccessful vendors after award of Bid.
- b) The successful proposer must provide a Performance Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days after receipt of written notice of formal award of the Contract.
- c) The successful offeror must provide a Payment and Material Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days after receipt of written notice of formal award of Contract.
- d) Should any Surety on the Construction Contract be determined unsatisfactory at any time by the Owner, notice will be given the Contractor who shall immediately provide a new Surety, satisfactory to the Owner and at no additional cost to the Owner. The Contract shall not be operative nor will any payments be due or paid until approval of the bonds has been made by the Owner.
- e) The Bidder shall require the Attorney-in-Fact who executes the required bonds, on behalf of the Surety, to affix thereto a certified and current copy of his Power of Attorney, indicating the monetary limit of such power.
- f) The cost of the bonds shall be included in the construction portion of the base bid.

Throughout this Project Manual all references to the "Owner" shall mean the County of Georgetown, SC or its Designated Representative.

Project Funding: Georgetown County SC Capital Improvement Finds (local funds)

Construction Contract Documents, including Bidding and Contract Documents, General Requirements, Plans and Technical Specifications may be viewed and downloaded on line at the County Website www.gtcounty.org, select "Bid Opportunities" from the *Quick Links* box on the homepage.

SITE INSPECTION:

- a) The bidder is expected to have become familiar with and take into consideration, site conditions which may affect the work and to check all dimensions at the site.
- b) Each bidder shall acquaint themselves thoroughly as to the character and nature of the work to be done. Each bidder furthermore shall make a careful examination of the site of the work and inform themselves fully as to the difficulties to be encountered in performance of the work, the facilities for delivering, storing and placing materials and equipment and other conditions relating to construction and labor.
- c) The bidder shall examine the premises and the site and compare them with any applicable drawings and specifications. He/she shall familiarize themselves with the existing conditions such as obstructive area levels and any problems related to erecting the required systems.
- d) No plea of ignorance of conditions that exist or may hereafter exist on the site of the work, or difficulties that may be encountered in the execution of the work, as a result of failure to make necessary investigations and examinations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all the requirements of the contract documents and to complete the work for the consideration set forth therein, or as a basis for any claim whatsoever.
- e) Insofar as possible, the Contractor, in carrying out his/her work, must employ such methods or means as will not cause interruption of or interference with the work of any other Contractor, or County personnel at the site.
- f) When boring data is provided by the Owner, the Bidder shall assume responsibility for any conclusions he/she may draw from such data. (S)he may employ his/her own consultants to analyze available information and shall be responsible for any conclusions drawn from that information. The cost of such employment shall be borne solely by the Bidder.

TITLE VI COMPLIANCE:

Georgetown County hereby gives public notice that it is the policy of the agency to assure full compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related statutes and regulations in all programs and activities. Title VI requires that no person in the United States of America shall, on the grounds of race, color, or national origin, be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which Georgetown County receives federal financial assistance. Any person who believes they have been aggrieved by an unlawful discriminatory practice under Title VI has a right to file a formal complaint with Georgetown County. Any such complaint must be in writing and filed with Georgetown County's Title VI Coordinator within one hundred and eighty (180) days following the date of the alleged discriminatory occurrence. For more information, or to obtain a Title VI Discriminatory Complaint Form, please see our website at <http://www.gtcounty.org>.

END OF SECTION 00010



SECTION 00100
INSTRUCTIONS TO BIDDERS/PROPOSERS
Bid #18-041

1. **Submission of Questions**

Questions must be submitted in writing via electronic mail, facsimile or postal mail to the Issuing Officer no later than the "Deadline for Questions" cutoff identified in the Bid Timeline on page four (4) in order to generate an official answer. All written questions will receive an official written response from the Georgetown County Purchasing Office (GCPO) and will become addenda to the solicitation.

GCPO reserves the right to reject or deny any requests made by the provider.

Impromptu, unwritten questions are permitted and verbal answers may be provided, but are only intended as general direction and will not represent the official GCPO position. The only official position of GCPO is that which is stated in writing and issued in the solicitation as addenda thereto.

No other means of communication, whether oral or written, shall be construed as a formal or official response/statement and may not be relied upon. SEND QUESTIONS TO:

Purchasing Office
Post Office Box 421270, Georgetown, SC 29442-1270
Fax: (843) 545-3500
Email: purch@gtcounty.org

2. **IMPORTANT OFFEROR NOTES:**

- a) Bid Number & Title must be shown on the OUTSIDE of the delivery package.
- b) Federal Express does NOT guarantee delivery to Georgetown, SC before 4:30 PM Eastern Time on Next Day Service.
- c) UPS WILL guarantee delivery to Georgetown, SC before 10:30 AM Eastern Time on Next Day "Early AM" Service.

3. **Inclement Weather/Closure of County Courthouse**

If the County Courthouse is closed for business at the time scheduled for bid opening, for whatever reason, sealed bids will be accepted and opened on the next scheduled business day, at the originally scheduled time.

4. This solicitation does not commit Georgetown County to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services. It is the responsibility of each bidder to see that the Georgetown County Purchasing Office receives bids on, or before, the date and time specified for the bid opening. No bid will be accepted thereafter. The County assumes no responsibility for delivery of bids that are mailed. Georgetown County reserves the right to reject any or all bids and to waive any informalities and technicalities in the bid process.

5. Each bidder must provide one (1) unbound, reproducible ORIGINAL of their bid submitted in a sealed envelope and clearly marked on the outermost container as follows:

OFFEROR'S NAME
BID ITEM NAME
BID NUMBER

6. Bidders shall be licensed as a General Contractor in the State of South Carolina and will hold all Trade Contracts and the Building Permit on the Project.

7. Trade Contractors (Prime and sub-contractors) shall be qualified to perform the work contracted for and shall be licensed as such in the State of South Carolina.

8. Design services shall be performed by qualified architects and engineers licensed to perform the contracted work in the State of South Carolina.
9. No Bidder may submit more than one bid. Multiple bids for different manufacturers but represented by the same firm will not be accepted. Bids offered directly from manufacturers shall indicate if a local dealer/representative will be involved.
10. Definitions:
 - a) The terms “Proposer”, “Offeror”, or “Bidder” refer to those parties who are submitting sealed responses for the work set forth in this document to the OWNER, as distinct from a sub-bidder who provides a bid to the Bidder. The term “Contractor” refers to the successful Bidder.
 - b) The term **Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project** or “project” refers to the **complete set of services** as specified in this document, in every aspect.
 - c) The terms “Owner” and “County” refer to the County of Georgetown, South Carolina.
 - d) Where the words “shall” or “must” are used, it signifies an absolute minimum function or capacity that, if not satisfied, may result in disqualification.
 - e) Where the words “should”, “may”, or “is desirable” are used, it signifies desirable, but not mandatory functions or capacities. Bidders who are able to provide these functions or capacities may be evaluated more favorably than those who cannot.
11. Correction or Withdrawal of Bids; Cancellation of Awards

An offeror must submit in writing a request to either correct or withdraw a bid to the Procurement Officer. Each written request must document the fact that the offeror’s mistake is clearly an error that will cause him substantial loss.

 - a) Correction of awards : An offeror shall not be permitted to correct a bid mistake after bid opening that would cause such offeror to have the low bid unless the mistake in the judgment of the Procurement Officer is clearly evident from examining the bid document; for example, extension of unit prices or errors in addition.
 - b) Cancellation of awards prior to performance: When it is determined after an award has been issued but before performance has begun that Georgetown County’s requirements for the goods or services have changed or have not been met, the award or contract may be canceled and either re-awarded or a new solicitation issued.
12. Faxed or E-mailed bids will not be accepted by Georgetown County.
13. If you need any reasonable accommodation for any type of disability in order to participate in this procurement, please contact the purchasing office as soon as possible.
14. Any deviations from the specifications or modification of this bid and any extra or incidental work or reductions in work shall be set forth in writing and signed by both parties prior to making such change. Any increase or decrease in the bid price resulting from such change shall be included in writing.
15. Exceptions: The bidder shall list on a separate sheet of paper any variations from, or exceptions to, the conditions and specifications of this bid. This sheet shall be labeled “Exception(s) to Bid Conditions and Specifications,” and shall be attached to the bid. When Proposers find instances where they must take exception with certain requirements or specifications of the bid, all exceptions shall be clearly identified. Written explanations shall include the scope of the exceptions, the ramifications of the exceptions for the County of Georgetown, and a description of the advantage to be gained or disadvantages to be incurred by the County as a result of these exceptions.

16. The County reserves the right to reject any or all bids, waive any informality in bids and accept in whole or in part such bid or bids as may be deemed in the best interest of the County. Georgetown County reserves the right to reject any bid submitted, at sole option that the vendor may not be able to meet the service requirements of the bid.
17. Publicity releases: contractor agrees not to refer to award of any resulting contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the user.
18. Material Safety Data Sheets: The County of Georgetown will not receive any materials, products, or chemicals which may be hazardous to an employee's health unless accompanied by a Material Data Sheet when received.
19. Ownership of Copyright: All right, title and interest in all copyrightable materials which vendor shall create in the performance of its obligations hereunder shall be the property of the procurer. Vendor agrees to assign and hereby does assign any and all interest it has in and to such material to procurer. Vendor agrees, upon the request of procurer to execute all papers and perform all other such acts necessary to assist procurer to obtain and register copyrights on such materials. Where applicable, works of authorship created by the vendor in the performance of its obligations hereunder, shall be considered "works for hire" as defined in the U.S. Copyright Act.
20. Ownership of Documents: Any reports, studies, photographs, negatives or other documents prepared by vendor in the performance of its obligations shall be the exclusive property of the procurer and all such material shall be remitted to the procurer by the vendor upon completion, termination or cancellation of this order. Vendor shall not use, willingly allow or cause to have such material used for any purpose other than performance of its obligations under this order without the prior written consent of the procurer.
21. Affirmative Action: The contractor will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of age, race, color, religion, sex, national origin or physical handicap. The following are incorporated herein by reference: 41 C.F.R. 60-1.4, 60-250.4 and 60-741.4.
22. CERTIFICATION REGARDING DRUG-FREE WORKPLACE:
The contractor certifies that the vendor(s) will provide a "drug-free workplace" as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107.
23. Certification of Non-Segregated Facilities
The federally-assisted construction contractor certifies that he does not maintain or provide, for his employees, any segregated facilities at any of his establishments and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally-assisted construction contractor certifies that he will not maintain or provide, for his employees, segregated facilities at any of his establishments and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The federally-assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause and that he will retain such certifications in his files.

24. ILLEGAL IMMIGRATION: Construction

By signing its bid or proposal, Contractor certifies that it will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agrees to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or (b) that Contractor and its subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both." Contractor agrees to include in any contracts with its subcontractors language requiring its subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14. (An overview is available at www.procurement.sc.gov)

25. Bidders must clearly mark as "confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under section 30-4-40, Code of Laws of South Carolina 1976, as amended (Freedom of Information Act). If any part is designated as confidential, there must be attached to that part an explanation of how this information fits within one or more categories listed in section 30-4-40. The County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the County or its agents for its determination in this regard.

26. Nothing herein is intended to exclude any responsible vendor, his product or service or in any way restrain or restrict competition. On the contrary, all responsible vendors are encouraged to bid and their bids are solicited.

27. Acknowledgement of Addenda

Each contractor is responsible to verify the number of total addenda issued prior to bid. **Failure to acknowledge all addenda may disqualify the bidder.** All addenda are posted by the County at the website located at www.gtcounty.org, select "Bid Opportunities" in the *Quick Links* box. It is each proposer's responsibility to verify that all addenda have been received and acknowledged.

28. Form and Style of Bids

- a) Bids in the form of sealed proposals for the Construction of the Project will be received until the time and the date stated in Section 00010, Notice to Bidders.
- b) The Bid shall be submitted on the Bid Form provided; no other form is acceptable.
- c) The successful Bidder will be required to provide verified breakdown of costs of all services and work in a manner acceptable to the Owner.
- d) All blanks on the Bid Form shall be filled in, either typed or printed in ink. The person signing the bid shall initial all corrections or erasures.
- e) Where so indicated on the Bid Form, the Bid Sum shall be expressed in both words and figures; in case of a discrepancy between the two, the Sums expressed in words shall govern.
- f) Bid unit price on quantity specified -- extend and show total. In case of errors in extension, unit prices shall govern.
- g) Bidder shall quote all Alternates in the Bidding Documents. If Bidder fails to bid on all Alternates, then his/her Bid may be considered irregular, non-responsive and may be disqualified.
- h) Bids containing qualifications will be considered irregular, non-responsive and may be disqualified.

- i) A Bid Form submitted by a partnership shall list the names of all partners and shall be signed in the partnership name by one of the members of the partnership who is authorized to sign for the partnership.
- j) A Bid Form submitted by a corporation shall be executed in the legal name of the corporation, followed by the state of incorporation and signed by the President or Vice President or other authorized officer. The name of each person signing the Bid Form shall be typed or printed below the signature.
- k) When the person signing for a corporation is other than the President or Vice President and when requested by the Owner, a resolution or other satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished for the Owner's records. The name of each person signing the Bid Form shall be typed or printed below the signature.

29. **Insurance**

The successful bidder shall procure, maintain, and provide proof of, insurance coverage for injuries to persons and/or property damage as may arise from or in conjunction with, the work performed on behalf of the County by the bidder, his agents, representatives, employees or subcontractors. Proof of coverage as contained herein shall be submitted fifteen (15) days prior to the commencement of work and such coverage shall be maintained by the bidder for the duration of the contract period; for occurrence policies.

a. General Liability

Coverage shall be as broad as: User Fee Comprehensive General Liability endorsed to include Broad Form, Commercial General Liability form including Products/Completed Operations.

1. Minimum Limits

General Liability:

- \$1,000,000 General Aggregate Limit
- \$1,000,000 Products & Completed Operations
- \$1,000,000 Personal and Advertising Injury
- \$1,000,000 Each Occurrence Limit
- \$50,000 Fire Damage Limit
- \$5,000 Medical Expense Limit

b. Automobile Liability

Coverage sufficient to cover all vehicles owned, used, or hired by the bidder, his agents, representatives, employees or subcontractors.

1. Minimum Limits

Automobile Liability:

- \$1,000,000 Combined Single Limit
- \$1,000,000 Each Occurrence Limit
- \$5,000 Medical Expense Limit

c. Workers' Compensation

Limits as required by the Workers' Compensation Act of SC. Employers Liability, \$1,000,000.

d. Owners' & Contractors' Protective Liability

Policy will be in name of County. Minimum limits required are \$1,000,000.

e. Professional Liability

Minimum limits are \$1,000,000 per occurrence.

f. Coverage Provisions

- 1. All deductibles or self-insured retention shall appear on the certificate(s).
- 2. The County of Georgetown, its officers/ officials, employees, agents and volunteers shall be added as "additional insured" as their interests may appear. This provision does not apply to Professional Liability or Workers' Compensation/Employers' Liability.

3. The offeror's insurance shall be primary over any applicable insurance or self-insurance maintained by the County.
4. Shall provide 30 days written notice to the County before any cancellation, suspension, or void of coverage in whole or part, where such provision is reasonable.
5. All coverage for subcontractors of the bidder shall be subject to all of the requirements stated herein.
6. All deductibles or self-insured retention shall appear on the certificate(s) and shall be subject to approval by the County. At the option of the County, either; the insurer shall reduce or eliminate such deductible or self-insured retention; or the bidder shall be required to procure a bond guaranteeing payment of losses and related claims expenses.
7. Failure to comply with any reporting provisions of the policy(s) shall not affect coverage provided the County, its officers/officials, agents, employees and volunteers.
8. The insurer shall agree to waive all rights of subrogation against the County, its' officers/officials, agents, employees or volunteers for any act, omission or condition of premises which the parties may be held liable by reason of negligence.
9. The bidder shall furnish the County certificates of insurance including endorsements affecting coverage. The certificates are to be signed by a person authorized by the insurance company(s) to bind coverage on its' behalf, if executed by a broker, notarized copy of authorization to bind, or certify coverage must be attached.
10. All insurance shall be placed with insurers maintaining an A.M. Best rating of no less than an A:VII. If A.M. Best rating is less than A:VII, approval must be received from County's Risk Officer.

30. Workman's Compensation Coverage

Georgetown County, SC will require each contractor and service provider to maintain on file with the purchasing officer, a current Certificate of Insurance showing limits as required by the Workers' Compensation Act of SC: Employers Liability, \$1,000,000.

The law also recognizes "statutory employees." These are employees who work for a subcontractor who may be working for a business or another contractor. Employers should inquire whether or not a subcontractor working for them has workers' compensation insurance, regardless of the number of employees employed by the subcontractor. If the subcontractor does not, the subcontractor's injured employees would be covered under the employer's workers' compensation insurance. If the subcontractor does not carry workers' compensation insurance, then the owner or the principal contractor would be liable just as if the subcontractor's employee was one of their employees.

For answers to additional questions, visit the SC Worker's Compensation Commission website, at: <http://www.wcc.state.sc.us/Frequently%20Asked%20Questions/FAQ.htm>

31. Retainage, in the amount of ten percent (10%) of the value of construction costs incurred for the project, shall be withheld until the project has been completed to the satisfaction of Owner.

32. Hold Harmless Clause

The Contractor shall, during the term of the contract including any warranty period, indemnify, defend, and hold harmless the County, its officials, employees, agents, and representatives thereof from all suits, actions, or claims of any kind, including attorney's fees, brought on account of any personal injuries, damages, or violations of rights, sustained by any person or property in consequence of any neglect in safeguarding contract work or on account of any act or omission by the contractor or his employees, or from any claims or amounts arising from violation of any law, bylaw, ordinance, regulation or decree. The vendor agrees that this clause shall include claims involving infringement of patent or copyright.

33. Condition of Items

All items shall be new, in first class condition, including containers suitable for shipment and storage, unless otherwise indicated herein. Verbal agreements to the contrary will not be recognized.

34. Workmanship and Inspection

All work under this contract shall be performed in a skillful and workmanlike manner. The County may, in writing, require the Contractor to remove any employee from work that the County deems incompetent or careless.

Further, the County may, from time to time, make inspections of the work performed under this contract. Any inspection by the County does not relieve the Contractor from any responsibility regarding defects or other failures to meet the contract requirements.

35. Progress Payments

Contractor's Application for Payment shall be submitted to the Owner in accordance with Section 00700 and Section 01027.

36. South Carolina Sales Tax

The County of Georgetown, SC is not exempt and pays the appropriate SC sales tax on all applicable purchases.

37. Assignment of Contract

This contract may not be assigned in whole or part without the written consent of the Purchasing Officer.

38. Termination

Subject to the provisions below, the contract may be terminated by the County upon thirty (30) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then this contract may be extended upon written approval of the County until said work or services are completed and accepted.

a. Termination for Convenience

In the event that this contract is terminated or canceled upon request and for the convenience of the County, without the required thirty (30) days advance written notice, then the County shall negotiate reasonable termination costs, if applicable.

b. Termination for Cause

Termination by the County for cause, default or negligence on the part of the contractor shall be excluded from the foregoing provision; termination costs, if any, shall not apply. The thirty (30) days advance notice requirement is waived in the event of Termination for Cause.

c. Non-Appropriation:

It is understood and agreed by the parties that in the event funds are not appropriated in the current fiscal year or any subsequent fiscal years, this contract will become null and void and the County will only be required to pay for services completed to the satisfaction of the County.

39. Default

In case of default by the contractor, for any reason whatsoever, the County may procure the goods or services from another source and hold the contractor responsible for any resulting excess cost and may seek other remedies under law.

40. Severability

In the event that any provision shall be adjudged or decreed to be invalid, such ruling shall not invalidate the entire Agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding and in full force and effect.

41. Applicable Laws

This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina, U.S.A.

42. Claims and Disputes:

All claims, disputes and other matters in question between parties arising out of, or relating to, this Agreement, or the breach thereof, shall be decided in the Circuit Court of the Fifteenth Judicial circuit in Georgetown County, South Carolina. By executing this Agreement, all parties specifically consent to venue and jurisdiction in Georgetown County, South Carolina and waive any right to contest jurisdiction and venue in said Court.

43. Rights of County

The County reserves the right to reject all, or any part of any bid, waive informalities and award the contract to the lowest responsive and responsible bidder to best serve the interest of the County.

44. Notice of Award

A *Notice of Intent to Award* will be mailed to all respondents.

45. Protest

Bidders may refer to Sections 2-67, 2-73, and 2-74 of Ordinance #2008-09, also known as the Georgetown County, South Carolina Purchasing Policy to determine their remedies concerning this competitive process. The failure to be awarded a bid shall not be valid grounds for protest.

46. Debarment

By submitting a bid, the offeror certifies to the best of its knowledge and belief, that it and its principals, sub-contractors and assigns are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency. A copy of the County's debarment procedure in accordance with Section 2-68 of Ordinance #2008-09, also known as the Georgetown County, South Carolina Purchasing Policy is available upon request.

47. Firm Pricing for County Acceptance

Bid price must be firm for County acceptance for 90 days from bid opening date.

48. Use of Brand Names (If Appropriate)

(not used)

49. Substitutions and Product Options

Written requests for changes in products, materials, equipment and methods of construction required by the Contract Documents shall be submitted to the Owner prior to effecting such requested changes.

50. Mobilization After Notice to Proceed

Bid must show the number of days required to mobilize after receiving a Notice to Proceed under normal conditions. Failure to state mobilization time obligates bidder to mobilize within fourteen (14) calendar days. Unrealistically short or long mobilization promised may cause bid to be disregarded. Consistent failure to meet delivery promises without valid reason may be cause for removal from bid list.

51. Permits

The successful Offeror must be responsible for obtaining all necessary city, county, and state permits/licenses and must comply with all local codes and ordinances. Copies of such permits/licenses shall be made available to the County upon request. Building contractors working within Georgetown County must also secure a Contractor's License from the Building Department. Work within the Georgetown City Limits may require a City Business License.

52. Environmental Management:

Vendor/Supplier/Contractor will be responsible for complying with all federal, state and local environmental regulations relating to transportation, handling, storage, spillage and any other aspect of providing the services specified herein, as applicable.

53. Bid Tabulation Results

Vendors wishing to view the bid tabulation results may visit the Georgetown County, SC web-site at: <http://www.gtcountry.org>. Select "Purchasing", then "Bids Information" and double click the link under the individual bid listing.

54. The Bidder hereby certifies that he or she has carefully examined all of the Documents for the project, has carefully and thoroughly reviewed this Request for Bid/Quotation, has inspected the location of the project (if applicable), and understands the nature and scope of the work to be done; and that this Bid is based upon the terms, specifications, requirements, and conditions of the Request for Bid/ Documents. The Bidder further agrees that the performance time specified is a reasonable time, having carefully considered the nature and scope of the project as aforesaid.

55. Any attempt by the vendor to influence the opinion of County Staff or County Council by discussion, promotion, advertising, misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor's submittal to be declared null and void.

56. Apparent omission of a detailed description concerning any point, shall be regarded as meaning the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used.

57. Response Clarification

Georgetown County reserves the right to request additional written or oral information from Bidders in order to obtain clarification of their Responses.

58. Georgetown County, SC has a Local Vendor Preference Option by ordinance:

Sec 2-50. Local Preference Option

1. A vendor shall be deemed a Local Georgetown County vendor for the purposes of this Section if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the State, maintains an office in Georgetown County, and maintains a representative inventory or commodities within the County on which the bid is submitted, and has paid all taxes duly assessed.
2. This option allows the lowest local Bidder whose bid is within five-percent (5%) of the lowest non-local Bidder to match the bid submitted by the non-local Bidder and thereby be awarded the contract. This preference shall apply only when (a) the total dollar purchase is \$10,000 or more; (b) the vendor has a physical business address located and operating within the limits of Georgetown County and has been doing business in the County for a period of twelve (12) months or more; and (c) the vendor provides proof of payment of all applicable Georgetown County taxes and fees if so requested.
3. Should the lowest responsible and responsive Georgetown County bidder not exercise its right to match the bid as granted herein, the next lowest qualified Georgetown County bidder shall have that right and so on. The right to exercise the right to match the bid shall be exercised within 24 hours of notification of the right to match the non-Georgetown County bidder's bid.
4. In order to qualify for the local preference authorized by this Section, the vendor seeking same shall be required to submit with its bid a statement containing relevant information which demonstrates compliance with the provisions of this Section. This statement shall be on a form provided by the County purchasing department and shall be signed under penalty of perjury. Failure to provide such affidavit at the time the

bidder submits its bid shall constitute a waiver of any claim for preference.

5. For all contracts for architecture, professional engineering, or other professional services governed by § 2-56, Architect-Engineer and Land Surveying Services – Public Announcement and Selection Process, the county shall include the local business status of a firm among the factors considered when selecting which firms are “most highly qualified.” In determining which firm is the “most qualified” for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.
6. Local preference shall not apply to the following categories of contracts: (a) Goods or services provided under a cooperative purchasing agreement or similar “piggyback” contract; (b) Contracts for professional services except as provided for in section five (§5) above; (c) Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference; (d) Purchases or contracts made pursuant to a noncompetitive award process, unless otherwise provided by this section; or (e) Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county council or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

See the RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE form attached for details.

59. Bidding Documents

- a) Each Bidder shall carefully examine the Bidding and Contract Documents, General Requirements, Drawings and Technical Specifications and all addenda or other revisions and thoroughly familiarize themselves with the detailed requirements prior to submitting a Bid. Bidders shall promptly notify the Owner in writing of any ambiguity, inconsistency, error or omission, which they may discover upon examination of the Bidding and Contract Documents, Project Site and / or local conditions. The Owner shall make such interpretations, corrections or changes to the Bidding Documents and will reply to all questions submitted by the Bidders. The Owner will log all responses and issue an addendum as may be appropriate. The Owner will not be responsible for any oral instructions and / or responses. Interpretations, corrections or changes made in any other manner will not be binding. All addenda sent to Bidders will become a part of the Bidding and Contract Documents. All inquiries shall be directed in writing or transmitted by facsimile to the office of the Owner. No allowance will be made after Bids are received due to oversight and / or error by bidder.
- b) Each Bidder shall carefully review the Table of Contents and the List of Drawings in the Project Manual to determine if any instrument is missing from the Bidding Documents. Bidders shall promptly notify the Owner, in writing, of any discrepancy.
- c) Addenda will be mailed or faxed to all Bidders. Copies of Addenda will be made available for inspection at the office of the County Purchasing Officer. Prior to submitting a Bid each Bidder shall ascertain that he/she has received all Addenda issued.
- d) Owner does not assume any responsibility for errors, omissions or misinterpretations resulting from the Bidder’s use of incomplete Bidding Documents.

60. Liquidated Damages

Refer to *Section 00300*.

61. Testing Laboratory Services

(not used)

62. Allowances

(not used)

63. The contractor will be responsible for disposal of any and all removed, unused and surplus materials and any fees and transportation costs associated with the disposal.
64. The contractor is responsible for contacting the **Palmetto Utility Protection Service (P.U.P.S.)** at its **811** or toll-free number **(1-888-721-7877)** between the hours of 7:30 am (ET) and 5:30 pm (ET), Monday through Friday, 72 hours before starting the proposed work.

END OF SECTION 00100

SECTION 00300
BID FORM
MANDATORY BID SUBMITTAL FORM

FIRM NAME: _____

For: **BID #18-041, Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project**

To: **MAILING ADDRESS:**
County of Georgetown
Post Office Drawer 421270
Georgetown SC 29442-1270
Attn: Purchasing

STREET ADDRESS:
Georgetown County Courthouse
129 Screven Street, Suite 239
Georgetown SC 29440-3641
Attn: Purchasing

The undersigned, having visited the site of the Work and having familiarized themselves with local conditions affecting the design and cost of the work and with all requirements of the proposed Contract Documents, and duly issued Addenda to said documents, as acknowledged herein, propose to furnish and perform all labor, materials, necessary tools, expendable equipment, and all utility and transportation services necessary to perform and complete in a workmanlike manner all work required by said documents and Addenda.

- 1) **BASE BID PROPOSAL:** Bidder / Proposer agrees to perform all of the work described in the specifications, including allowances, and shown on the drawings, for the sum of:

_____ \$ _____
(words shall govern)

- 2) For additional work authorized after signing the Contract, the amount of overhead and the amount of profit to be added to base costs of labor and materials shall not exceed 10% total for overhead and profit on work performed by the Contractor's own forces and shall not exceed 15% total on work by Subcontractors.
- 3) **COMPLETION DATE:** Contractor must conform to Division 0, Section 00750, Summary Schedule and Key Milestones.
- 4) **LIQUIDATED DAMAGES:** Liquidated damages for this project shall be \$1500.00 per calendar day for Contractor's failure to complete any key milestone by its intermediate completion date or the Substantial Completion date.
- 5) The undersigned affirms that in making such Bid, neither he /she nor any company that they may represent, nor anyone in behalf of him / her or their company, directly or indirectly, has entered into any combination, collusion, undertaking or agreement with any other Bidder or Bidders to maintain the prices of said work, or any compact to prevent any other Bidder or Bidders from Bidding on said Contract or work and further affirms that such bid is made without regard or reference to any other Bidder or Proposer and without any agreement or understanding or combination either directly or indirectly with any other person or persons with reference to such Bidding in any way or manner whatsoever.
- 6) The undersigned, when notified of the acceptance of this Bid proposal, does hereby agree to enter into a Contract with the Owner within fifteen (15) calendar days from the date of the Notice of Award, for the execution of the work

described within the period of time allocated, and he / she shall give a Performance Bond and Payment Bond, with good and sufficient surety.

- 7) The undersigned further agrees that if awarded the Contract he /she will commence the work within fifteen (15) calendar days after the date of the Notice to Proceed and that he / she will complete the work in accordance with the Summary Schedule and Key Milestones and Substantial Completion date set forth in the Bidding and Contract Documents or such amended date as may be granted. If the undersigned fails to complete the work as provided in the aforementioned schedule, then and in that event, he / she further expressly agrees that, for each day that any phase of work under this Contract remains uncompleted thereafter the Owner may deduct from the Contract price herein specified the stipulated sum of liquidated damages as provided for herein and retain that sum for failure of the undersigned to complete this Contract on or before the expiration of the period shown in the completion schedule.
- 8) The undersigned agrees that the Owner's damages caused by delay are not capable of being established and would be difficult to measure accurately and that the sums herein specified as liquidated damages are not a penalty, but represent the parties' estimate of the actual damages which the Owner would suffer per day if the work is not completed as scheduled.
- 9) In submitting this Bid, it is understood that the right is reserved by the Owner to waive any informality or irregularity in any Bid or Bid guaranty, to reject any and all Bids, to re-Bid, to award or refrain from awarding a contract for the work and to negotiate with the apparent qualified low responsive Bidder to such extent as may be beneficial to the Owner.
- 10) The undersigned attaches hereto a cashier's check, certified check or Bid Bond in the sum five per-cent (5%) of the total base bid payable to Georgetown County, as required in the Request for Proposals, and the undersigned agrees that in case he / she fails within ten (10) calendar days after Notice of Award of the Contract to him /her to enter into the Contract in writing and furnish the required Payment and Performance Bonds, with surety or sureties to be approved by Owner, and insurance policies or endorsements, the Owner may, as its option, determine that the undersigned has abandoned his / her rights and interest in such Bid and that the cashier's check, certified check, or Bid Bond accompanying his or her bid has been forfeited. Otherwise, the cashier's check, certified check, or Bid Bond shall be returned to the undersigned upon the execution of the Contract and acceptance of the bonds and insurance, or upon rejection of his / her Bid.
- 11) A Bid shall be considered unresponsive and shall be rejected if it fails to include fully executed statements or if the Bidder fails to furnish required data. When a determination has been made to award the Contract to a specific Contractor, such Contractor shall, prior to award, furnish such other pertinent information regarding his / her own employment policies and practices as well as those of his / her proposed prime contractor, subcontractors and consultants as the Owner may require.
- 12) The Bidder shall furnish similar statements executed by each of his / her prime contractor, first-tier and second-tier subcontractors and consultants whose contracts equal Ten Thousand Dollars (\$10,000.00) or more and shall obtain similar compliance by such prime contractor, subcontractors and consultants before awarding such contracts. No prime contractor or subcontract shall be awarded to any non-complying prime contractor and/or subcontractor.
- 13) It is understood and agreed that all workmanship and materials under all items of work are guaranteed for one (1) year from the date of Final Acceptance, unless otherwise specified.
- 14) The undersigned affirms that he / she has completed all of the blank spaces in the Bid Form, with an amount in words and numbers and agrees that where a discrepancy occurs between the prices quoted in words and/or in numbers the lowest figure quoted in words shall take precedence and govern when determining final costs or award of the Contract.
- 15) The undersigned affirms that wages not less than the minimum rates or wages, as predetermined for this project by the State of South Carolina were used in the preparation of this "Bid Form".

16) **REQUIRED FORMS:** There are specific forms required to be completed and submitted as part of the response to this Request for Proposals (RFP). The omission, whether inadvertent or not, of any one or more of these forms will cause the Bidder's / Proposer's response to be disqualified. The following forms identified as Exhibits to this RFP, shall be included in the response:

- Exhibit A: Acknowledgement of Addenda
- Exhibit B: Notice of Intent to Respond
- Exhibit C: Non-Collusion Affidavit
- Exhibit D: Substitute IRS Form W-9
- Exhibit E: Indemnification
- Exhibit F: List of Prime and Sub-Contractors
- Exhibit G: Statement of Experience
- Exhibit H: Unit Price Bid
- Exhibit I: Local Resident Vendor Certification
- Exhibit J: Exceptions Page Form

17) SC GC LLR License Number and Endorsements: _____

18) Project Mgr/NTP Contact Address: _____

19) Project Mgr/NTP Contact Person: _____

20) Telephone Number _____ Fax Number _____

21) E-Mail address _____

22) Remittance Address: _____

23) A/P Accounting Contact _____

24) Telephone Number _____ Fax Number _____

25) E-Mail address _____

26) **Suspension and Debarment**

Federal guidelines require grant recipients to obtain sufficient assurance that vendors are not suspended or debarred from participating in federal programs when contracts exceed \$25,000. By signing below you verify that no party to this agreement is excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Nonprocurement suspension and debarment. [See <https://www.epls.gov/> for additional information.]

27) SCLLR Contractor's License No. and Endorsements: _____

28) Will you honor the submitted prices for purchase by other departments within Georgetown County and by other government entities who participate in cooperative purchasing with Georgetown County, South Carolina?

Yes No

29) Acceptance of Invitation for Bid Content: The contents of the successful IFB/RPS are included as if fully reproduced herein. Therefore, the selected contractor must be prepared to be bound by his/her proposal as submitted.

30) CERTIFICATION REGARDING DRUG-FREE WORKPLACE:

The undersigned certifies that the vendor listed below will provide a “drug-free workplace” as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107.

Yes

No

31) Any attempt by the vendor to influence the opinion of County Staff or County Council by discussion, promotion, advertising, misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor’s submittal to be declared null and void.

32) The lowest or any proposal will not necessarily be accepted and the County reserves the right to award any portion thereof. I/We, the undersigned, hereby confirm that all the above noted documents for Bid/Request for Proposal No. 18-041 were received.

33) Printed Name of person binding bid _____

34) Signature (X)_____

35) Date_____

36) **IMPORTANT:** Execute acknowledgment of officer or agent who signs this document (use proper form on following pages).

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION:

State of: (_____)

Country of: (_____)SS

On this _____ day of _____, 20____, before me personally came and appeared _____ to me Known, who, being by me duly sworn, did depose and say to me that he resides at _____, that he/she is the _____ of _____ the corporation described in and which executed the foregoing instrument is an impression of such seal; that it was so affixed by the order of the directors of said corporation, and that he signed his name thereto by like order.

(Seal) _____
Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP:

State of (_____)

Country of (_____)

On this _____ day of _____ 20____, before me personally came and appeared _____ to me known and known to me to described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Seal) _____
Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL:

State of (_____)

Country of (_____)

On this _____ day of _____ 20____, before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the forgoing instrument and acknowledged that he executed the same.

(Seal) _____
Notary Public

(Exhibits Continue on Following Pages)



EXHIBIT A

BID #18-041

Georgetown County

Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project

ADDENDA ACKNOWLEDGEMENT

Mandatory Bid Submittal Form

COMPANY NAME: _____

- Addendum #1 Received Date: _____ Initialed By: _____
- Addendum #2 Received Date: _____ Initialed By: _____
- Addendum #3 Received Date: _____ Initialed By: _____
- Addendum #4 Received Date: _____ Initialed By: _____
- Addendum #5 Received Date: _____ Initialed By: _____
- Addendum #6 Received Date: _____ Initialed By: _____

Company Name: _____

Authorized Signature: (X) _____

Printed Name: _____

[THE REMAINDER OF THIS PAGE IS BLANK]



EXHIBIT B

Intent to Respond

REF: #18-041. Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project

If your company intends to respond to this solicitation, please complete and promptly return this form to assure that you can be included on the mailing list to receive all addenda regarding this project.

It is not necessary to return any other portion of the bid documents if you are not bidding.

Failure to return the Intent to Respond shall not be sufficient cause to rule a submittal as non-responsive; nor does the return of the form obligate an interested party to submit a response. Georgetown County's efforts to directly provide interested parties with addenda or additional information are provided as a courtesy only, and do not alleviate the respondent from their obligation to verify they have received and considered all addenda. All addenda are published and available on the county website at www.gtcounty.org select "purchasing" and "current bids".

Our firm **does** intend on responding to this solicitation.

Our firm **does not** intend on responding to this solicitation.

Company Name: _____

Address: _____

Contact Person: _____

Telephone: _____

FAX: _____

E-Mail: _____

Please return this completed form to Purchasing:

- by e-mail to purch@gtcounty.org
- or by FAX to (843)545-3500.

[End of Intent to Respond]

EXHIBIT C

**FORM OF NON-COLLUSION AFFIDAVIT OF PRIME PROPOSER / BIDDER
(Mandatory Bid Submittal Form)**

**State of South Carolina)
County of Georgetown)**

Being first duly sworn deposes and says that:

- (1) (S)he is _____ of _____
The Bidder / Proposer that has submitted the attached Bid / Proposal;
- (2) He / She is fully informed respecting the preparation and contents of the attached Bid / Proposal and of all pertinent circumstances respecting such Bid / Proposal;
- (3) Such Bid / Proposal is genuine and is not a collusive or sham Bid / Proposal;
- (4) Neither the said Bidder / Proposer nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder / Proposer, firm or person to submit a collusive or sham Bid / Proposal in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder / Proposer, firm or person to fix the price or prices in the attached Bid / Proposal or of any other Bidder / Proposer, or to fix any overhead, profit or cost element of the Bid / Proposal price or the Bid / Proposal price of any other Bidder / Proposer, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Owner or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid / Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder / Proposer or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) _____

(Title)

Subscribed and sworn to before me this _____ day of _____, 2018

Notary Public in and for Georgetown County, South Carolina

My commission expires on: _____

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]



EXHIBIT D
SUBSTITUTE FOR FORM W-9
MANDATORY BID SUBMISSION FORM

Pursuant to Internal Revenue Service Regulations, you must furnish your Taxpayer Identification Number (TIN) to Georgetown County. If this number is not provided, you may be subject to a 28% withholding on each payment.

INDIVIDUAL OR OWNER'S NAME _____
 (Sole Proprietor Must Provide Individual Name along with Business Name)

LEGAL BUSINESS NAME (d/b/a): _____

ADDRESS: (_____
 (_____
 (_____

9 DIGIT TAXPAYER IDENTIFICATION NUMBER (TIN)
 (Individual Must Provide SS#; Sole Proprietorship may provide SS# or EIN#)
 Social Security Number - _____
 Employer Identification Number - _____

BUSINESS DESIGNATION

- | | |
|---|--|
| <input type="checkbox"/> Individual, Sole Proprietor, or Single-Member LLC | <input type="checkbox"/> C-Corporation |
| <input type="checkbox"/> S-Corporation | <input type="checkbox"/> Partnership |
| <input type="checkbox"/> Trust/Estate | <input type="checkbox"/> Governmental Entity |
| <input type="checkbox"/> Non-Profit Organization/501(a) | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Limited Liability Company: C = Corporation S = S Corporation P = Partnership | |
| <u>(Must Circle the appropriate Tax Classification)</u> | |

Exempt Payee Code (if any): _____
 (Exemption codes apply only to certain entities, not individuals; IRS W-9 instructions, page 3):

PRINCIPAL BUSINESS ACTIVITY (List Type of Service or Product Provided):

- MEDICAL SERVICES PROVIDER ATTORNEY/LEGAL SERVICES PROVIDER

CERTIFICATION Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person; and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. *The Internal Revenue Service does not require your consent to any provision of this document other than the certifications required to avoid back-up withholding.*

Signature: _____

Date: _____

EXHIBIT E

**INDEMNIFICATION
(Mandatory Bid Submittal Form)**

The Bidder / Proposer will indemnify and hold harmless the Owner, Georgetown County, South Carolina and their agents and employees from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance of the Work provided that any such claims, damages, loss, or expense is attributable to bodily injury, sickness, disease or death, injury to or destruction of tangible property, including the loss of use resulting there from, and is caused by any negligent or willful act or omission of the Bidder / Proposer, and anyone directly or indirectly employed by him/her or anyone for whose acts any of them may be liable.

In any and all claims against the Owner, Georgetown County, South Carolina or any of their agents and / or employees by an employee of the Bidder / Proposer, and anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way to the amount or type of damages, compensation or benefits payable by or for the Bidder / Proposer under the Worker's Compensation Acts, Disability Benefit Acts, or other employee benefit acts.

The obligation of the Bidder / Proposer under this paragraph shall not extend to the liability of Georgetown County, South Carolina or its agents and / or employees arising out of the reports, surveys, Change Orders, designs or Technical Specifications.

BIDDER / PROPOSER: _____

BY: _____

DATE: _____

TELEPHONE NO.: _____

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]

EXHIBIT F

**LIST OF PRIME AND SUBCONTRACTORS
(Mandatory Bid Submittal Form)**

The undersigned states that the following is a full and complete list of proposed prime contractor and subcontractors on this Project and the class of work to be performed by each, and that such list will not be added to nor altered without the written consent of the Owner.

**Prime Contractor, Subcontractor
Consultants and Address**

**Class of Work
to be Performed**

| | | |
|----|-------|-------|
| 1) | _____ | _____ |
| | _____ | _____ |
| 2) | _____ | _____ |
| | _____ | _____ |
| 3) | _____ | _____ |
| | _____ | _____ |
| 4) | _____ | _____ |
| | _____ | _____ |
| 5) | _____ | _____ |
| | _____ | _____ |
| 6) | _____ | _____ |
| | _____ | _____ |

Date: _____ **Firm Name:** _____

Signed: _____ **Title:** _____

EXHIBIT G

**STATEMENT OF EXPERIENCE OF THE BIDDER / PROPOSER
(Mandatory Bid Submittal Form)**

The Bidder / Proposer is requested to state below what work of similar scope and complexity he/she has successfully completed, and to provide references that will enable the Owner to judge his/her experience, skill and business standing and his/her ability to conduct the Work in conformance with the requirements of the Construction Contract Documents.

Project and Location

Reference

| | |
|-------------------|----------------|
| 1) _____ _____ | _____ _____ |
| 2) _____ _____ | _____ _____ |
| 3) _____ _____ | _____ _____ |
| 4) _____ _____ | _____ _____ |
| 5) _____ _____ | _____ _____ |
| 6) _____ _____ | _____ _____ |

Dated: _____ **Bidder / Proposer:** _____

Signed: _____

Title: _____

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]

EXHIBIT H - UNIT PRICE SCHEDULE

SEE ATTACHED UNIT PRICE BID FORMS

EXHIBIT H
Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project
Bid #18-041

County Borrow Area Shown on Drawings Made Available to the
Contractor for the Contractor's Use at the Contractor's Option
See Borrow Area Notes on Drawings for Borrow Area Use/Development Requirements

| Bid Item | Description | Estimated Quantity | Unit | Unit Price | Extended Total |
|----------|---|--------------------|------|------------|----------------|
| 1 | Bonds, Mobilization and Insurance | 1 | LS | | |
| 2 | Temporary Stormwater Management | 1 | LS | | |
| 3 | Silt Fence | 1,700 | LF | | |
| 4 | Temporary Diversion Ditch | 1,750 | LF | | |
| 5 | Stripping (CL3 Landfill Area) | 15 | AC | | |
| 6 | Clearing & Grubbing (CL3 Landfill Area) | 1.5 | AC | | |
| 7 | Remove and Replace Unsuitable Materials | 5,000 | CY | | |
| 8 | Geogrid Fabric for Foundation Improvement | 1,000 | SY | | |
| 9 | Subgrade Excavation & Structural Fill Placement | 12,000 | CY | | |
| 10 | Structural Fill Placement | 190,000 | CY | | |
| 11 | 24" Thick Low-Perm Clay Liner (1x10-5 cm/sec) | 51,650 | SY | | |
| 12 | Geosynthetic Clay Liner (GCL) | 51,650 | SY | | |
| 13 | 60 mil Textured HDPE Geomembrane Liner | 51,650 | SY | | |
| 14 | Geocomposite Drainage Net (GDN) | 51,650 | SY | | |
| 15 | 24" Thick Protective Cover Soil Layer | 51,650 | SY | | |
| 16 | LCS - 8" Diam. HDPE Pipe Collection Line | 2,410 | LF | | |
| 17 | LCS - 8" Diam. Pipe Tie-ins (new to exist.) | 5 | EA | | |
| 18 | LCS - HDPE Sideriser Piping System | 5 | EA | | |
| 19 | LCS - Leachate Pump System Valve Box & Components | 5 | EA | | |
| 20 | LCS - 4" Diameter HDPE Force Main | 3,200 | LF | | |
| 21 | Geomembrane Leak Location Survey | 1 | EA | | |
| 22 | Electrical Conduit | 3,150 | LF | | |
| 23 | 18" Thick Compacted ABC w/ 8 oz Geotextile | 4,100 | SY | | |
| 24 | 12" Thick Compacted ABC w/ 8 oz Geotextile | 1,550 | SY | | |
| 25 | Drop Inlet - Precast Structure | 1 | EA | | |
| 26 | Drop Inlet - 36" Diam. RCP w/ End Treatments | 190 | LF | | |
| 27 | Drop Inlet - Energy Dissipator | 1 | EA | | |

EXHIBIT H
Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project
Bid #18-041

County Borrow Area Shown on Drawings Made Available to the
Contractor for the Contractor's Use at the Contractor's Option
See Borrow Area Notes on Drawings for Borrow Area Use/Development Requirements

| Bid Item | Description | Estimated Quantity | Unit | Unit Price | Extended Total |
|------------------------------------|--|--------------------|------|------------|----------------|
| 28 | 24" RCP w/ End Treatments and Dissipators | 76 | LF | | |
| 29 | 6" Thick Unimat Fabric Formed Concrete Mat | 4,750 | SY | | |
| 30 | Landfill Cell Access Ramp w/ 24" RCP | 1 | EA | | |
| 31 | Edge of Liner Markers | 30 | EA | | |
| 32 | Seeding and Mulching | 7 | AC | | |
| 33 | Guardrail - Remove, Relocate and Re-Install | 1,100 | LF | | |
| 34 | Strip & Fine Grade Existing Cover (CL2 Landfill) | 77,000 | SY | | |
| 35 | Structural Fill Placement (CL2 Landfill) | 5,000 | CY | | |
| 36 | 24-inch Cover Soil (CL2 Landfill) | 77,000 | SY | | |
| 37 | Erosion Control Matting (CL2 Landfill) | 77,000 | SY | | |
| 38 | Seeding and Mulching (CL2 Landfill) | 16 | SY | | |
| 39 | Miscellaneous Work and Cleanup | 1 | LS | | |
| TOTAL BASE BID (ITEMS 1-39) | | | | | |

In words: _____

| ALTERNATE BID ITEM | | | | | |
|---|---|--------------------|------|------------|----------------|
| Bid Item | Description | Estimated Quantity | Unit | Unit Price | Extended Total |
| A-1 | Delete Items 11 and 12 and Replace with: 24" Thick Low-Perm Clay Liner (1x10 ⁻⁷ cm/sec) | 51,650 | SY | | |
| TOTAL ALTERNATE BID (ITEMS 1-10, 13-39, A-1) | | | | | |

In words: _____

May 2018

SECTION 00300

EXHIBIT H

BID INFORMATION QUESTIONNAIRE - BACKFILL, COMPACTED SOIL LINER,
PROTECTIVE COVER LAYER, FINAL COVER MATERIAL

FOR OFFSITE SOIL DOCUMENTATION

(Submit with necessary attachments
along with your bid documents)

(Please Type or Print)

THIS PAGE INTENTIONALLY LEFT BLANK

**BACKFILL
(SUBMIT ONE FORM FOR EACH SOURCE)**

1. FOR PROPOSED OFF-SITE BACKFILL, PLEASE PROVIDE THE FOLLOWING INFORMATION.

1A OFF-SITE SOURCE LOCATION (be precise)

1B HAS THE BORROW SOURCE MATERIAL BEEN TESTED?

Yes No (Please check one)

1C SOURCE SIZE: _____ ACRES

1D QUANTITY AVAILABLE: _____ CUBIC YARDS

1E HAS THE USE OF THE SOURCE BEEN APPROVED BY THE SOURCE OWNER?

Yes No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

1F HAS SOURCE BEEN VERIFIED BY A PROFESSIONAL ENGINEER TO COMPLY WITH PROJECT SPECIFICATIONS?

Yes No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

1G DOES SOURCE HAVE ALL APPLICABLE PERMITS AND ZONING APPROVALS?

EROSION CONTROL PERMIT Yes No NA

ZONING APPROVAL Yes No NA

MINING PERMIT Yes No NA
(Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

1H. NAME OF FIRM/CONTRACTOR RESPONSIBLE FOR INSTALLATION OF INFILTRATION LAYER:

**COMPACTED SOIL LINER
(SUBMIT ONE FORM FOR EACH SOURCE)**

2. FOR PROPOSED OFF-SITE COMPACTED SOIL LINER, PLEASE PROVIDE THE FOLLOWING INFORMATION.

2A PRIMARY OFF-SITE SOURCE LOCATION (be precise)

2B HAS THE BORROW SOURCE MATERIAL BEEN TESTED?

_____ Yes _____ No (Please check one)

2C SOURCE SIZE: _____ ACRES

2D QUANTITY AVAILABLE: _____ CUBIC YARDS

2E HAS THE USE OF THE SOURCE BEEN APPROVED BY THE SOURCE OWNER?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2F HAS SOURCE BEEN VERIFIED BY A PROFESSIONAL ENGINEER TO COMPLY WITH PROJECT SPECIFICATIONS?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2G DOES SOURCE HAVE ALL APPLICABLE PERMITS AND ZONING APPROVALS?

EROSION CONTROL PERMIT _____ Yes _____ No _____ NA

ZONING APPROVAL _____ Yes _____ No _____ NA

MINING PERMIT _____ Yes _____ No _____ NA
(Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2H. NAME OF FIRM RESPONSIBLE FOR INSTALLATION OF EROSION AND DRAINAGE LAYER:

**PROTECTIVE COVER
(SUBMIT ONE FORM FOR EACH SOURCE)**

2. FOR PROPOSED OFF-SITE PROTECTIVE COVER, PLEASE PROVIDE THE FOLLOWING INFORMATION.

2A PRIMARY OFF-SITE SOURCE LOCATION (be precise)

2B HAS THE BORROW SOURCE MATERIAL BEEN TESTED?

_____ Yes _____ No (Please check one)

2C SOURCE SIZE: _____ ACRES

2D QUANTITY AVAILABLE: _____ CUBIC YARDS

2E HAS THE USE OF THE SOURCE BEEN APPROVED BY THE SOURCE OWNER?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2F HAS SOURCE BEEN VERIFIED BY A PROFESSIONAL ENGINEER TO COMPLY WITH PROJECT SPECIFICATIONS?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2G DOES SOURCE HAVE ALL APPLICABLE PERMITS AND ZONING APPROVALS?

EROSION CONTROL PERMIT _____ Yes _____ No _____ NA

ZONING APPROVAL _____ Yes _____ No _____ NA

MINING PERMIT _____ Yes _____ No _____ NA
(Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2H. NAME OF FIRM RESPONSIBLE FOR INSTALLATION OF EROSION AND DRAINAGE LAYER:

**FINAL COVER
(SUBMIT ONE FORM FOR EACH SOURCE)**

2. FOR PROPOSED OFF-SITE FINAL COVER, PLEASE PROVIDE THE FOLLOWING INFORMATION.

2A PRIMARY OFF-SITE SOURCE LOCATION (be precise)

2B HAS THE BORROW SOURCE MATERIAL BEEN TESTED?

_____ Yes _____ No (Please check one)

2C SOURCE SIZE: _____ ACRES

2D QUANTITY AVAILABLE: _____ CUBIC YARDS

2E HAS THE USE OF THE SOURCE BEEN APPROVED BY THE SOURCE OWNER?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2F HAS SOURCE BEEN VERIFIED BY A PROFESSIONAL ENGINEER TO COMPLY WITH PROJECT SPECIFICATIONS?

_____ Yes _____ No (Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2G DOES SOURCE HAVE ALL APPLICABLE PERMITS AND ZONING APPROVALS?

EROSION CONTROL PERMIT _____ Yes _____ No _____ NA

ZONING APPROVAL _____ Yes _____ No _____ NA

MINING PERMIT _____ Yes _____ No _____ NA
(Please check one)

(IF YES, PLEASE INCLUDE A LETTER INDICATING APPROVAL)

2H. NAME OF FIRM RESPONSIBLE FOR INSTALLATION OF EROSION AND DRAINAGE LAYER:

END OF SECTION



EXHIBIT I

RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE

MANDATORY VENDOR SUBMITTAL FORM

WHEREAS, Georgetown County Council desires to further its support of local businesses when awarding contracts for the provision of supplies and construction services to the County through its established procurement procedures.

THEREFOR pursuant to Georgetown County, SC Ordinance #2014-02 as adopted, §2-50 Local Preference Option, the Georgetown County Purchasing Officer requests each offeror provide Residence Certification. The Local Preference Option provides some restrictions on the awarding of governmental contracts; provisions of which are stated below:

Sec 2-50. Local Preference Option

1. A vendor shall be deemed a Local Georgetown County vendor for the purposes of this Section if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the State, maintains an office in Georgetown County, and maintains a representative inventory or commodities within the County on which the bid is submitted, and has paid all taxes duly assessed.
2. This option allows the lowest local Bidder whose bid is within five-percent (5%) of the lowest non-local Bidder to match the bid submitted by the non-local Bidder and thereby be awarded the contract. This preference shall apply only when (a) the total dollar purchase is \$10,000 or more; (b) the vendor has a physical business address located and operating within the limits of Georgetown County and has been doing business in the County for a period of twelve (12) months or more; and (c) the vendor provides proof of payment of all applicable Georgetown County taxes and fees if so requested.
3. Should the lowest responsible and responsive Georgetown County bidder not exercise its right to match the bid as granted herein, the next lowest qualified Georgetown County bidder shall have that right and so on. The right to exercise the right to match the bid shall be exercised within 24 hours of notification of the right to match the non-Georgetown County bidder's bid.
4. In order to qualify for the local preference authorized by this Section, the vendor seeking same shall be required to submit with its bid a statement containing relevant information which demonstrates compliance with the provisions of this Section. This statement shall be on a form provided by the County purchasing department and shall be signed under penalty of perjury. Failure to provide such affidavit at the time the bidder submits its bid shall constitute a waiver of any claim for preference.

5. For all contracts for architecture, professional engineering, or other professional services governed by § 2-56, Architect-Engineer and Land Surveying Services – Public Announcement and Selection Process, the county shall include the local business status of a firm among the factors considered when selecting which firms are “most highly qualified.” In determining which firm is the “most qualified” for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.

6. Local preference shall not apply to the following categories of contracts:

- (a) Goods or services provided under a cooperative purchasing agreement or similar “piggyback” contract;
- (b) Contracts for professional services except as provided for in section five (§5) above;
- (c) Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference;
- (d) Purchases or contracts made pursuant to a noncompetitive award process, unless otherwise provided by this section; or
- (e) Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county council or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

I certify that [Company Name] _____ is a

Resident Bidder of Georgetown County as defined in Ordinance #2014-02, (see §1. above) and our local place of business within Georgetown County is: _____

I certify that [Company Name] _____ is a

Non-Resident Bidder of Georgetown County as defined in Ordinance #2014-02, and our principal place of business is _____ [City and State].

(X) _____

Signature of Company Officer

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]

EXHIBIT J

EXCEPTIONS PAGE

MANDATORY BID SUBMISSION FORM

List any areas where you cannot or will not comply with the specifications or terms contained within the bid documentation. If none, write "NONE".

END OF SECTION 00300



SECTION 00400

BID BOND

(Submit in duplicate – one (1) original and one (1) copy. Attach copies of Power of Attorney and Agent’s Current South Carolina license

STATE OF _____)

SS

COUNTY OF _____)

KNOW ALL MEN BY THESE PRESENTS that we, _____

as Principal, and _____ as Surety, are

held and firmly bound unto Georgetown County, hereinafter called the Owner,
in the sum of _____ Dollars

(\$ _____) for the payment of which sum well and

to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns,
jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2018 entered into a
certain Contract with the Owner, hereto attached, for Contract entitled

**#18-041, Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill
Closure Project**

NOW THEREFORE, If the Principal shall not withdraw said Bid within Ninety (90) calendar days after date of opening of the same, and shall within fifteen (15) calendar days after the prescribed forms are presented to him/her for signature, enter into a written Contract with the Owner in accordance with the Bid as accepted, and give a Performance Bond and a Payment Bond with good and sufficient surety or sureties, as required by the Contract Documents, for the faithful performance and proper fulfillment of such Contract and for the proper payment of all persons furnishing labor or materials in connection therewith, or in the event or withdrawal of said Bid within the period specified, or in the event of failure to enter into such Contract and give such Bonds within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said Bid and the amount of which the Owner may procure the required work and/or supplies, provided the latter amount be in excess of the former then the above obligations shall be void and of no effect; otherwise, to remain in full force and effect.

IN WITNESS WHEREOF, the Principal and Surety have hereunto caused this Bond to be duly executed and acknowledged by their appropriate officials as set forth below this _____ day of _____, 2018.

PRINCIPAL (If Sole Proprietor or Partnership)

(Firm Name)

ATTEST

By: _____
(SEAL)

Title (Sole Proprietor or Partner)

PRINCIPAL (If Corporation)

(Corporate Name)

By: _____
(President)

Attest: _____
(Secretary)

(Impress Corporate Seal)

COUNTERSIGNED BY
RESIDENT SOUTH CAROLINA
AGENT OF SURETY:

SURETY:

(Copy of Agent's current license
as issued by State of South Carolina
Insurance Commissioner

By: _____
Attorney-In-Fact
(Power of Attorney Must Be Attached)

(Impress Corporate Seal)

END OF SECTION 00400

SECTION 00500

CONTRACT

THIS CONTRACT made and entered into this _____ day of _____, 2018, by and between Georgetown County, hereinafter referred to as the "Owner", a body politic and corporate and political subdivision of the State of South Carolina, whose administrative address is: 129 Screven Street Georgetown, South Carolina 29442; and _____ hereinafter referred to as the "Contractor", a corporation formed and existing under the laws of the State of _____ and authorized to do business within the State of South Carolina, whose administrative address is:

WITNESSETH:

WHEREAS, the Owner has a project entitled **18-041, Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Projects** hereinafter referred to as the "Project", and;

WHEREAS, the Contractor has submitted the lowest responsible and responsive bid for the Project at \$ _____ and the Owner has awarded the Project to the Contractor; and

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, as well as other good and valuable consideration not specifically mentioned, the parties agree as follows:

1. The Contractor, for and in consideration of the payments hereinafter specified and agreed to be made by the Owner, hereby covenants and agrees to furnish and deliver all materials required, to do and perform all the work and labor, in a satisfactory and workmanlike manner, required to complete the Project within the time specified, in strict and entire conformity with the Construction Contract Documents, on file at the Office of the Purchasing Dept., Georgetown County, which are duly approved by the Owner and which said Project Manual, Drawings, Technical Specifications and other Contract Documents are hereby made part of this Contract as fully and with the same effects as if the same had been set forth at length in the body of this Contract.

2. The Contractor hereby agrees to indemnify, defend and hold the Owner and its agents, representatives and employees harmless from any and all liabilities, losses, damages, penalties, judgments, awards, claims, demands, costs, expenses, including reasonable attorney's fees and court costs, actions, lawsuits or other proceedings arising directly or indirectly, in whole or in part, out of the negligence or willful acts or omissions of the Contractor, its prime contractor, trade subcontractors and consultants or their respective agents, directors, officers or employees in connection with this Contract or in any way with the services or Work described herein, any occurrence at the Project site, or any occurrence arising in connection with or at the Project site or in connection with the Work, whether within or beyond the scope of its duties hereunder.

3. The Contractor's indemnity and defense obligations under this Contract shall be absolute notwithstanding any provision contained herein or elsewhere to the contrary, and shall survive Final Completion and Final Payment for a period equal to the statute of limitations for any action which could be brought against the Owner or its agents, officers, directors and employees and shall continue through the duration of any action brought during the applicable time periods.

4. Contractor agrees to indemnify, defend and hold the Owner and its agents, representatives, officers, directors and employees harmless from all costs, damages and expenses, including reasonable attorneys fees, incurred by the Owner and its consultants by virtue of any claim or claims filed by any trade prime or subcontractor, mechanic, laborer, or materialman making claims arising from the performance of the Work by, through, or under the Contractor, provided the Contractor has received from the Owner all amounts properly due under this Contract concerning the claim. The Contractor shall execute and deliver to the Owner's title insurer similar indemnifications or such other document as such title insurer shall reasonably request in order to protect it against lien claims from trade prime or subcontractors. The Contractor also hereby agrees to indemnify and hold harmless, protect and defend the Owner and its consultants from and against any liability, claim, judgment, loss or damage, including, but not limited, to direct damages, attorney's fees, court costs and expenses of collection, occasioned in whole or in part by

the sole failure of the Contractor, and its trade prime or subcontractors to comply with any of the terms or provisions of this Contract.

5. In any and all claims against the Owner by any employee of the Contractor or trade prime or subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 2 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any trade prime or subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6. The Owner hereby agrees to pay to the Contractor for the said work, when fully completed, the total sum of \$ _____ (the said sum being the total of the Contractor's bid, a copy of which is attached hereto and made a part hereof for all purposes), subject to such additions and deductions as may be provided for in the Contract Documents. In the event the Bid contains multiple pay items, it is understood that the amount to be paid shall be the total based on the unit prices, together with lump sum prices, contained in said bid, for the work actually completed. Payments on accounts will be made as provided for in the Contract Documents, Division 1, General Requirements, Section 01027, Application for Payment. The Contractor shall submit bills for fees or other compensation for services or expenses in detail sufficient for a proper pre-audit and post audit thereof. Any unit of provision of goods and services must be approved in writing by the Owner prior to payment.

7. The Owner may unilaterally cancel this Contract and the goods and services there under in the event that the Contractor fails and refuses to allow public access to all documents, papers, letters, or other material subject to the provisions of the applicable South Carolina Statutes, made or received by the Design/Builder in conjunction with this Contract.

8. The Construction Contract Documents provide the criteria and the final date for completion of the Work of the Project

9. This Contract has been executed by the parties prior to the rendering of any goods or services by the Contractor.

10. The Contractor shall provide a payment and performance bond (the Bond) to the Owner meeting the requirements of Applicable South Carolina Statute in the sum of \$ _____ and shall cause the Bond to be recorded with the Notice of Award in the Public Records of Georgetown County, South Carolina

11. This Contract shall be subordinate to any rule, regulation, order or law of the United States of America, or the State of South Carolina.

12. Contractor and its employees shall promptly observe and comply with then applicable provisions of all Federal, State and local laws, rules and regulations which govern or apply to the goods and services rendered by the Contractor hereunder, or to the wages paid by the Contractor to its employees. Contractor shall require all of its prime and subcontractors and consultants to comply with the provisions of this paragraph.

13. Contractor shall procure and keep in force during the term of this contract all necessary licenses, registrations, certificates, permits and other authorizations as are required by law in order for Contractor to render its services hereunder. Contractor shall require all of its prime and subcontractors and consultants to comply with the provisions of this paragraph.

14. All remedies provided in this Contract shall be deemed cumulative and additional and not in lieu of or exclusive of each other or of any other remedy available to any party at law or in equity. In the event one party shall prevail in any action (including appellate proceedings), at law or in equity arising hereunder, the losing party will pay all costs, expense, reasonable attorneys' fees and all other actual and reasonable expenses incurred in the defense and/or prosecution of any legal or arbitration proceedings, including, but not limited to, those for paralegal, investigate and legal support services and actual fees charged by expert witnesses for testimony and analysis, incurred by the prevailing party referable thereto.

15. Contractor represents and warrants unto Owner that no officer, employee or agent of Owner has any interest, either directly or indirectly, in the business of the Contractor to be conducted hereunder. Contractor further

represents and warrants to Owner that it has not employed or retained any company person, other than a bona fide employee working solely for Contractor, to solicit or secure this Contract, that it has not paid or agreed to any person, company, corporation, individual or firm, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of this Contract, and that it has not agreed, as an express or implied condition for obtaining this Contract, to employ or retain the services of any firm or person in connection with carrying out this Contract. Contractor assures that it will insert the above provision in each of its prime and subcontractor and consultant's agreements relating to the services to be performed hereunder.

16. The headings of the sections of this Contract are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.

17. This Contract, including all Contract documents, constitute the entire understanding and agreement between the parties and shall supersede and replace all prior agreements or understandings, written or oral, relating to the matters set forth herein.

18. This Contract shall not be amended or modified other than in writing signed by the parties hereto. Notwithstanding the foregoing, any Amendments that are not being paid for, in whole or in part, with funds granted by the United States of America or State of South Carolina need not be approved by them.

19. The validity, interpretation, construction and effect of this Contract shall be in accordance with and be governed by the laws of the State of South Carolina. In the event any provision hereof shall be finally determined to be unenforceable, or invalid, such unenforceability or invalidity shall not affect the remaining provisions of this Contract which shall remain in full force and effect.

21. Termination of Contract

- a) The Owner may, by written notice, terminate this Contract in whole or in part at any time, either for the Owner's convenience or because of failure to fulfill the Contract obligations. Upon receipt of such notice, services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performed this Contract, whether completed or in process, delivered to the Owner.
- b) Contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.
- c) If the termination is due to failure to fulfill the Contractor's obligations, the Owner may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the Owner for any additional cost occasioned to the Owner thereby.
- d) If, after notice of termination for failure to fulfill its Contract obligations, it is determined that the Contractor had not failed, the termination shall be deemed to have been effected for the convenience of the Owner. In such event, adjustment in the Contract price shall be made as provided in paragraph 21.a of this clause.
- e) The rights and remedies of the Owner provided in this clause are in addition to any other rights and remedies provided by law or under this Contract.

IN WITNESS WHEREOF, the Owner and Contractor hereto have signed and sealed this Contract on the day and date first above written in three counterparts, each deemed an original contract.

Georgetown County

Witness:

By: _____

Title: _____
Sample

Contractor

Witness:

By: _____

Title: _____

(SEAL)

END OF SECTION 00500

SECTION 00600

PERFORMANCE BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto Georgetown County, South Carolina hereinafter called the Obligee, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2018 entered into a certain Contract with the Owner, included herein, for the Contract entitled **Bid # 18-041 Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project** in Georgetown County, South Carolina.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract, and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation shall be void; otherwise, to remain in full force and effect.

Whenever the Principal shall be and is declared by the Owner to be in default under the Contract, or wherever the contract has been terminated by default of the Contractor, the Owner having performed the Owner's obligations hereunder, the Surety shall:

1. Complete the Contract in accordance with its terms and conditions, or at the Owner's sole option.
2. Obtain a Bid or Bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by the Owner and Surety of the lowest responsible Bidder, arrange for a Contract between such Bidder and the Owner, and made available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost completion less the balance of the Contract price but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term balance of the Contract price: as used in this paragraph, shall mean the total amount payable by the Owner to the Contractor under the Contract and any amendments thereto, less the amount properly paid by the Owner to the Contractor.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Owner named herein or the successors or assignees thereof.

In the case of termination of the Contract, as provided in the Contract Documents, there shall be assessed against the Principal and Surety herein, all expenses, including design/engineering, geo-technical, surveying, and legal services incidental to collecting losses to the Owner under this Bond.

This Bond shall remain in full force and effect for such period or periods of time after the date of acceptance of the project by the Owner as are provided for in the Contract Documents, and the Principal hereby guarantees to repair or replace for the said periods all work performed and materials and equipment furnished, which were not performed or furnished according to the terms of the Contract Documents. If no specific periods of warranty are stated in the Contract Documents for any particular item of work, material, or equipment, the Principal hereby guarantees the same for a minimum period of one (1) year from the date of final acceptance by the Owner.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the ____ day of _____, 2018.

PRINCIPAL

(Firm Name)

By: _____
WITNESS (Title)

SURETY

(Firm Name)

(Title) By: _____ WITNESS

END OF SECTION 00600

SECTION 00601
LABOR AND MATERIAL PAYMENT BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto Georgetown County, South Carolina hereinafter called the Obligees, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2018 entered into a certain Contract with the Owner, included herein, for Contract entitled **#18-041, Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project.**

NOW THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payments to all persons supplying labor, materials and supplies used directly or indirectly by said Principal or his Subcontractors in the prosecution of the work provided for in said Contract, then this obligations shall be void; otherwise to remain in full force and effect, subject, however, to the following conditions:

1. This bond is executed for the purpose of complying with the applicable State of South Carolina Statutes and all acts amendatory thereof, and this Bond shall inure to the benefit of any and all persons supplying labor, material and supplies used directly or indirectly by the Principal or his Subcontractors in the prosecution of the work provided for in said Contract so as to give such persons a right of action to recover upon this Bond in a separate suit brought on this Bond. No right of action shall accrue hereunder to or for the use of any person except as such right of action may be given and limited by the applicable State of South Carolina Statutes.
2. In each and every suit brought against the Principal and Surety upon this Bond in which the plaintiff shall be successful, there shall be assessed therein against the Principal and Surety herein, in favor of the Plaintiff therein, reasonable counsel fees, which the Principal and Surety hereby expressly agree to pay as a part of the cost and expense of said suit.
3. A claimant, except a laborer, who is not in privity with the Principal and who has not received payment for his labor, materials, or supplies, shall, within forty-five (45) calendar days after beginning to furnish labor, materials, or supplies for the prosecution of the work, furnish the Principal with a notice that he intends to look to the bond for protection.
4. A claimant who is not in privity with the Principal and who has not received payment for his labor, materials or supplies shall, within ninety (90) calendar days after performance of the labor or after complete delivery of the materials or supplies, deliver to the Principal and to the Surety written notice of the performance of the labor or delivery of the materials or supplies and of the non-payment.
5. No action for the labor, materials, or supplies may be instituted against the Principal or the Surety unless both notices have been given. No action shall be instituted against the Principal or the Surety on the bond after one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the _____ day of _____, 2018.

PRINCIPAL

(Firm Name)

(Witness)

By: _____

(Title)

SURETY

(Firm Name)

(Witness)

By: _____

(Title)

END SECTION 00601

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and



AMERICAN CONSULTING
ENGINEERS COUNCIL

Issued and Published Jointly By
 **National Society of
Professional Engineers**
Professional Engineers in Private Practice

ASCE
AMERICAN SOCIETY OF
CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General



Contractors of America

Construction Specifications Institute



These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-8-A-1 or 1910-8-A-2) (1996 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

Copyright ©1996

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Consulting Engineers Council
1015 15th Street N.W., Washington, DC 20005

American Society of Civil Engineers
345 East 47th Street, New York, NY 10017

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| ARTICLE 1 - DEFINITIONS AND TERMINOLOGY | 00700 - 6 |
| 1.01 <i>Defined Terms</i> | 00700 - 6 |
| 1.02 <i>Terminology</i> | 00700 - 8 |
| ARTICLE 2 - PRELIMINARY MATTERS | 00700 - 9 |
| 2.01 <i>Delivery of Bonds</i> | 00700 - 9 |
| 2.02 <i>Copies of Documents</i> | 00700 - 9 |
| 2.03 <i>Commencement of Contract Times; Notice to Proceed</i> | 00700 - 9 |
| 2.04 <i>Starting the Work</i> | 00700 - 9 |
| 2.05 <i>Before Starting Construction</i> | 00700 - 9 |
| 2.06 <i>Preconstruction Conference</i> | 00700 - 10 |
| 2.07 <i>Initial Acceptance of Schedules</i> | 00700 - 10 |
| ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE | 00700 - 10 |
| 3.01 <i>Intent</i> | 00700 - 10 |
| 3.02 <i>Reference Standards</i> | 00700 - 10 |
| 3.03 <i>Reporting and Resolving Discrepancies</i> | 00700 - 11 |
| 3.04 <i>Amending and Supplementing Contract Documents</i> | 00700 - 11 |
| 3.05 <i>Reuse of Documents</i> | 00700 - 11 |
| ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS | 00700 - 11 |
| 4.01 <i>Availability of Lands</i> | 00700 - 11 |
| 4.02 <i>Subsurface and Physical Conditions</i> | 00700 - 12 |
| 4.03 <i>Differing Subsurface or Physical Conditions</i> | 00700 - 12 |
| 4.04 <i>Underground Facilities</i> | 00700 - 13 |
| 4.05 <i>Reference Points</i> | 00700 - 13 |
| 4.06 <i>Hazardous Environmental Condition at Site</i> | 00700 - 14 |
| ARTICLE 5 - BONDS AND INSURANCE | 00700 - 15 |
| 5.01 <i>Performance, Payment, and Other Bonds</i> | 00700 - 15 |
| 5.02 <i>Licensed Sureties and Insurers</i> | 00700 - 15 |
| 5.03 <i>Certificates of Insurance</i> | 00700 - 15 |
| 5.04 <i>CONTRACTOR's Liability Insurance</i> | 00700 - 15 |
| 5.05 <i>OWNER's Liability Insurance</i> | 00700 - 16 |
| 5.06 <i>Property Insurance</i> | 00700 - 16 |
| 5.07 <i>Waiver of Rights</i> | 00700 - 17 |
| 5.08 <i>Receipt and Application of Insurance Proceeds</i> | 00700 - 18 |
| 5.09 <i>Acceptance of Bonds and Insurance; Option to Replace</i> | 00700 - 18 |
| 5.10 <i>Partial Utilization, Acknowledgment of Property Insurer</i> | 00700 - 18 |
| ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES | 00700 - 18 |
| 6.01 <i>Supervision and Superintendence</i> | 00700 - 18 |
| 6.02 <i>Labor; Working Hours</i> | 00700 - 19 |
| 6.03 <i>Services, Materials, and Equipment</i> | 00700 - 19 |
| 6.04 <i>Progress Schedule</i> | 00700 - 19 |
| 6.05 <i>Substitutes and "Or-Equals"</i> | 00700 - 19 |
| 6.06 <i>Concerning Subcontractors, Suppliers, and Others</i> | 00700 - 20 |
| 6.07 <i>Patent Fees and Royalties</i> | 00700 - 21 |
| 6.08 <i>Permits</i> | 00700 - 21 |
| 6.09 <i>Laws and Regulations</i> | 00700 - 22 |
| 6.10 <i>Taxes</i> | 00700 - 22 |
| 6.11 <i>Use of Site and Other Areas</i> | 00700 - 22 |
| 6.12 <i>Record Documents</i> | 00700 - 22 |
| 6.13 <i>Safety and Protection</i> | 00700 - 23 |
| 6.14 <i>Safety Representative</i> | 00700 - 23 |
| 6.15 <i>Hazard Communication Programs</i> | 00700 - 23 |

| | | |
|--|--|------------|
| 6.16 | <i>Emergencies</i> | 00700 - 23 |
| 6.17 | <i>Shop Drawings and Samples</i> | 00700 - 23 |
| 6.18 | <i>Continuing the Work</i> | 00700 - 24 |
| 6.19 | <i>CONTRACTOR's General Warranty and Guarantee</i> | 00700 - 25 |
| 6.20 | <i>Indemnification</i> | 00700 - 25 |
| ARTICLE 7 - OTHER WORK | | 00700 - 26 |
| 7.01 | <i>Related Work at Site</i> | 00700 - 26 |
| 7.02 | <i>Coordination</i> | 00700 - 26 |
| ARTICLE 8 - OWNER'S RESPONSIBILITIES | | 00700 - 26 |
| 8.01 | <i>Communications to Contractor</i> | 00700 - 26 |
| 8.02 | <i>Replacement of ENGINEER</i> | 00700 - 26 |
| 8.03 | <i>Furnish Data</i> | 00700 - 26 |
| 8.04 | <i>Pay Promptly When Due</i> | 00700 - 26 |
| 8.05 | <i>Lands and Easements; Reports and Tests</i> | 00700 - 26 |
| 8.06 | <i>Insurance</i> | 00700 - 27 |
| 8.07 | <i>Change Orders</i> | 00700 - 27 |
| 8.08 | <i>Inspections, Tests, and Approvals</i> | 00700 - 27 |
| 8.09 | <i>Limitations on OWNER's Responsibilities</i> | 00700 - 27 |
| 8.10 | <i>Undisclosed Hazardous Environmental Condition</i> | 00700 - 27 |
| 8.11 | <i>Evidence of Financial Arrangements</i> | 00700 - 27 |
| ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION | | 00700 - 27 |
| 9.01 | <i>OWNER'S Representative</i> | 00700 - 27 |
| 9.02 | <i>Visits to Site</i> | 00700 - 27 |
| 9.03 | <i>Project Representative</i> | 00700 - 27 |
| 9.04 | <i>Clarifications and Interpretations</i> | 00700 - 28 |
| 9.05 | <i>Authorized Variations in Work</i> | 00700 - 28 |
| 9.06 | <i>Rejecting Defective Work</i> | 00700 - 28 |
| 9.07 | <i>Shop Drawings, Change Orders and Payments</i> | 00700 - 28 |
| 9.08 | <i>Determinations for Unit Price Work</i> | 00700 - 28 |
| 9.09 | <i>Decisions on Requirements of Contract Documents and Acceptability of Work</i> | 00700 - 28 |
| 9.10 | <i>Limitations on ENGINEER's Authority and Responsibilities</i> | 00700 - 28 |
| ARTICLE 10 - CHANGES IN THE WORK; CLAIMS | | 00700 - 29 |
| 10.01 | <i>Authorized Changes in the Work</i> | 00700 - 29 |
| 10.02 | <i>Unauthorized Changes in the Work</i> | 00700 - 29 |
| 10.03 | <i>Execution of Change Orders</i> | 00700 - 29 |
| 10.04 | <i>Notification to Surety</i> | 00700 - 29 |
| 10.05 | <i>Claims and Disputes</i> | 00700 - 30 |
| ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK | | 00700 - 30 |
| 11.01 | <i>Cost of the Work</i> | 00700 - 30 |
| 11.02 | <i>Cash Allowances</i> | 00700 - 32 |
| 11.03 | <i>Unit Price Work</i> | 00700 - 32 |
| ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES | | 00700 - 33 |
| 12.01 | <i>Change of Contract Price</i> | 00700 - 33 |
| 12.02 | <i>Change of Contract Times</i> | 00700 - 33 |
| 12.03 | <i>Delays Beyond CONTRACTOR's Control</i> | 00700 - 33 |
| 12.04 | <i>Delays Within CONTRACTOR's Control</i> | 00700 - 34 |
| 12.05 | <i>Delays Beyond OWNER's and CONTRACTOR's Control</i> | 00700 - 34 |
| 12.06 | <i>Delay Damages</i> | 00700 - 34 |
| ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK | | 00700 - 34 |
| 13.01 | <i>Notice of Defects</i> | 00700 - 34 |
| 13.02 | <i>Access to Work</i> | 00700 - 34 |
| 13.03 | <i>Tests and Inspections</i> | 00700 - 34 |
| 13.04 | <i>Uncovering Work</i> | 00700 - 35 |
| 13.05 | <i>OWNER May Stop the Work</i> | 00700 - 35 |
| 13.06 | <i>Correction or Removal of Defective Work</i> | 00700 - 35 |

| | | |
|---|--|------------|
| 13.07 | <i>Correction Period</i> | 00700 - 35 |
| 13.08 | <i>Acceptance of Defective Work</i> | 00700 - 36 |
| 13.09 | <i>OWNER May Correct Defective Work</i> | 00700 - 36 |
| ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION | | 00700 - 36 |
| 14.01 | <i>Schedule of Values</i> | 00700 - 36 |
| 14.02 | <i>Progress Payments</i> | 00700 - 37 |
| 14.03 | <i>CONTRACTOR's Warranty of Title</i> | 00700 - 38 |
| 14.04 | <i>Substantial Completion</i> | 00700 - 38 |
| 14.05 | <i>Partial Utilization</i> | 00700 - 39 |
| 14.06 | <i>Final Inspection</i> | 00700 - 39 |
| 14.07 | <i>Final Payment</i> | 00700 - 39 |
| 14.08 | <i>Final Completion Delayed</i> | 00700 - 40 |
| 14.09 | <i>Waiver of Claims</i> | 00700 - 40 |
| ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION | | 00700 - 40 |
| 15.01 | <i>OWNER May Suspend Work</i> | 00700 - 40 |
| 15.02 | <i>OWNER May Terminate for Cause</i> | 00700 - 40 |
| 15.03 | <i>OWNER May Terminate For Convenience</i> | 00700 - 41 |
| 15.04 | <i>CONTRACTOR May Stop Work or Terminate</i> | 00700 - 41 |
| ARTICLE 16 - DISPUTE RESOLUTION | | 00700 - 41 |
| 16.01 | <i>Methods and Procedures</i> | 00700 - 41 |
| ARTICLE 17 - MISCELLANEOUS | | 00700 - 42 |
| 17.01 | <i>Giving Notice</i> | 00700 - 42 |
| 17.02 | <i>Computation of Times</i> | 00700 - 42 |
| 17.03 | <i>Cumulative Remedies</i> | 00700 - 42 |
| 17.04 | <i>Survival of Obligations</i> | 00700 - 42 |
| 17.05 | <i>Controlling Law</i> | 00700 - 42 |

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the

Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

SC 12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

SC 28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

SC 30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

SC 41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

SC 43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

46. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases,

steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

SC 51. - 63. ADDED

1.02 Terminology

A. Intent of Certain Terms or Adjectives

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The

use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. Day

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. Defective

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. Furnish, Install, Perform, Provide

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 Delivery of Bonds

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 Copies of Documents

SC A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

SC A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 Starting the Work

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 Before Starting Construction

A. **CONTRACTOR's Review of Contract Documents:** Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. **Preliminary Schedules:** Within ten days after the Effective Date of the Agreement (unless otherwise specified

in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and
3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

SC C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

SC A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

SC A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids),

except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

SC C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

SC B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

SC C. ADDED

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

SC 2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *Reference Points*

SC A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property

monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous

Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing

in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements

of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

SC A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04 *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

SC 1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

SC 5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be

correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

SC 7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

SC C. ADDED

5.05 OWNER's Liability Insurance

SC A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

SC 5.06 Property Insurance

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work

at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 Waiver of Rights

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion

pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 Receipt and Application of Insurance Proceeds

SC A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09 Acceptance of Bonds and Insurance; Option to Replace

SC A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required

of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 Partial Utilization, Acknowledgment of Property Insurer

SC A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 Supervision and Superintendence

SC A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 Labor; Working Hours

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

SC B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 Services, Materials, and Equipment

SC A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

SC B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 Progress Schedule

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with

any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 Substitutes and "Or-Equals"

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. "Or-Equal" Items: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under

paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly

required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

SC A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or

entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

SC D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor

or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

SC A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits

and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10 *Taxes*

SC A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not

unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work

Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

SC B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties and

responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample

submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop

Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *Resubmittal Procedures*

1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except

as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 CONTRACTOR's General Warranty and Guarantee

SC A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or
2. normal wear and tear under normal usage.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by ENGINEER;
2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;
3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;
4. use or occupancy of the Work or any part thereof by OWNER;
5. any acceptance by OWNER or any failure to do so;
6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;
7. any inspection, test, or approval by others; or
8. any correction of defective Work by OWNER.

6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from

and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

SC 2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

SC B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

A. OWNER shall promptly furnish the data required of OWNER under the Contract Documents.

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations

and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.06 Insurance

SC A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 Change Orders

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 Inspections, Tests, and Approvals

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 Limitations on OWNER's Responsibilities

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

8.10 Undisclosed Hazardous Environmental Condition

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 Evidence of Financial Arrangements

SC A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 OWNER'S Representative

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 Visits to Site

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03 Project Representative

SC A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another

representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of paragraph 10.05.

9.09 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority

or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

SC A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change

Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

SC 1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

SC c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable,

and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

SC j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be

considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allow-

ances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

SC C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE;
CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee*: The CONTRACTOR's fee for overhead and profit shall be determined as follows:

SC 1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no

fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by

Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or
2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

SC B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

**ARTICLE 13 - TESTS AND INSPECTIONS;
CORRECTION, REMOVAL OR ACCEPTANCE OF
DEFECTIVE WORK**

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given

to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

SC A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

SC B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;
2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and
3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

13.05 *OWNER May Stop the Work*

SC A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop

the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that

item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *OWNER May Correct Defective Work*

SC A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In

connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

SC D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests,

revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Written Amendment or Change Orders;
- c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or
- d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

SC 1. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02:D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

- a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;
- c. there are other items entitling OWNER to a set-off against the amount recommended; or
- d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld.

OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

SC A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

SC A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibility.

ties pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

SCA. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will promptly make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

SC 14.07 *Final Payment*

A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. *Review of Application and Acceptance*

1. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

SCA. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *OWNER May Suspend Work*

SCA. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 *OWNER May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

SC2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

SC4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate

the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of

engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *CONTRACTOR May Stop Work or Terminate*

SC A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

SC A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

SCA. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement.

17.05 *Controlling Law*

SCA. This Contract is to be governed by the law of the state in which the Project is located.

SECTION 00750

SUMMARY SCHEDULE AND KEY MILESTONES

1.1 GENERAL

1.2 THIS SECTION INCLUDES

- A. Summary Submittals
- B. Key Milestones
- C. Base Bid Summary Schedule
- D. Alternate Summary Schedule (If Applicable)

1.3 SUMMARY SCHEDULE

- A. Summary Schedules referred to in this section will be developed by the Contractor illustrating an approach to planning and constructing the project. The activities to be shown on the schedules will be monitored and updated.
- B. Milestones shown on the Summary Schedules will be “Key Milestones” and are to be included in the Contractor’s Contract Schedule.

1.4 KEY MILESTONES

- A. Key Milestones shall be included in all Contractor Schedules and show completing on the intermediate dates shown in this Section.
- B. Key Milestones are a contractual requirement and liquidated damages will be assessed for each Key Milestone that completes beyond the dates listed below.
- C. Key Milestones for the Base Bid are as follows:

Substation Completion: 180 calendar days from Notice to Proceed

Final Completion: 210 calendar days from Notice to Proceed.

END OF SECTION 00750

SECTION 00800
SUPPLEMENTARY CONDITIONS

TABLE OF CONTENTS

PART I - AMENDMENTS TO GENERAL CONDITIONS

| <u>Article Number</u> | <u>Title</u> |
|---------------------------|--|
| 1 | DEFINITIONS AND TERMINOLOGY |
| 2 | PRELIMINARY MATTERS |
| 3 | CONTRACT DOCUMENTS; INTENT, AMENDING, REUSE |
| 4 | AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS |
| 5 | BONDS AND INSURANCE |
| 6 | CONTRACTOR'S RESPONSIBILITIES |
| 7 | OTHER WORK |
| 8 | OWNER'S RESPONSIBILITIES |
| 9 | ENGINEER'S STATUS DURING CONSTRUCTION |
| 10 | CHANGES IN THE WORK; CLAIMS |
| 11 | COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK |
| 12 | CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES |
| 13 | TESTS AND INSPECTION; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK |
| 14 | PAYMENTS TO CONTRACTOR AND COMPLETION |
| 15 | SUSPENSION OF WORK AND TERMINATION |
| 16 | DISPUTE RESOLUTION |
| 17 | MISCELLANEOUS |

PART I - AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC Document No. 1910-8, 1996 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01.A.12

Insert the following in the first sentence after the word "include":

Invitation to Bid, Instructions to Bidders,

SC-1.01.A.28

Delete paragraph 1.01.A.28 in its entirety and replace with the following:

The written notice by Owner to the apparent successful bidder stating that upon completion by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, if OWNER decides to proceed with the Work, Owner will sign and deliver the Agreement to the CONTRACTOR. However, the Notice of Award shall not be construed as an agreement, meeting of the minds, contract, or any other legal obligation between the OWNER and CONTRACTOR. Until the CONTRACTOR receives a Notice to Proceed from the OWNER, the CONTRACTOR has no remedy against the OWNER.

SC-1.01.A.30

Insert the following at the end of paragraph 1.01.A.30:

Georgetown County is OWNER.

SC-1.01.A.41

Delete paragraph 1.01.A.41 in its entirety and replace with the following:

41. Specifications - Sections included under Division 1 through Division 16 of the Project Manual.

SC-1.01.A.43

Delete paragraph 1.01.A.43 in its entirety and replace with the following:

Substantial completion shall mean that all of the work has been completed and opened to OWNER'S use except for minor incomplete or unsatisfactory work items that do not materially impair the OWNER's use and that the remaining work required by the

Contract has a Contract Price of less than five percent of the then adjusted total Contract Price.

SC-1.01.A.50

Add the following after paragraph 1.01.A.50:

SC-1.01.A.51

51. *Compensable Delay* - Any delay beyond the control and without the fault or negligence of the CONTRACTOR resulting from OWNER-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by OWNER.

SC-1.01.A.52

52. *Excusable Delay* - Any delay beyond the control and without the fault or negligence of the CONTRACTOR, the OWNER, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, acts of interveners, acts of government other than the OWNER, fires, floods, epidemics, quarantine restrictions, freight embargos, and hurricanes, tornadoes, or new sink holes.

SC-1.01.A.53

53. *Inexcusable Delay* - Any delay caused either (i) by events or circumstances within the control of the CONTRACTOR, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the CONTRACTOR, or (ii) by weather conditions (other than hurricanes and tornadoes) or labor disputes.

SC-1.01.A.54

54. *Nonprejudicial Delay* - Any delay impacting a portion of the Work within the available total float or slack time, as that term is used in Section 01310 and not necessarily preventing completion of the Work within the Contract Time.

SC-1.01.A.55

55. *Prejudicial Delay* - Any excusable or compensable delay impacting the Work and exceeding the total float available in the progress schedule, thus preventing completion of the Work within the Contract Time unless the Work is accelerated.

SC-1.01.A.56

56. *Preoperational Testing* - All field inspections, installation checks, water tests, performance tests, and necessary corrections required of CONTRACTOR to demonstrate that individual components of the Work have been properly constructed and do operate in accordance with the Contract Documents for their intended purposes.

SC-1.01.A.57

57. *Start-Up Testing* - A predefined trial period required for achieving substantial completion during which CONTRACTOR is to operate the entire Work (or any part thereof agreed to by the OWNER) under actual and simulated operating conditions for the purpose (i) of making such minor adjustments and changes to the Work as may be necessary for the Work to comply with the Contract Documents and (ii) to comply with the final test requirements in the Contract Documents.

SC-1.01.A.58

58. *Float or Slack Time* - The time available in the progress schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

SC-1.01.A.59

59. *Georgetown County* – Same as OWNER

SC-1.01.A.60

60. *Consultant* - Same as Engineer.

SC-1.01.A.61

61. *Work Directive Change* - Same as Work Change Directive.

SC-1.01.A.62

62. *Acceptance* - By the OWNER of the Work as being fully complete in accordance with the Contract Documents subject to waiver of claims.

SC-1.01.A.63

63. *Bidder* - Any person, firm or corporation submitting a bid for the Work.

ARTICLE 2. PRELIMINARY MATTERS

SC-2.02.A

Delete "ten" in the first line and replace with three.

SC-2.03.A

Delete paragraph 2.03.A in its entirety and replace with the following:

2.03.A A Notice to Proceed may be given at any time within thirty days after the Effective Date of the Agreement. The Contract Time will commence at the time specified in such notice or, if noticed is not given, thirty days following the Effective Date of Agreement, provided that the Notice to Proceed may not specify a time of commencement later than 60 days after the Effective Date of the Agreement. However, the CONTRACTOR has no rights or remedies arising from execution of the agreement prior to receiving a Notice to Proceed from the OWNER or ENGINEER.

SC-2.05.C

Delete paragraph 2.05.C in its entirety and replace with the following:

2.05.C. Before any Work at the site is started, CONTRACTOR shall deliver to OWNER, with copies to ENGINEER and each additional insured identified in Article 5 of the Supplementary Conditions, certificates of insurance (and other evidence requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with the requirements of Article 5.

SC-2.07.A

Delete "Engineer" throughout paragraph 2.07.A and replace with "Engineer and Owner".

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01.A

Add a new paragraph immediately after Paragraph 3.01.A, which is to read as follows:

3.01.A.1 Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.01.C

Add a new paragraph immediately after paragraph 4.01.C, which is to read as follows:

4.01.D If all lands and right-of-ways are not obtained as herein contemplated before construction begins, CONTRACTOR shall begin the Work upon such land and right-of-ways as OWNER has previously acquired and no claim for damages whatsoever will be allowed by reason of delay in obtaining the remaining lands and right-of-way. Should OWNER be prevented or enjoined from proceeding with the Work, or from

authorization its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or right-of-ways for the Work, CONTRACTOR shall not be entitled to make or assert claim for damage by reason or said delay, or to withdraw from the Agreement except by consent of OWNER.

Time of completion of the Work will be extended as provided in Article 12, to such time OWNER determines will compensate for the time lost by such delay.

SC-4.02.B

Delete "Supplementary Conditions" from the sixth line and replace with "Specifications and Contract Drawings".

SC-4.02.C

Add the following new paragraph immediately after paragraph 4.02.B, which is to read as follows:

C. In the preparation of Drawings and Specifications, the ENGINEER has relied upon the following reports of explorations and tests of subsurface conditions at the Site:

1. None

D. Copies of reports itemized in SC-4.02.C that are not included with Bidding Documents may be purchased from the ENGINEER's office during regular business hours. These reports are not part of the Contract Documents, but the "technical data" contained herein upon which the CONTRACTOR may rely as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER in preparation of Drawings and Specifications.

SC-4.04.B.2

Add the following to the end of the second sentence of Paragraph 4.04.B.2:

"and if the existing underground facility requires relocation and is not covered by other Lump Sum or Unit Price items of Work".

SC-4.05.A

Add a new paragraph immediately after paragraph 4.05.A, which is to read as follows:

4.05.B ENGINEER may check the lines, elevations, reference marks, batter boards, etc., set by CONTRACTOR, and CONTRACTOR shall correct any errors disclosed by such check. Such a check shall not be considered as approval of CONTRACTOR'S work and shall not relieve CONTRACTOR of the responsibility for accurate construction of the entire Work. CONTRACTOR shall furnish personnel to assist ENGINEER in checking lines and grades.

ARTICLE 5. BONDS AND INSURANCE

SC-5.03.A

Add a new paragraph immediately after paragraph 5.03.A, which is to read as follows:

5.03.B Wherever in this Article the terms "The Insured" and OWNER occurs with respect to coverage in a policy, it shall mean the OWNER and its agent and agencies, all municipalities where work is being performed under the Contract, the ENGINEER, and any other parties specifically designated herein, who shall be named as insured in each policy issues. The insurance policies required herein shall not contain any Third Party Beneficiary Exclusion.

The CONTRACTOR shall not commence work under the Contract until he has obtained all insurance required under this Article and such insurance has been approved by the OWNER, nor shall the CONTRACTOR allow any Subcontractor to commence work on his Subcontract until all similar insurance required of the Subcontractor has been so obtained and approved.

Provisions of some types of insurance by a Subcontractor may be waived, at the option of the OWNER, where it is deemed that adequate coverage is provided by the CONTRACTOR'S insurance. Subcontractors must, in all cases, provide Workmen's Compensation and Employer's Liability Insurance and Motor Vehicle Liability Insurance.

An authorized representative of the insurance company(ies) shall certify that all of the required insurance coverages and amounts specified hereinafter are provided by the submitted policies. The certification shall be signed by the authorized representatives of the insurance company(ies) shall specifically indicate with the submittal which of the policies submitted fulfill which specific coverage and amounts specified under Article 5.4 and 5.5 of the Supplementary Conditions. The certification statement and correlation shall be furnished and included with the insurance certificates.

One (1) copy of each such insurance policy and certificates indicating each type of coverage mentioned, and the correlation between the insurance furnished and that required, shall be filed with each of the Insured.

All policies relating to the Contract shall be so written that each of The Insured shall be notified by the carrier of cancellation or change at least sixty (60) days prior to the effective date of such cancellation or change. Renewal certificates covering the renewal of all policies expiring during the lift of the Contract shall be filed with each of The Insured not less than sixty (60) days before the expiration of such policies. The insurance carrier shall notify each of The Insured of the filing of any claims within thirty (30) days of the filing of such claim.

SC-5.04.B.1

Add a new paragraph immediately after paragraph 5.04.B.1, which is to read as follows:

5.04.B.1.a The following entities are “additional insured as their interest may appear” including their respective officers, directors, agents, and employees: ENGINEER: Garrett and Moore, Inc., and any subconsultants to the ENGINEER, including their respective offices, directors, agents, and employees, to be named during the execution of this Contract.

SC-5.04.B.5

Delete the words “to whom a certificate of insurance has been issued” from the six and seventh lines.

SC-5.04.B.7

Delete the words “to whom a certificate of insurance has been issued” from the six and seventh lines.

5.04.B.7.b With respect to all insurance required by this paragraph 5.04, CONTRACTOR agrees to waive all rights of subrogation against OWNER, ENGINEER, and each additional insured identified in the Supplemental Conditions.

5.04.B.7.c In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, CONTRACTOR shall purchase and maintain for OWNER at CONTRACTOR’S expense OWNER’s Protective Liability insurance naming OWNER as the named insured with ENGINEER and ENGINEER’s consultants as additional insured.

5.04.B.7.c.1 Said insurance will protect said parties against claims which may arise from operations under the Contract Documents. This coverage shall be in the same company, which provides CONTRACTOR’s liability insurance coverage, and it the same minimum amounts.

5.04.B.7.c.2 The following entities are “additional insured as their interest may appear” including their respective officers, directors, agents, and employees: ENGINEER: Garrett and Moore, Inc., and any subconsultants to the ENGINEER, including their respective offices, directors, agents, and employees, to be named during the execution of this Contract.

SC-5.06

Delete paragraphs 5.06.A, 5.06.B, 5.06.C, and 5.06.E in their entirety without replacing.

SC-5.07

Delete paragraphs 5.07.A, 5.07.B, and 5.07.C, in their entirety without replacing.

SC-5.08.A

Delete paragraphs 5.08.A and 5.08.B in their entirety without replacing.

SC-5.09.A

Delete paragraph 5.09.A in its entirety without replacing.

SC-5.10.A

Delete paragraph 5.10.A in its entirety without replacing.

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.01.A

Add the following at the end of paragraph 6.01.A:

CONTRACTOR is responsible for coordination with their Subcontractors, other project contractors, the OWNER and the ENGINEER.

SC-6.02.B

Add the following to the beginning of the first sentence of paragraph 6.02.B:

In the absence of any Federal, State or local laws, regulations or covenants and, ...

SC-6.02.B

Add new paragraphs immediately after paragraph 6.02.B, which are to read as follows:

6.02.B.1 Regular working hours are defined as 10 hours per day, Monday through Friday, excluding holidays, between the hours of 7 AM and 7 PM. Requests to work other than regular working hours shall be submitted to ENGINEER not less than 48 hours prior to any proposed additional daily working hours, weekend work, or scheduled extended work weeks. All requests to work other than regular working hours must comply with all applicable regulation and ordinances. Requests will be reviewed by ENGINEER and ENGINEER will either (1) deny request or (2) provide CONTRACTOR with terms for additional engineering and/or inspection costs to be paid for by CONTRACTOR as a result of overtime work in excess of the regular working hours. CONTRACTOR shall agree to the ENGINEER's terms prior to ENGINEER approving CONTRACTOR's request to work other than regular working hours.

6.02.B.2. CONTRACTOR shall reimburse the OWNER for additional engineering and/or inspection costs incurred as a result of overtime work in excess of the regular working hours stipulated in Article SC-6.02.B.1. At OWNER'S option, overtime costs may either be deducted from the CONTRACTOR'S monthly payment request or deducted from the CONTRACTOR'S retention prior to release of final payment. Overtime costs for the OWNER'S personnel shall be based on the individual's current overtime wage rate and expenses. Overtime costs for personnel employed by the ENGINEER shall be as follows:

Resident Project Representative \$75.00 per hour

Registered Professional Engineer (PE) \$140.00 per hour

6.02.B.3. CONTRACTOR shall employ only competent persons to do the work and whenever OWNER shall notify CONTRACTOR, in writing, that any person on the Work appears to be incompetent, disorderly, or otherwise unsatisfactory, such person shall be removed from the PROJECT and shall not again be employed except with the consent of OWNER.

SC-6.03.A

Add a new paragraph immediately after paragraph 6.03.A, which is to read as follows:

6.03.A.1 Where all Work requires equipment be furnished, due to the lack of standardization of equipment as produced by various manufacturers, it may become necessary to make minor modifications in the structures, buildings, piping, to accommodate the particular equipment offered. CONTRACTOR'S bid price for any equipment offered shall include the cost of making any necessary changes subject to the approval of ENGINEER.

SC-6.03B

Add a new sentence after the first sentence in paragraph 6.03.B, which is to read as follows:

All items of standard equipment shall be of the latest model at the time of delivery.

SC-6.06.A

Delete Paragraphs 6.06.A and 6.06.B in their entirety and replace with the following:

6.06.A CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom OWNER may have reasonable objection. Acceptance of any Subcontractor, other person or organization by OWNER shall not constitute a waiver of any right of OWNER to reject defective Work. CONTRACTOR shall not be required to employ any Subcontractor, other person or organization against whom CONTRACTOR has reasonable objection.

SC-6.06.D

Add a new paragraph at the end of section 6.06.D, which is to read as follows:

6.06.D.1 OWNER or ENGINEER may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, information about amounts paid on their behalf to CONTRACTOR in accordance with CONTRACTOR'S Applications for Payment.

SC-6.07.A

Delete 6.07.A in its entirety and replace with the following:

6.07.A Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work of any invention, design, process, products or device which is the subject of patent rights or copyrights held by others. CONTRACTOR shall indemnify and hold harmless OWNER and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses, including attorney's fees, arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or furnished by him in fulfillment of the requirements of this Contract. In the event of any claim or action by law on account of such patents or fees, it is agreed that the OWNER may retain out of the monies which are or which may become due the CONTRACTOR under this Contract, a sum of money sufficient to protect itself against loss, and to retain the same until said claims are paid or are satisfactorily adjusted.

SC-6.10.A

Delete paragraph 6.10.A in its entirety and replace with the following:

6.10.A The following procedure in handling the South Carolina Sales Tax is applicable to this Project. CONTRACTORS shall comply fully with the requirements outlined hereinafter, in order that the OWNER may recover the amount of tax permitted under the law.

6.10.A.1 It shall be the CONTRACTOR'S responsibility to furnish the OWNER documentary evidence showing the materials used and sales tax paid by the CONTRACTOR and each of his Subcontractors with each payment request in a format approved by the OWNER.

6.10.A.2 The documentary evidence shall consist of a certified statement, by the CONTRACTOR and each of his Subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes paid each vendor. Certified statements must show the invoice number or numbers, covered and inclusive dates of such invoices.

6.10.A.3 Materials used from the CONTRACTOR'S or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.

6.10.A.4 The CONTRACTOR shall not be required to certify the Subcontractor's tax statements.

6.10.A.5 The documentary evidence to be furnished to OWNERS eligible for sales or use tax refunds covers sales taxes paid on building materials, supplies, fixtures, and equipment which become a part of or annex to buildings or structures being erected, altered or repaired under Contracts with such institutions, organizations or governmental units.

SC-6.13.B

Add a new paragraph immediately after paragraph 6.13.B, which is to read as follows:

6.13.C Until final acceptance of the work by the ENGINEER, as evidenced in writing, the CONTRACTOR shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by action of the elements, or from other causes, whether arising from the execution or from the non-execution of the work. Unless otherwise provided in these specifications, the CONTRACTOR shall rebuild, restore and make good all injuries or damages to any portion of the work occasioned by any cause before final acceptance and shall bear the expense thereof.

SC-6.19.A

After the first sentence of paragraph 6.19.A add the following:

"All materials or equipment delivered to the site shall be accompanied by certificates, signed by an authorized officer of the supplier, and notarized guaranteeing that the materials or equipment conform to specification requirements. Such certificates shall be immediately turned over to the ENGINEER. Materials or equipment delivered to the site without such certificates will be subject to rejection."

SC-6.20.A.2

Delete the work "negligent" from the first line.

SC-6.20.A.2

Add the following to the end of paragraph 6.20.A.2:

If through the acts of neglect on the part of CONTRACTOR, any other CONTRACTOR or any Subcontractor shall suffer loss or damage on the Work, CONTRACTOR shall settle with such other CONTRACTOR or Subcontractor by agreement or arbitration if such other CONTRACTOR or Subcontractor will so settle. If such other CONTRACTOR or Subcontractor shall assert any claim against OWNER on account of any damage alleged to have been sustained, OWNER shall notify CONTRACTOR, who shall indemnify and save harmless OWNER against any such claims.

SC-6.20.A.2

Add a new paragraph immediately after paragraph 6.20.A.2, which is to read as follows:

6.20.A.3 It is understood and agreed between the parties that the Owner is in no way connected with the actual performance of this contract on the part of the CONTRACTOR, nor as to the employment of labor or the incurring of other expenses; that the CONTRACTOR is an independent contractor in the performance of each and every part of this contract and so liable for all labor and expenses in connection therewith and for all damages which may be occasioned on account of the operation of

this contract, whether the same be for personal injuries or damages of any kind. Nothing in these Contract Documents shall be construed to be inconsistent with the CONTRACTOR'S status as an independent contractor, or construed to constitute the CONTRACTOR, or any of its agents or employees as agents, employees, or representatives of the OWNER. The CONTRACTOR will superintend the execution of all work covered by these Contract Documents which shall be in the exclusive charge and control of the CONTRACTOR. The CONTRACTOR agrees that as an independent contractor, it will not assert in any legal action by claim or defense, or take the position in any administrative procedures that it is an agent or employee of the Owner. The CONTRACTOR further agrees that as an independent contractor it cannot and will not incur the OWNER with any obligation and that it will make no representation to any person or any party on behalf of the OWNER. The CONTRACTOR further additionally agrees that it will be barred and estopped from instituting or participating in any litigation against the OWNER to recover damages, costs, or expenses which might arise out of or in any way be connected with the performance of any work, services, or functions covered by this Agreement, with the exception of actions by the CONTRACTOR to recover payment for services provided under this Agreement. The CONTRACTOR further additionally agrees and binds itself and its successors in any action by the OWNER for recoupment or reimbursement of such damages and expenses and to be estopped for asserting as a defense that the OWNER did not have proper authority or approval to enter into such indemnity agreement or that the CONTRACTOR is not liable for such costs, claims, and expenses and the CONTRACTOR shall be deemed to have waived such defenses and positions so that only the amount of such costs, claims, etc. shall be the subject of defense. The CONTRACTOR agrees that these Contract Documents may be pleaded by the OWNER in such actions.

ARTICLE 7. OTHER WORK

SC-7.02.B

Add a new paragraph immediately after paragraph 7.02.B, which is to read as follows:

7.02.C Should CONTRACTOR cause damage to the work or property of any separate contractor at the site, or should any claim arising out of CONTRACTOR's performance of the Work at the site be made by any separate contractor against CONTRACTOR, OWNER, ENGINEER, Engineer's Consultants, the Construction Coordinator or any other person, CONTRACTOR shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER, ENGINEER, Engineer's Consultants and the Construction Coordinator harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals, and court and arbitration or mediation costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against OWNER, ENGINEER, Engineer's Consultants or the Construction Coordinator to the extent based on a claim arising out of CONTRACTOR's performance of the Work. Should a separate contractor cause damage to the Work or property of

CONTRACTOR or should the performance of work by any separate contractor at the site give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER, Engineer's Consultants or the Construction Coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER, Engineer's Consultants or the Construction Coordinator on account of any such damage or claim. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, CONTRACTOR may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be CONTRACTOR's exclusive remedy with respect to OWNER, ENGINEER, Engineer's Consultants and Construction Coordinator for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from OWNER, ENGINEER, Engineer's Consultant or Construction Coordinator for activities that are their respective responsibilities.

ARTICLE 8. OWNER'S RESPONSIBILITIES

SC-8.06.A

Delete paragraph 8.06.A in its entirety without replacing.

SC-8.11.A

Add a new paragraph immediately after paragraph 8.11.A, which is to read as follows:

8.12.A Work Changes: The OWNER may, as the need arises, order changes in the work through additions, deletions, or modifications to the extent of 25% of the Contract Price, without invalidating the Contract. Compensation and time of completion affected by the change shall be adjusted at the time of ordering such change.

ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.03.A

Add a new paragraph immediately after paragraph 9.03.A, which is to read as follows:

9.03.B The duties and responsibilities of the Resident Project Representative will be as enumerated in Section 01055-Resident Project Representative of the Project Manual.

ARTICLE 10. CHANGES IN THE WORK

SC-10.01.A

Add the following to the end of the Paragraph 10.01.A:

A change in the Contract Price or the Contract Times shall be accomplished only by a written amendment, a written change order, or a written work change directive. Accordingly, no course of conduct or dealings between the parties, no expressed or implied acceptance of alterations or additions to the Work, and no claim that the OWNER had been unjustly enriched by any alterations or additions to the Work shall be the basis of any claim for an increase in any amount due under the contract documents or a change in any time period for in the contract documents.

SC-10.01.A

Add two (2) new paragraphs immediately after paragraph 10.04.A, which are to read as follows:

10.01.A.1. At any time ENGINEER may request a quotation from CONTRACTOR for a proposed change in the Work. Within 14 calendar days after receipt of a request for a quotation for a proposed change, a written and detailed proposal for an increase or decrease in the Contract Price or Contract Time for the proposed change. ENGINEER shall have 14 calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all cost and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in accordance with Articles 11 and 12 of the General Conditions, and in sufficient detail reasonably to permit an analysis by ENGINEER of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Any amount claimed for subcontracts shall be similarly supported. Itemized schedule adjustments shall be in sufficient detail to permit an analysis of impact as required in the Contract Documents. Notwithstanding the request for quotation, CONTRACTOR shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial as defined in the Supplementary Conditions.

10.01.A.2 The adjustment in Contract Price and/or Contract Time stated in a Change Order shall comprise the total price and/or time adjustment due or owed the CONTRACTOR for the work or changes defined in the Change Order. By executing the Change Order, the CONTRACTOR acknowledges and agrees that the stipulated price and/or time adjustments include the costs and delays for all work contained in the Change Order, including costs and delays associated with the interruption of schedules, extended overheads, delay, and cumulative impacts of ripple effect on all other non-affected work under this contract. Signing of the Change Order constitutes full and mutual accord and satisfaction for the adjustment in contract price or time as a result of increases or decreases in costs and time of performance caused directly and indirectly from the change, subject to the current scope of the entire work as set forth in the Contract Documents. Acceptance of this waiver constitutes an agreement between OWNER and CONTRACTOR that the Change Order represents an equitable adjustment to the Contract, and that CONTRACTOR will waive all rights to file a claim on this Change Order after it is properly executed.

ARTICLE 11. COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01.A.1

Delete paragraph 11.01.A.1 in its entirety and replace with the following:

11.01.A.1 Payroll costs for employees in the direct employ of the CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by the OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work after regular working hours, on Sunday or legal holidays shall be included in the above to the extent authorized by the OWNER.

- (1) Wage rates used in determining the amount of the payment shall be actual wage rates paid by the CONTRACTOR for Work under this Contract except that no rate used shall exceed the rate of comparable labor currently employed on the project.
- (2) Payment for the services of foremen in direct charge of the specific operation will be made. Payment for the service of superintendents, timekeepers, or other overhead personnel will not be made nor will payment for the services of watchmen be made unless required specifically by the Cost Reimbursement Work. The actual function performed by an employee rather than his payroll title will be the criterion used in determining the eligibility of an employee's services for payment under this provision.

SC-11.01.A.5.c.

Add two (2) new paragraphs immediately after paragraph 11.01.A.5.c which are to read as follows:

11.01.A.5.c.1 The types and amounts of equipment and machinery used by the CONTRACTOR in carrying out his Work shall be in keeping with normal practice for Work of a similar nature, except that the ENGINEER or OWNER may, at their discretion, limit by specific instruction the types and amounts of equipment and machinery to be used.

11.01.A.5.c.2 In computing the hourly rental of such equipment, less than thirty (30) minutes shall be considered one-half (1/2) hour, except the minimum rental time to be paid shall be one (1) hour. Rental time shall not be allowed while equipment is inoperative due to breakdowns. The rental time of equipment to be paid for shall be the time the equipment is in operation on the Cost Reimbursement Work being performed and, in addition, shall include the time required to move the equipment to the Work and return it to its original location. When approved in advance by the OWNER, towing or

transporting costs will be allowed when the equipment is moved by means other than its own power. No payment shall be made for moving time, towing, or transporting the equipment if it is used at the site of the Work on other than Cost Reimbursement Work.

Payment for the approved rental time shall be at the monthly rental rate prorated over the rental time.

SC-11.01.A.5.j

Add a new paragraph immediately after paragraph 11.01.A.5.j, which is to read as follows:

11.01.A.5.k For additional premiums paid on Performance and Labor and Material Bonds by reason of increases in the amount of Work over and above that called for in the original Contract Agreement due to the inclusion of the Cost Reimbursement Work, and for additional premiums paid on public liability and property damage insurance by reason of extra hazard inherent in the Cost Reimbursement Work over and above the hazard normally encountered in Work of the type called for in the original Contract Agreement, the CONTRACTOR will, on presentation of substantiating evidence from his bonding and insurance carriers, be paid the actual costs to which sums no percentage will be added. Payment for the cost of additional premiums paid on workmen's compensation insurance by reason of extra hazard introduced into the CONTRACTOR's operations by the inclusion of Cost Reimbursement Work is covered by the provisions above, except that any claim for additional cost based on the application, by reason of extra hazard, or a higher insurance rate to any portion of the payroll over and above that chargeable to the Cost Reimbursement Work under the provisions above, must be substantiated by evidence from the CONTRACTOR's insurance carrier.

SC-11.03.C

Delete paragraph 11.03.C in its entirety and replace with the following:

11.03.C The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

11.03.C.1. If the total cost of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

11.03.C.2. If there is no corresponding adjustment with respect to any other item of Work; and

11.03.C.3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

ARTICLE 12 CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.01.C.1

Delete paragraph 12.01.C.1 in its entirety without replacing.

SC-12.06.B

Add a new paragraph immediately after paragraph 12.06.B, which is to read as follows:

12.06.C. On any day that the CONTRACTOR considers that he is delayed by adverse weather conditions, he shall identify in writing to the ENGINEER and the OWNER the adverse weather conditions affecting his activity, the specific nature of the activity affected, the number of hours lost and the number of and identity (by responsibility or trade) of workers affected and shall obtain from the Engineer written recognitions of the delay. A delay is defined as the CONTRACTOR being unable to perform at least 4 hours of work on the critical path. The time for performance of this contract includes an allowance of fifteen (15) calendar days that are unsuitable for critical path construction work by reason of adverse weather. The Contract time will be extended only if the number of calendar days of adverse weather recognized by the Engineer exceeds the fifteen (15) calendar days of adverse weather set forth, and the Contractor demonstrates how this adverse weather impacts activities on the critical path of the Contract Construction schedule.

ARTICLE 13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.02.A

Delete paragraph 13.02.A in its entirety and replace with the following:

13.02.A ENGINEER and his representatives and other representatives of OWNER, State and public agencies shall have unrestricted access to the Work. CONTRACTOR shall provide proper and safe facilities for such access and observation, and such uncovering and replacement shall be at CONTRACTOR's expense.

SC-13.03.B

Delete paragraph 13.03.B in its entirety and replace with the following:

13.03.B. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to be specifically inspected, tested, or approved by some public body, CONTRACTOR shall assume full responsibility therefore, pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection, testing or approval.

13.03.B.1 The OWNER reserves the right to independently perform at its own expense, laboratory tests on random samples of material or performance tests on equipment delivered to the site. These tests if made will be conducted in accordance with the appropriate referenced standards or specification requirements. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements. All rejected materials or equipment shall be removed from the site, whether stored or installed in the Work, and the required replacement shall be made, all at no additional cost to the OWNER.

SC-13.05.A

Add a new paragraph immediately after paragraph 13.05.A, which is to read as follows:

13.05.B. If the OWNER stops Work under Paragraph 13.05 CONTRACTOR shall be entitled to no extension of Contract Time or increase in Contract Price.

SC-13.09.A

Add a new sentence immediately after the first sentence of paragraph 13.09.A, which is to read as follows:

However, if the deficiency results in the issuance of the Notice of Violation by any agency or department of the State of the project location, OWNER may take immediate action to correct and remedy any such deficiency without written notice.

SC-13.09.D

Add a new paragraph immediately after paragraph 13.09.D, which is to read as follows:

13.09.E At any time during the progress of the Work and up to the date of final acceptance, the Engineer shall have the right to reject any work which does not conform to the requirements of the Contract Documents, even though such work has been previously inspected and paid for. Any omissions or failure on the part of the Engineer to disapprove or reject any Work or materials at the time of inspection shall not be construed as an acceptance of any defective work or materials.

ARTICLE 14. PAYMENTS TO THE CONTRACTOR AND COMPLETION

SC-14.02.A.1

Delete paragraph 14.02.A.1 in its entirety and replace with the following:

14.02.A.1 CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. CONTRACTOR shall submit Application for Payment on or after the date established for progress payments (but not more than

once a month). If payment is requested on the basis of materials and equipment not incorporated in the work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER. The CONTRACTOR shall also furnish evidence that payment received on the basis of such materials and equipment has in fact been paid to the respective supplier(s) within sixty days of payment by OWNER. Failure to provide such evidence of payment may result in the withdrawal of previous approval(s) and removal of the cost of related materials and equipment from the next submitted Application for Payment.

SC-14.02.C.1

Amend the first sentence of Paragraph 14.02.C.1 to read as follows:

Thirty days after presentation of the Application for Payment

SC-14.03.A

Add two (2) new paragraphs immediately after paragraph 14.03.A, which are to read as follows:

14.03.B No materials or supplies for the Work shall be purchased by CONTRACTOR or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. CONTRACTOR warrants that he/she has good title to all materials and supplies used by him/her in the Work, free from all liens, claims or encumbrances.

14.03.C CONTRACTOR shall indemnify and save OWNER harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. CONTRACTOR shall at OWNER's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If CONTRACTOR fails to do so, then OWNER may, after having served written notice on the said CONTRACTOR either pay unpaid bills, of which OWNER has written notice, direct, or withhold from the CONTRACTOR's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to CONTRACTOR shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon OWNER to either CONTRACTOR or his/her Surety. In paying any unpaid bills of the CONTRACTOR, OWNER shall be deemed the agent of CONTRACTOR and any payment so made by OWNER, shall be considered as payment made under the Contract by OWNER to CONTRACTOR and OWNER shall not be liable to CONTRACTOR for any such payment made in good faith.

SC-14.04.A

Delete paragraph 14.04.A in its entirety and replace with the following:

14.04.A Contractor may, in writing to OWNER and Engineer, certify that the entire Project is substantially complete and request that Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER, Contractor and Engineer shall make an inspection of the Project to determine the status of completion. If Engineer and OWNER do not consider the Project substantially complete, Engineer will notify Contractor in writing giving his reasons therefor. If Engineer and OWNER consider the Project substantially complete, Engineer will prepare and deliver to OWNER a tentative certificate of Substantial Completion and the responsibilities between OWNER and Contractor for maintenance. There shall be attached to the certificate a tentative list of items to be completed or corrected before Substantial Completion, and the certificate shall fix the time within which such items shall be completed or corrected, said time to be within Contract Time.

SC-14.05.A

Delete 14.05.A in its entirety and replace with the following:

14.05.A Prior to Substantial Completion of the Project, OWNER may request Contractor in writing to permit him to use a specified part of the Project which he believes he may use without significant interference with construction of the other parts of the Project. If Contractor agrees, he will certify to OWNER and Engineer that said part of the Project is substantially complete and request the Engineer to issue a certificate of Substantial Completion for that part of the Project. Within a reasonable time thereafter, OWNER, Contractor and Engineer shall make an inspection of that part of the Project to determine its status of completion. If Engineer and OWNER do not consider that it is substantially complete, Engineer will notify Contractor in writing giving his reasons therefor. If Engineer and OWNER consider that part of the Project to be substantially complete, Engineer will execute and deliver to OWNER and Contractor a certificate to that effect, fixing the date of Substantial Completion as to that part of the Project, attaching thereto a tentative list of items to be completed or corrected before Substantial Completion of the entire Project and fixing the responsibility between OWNER and Contractor for Maintenance as to that part of the Project. OWNER shall have the right to exclude Contractor from any part of the Project which Engineer has so certified to be substantially complete, but OWNER shall allow Contractor reasonable access to complete items on the tentative list.

SC-14.07

Delete paragraphs 14.07.B and 14.07.C in their entirety replace with the following:

14.07.B If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will indicate in writing

his/her recommendation of payment and present the Application to OWNER for payment. Thereupon, ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, OWNER shall, within sixty-five days after receipt thereof pay CONTRACTOR the amount recommended by ENGINEER.

SC-14.08.A

Add a new paragraph immediately after paragraph 14.08.A, which is to read as follows:

14.08.A.1 CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress of final payment by ENGINEER, nor the issuance of a certificate of Substantial Completion, nor any payment by Owner to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.07, nor any correction of defective work by OWNER will constitute an acceptance of work not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the work in accordance with the Contract Documents (except as provided in paragraph 14.09).

ARTICLE 15. SUSPENSION OF WORK AND TERMINATION

SC-15.01.A

Add a new paragraph immediately after paragraph 15.01.A, which is to read as follows:

15.01.A.1 Should the OWNER suspend Work due to repeated unsafe Work conducted by the CONTRACTOR which is confirmed by subsequent inspection by OSHA, the CONTRACTOR shall not be allowed any adjustment in Contract Price or extension of Contract Time attributed to this delay.

SC-15.02.A.2

Add the following to the end of Section 15.02.A.2 after "jurisdiction":

"(including those governing employee safety)"

SC-15.02.A.4

Add a new paragraph immediately after paragraph 15.02.A.4, which is to read as follows:

15.02.A.5 If CONTRACTOR abandons the Work, or sublets this Contract or any part thereof, without the previous written consent of OWNER, or if the Contract or any claim thereunder shall be assigned by CONTRACTOR otherwise than as herein specified;

SC-15.04.A

Add a new paragraph immediately after paragraph 15.04.A, which is to read as follows:

15.04.B. CONTRACTOR shall not assign, transfer, convey or otherwise dispose of the Contract, or of his legal right, title, or interest in or to the same or to any part thereof, without the prior written consent of the OWNER. CONTRACTOR shall not assign by power of attorney or otherwise any monies due him and payable under this contract without the prior written consent of the OWNER. Such consent, if given, will in no way relieve the CONTRACTOR from any of the obligations of this Contract.

ARTICLE 16. DISPUTE RESOLUTION

SC-16.

Delete paragraph 16.01.A in its entirety and replace with following:

16.01.A This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina. Any cause of action between the parties arising out of or involving this Agreement shall be brought in the venue and jurisdiction of Georgetown County, South Carolina.

ARTICLE 17. MISCELLANEOUS

SC 17.01.A

Add a new paragraph immediately after paragraph 17.01.A, which is to read as follows:

17.01.B. No oral statement of any person whomsoever shall in any manner of degree modify or otherwise affect the terms of this Contract. Any notice to the CONTRACTOR, from OWNER and ENGINEER, relative to any part of this Contract shall be in writing.

SC-17.05.A

Add four (4) new paragraphs immediately after paragraph 17.05.A, which are to read as follows:

17.06.A. Both the address given in the Bid Form upon which this Agreement is founded, and CONTRACTOR's office at or near the site of the Work are hereby designated as places to either of which notices, letters, and other communications to CONTRACTOR shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in

any post office box regularly maintained by the post office department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon CONTRACTOR; and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by CONTRACTOR, and delivered to OWNER and ENGINEER. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon CONTRACTOR personally.

17.07.A. The form of all submittals, notices, change orders and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the ENGINEER. The forms for Notice of Award, Notice to Proceed, Field Order, Application for Payment, Work Change Directive, Change Order, Certificate of Substantial Completion and Final Receipt which the ENGINEER may use are contained in the Project Manual.

17.08.A. The CONTRACTOR shall keep adequate records and supporting documents applicable to this contractual matter. Said records and documentation will be retained by the CONTRACTOR for a minimum of five (5) years from the date of termination of this Contract. The OWNER and its authorized agents shall have the right to audit, inspect and copy records and documentation as often as the OWNER deems necessary during the period of this Contract and during the period of five (5) years thereafter; provided, however, such activity shall be conducted only during normal business hours. The OWNER, during the period of time expressed by the preceding sentence, shall also have the right to obtain a copy of and otherwise inspect and audit made at the direction of the CONTRACTOR as concerns the aforesaid records and documentation.

17.09.A Whenever the terms of the Contract require the CONTRACTOR to notify or advise the OWNER in writing on a specific matter, such written notification or advisement shall be limited to one subject or one item. By virtue of this Paragraph, the CONTRACTOR is prohibited from addressing more than one issue or subject in a letter, when the intent of such letter is to satisfy a notification requirement called for in the Contract. Any notice not in compliance with this requirement shall automatically not be deemed to satisfy the notice or advisement requirement imposed by this Contract.

END OF SECTION

SECTION 00900

INFORMATION AVAILABLE TO BIDDERS

The following information is available. Prior to reviewing the Information and/or Report(s), interested Bidders will be required to sign a release form stating that it is understood the information is for general information purposes only; no warranties or guarantees are implied.

Project: Georgetown County Class Three Landfill Cells 8-12 & Class Two Landfill Closure Project, Bid #18-041

Information and/or Name of Report(s):

1. Boring Logs, Class Three Landfill Expansion Vicinity
2. Soils Laboratory Data, Class Three Landfill Expansion Vicinity
3. Test Pit Logs and Laboratory Data, Onsite Borrow Area
4. Engineer's CADD Files

_____ ("CONTRACTOR") hereby acknowledges and agrees that the following information and/or report(s) are provided by Garrett and Moore, Inc. ("ENGINEER") solely for general information purposes, no warranties or guarantees are implied.

CONTRACTOR:

(Name of Company)

ACCEPTED BY:

(Name of the Contractor's Representative)

Title: _____

(Title of the Contractor's Representative)

Date: _____

This page intentionally left blank

SECTION 01010

SUMMARY OF WORK

PART 1: GENERAL

1.01 LOCATION OF WORK

- A. The Work of this Contract is generally located in Georgetown County, South Carolina. The project site is the Georgetown County Solid Waste Facility located on Highway 51 approximately 5 miles northwest of Georgetown, South Carolina.
- B. The project consists of furnishing and installing, complete, including labor, equipment, parts, materials, and other work incidental for the installation of an approximate 10.3-acre Class Three Landfill expansion complete with: approximately 180,000 cy of backfill, low permeability compacted soil liner, textured high density polyethylene (HDPE) flexible membrane liner (FML), geocomposite drainage net, soil protective cover, HDPE leachate collection system piping, stormwater management features, and restoration. The Project includes development of an onsite borrow area, complete with erosion and sedimentation controls, site access, and grading. Additional work associated with the project includes final closure of the approximate 15-acre Class Two landfill. The Class Two Landfill final closure system generally consists of 24-inches of soil final cover and stabilization.

1.02 WORK TO BE DONE

- A. Provide all labor, materials, equipment, tools, services and incidentals necessary to complete all work required by the Contract Documents to furnish and install all work as shown on the Drawings and specified herein.
- B. Complete the Work, in place, tested, and ready for continuous service. Perform or provide repairs, replacements and restoration required as a result of damages resulting from construction operations.
- C. Furnish and install 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.

1.03 DRAWINGS AND SPECIFICATIONS FURNISHED TO THE CONTRACTOR FOR CONSTRUCTION

- A. Three sets of Drawing and three sets of Specifications shall be furnished to the Contractor for construction at no charge. Additional sets may be purchased at the cost of reproduction.

1.04 ABBREVIATIONS AND REFERENCES

- A. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for bids, even if reference has been made to an earlier standard. Where standards, specifications or codes of the various technical societies, organizations or bodies have been referred to throughout the Specifications, the referenced standard, specification or code is hereby made a part of the Contract the same as if herein repeated in full.

In the event of any conflict between any of these specifications, standards, codes or tentative specifications, and the Specifications, the latter shall govern.

- B. Reference to a technical society, organization, or body may be made in the Specifications by abbreviations, in accordance with the following list:

| | | |
|-----------|---|---|
| AASHTO | - | The American Assoc. of State Highway and Transportation Officials |
| ACI | - | American Concrete Institute |
| AISC | - | American Institute of Steel Construction |
| AGA | - | American Gas Association |
| ANSI | - | American National Standards Institute |
| ASCE | - | American Society of Civil Engineers |
| ASME | - | American Society at Mechanical Engineers |
| ASTM | - | American Society of Testing Materials |
| AWS | - | American Welding Society |
| AWWA | - | American Water Works Association |
| DIPRA | - | Ductile Iron Pipe Research Association |
| EPA | - | Environmental Protection Agency |
| FED.SPEC. | - | Federal Specifications |
| IEEE | - | Institute of Electrical and Electronic Engineers |
| OSHA | - | Occupational Safety and Health Administration |
| SCDOT | - | South Carolina Department of Transportation |
| NEMA | - | National Electrical Manufacturers Association |
| DHEC | - | South Carolina Department of Health and Environment Control |

- C. When no reference is made to a code, standard, or specification, the standard specifications of the ASTM, the ANSI, the ASME, the IEEE, or the NEMA shall govern.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1: GENERAL

1.01 SCOPE OF WORK

- A The Project generally consists of furnishing and installing, complete, including labor, equipment, parts, materials, and other work incidental for the 1) construction of an approximate 10-acre composite lined Class 3 Landfill cell complete with: backfill, low permeability compacted soil liner, geosynthetic clay liner (GCL), textured high density polyethylene (HDPE) flexible membrane liner (FML), geocomposite drainage net, soil protective cover, HDPE leachate collection system piping and appurtenances, gravel roads, stormwater management features, and restoration; and 2) closure of an approximate 16-acre Class 2 landfill complete with: site preparation, soil cover, and restoration. **An on-site borrow area is made available to the Contractor for the Contractor's use at the Contractor's option, with requirements for the use/development of the borrow area identified on the drawings.**
- B All contract prices included in Section 00300 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.
- C The items listed below, refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory work, services, job signs, sanitary requirements, testing, safety devices, surveying, field engineering, approval and record drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, and all other requirements of the General Conditions and DIVISION 1 - GENERAL REQUIREMENTS. Compensation for all such services, equipment and materials shall be included in the prices stipulated for the lump sum and unit price bid items listed herein.
- D Each lump sum and unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR'S overhead and profit for each separately identified item.
- E Restoration is not a separate bid 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.
- F Progress Payment for any item for which certifying surveys are required by

Section 01050 will be made based on estimated quantities verified by the ENGINEER. The ENGINEER will verify all final quantities prior to Final Payment for that item. Certifying surveys will be required for payment greater than 75% of the estimated total amount of that bid item as required by Section 01050. No Final Payment will be made for any item for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

1.02 BID ITEMS

Item 1 – Bonds, Insurance, Mobilization, and Demobilization

1. Measurement for this item will be based on actual invoice amounts to substantiate the actual bond and insurance premiums and other invoiced costs, as well as an allowance for mobilization/demobilization. Mobilization will be paid for at the contract lump sum bid price, which price and payment shall be full compensation for organizing and moving all forces, supplies, equipment and incidentals to the project site, regardless of the number of times such moves are made, and all pre-construction costs incurred after award of the contract. This price shall also include costs for demobilization.
2. Payment of this item will be made at the applicable lump sum amount, as above determined, and will represent full compensation for providing the required 100 percent Payment Bond, 100 percent Performance Bond, all insurance and mobilization/demobilization in accordance with the requirements of the General Conditions. The ENGINEER will include payments for mobilization on the first and second construction estimates. Each payment will be for ½ of the contract lump sum price for Mobilization, subject to the limits shown in the following table:

| Contract Amount (CA) | Max. Payment First Estimate | Max. Payment Second Estimate |
|-------------------------|-----------------------------|------------------------------|
| 0 - \$40,000 | CA x 0.05 | CA x 0.05 |
| \$40,000 - \$200,000 | \$2,000 | \$2,000 |
| \$200,000 - \$2,000,000 | CA x 0.01 | CA x 0.01 |
| \$2,000,000 and above | (CA x 0.005) + \$10,000 | (CA x 0.005) + \$10,000 |

Item 2 – Temporary Stormwater Management

1. The lump sum price bid for Temporary Stormwater Management will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to plan, furnish, install, and maintain Temporary Stormwater Management during construction. Temporary Stormwater Management includes, but is not limited to, planning for temporary stormwater management during all sequences of construction, installation of necessary controls other than as called for on the Plan Drawings,

maintenance of all erosion and sedimentation controls, diversion swales, check dams, diversion berms, hay bales, silt fences, temporary seeding, and any other stormwater management controls necessary to adequately manage stormwater at the project area, prevent release from the project area, and protect the working area for which payment is not provided under other items in the bid form. Temporary stormwater controls shall conform to all Georgetown County and SCDHEC Standards and Requirements. Sediment and Erosion Control Maintenance will be provided for the entire construction period through Final Completion and Acceptance by the ENGINEER. Payment will be made in monthly increments equaling the lump sum price divided by the contract time in months (not to exceed the contract price).

Item 3 – Silt Fence

1. Measurement: The quantity of Silt Fence to be paid under this item will be the actual number of linear feet of Silt Fence installed.
2. Payment: The unit price bid for this item will be full compensation for vegetation removal, furnishing, installing, and maintaining Silt Fence as shown on the Drawings and specified herein.

Item 4 – Temporary Diversion Ditch

1. Measurement: The quantity of Temporary Diversion Ditch to be paid under this item will be the number of linear feet of Diversion Ditch installed in accordance with the Plan Drawings.
2. Payment: The unit price bid for this item will be full compensation for furnishing and installing the Temporary Diversion Ditch as shown on the Drawings and specified herein, including but not limited to, excavation, restoration, hauling, placement and compaction of backfill, protection of stockpiled and installed material and removal upon completion and as directed by the ENGINEER.

Item 5 – Stripping (CL3 Landfill Area)

1. Measurement: The quantity of Stripping (CL3 Landfill Area) which will be paid for under this item will be the actual number of acres, as measured in the two-dimensional plan view, stripped of topsoil within the construction limits as measured by the survey of the limits of stripping.
2. Payment: The unit prices bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to perform all work required to remove and properly stockpile stripped topsoils within the construction limits. Stripping materials shall be placed on site as shown on the Plans or as directed by the ENGINEER.

Item 6 – Clearing & Grubbing (CL3 Landfill Area)

1. Measurement: The quantity of Clearing & Grubbing (CL3 Landfill Area) which will be paid for under this item will be the actual number of acres, as measured in the two-dimensional plan view, cleared & grubbed within the construction limits as measured by the survey of the limits of Clearing & Grubbing.
2. Payment: The unit prices bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to perform all work required to remove and properly dispose of existing vegetation within the construction limits. **Clearing and grubbing debris shall be placed in the existing yard waste stockpile on site.**

Item 7 – Remove & Replace Unsuitable Soils

1. Measurement: The quantity of Remove & Replace Unsuitable Soils to be paid for under this item will be the number of actual cubic yards of unsuitable materials excavated and backfilled at the direction of the ENGINEER as measured by comparing topographic surveys performed before and after excavation.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for measuring, excavating, backfilling, grading, compacting, stockpiling, and disposing of all unsuitable materials excavated and all other work required or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other items in the bid form. **Payment for removal and replacement of unsuitable soil material requires verification and observation by the ENGINEER or designated representative on the day of the work being performed.**

Item 8 – Geogrid Fabric for Foundation Improvement

1. Measurement: The quantity of Geogrid for Foundation Improvement to be paid for under this item will be the actual number of square yards of Geogrid (Tensar BX-1200 or approved equivalent) material furnished and installed at the direction of the ENGINEER as measured by field measurements performed of the placed/installed Geogrid. The quantity shall be verified by ENGINEER (or ENGINEER's RPR) in the field.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to furnish and install the Geogrid as shown on the drawings and specified herein for which payment is not provided under other items in the bid form.

Item 9 – Subgrade Excavation & Structural Fill Placement

1. Measurement: The quantity of Subgrade Excavation & Structural Fill Placement which will be paid for under this item will be the actual number of cubic yards measured by comparing the topographic survey performed after the stripping, clearing and grubbing and prior to excavation and backfill, to the topographic survey performed upon the completion of excavation, as required in Section 01050.
2. Payment: The unit price bid for this item will be full compensation for excavation and backfilling to the design Subgrade Plan as shown on the Drawings and specified herein including but not limited to hauling, and backfilling; compaction, quality control and surveying; drainage and dewatering; sheeting and bracing; test pits to verify location and depth of existing buried utilities and other facilities; care and protection of existing utilities and structures; site restoration; conformance to all federal, state, and county Standards and requirements; and all other work required or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other items in the bid form. No Final Payment will be made for any structural fill for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Item 10 – Structural Fill Placement

1. Measurement: The quantity of Structural Fill Placement which will be paid for under this item will be the actual number of cubic yards of structural fill constructed as measured by comparing the topographic survey performed after the clearing and grubbing and prior to backfill, to the topographic survey performed upon the completion of structural fill, as required in Section 01050.
2. Payment: The unit price per cubic yard for this item will be full compensation for placing structural fill to the design Subgrade Plan as shown on the Drawings and specified herein including but not limited to borrow source excavation, hauling, and backfilling; compaction, quality control and surveying; drainage and dewatering; sheeting and bracing; test pits to verify location and depth of existing buried utilities and other facilities; care and protection of existing utilities and structures; site restoration; conformance to all federal, state, and county Standards and requirements; and all other work required or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other items in the bid form. No Final Payment will be made for any backfill for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Item 11 – 24" Low-Perm Clay Liner (1×10^{-5} cm/sec)

1. Measurement: The quantity for the 24" Low-Perm Clay Liner (1×10^{-5} cm/sec) which will be paid for under this item will be the actual number of square yards of the 24" Low-Perm Clay Liner (1×10^{-5} cm/sec) measured in place by computing the two-dimensional plan area of the limits of the Compacted Soil Liner survey as required in Section 01050.
2. Payment: The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, approved water source, quality control, surveying, supervision and incidentals (including anchor trench) required to complete the installation of the 24" Low-Perm Clay Liner (1×10^{-5} cm/sec) as shown on the Drawings and specified herein, including, but not limited to, excavation and restoration, hauling, mixing, placement and compaction, testing, tie-in with existing soil liner system, and protection of stockpiled and installed material. Payment will only be made for areas that have reached the required thickness, compaction, and permeability requirements and approved by the ENGINEER.

Item 12 – Geosynthetic Clay Liner (GCL)

1. Measurement: The quantity of Geosynthetic Clay Liner (GCL) which will be paid for under this item will be the actual number of square yards as measured in the two-dimensional plan view and excluding the anchor trench of installed Geosynthetic Clay Liner (GCL) measured in place.
2. Payment: The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, certification of surveying, testing equipment, supervision, and incidentals (including anchor trench) required to install the Geosynthetic Clay Liner (GCL) as shown on the Drawings and specified herein.

Item 13 – 60-mil Textured HDPE Liner

1. Measurement: The quantity of 60-mil Textured HDPE Liner which will be paid for under this item will be the actual number of square yards as measured in the two-dimensional plan view and excluding the anchor trench of installed 60 mil Textured HDPE Liner measured in place.
2. Payment: The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, quality control, surveying, testing equipment, cleaning the tie-in area to existing and performing the tie-in with the existing liner, supervision, and incidentals (including anchor trench) required to furnish approved materials and install the 60 mil Textured HDPE Liner as shown on the Drawings and

specified herein.

Items 14 – Geocomposite Drainage Net (GDN)

1. Measurement: The quantity of Geocomposite Drainage Net which will be paid for under this item will be the number of square yards as measured in the two-dimensional plan view and excluding the anchor trench of Geocomposite Drainage Net measured in place.
2. The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, cleaning the tie-in area to existing and performing the tie-in with the existing GDN, quality control, surveying, testing equipment, supervision, and incidentals (including anchor trench) required to furnish approved materials and install the Geocomposite Drainage Net (GDN) as shown on the Drawings and specified herein.

Item 15 – 24-inch Thick Protective Cover Soil Layer

1. Measurement: The quantity for the Protective Cover Layer which will be paid for under this item will be the number of square yards of Protective Cover Layer measured in place by computing the two-dimensional plan area of the limits of the Protective Cover Layer installed.
2. Payment: The unit price bid per square yard for this item will be full compensation to furnish and install the Protective Cover Layer as shown on the Drawings and specified herein including, but not limited to, borrow excavation and restoration, hauling, placement and compaction, testing, cleaning the tie-in area to existing and tie-in with existing protective cover, protection of stockpiled and installed material. Payment will only be made for areas which have reached the required minimum thickness, gradation, permeability requirements, and approved by the ENGINEER.

Items 16 – LCS - 8" Diam. HDPE Pipe Collection Line

1. Measurement: The quantity of LCS - 8" Diam. HDPE Pipe Collection Line to be paid for under these items will be the actual number of linear feet of pipe in place measured horizontally along the centerline of the installed pipes.
2. Payment: The unit price bids per linear foot for this items will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the designated pipe as shown on the Drawings and specified herein, including but not limited to furnishing and installing all pipe, fittings, flanges, bolts, tee sections, pipe supports, crosses, wye laterals, couplings, #57 stone, #789 stone, C-33 sand, 28 oz. non-woven fabric cushion, minimum 40-mil thick HDPE flap,

trench excavation and backfilling, cleaning, testing, certifying surveying, and all other appurtenances

Item 17 – LCS - 8" Diam. Pipe Tie-ins (new to existing)

1. Measurement: The quantity of LCS - 8" Diam. Pipe Tie-ins (new to existing) which will be paid for under these items will be the actual number of Pipe Tie-ins constructed.
2. Payment: The unit price per each for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and constructing the tie-ins to existing pipes shown on the Drawings and specified herein, including but not limited to furnishing and installing all pipe and materials, fusion-welding equipment, excavation and backfilling, cleaning, testing, surveying, and all other appurtenances.

Items 18 – LCS - HDPE Sloperiser Piping System

1. Measurement: The quantity of LCS - HDPE Sloperiser Piping System which will be paid for under this item will be the number of LCS - HDPE Sloperiser Piping Systems installed to the completion and approval of the ENGINEER.
2. Payment: The unit price per linear foot for this item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to complete the installation of the LCS - HDPE Sloperiser Piping System as shown on the Drawings and specified herein including, but not limited to, furnishing and installing 24-inch HDPE pipe; fittings; bolted HDPE flange, coupling, cleaning; testing; and all other work required for or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other items in the bid form.

Item 19 – LCS - Leachate Pump System Valve Box and Components

1. The lump sum price for LCS - Leachate Pump System Valve Box and Components shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the LCS - Leachate Pump System Valve Box and Components as shown in the Drawings and specified herein, including but not limited to, HDPE valve box (flowmeter, pressure gauge, flanges, couplings, gate and check valves, tees, pipe support, bends, 4" diameter HDPE pipe, connections to force main, excavation and backfill, and any other work not specifically included for payment under any other item but obviously necessary to complete the Contract.

Item 20 – 4" Diameter HDPE Force Main

1. Measurement: The quantity of 4" Diameter HDPE Force Main to be paid under these items will be the actual number of linear feet of force main pipe installed as measured horizontally along the centerline of the installed pipe.
2. Payment: The unit price per linear foot for these items will be full compensation for furnishing all labor, materials, tools, equipment, supervision and incidentals required for installing the force main as shown on the Drawings and specified herein, including but not limited to furnishing and installing approved pipe, fittings, caps, plugs, connections to existing pipelines, connections to valve vault assembly, flex restraints/thrust anchors as specified, trench excavation and backfilling, miscellaneous appurtenances, bedding material, as-built alignment marking devices, surveying, cleaning, and testing.

Item 21 – Geomembrane Leak Location Survey

1. The lump sum price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to provide the Geomembrane Leak Location Survey of all lined areas by the appropriate method, to be performed after completion and approval of the protective cover layer installation. Work associated with the Geomembrane Leak Location Survey includes, but is not limited to, site preparation, perimeter trenching, planning and sequencing of work to enable successful leak location surveying, scheduling, testing, and reporting for which payment is not provided under other items in the bid form. **Payment in full for this item is conditioned upon submittal and acceptance of an administratively complete and successful Geomembrane Leak Location Survey Report.**

Item 22 – Electrical Conduit

1. Measurement: The quantity of Electrical Conduit to be paid under these items will be the actual number of linear feet of conduit installed as measured horizontally along the centerline of the installed pipe.
2. Payment: The unit price per linear foot for these items will be full compensation for furnishing all labor, materials, tools, equipment, supervision and incidentals required for installing the electrical conduit as shown on the Drawings and specified herein, including but not limited to furnishing and installing conduit pipe, fittings, caps, plugs, connections, trench excavation and backfilling, miscellaneous appurtenances, bedding material, as-built alignment marking devices, surveying and cleaning.

Item 23 – 18" Thick Compacted ABC w/8 oz Geotextile

1. Measurement: The quantity of 18" Thick Compacted ABC w/8 oz Geotextile to be paid for under this item will be the actual number of square yards of 18-inch thick SCDOT GABC stone road paving installed as shown on the Drawings and at the direction of the ENGINEER. The payment area shall be as determined by the limits of Road Paving Survey required by Section 01050.
2. Payment: The unit price per square yard shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the 18" compacted ABC stone road including sub-base preparation, furnishing and installing 8-oz. geotextile, 18-inch ABC stone section placement, compaction, quality control and testing, surveying and incidentals as shown on the Drawings and specified herein.

Item 24 – 12" Thick Compacted ABC w/8 oz Geotextile

1. Measurement: The quantity of 12" Thick Compacted ABC w/8 oz Geotextile to be paid for under this item will be the actual number of square yards of 12-inch thick SCDOT GABC stone road paving installed as shown on the Drawings and at the direction of the ENGINEER. The payment area shall be as determined by the limits of Road Paving Survey required by Section 01050.
2. Payment: The unit price per square yard shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the 12" compacted ABC stone road including sub-base preparation, furnishing and installing 8-oz. geotextile, 12-inch ABC stone section placement, compaction, quality control and testing, surveying and incidentals as shown on the Drawings and specified herein.

Item 25 - Precast Drop Inlet – Pre-cast Structure

1. Measurement: The unit price bid for each Precast Drop Inlet – Pre-cast Structure to be paid for under this item will be the actual number of Precast Drop Inlet – Pre-cast Structure installed as shown on the Drawings to facilitate onsite borrow activities and accepted by the ENGINEER.
2. The unit price for the Precast Drop Inlet – Pre-cast Structure shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and install the Precast Drop Inlet – Pre-cast Structure as shown in the Drawings and specified herein, including but not limited to, excavation, geotextile, bedding material, maintenance, and other appurtenances for which payment is not provided under other items

in the bid form.

Items 26 – Drop Inlet - 36" Diam. RCP w/End Treatments

1. Measurement: The quantity of Drop Inlet - 36" Diam. RCP w/End Treatments to be paid under this item will be the actual number of linear feet of 36-Inch Diameter RCP pipe installed as measured horizontally along the centerline of the installed pipe.
2. Payment: The unit price per linear foot for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the 36-Inch Diameter RCP pipe as shown on the drawings and specified herein, including, but not limited to, furnishing and installing pipe, flared end sections (FES), fittings, gaskets and all other appurtenances.

Items 27 – Drop Inlet - Energy Dissipaters

1. Measurement: The quantity of Drop Inlet - Energy Dissipaters which will be paid for under this item will be the actual number of Energy Dissipaters installed and accepted by the ENGINEER.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to furnish and install stone and filter fabric as shown on the drawings and specified herein for which payment is not provided under other items in the bid form.

Items 28 – 24" Diameter RCP Culvert w/End Treatments & Dissipaters

1. Measurement: The quantity of Drop Inlet - 24" Diameter RCP w/End Treatments and energy dissipaters to be paid under this item will be the actual number of linear feet of 24" Diameter RCP pipe installed as measured horizontally along the centerline of the installed pipe.
2. Payment: The unit price per linear foot for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required for furnishing and installing the 24" Diameter RCP pipe as shown on the drawings and specified herein, including, but not limited to, furnishing and installing pipe, flared end sections (FES), fittings, gaskets and all other appurtenances.

Item 29 – 6" Thick Unimat Fabric Formed Concrete Mat

1. Measurement: The quantity of 6" Thick Unimat Fabric Formed Concrete Mat which will be paid for under this Item will be the actual number of square yards as measured in the two-dimensional plan view and

excluding the anchor trench of Fabric-Formed Concrete Mat measured in place.

2. Payment: The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, certification of surveying, testing equipment, supervision, and incidentals (including anchor trench) required to furnish approved materials and construct the Fabric-Formed Concrete as shown on the Drawings and specified herein.

Items 30 – Landfill Cell Access Ramp w/24" RCP

1. Measurement: The quantity of Landfill Cell Access Ramp w/24" RCP to be paid for under this time will be the actual number of complete landfill access ramps installed as shown on the Drawings and accepted by the ENGINEER.
2. Payment: The unit price for the Landfill Cell Access Ramp w/24" RCP shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and install the access ramp with 24-Inch RCP as shown in the Drawings and specified herein, including but not limited to, excavation and backfill, pipe, aggregate, geotextile and other appurtenances.

Item 31 – Edge of Liner Markers

1. Measurement: The unit price bid for each of the Edge of Liner Markers to be paid for under this item will be the actual number of complete Edge of Liner Markers installed at a maximum of 100-feet horizontal spacing and at all change in directions at the direction of the ENGINEER. Markers posts shall be Reinforced Composite Dual Sided Marker (CIB30) as manufactured by Carsonite, or ENGINEER approved equivalent.
2. The unit price for the Edge of Closure Markers shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to fabricate, furnish and install the Edge of Liner Markers as shown in the Drawings and specified herein, including but not limited to the dual-sided marker, decals, decal layout, surveying, marker installation and other appurtenances for which payment is not provided under other items in the bid form. *The unit price shall include supply (only) of four (4) additional decaled markers.*

Item 32 – Seeding and Mulching

1. Measurement: The quantity of Seeding and Mulching which will be paid for under this item will be the actual number of acres Seeded and Mulched as measured in place by computing the two-dimensional plan area of the limits of the Seeding and Mulching performed.

2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to complete the seeding and mulching work for disturbed areas as shown on the Drawings and specified herein, and the establishment of a sufficient growth of grass as examined and accepted by the ENGINEER.

Items 33 – Guardrail – Remove, Relocate and Reinstall

1. Measurement: The quantity of Guardrail – Remove, Relocate and Reinstall which will be paid for under this item will be the number of linear feet as measured and accepted by the ENGINEER.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals to remove and reinstall the guardrail as shown on the Drawings.

Item 34 – Strip & Fine Grade Existing Cover (CL2 Landfill Area)

1. Measurement: The quantity of Strip & Fine Grade Existing Cover (CL2 Landfill Area) which will be paid for under this item will be the actual number of square yards, as measured in the two-dimensional plan view, stripped and fine-graded within the construction limits as measured by the survey of the limits of stripping.
2. Payment: The unit prices bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to perform all work required to remove existing vegetation within the construction limits. Stripped material shall be placed in the existing yard waste stockpile on site or as otherwise directed by the ENGINEER.

Item 35 –Structural Fill Placement (CL2 Landfill Area)

1. Measurement: The quantity of Structural Fill Placement which will be paid for under this item will be the actual number of cubic yards of structural fill constructed as measured by comparing the topographic survey performed after stripping and fine-grading and prior to backfill, to the topographic survey performed upon the completion of structural fill, as required in Section 01050.
2. Payment: The unit price per cubic yard for this item will be full compensation for placing structural fill to the design Subgrade Plan as shown on the Drawings and specified herein including but not limited to borrow source excavation, hauling, and backfilling; compaction, quality control and surveying; drainage and dewatering; sheeting and bracing; care and protection of existing utilities and structures; site restoration; conformance to all federal, state, and county Standards and requirements; and all other work required or incidental to the satisfactory

completion of all Work under this contract for which payment is not provided under other items in the bid form. No Final Payment will be made for any structural fill for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Item 36 – 24-inch Cover Soil (CL2 Landfill)

1. Measurement: The quantity of 24" Soil Cover which will be paid for under this item will be the number of square yards of 24" thick Soil Cover installed over the accepted fine-graded subgrade measured in place by computing the volume from the survey as required in Section 01050.
2. Payment: The unit prices bid per square yard for this item will be full compensation to complete the installation of 24" soil cover as specified herein, including, but not limited to, surveying and quality control, borrow excavation, hauling, placement and compaction, and protection of installed material. No Final Payment will be made for any 24" soil cover for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER

Items 37 – Erosion Control Matting (CL2 Landfill)

1. Measurement: The quantity of Erosion Control Matting (CL2 Landfill) which will be paid for under this item will be the actual number of square yards of Erosion Control Matting as measured in the two-dimensional plan view installed.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to furnish and install the Erosion Control Matting as shown on the drawings and specified herein for which payment is not provided under other items in the bid form.

Items 38 – Seeding and Mulching (CL2 Landfill)

1. Measurement: The quantity of Seeding and Mulching (CL2 Landfill) which will be paid for under this item will be the actual number of acres of Seeding and Mulching as measured in place by computing the two-dimensional plan area of the limits of the Seeded and Mulched performed.
2. Payment: The unit price bid for this item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to complete the installation of the seeding and mulching work for disturbed areas as shown on the Drawings and specified herein, and the establishment of a sufficient growth of grass as examined and approved by the ENGINEER.

Items 39 – Miscellaneous Work and Clean-up

1. The lump sum price for this item shall be full compensation for all labor, materials, and equipment required to perform the work specified in Section 02901 of the Specifications and as shown on the Drawings, and any other work not specifically included for payment under any other item but obviously necessary to complete the Contract.

1.03 Alternate Bid Item

Item A-1 – Delete Items 11 and 12 and Replace with: 24" Thick Low-Perm Clay Liner (1×10^{-7} cm/sec)

1. Measurement: The quantity for the 24" Low-Perm Clay Liner (1×10^{-7} cm/sec) which will be paid for under this item will be the actual number of square yards of the 24" Low-Perm Clay Liner (1×10^{-7} cm/sec) measured in place by computing the two-dimensional plan area of the limits of the Compacted Soil Liner survey as required in Section 01050.
2. Payment: The unit price bid per square yard for this item will be full compensation for all labor, materials, tools, equipment, approved water source, quality control, surveying, supervision and incidentals (including anchor trench) required to complete the installation of the 24" Low-Perm Clay Liner (1×10^{-7} cm/sec) as shown on the Drawings and specified herein, including, but not limited to, excavation and restoration, hauling, mixing, placement and compaction, testing, tie-in with existing soil liner system, and protection of stockpiled and installed material. Payment will only be made for areas that have reached the required thickness, compaction, and permeability requirements and approved by the ENGINEER.

END OF SECTION

SECTION 01026
SCHEDULE OF VALUES

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the ENGINEER a Schedule of Values allocated to the various portions of the Work as listed in the bid form, Section 00300, within 21 days after the effective date of the Agreement.
- B. Upon request of the ENGINEER, support the values with data that will substantiate their correctness.
- C. The accepted Schedule of Values shall be used as the basis for the CONTRACTOR'S Applications for Progress Payments.

1.02 RELATED REQUIREMENTS

- A. Section 00300- Bid Form
- B. Section 00700: General Conditions
- C. Section 00800: Supplemental Conditions
- D. Section 01027: Application for Payment

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper furnished by the OWNER; CONTRACTOR'S standard forms and automated printout will be considered for approval by the ENGINEER upon CONTRACTOR'S request. Identify 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.
- 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 and shall include a breakdown of all Lump Sum Bid Items. At a minimum the component parts listed in the bid form shall be used.
- C. For each major line item list sub-values of major products or operations under the item.
- D. For the various portions of the Work:
 - 1. Each item shall include a directly proportional amount of the CONTRACTOR'S overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the ENGINEER.
 - b. The total installed value.
- E. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a sub-schedule of unit costs and quantities for:
 1. Products on which progress payments will be requested for stored products.
- B. 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.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 2. Copies of 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.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION

SECTION 01027
APPLICATIONS FOR PAYMENT

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to the ENGINEER in accordance with the schedule established by Conditions of the Contract and Agreement Between OWNER and CONTRACTOR.
- B. The accepted Schedule of Values, Section 01026, shall be used as the basis for the CONTRACTOR'S Application for Payment.

1.02 RELATED WORK

- A. Section 00700: General Conditions - Progress Payments, Retainages and Final Payment
- B. Section 01025: Measurement and Payment
- C. Section 01026: Schedule of Values
- D. Section 01036: Change Order Procedures
- E. Section 01050: Field Engineering
- F. Section 01310: Construction Schedule
- G. Section 01380: Construction Photographs
- H. Section 01700: Contract Closeout
- I. Section 01720: Project Record Documents

1.03 SUBMITTALS

- A. Submit Application for Payment and continuation sheets in format consistent with Section 01026-Schedule of Values and approved by the OWNER providing complete documentation of all items for which payments is requested. The Application for Payment form and continuation sheets shall be typed on 8-1/2-inch by 11-inch or 8-1/2-inch by 14-inch white paper. Each Application for Payment submittal shall include an Excel Spreadsheet file (provided on a 3.5 inch high density floppy disk)
- B. Provide construction photographs in accordance with Section 01380.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
 - a. List by Change Order Number and description, as for an original component item of work.
4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the second application for payment.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the OWNER or the ENGINEER requires substantiating data, CONTRACTOR shall submit suitable information, with a cover letter identifying:
 1. Project.
 2. Application number and date.
 3. Detailed list of enclosures.
 4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.
- B. Submit one copy of data and cover letter for each copy of application.
- C. As a prerequisite for payment, CONTRACTOR is to submit a "Surety Acknowledgement of Payment Request" letter showing amount of progress payment which the CONTRACTOR is requesting.
- D. The CONTRACTOR is to maintain an updated set of drawings to be used as record drawings in accordance with Section 01720. As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit the updated record drawings and surveys in accordance with Section 01050 for review by the OWNER and the ENGINEER.
- E. CONTRACTOR shall maintain an updated construction schedule in accordance with Section 01310. As a prerequisite for monthly progress payments, CONTRACTOR shall submit the updated construction schedule with the applications for progress payments. If the CONTRACTOR fails to submit the required updated schedule within the time prescribed, the ENGINEER may withhold approval of progress payment estimates until such time as the

CONTRACTOR submits the required updated schedule. Submit one copy for each copy of application.

- F. The CONTRACTOR shall demonstrate, as a prerequisite for monthly progress payments, compliance with all requirements specified in Section 02276-Erosion and Sediment Control to the ENGINEER. If the CONTRACTOR fails to demonstrate compliance with Section 02276-Erosion and Sediment Control, the ENGINEER reserves the right to withhold approval of progress payment estimates until such time as the CONTRACTOR demonstrates to the ENGINEER full compliance with Section 02276-Erosion and Sediment Control.
- G. The CONTRACTOR shall provide, as a prerequisite for monthly progress payments, an accumulating cost curve (tabular and diagram) indicating schedule, forecast and actual progress.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 - Contract Closeout.
- C. Submit all Project Record Documents in accordance with Sections 01050 and 01720.

1.07 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the ENGINEER at the times stipulated in the Agreement.
- B. Number: Five copies of each Application.
- C. When the ENGINEER finds Application properly completed and correct, ENGINEER will transmit certificate for payment to OWNER, with copy to CONTRACTOR.
- D. Submit one copy of the invoices for all equipment and materials purchased under the Contract with each Application for Payment current through the previous payment period. Invoices shall show the sales tax paid and shall be used by the OWNER for recovery of taxes.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION

This page intentionally left blank

SECTION 01030

SPECIAL PROJECT PROCEDURES

PART 1: GENERAL

1.01 General

- A Carefully coordinate and conduct all work in strict accordance with Federal, State, and County requirements and standards.

1.02 LINES AND GRADES

- A The CONTRACTOR shall be responsible for establishing all lines and measurements necessary for proper prosecution and control of the work. Available horizontal and vertical controls are shown on the Drawings.

1.03 ACCESS AND DRAINAGE

- A The CONTRACTOR shall provide and maintain adequate access to and throughout the site and shall keep all natural drainage and water courses unobstructed or provide equal courses effectively placed. He shall maintain the access and drainage facilities in accordance with their original condition. The OWNER assumes no responsibility for the placement, condition or maintenance of any access roads or structures that may be used by the CONTRACTOR in the performance of his work.
- B Operation will continue at the facility. Proper safety measures, such as signs, barricades, and other means of traffic guidance, shall be implemented to ensure that the safety of these facilities is not jeopardized.

1.04 RIGHT-OF-WAYS

- A Work performed in RIGHT-OF-WAYS (R-O-W) shall be subject to the provisions of the R-O-W agreements. In general, these easements provide for restoring the property to the condition existing before construction began, except where otherwise noted on the Plans.

1.05 PROVISIONS FOR THE CONTROL OF DUST

- A Sufficient precautions shall be taken during construction to minimize dust. Water or calcium chloride shall be applied as required to control dust.

1.06 LOCATION, PROTECTION AND MAINTENANCE OF EXISTING UTILITIES, STRUCTURES AND PROPERTY

- A Existing utilities are located and are operating in the construction area. CONTRACTOR shall contact the office of each utility operator and ascertain the

extent of specific service areas. CONTRACTOR shall contact the South Carolina One Call system (1-888-721-7877) at least 48 hours prior to excavating.

- B The location of existing utilities across or along the line of the proposed work is not necessarily shown on the Drawings and where shown is only approximately correct. The CONTRACTOR shall locate all underground lines and structures prior to excavation.
- C The CONTRACTOR shall assume full responsibility for the protection and restoration of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. CONTRACTOR shall carefully support and protect all such structures and utilities from injury. Damages resulting from the construction operations shall be repaired by CONTRACTOR.
- D The CONTRACTOR shall fully cooperate at all times with the utility owners to maintain the operation of existing utilities with the least amount of interference and interruption possible. Continuous service, public health and safety considerations shall exceed all others and the CONTRACTOR'S schedule, plans and work shall at all times be subject to alteration and revision if necessary for these considerations.
- E Temporary support, adequate protection and maintenance of all underground and surface utility installations and structures, drains, sewers, and other obstructions encountered shall be provided as required by the CONTRACTOR. Arrange and pay all costs for required support of utility poles and other structures as required by the utility owners prior to excavation.
- F Trees, shrubbery, fences, poles, signs and all other property shall be protected to the extent practicable.
- G. No wetlands area shall be disturbed without written approval from the OWNER.

1.07 RELOCATION OF UTILITIES AND STRUCTURES

- A The CONTRACTOR shall be responsible for the temporary or permanent relocation of structures and utilities, including but not limited to poles, signs, fences, hydrants, valves, piping, conduits and drains that interfere with the positioning of the Work as shown on the Drawings.
- B No relocations of utilities shall be made without approval of the OWNER of the utility.
- C All valve boxes and manhole frames and covers in intersections and elsewhere shall be adjusted as required to be flush with the final pavement surface.

1.08 CLAIMS FOR PROPERTY DAMAGE

- A Upon notification by the OWNER, the CONTRACTOR shall investigate each claim for property damage and shall file, within ten (10) days of such notification, a statement with OWNER setting forth all facts and details relative to such claim.

1.09 CARE AND PROTECTION OF PROPERTY

- A The CONTRACTOR shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the CONTRACTOR, such property shall be restored by the CONTRACTOR, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the ENGINEER.
- B All driveways, sidewalks, curb and gutters disturbed by the CONTRACTOR'S operations shall be restored to their original condition in accordance with SCDOT and County requirements.
- C All fences, signs, mailboxes, and other physical features shall be protected and restored in a workmanlike manner by the CONTRACTOR. Fences and other features removed by the CONTRACTOR shall be replaced as soon as conditions permit. All grass areas beyond the limits of construction that have been damaged by the CONTRACTOR shall be regraded and restored to their original condition.
- D All highways and roads that become littered or soiled by the CONTRACTOR from hauling of borrow material to the construction site shall be kept clean. In addition, signs indicating construction traffic shall be installed at the entrances to the borrow area(s).
- E During the hauling of off-site borrow material onto the site the entrance road to the landfill from highway 90 to the maintenance building shall be cleaned by sweeping twice per month or at the direction of the ENGINEER.
- F Landfill gas (LFG) system pipes and appurtenances, leachate collection system pipes and appurtenances, and all other existing utilities shall be protected from construction activities. Any landfill gas and/or leachate collection system components that become damaged during construction activities by the CONTRACTOR shall be repaired by the CONTRACTOR at his cost.

1.10 GUARANTEE

- A Work on this PROJECT shall be guaranteed in accordance with requirements of Article 13 of the General Conditions. Work found to be defective within 1 year

after the date of Substantial Completion shall be corrected or replaced in accordance with the General Conditions.

1.11 HURRICANE PREPAREDNESS PLAN

- A Within fifteen (15) days of the date of Notice to Proceed, the CONTRACTOR shall submit to the ENGINEER and OWNER a Hurricane Preparedness Plan. The plan should outline the necessary measures which the CONTRACTOR proposes to perform at no additional cost to the OWNER in the event of a hurricane warning. Such measures shall be in accordance with state and local requirements.
- B In the event of inclement weather, the CONTRACTOR will, and will cause Subcontractors, to protect carefully the Work and materials against damage or injury from the weather at no additional cost to the OWNER. If, in the opinion of the ENGINEER, any portion of the Work or materials shall have been damaged or injured by reason of failure on the part of the CONTRACTOR or Subcontractors to so protect the work, such Work and materials shall be removed and replaced at the expense of the CONTRACTOR.

1.12 DAMAGE DUE TO HIGH WATER

- A The CONTRACTOR shall hold himself responsible for all damage done to the Work by heavy rains or flood and CONTRACTOR shall take all reasonable precautions to provide against damages in a permissible manner.

1.13 EMERGENCIES

- A The CONTRACTOR shall at all times after regular working hours, including weekend and holidays, maintain a telephone where the CONTRACTOR or his representative can be reached on an emergency basis. The CONTRACTOR or his representative shall be prepared to act to correct conditions on the site deemed to constitute an emergency by either the OWNER, his agent, or the ENGINEER. The CONTRACTOR shall give the ENGINEER prompt written notice of all significant changes in the Work or deviations from the Contract caused thereby. If a condition on the site requires attention after working hours, either the OWNER, his agent, ENGINEER, or local authority shall call the CONTRACTOR or his representative at the emergency telephone number, identify himself and describe the emergency condition. The CONTRACTOR is expected to dispatch men and equipment to adequately institute corrective measures within two (2) hours. If the CONTRACTOR or his representative cannot be reached at the emergency number after a reasonable time (1/2 hour), the OWNER shall have the right to immediately initiate corrective measures, and the cost of such measures shall be borne by the CONTRACTOR.
- B Emergency phone numbers (fire, medical, police) shall be posted at the CONTRACTOR'S phone and its location known to all.

January 2010

- C Accidents or incidents shall be reported immediately to the ENGINEER by messenger or phone.
- D All accidents or incidents shall be documented and a fully detailed written report, including police reports if produced, submitted to the ENGINEER after each occurrence.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION

This page intentionally left blank

SECTION 01036

CHANGE ORDER PROCEDURES

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A Promptly implement change order procedures.
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records of work done on a time-and-material/ force account basis.
 - 3. Provide full documentation to ENGINEER on request.
- B Designate in writing the member of CONTRACTOR'S organization:
 - 1. Who is authorized to accept changes in the Work.
 - 2. Who is responsible for informing others in the CONTRACTOR'S employ of the authorization of changes in the Work.
- C OWNER will designate in writing the person who is authorized to execute Change Orders.

1.02 RELATED REQUIREMENTS

- A Section 00500: Agreement.
- B Section 00700: General Conditions.
- C Section 00800: Supplementary Conditions
- D Section 01027: Application for Payment.
- E Section 01310: Construction Schedules.
- F Section 01026: Schedule of Values.
- G Section 01630: Substitutions and Product Options.
- H Section 01720: Project Record Documents.

1.03 DEFINITIONS

A See Section 00700 and 00800.

1.04 PRELIMINARY PROCEDURES

A OWNER or ENGINEER may initiate changes by submitting a Request for Proposal (RFP) to CONTRACTOR. Request will include:

1. Detailed description of the Change, Products, and location of the change in the PROJECT.
2. Supplementary or revised Drawings and Specifications.
3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
4. A specific period of time during which the requested price will be considered valid.
5. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress.

B CONTRACTOR may initiate changes by submitting a written notice to ENGINEER, containing:

1. Description of the proposed changes.
2. Statement of the reason for making the changes.
3. Statement of the effect on the Contract Sum and the Contract Time.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.05 WORK DIRECTIVE CHANGE (WDC)

A In lieu of a Request for Proposal (RFP), OWNER or ENGINEER may issue a Work Directive Change (WDC) for CONTRACTOR to proceed with a change for subsequent inclusion in a Change Order.

B Each WDC will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.

- C OWNER and ENGINEER will sign and date the WDC as authorization for the CONTRACTOR to proceed with the changes.
- D CONTRACTOR may sign and date the WDC indicate agreement with the terms therein.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow ENGINEER to evaluate the quotation.
- B On request, provide additional data to support time and cost computations.
 - 1. Labor required.
 - 2. Equipment required.
 - 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 - 4. Taxes, insurance and bonds.
 - 5. Credit for work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.
- C Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information.
 - 1. Name of the OWNER'S authorized agent who ordered the work, and date of the order.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time record, summary of hours worked, and hourly rates paid.
 - 4. Receipts and invoices for:
 - a. Equipment used, listing dates and times of use.

- b. Products used, listing of quantities.
- c. Subcontracts.

D Document requests for substitutions for Products as specified in Section 01630.

1.07 PREPARATION OF CHANGE ORDERS AND FIELD ORDERS

A ENGINEER will prepare each Change Order and Field Order.

B Forms: See end of this section for forms.

C Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

D Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

E Field Order will describe interpretations or clarifications of Contract Documents, order minor changes in the Work, and/or memorialize trade-off agreements.

F Field Order work will be accomplished without change in the Contract Sum, Contract Time, and/or claims for other costs.

1.08 LUMP-SUM/FIXED PRICE CHANGE ORDER

A Content of Change Orders will be based on, either:

1. ENGINEER'S Proposal Request and CONTRACTOR'S responsive Proposal as mutually agreed between OWNER and CONTRACTOR.
2. CONTRACTOR'S Proposal for a change, as recommended by ENGINEER.

B OWNER and ENGINEER will sign and date the Change Order as authorization for the CONTRACTOR to proceed with the changes.

C CONTRACTOR will sign and date the Change Order to indicate agreement with the terms therein.

1.09 UNIT PRICE CHANGE ORDER

A Content of Change Orders will be based on, either:

1. ENGINEER'S definition of the scope of the required changes.
2. CONTRACTOR'S Proposal for a change, as recommended by ENGINEER.

3. Survey of completed work.
- B The amounts of the unit prices to be:
1. Those stated in the Agreement.
 2. Those mutually agreed upon between OWNER and CONTRACTOR.
- C When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
1. OWNER and ENGINEER will sign and date the Change Order as authorization for CONTRACTOR to proceed with the changes.
 2. CONTRACTOR will sign and date the Change Order to indicate agreement with the terms therein.
- D When quantities of the items cannot be determined prior to start of the work:
1. ENGINEER or OWNER will issue a WDC directing CONTRACTOR to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
 2. At completion of the change, ENGINEER will determine the cost of such work based on the unit prices and quantities used.
 - a. CONTRACTOR shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.
 3. ENGINEER will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
 4. OWNER and CONTRACTOR will sign and date the Change Order to indicate their agreement with the terms therein.
- 1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/WORK DIRECTIVE CHANGE
- A ENGINEER and OWNER will issue a WDC directing CONTRACTOR to proceed with the changes.
- B At completion of the change, CONTRACTOR shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.
- C ENGINEER will determine the allowable cost of such work, as provided in General Conditions and Supplementary Conditions.

- D ENGINEER will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
- E OWNER and CONTRACTOR will sign and date the Change Order to indicate their agreement therewith.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.
- B Periodically revise the Construction Schedule to reflect each change in Contract Time.
 - 1. Revise sub-schedules to show changes for other items of work affected by the changes.
- C Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION

SECTION 01040
CONSTRUCTION QUALITY ASSURANCE PLAN
(CQA PLAN)

PART 1 GENERAL

1.1 SUMMARY

This section addresses the Construction Quality Assurance Plan (CQA Plan) for the installation of critical items of work associated with this project.

The CQA Plan is a joint effort between the CONTRACTOR and the OWNER. This section presents the principals and practices to be implemented during construction. Additional quality assurance/quality control measures are stated in the individual specifications sections contained in the appendix of the plan.

1.2 MEASUREMENT AND PAYMENT

Work required for the CQA Plan by the Contract Documents shall not be measured for direct payment. All costs in connection with this work shall be reflected and included in the unit price for the items to which they pertain.

1.3 ELEMENTS OF THE CQA PLAN

Responsibility and Authority – The responsibility and authority of organizations and key personnel (by title) involved in permitting, designing, and constructing the landfill facility.

Inspection Activities – The observations and tests that will be used to ensure that the construction or installation meets or exceeds all design criteria, plans, specifications, and regulations for each landfill component of the construction project. Inspection activities are discussed in sections for each specific work item that is presented in the appendix of the plan.

Sampling Strategies – The sampling activities, sample size, methods for determining sample locations, frequency of sampling, acceptance and rejection criteria, and methods for ensuring that corrective measures are implemented as addressed in the design criteria, plans, specifications, and regulations. Sampling strategies are discussed in section for each specific work item.

Documentation – Reporting requirements for CQA activities including daily field reports, inspection data sheets, problem identification and corrective measures reporting, acceptance reporting and final documentation.

1.4 CONSTRUCTION QUALITY ASSURANCE AND CONSTRUCTION QUALITY CONTROL

In the context of this CQA Plan, Construction Quality Assurance and Construction Quality Control are defined as follows:

Construction Quality Assurance refers to the means and methods employed by the Owner to assure conformity of construction of the landfill (compacted soil liner, geomembrane liners, protective cover layers, etc.) and their materials, workmanship and installation with this CQA Plan, Contract Drawings, and the Specifications. CQA is provided by the CQA Officer as a representative of the Owner and independent from construction and installation.

Construction Quality Control refers to those actions taken by manufacturers, installers, Quality Control Agency, and/or Contractor to ensure that the materials and the workmanship meet the requirements of this CQA Plan and the Specifications. **CQC is provided by the Contractor and their CQC Engineer.**

1.5 DEFINITION, RESPONSIBILITIES, AND QUALIFICATIONS OF PARTIES

1.5.1 General

The principal parties involved in the CQA Plan for the landfill facility include the Owner, Permitting Agency, Engineer, CQA Officer, Quality Assurance Laboratory, QA Resident Project Representative, Contractor, Quality Control firm, Quality Control Laboratory, Contractor's Surveyor, Manufacturers, and Installers. The general responsibilities, authorities and qualifications, as applicable, of each of these parties are described in the following paragraphs. The responsibility and/or authority of a given party may be modified or expanded as dictated by specific project needs during the Pre-construction Conference. The changes shall be incorporated into the CQA Plan prior to construction.

1.5.2 Owner

For this project, the Owner is the Georgetown County.

1.5.2.1 Responsibilities

The Owner is responsible for the design, construction, and operation of the landfill facility. This responsibility includes compliance with the permit and submission of CQA documentation demonstrating that the facility was constructed in accordance with the permit documents and the design plans and specifications.

The Owner has the authority to select and dismiss parties charged with design, CQA, and construction activities. The Owner also has the authority to accept or reject design plans and specifications, CQA plans, reports and recommendations of the CQA Officer or CQC Officer, and the materials and workmanship of Contractors.

1.5.3 Permitting Agency

The Permitting Agency is the South Carolina Department of Health and Environmental Control, Division of Mining and Solid Waste Management (SCDHEC or the Department).

1.5.3.1 Responsibilities

As construction progresses, DHEC has the responsibility and authority to review and accept or reject design revisions or requests for variance submitted by the Owner.

1.5.4 Engineer

For this project, the Engineer is Garrett and Moore, Inc., who was retained by the Owner to perform the engineering design and prepare the associated drawings and specifications.

1.5.4.1 Responsibilities

The Engineer is responsible for approving all design and specification changes, clarifying the design, reviewing and approving shop drawings, and other tasks as required during construction. The Engineer is also responsible for preparing the permit documents for acceptance by the Permitting Agency. The permit documents include forms, narratives, CQA Plan, design plans, and specifications that support construction and closure of the landfill. During construction, the Engineer may be requested to clarify inconsistencies or contradictions in the construction and contract documents or the CQA Plan.

During construction, the Engineer may approve substantive changes to the design plans or specifications of the facility. Substantive changes may require DHEC notification and/or approval prior to making any changes in the field. Substantive changes include any changes that modify or impact the technical basis for any engineered component of the facility design.

1.5.4.2 Qualifications

The Engineer shall be a Professional Engineer licensed by the State of South Carolina. The Engineer shall be familiar with general earthwork, low permeability soils and soil liners, geosynthetics including detailed design methods and procedures, and all applicable regulatory requirements.

1.5.5 CQA Officer

The CQA Officer is an entity, independent of the Contractor, responsible for observing, testing, and documenting activities related to the permit documents and the CQA Plan as well as the overall construction quality assurance of the project. The CQA Officer is also responsible for issuing a certification report, sealed by a Professional Engineer registered in the State of South Carolina. The CQA Officer may be the Engineer.

The CQA Officer is represented on-site by supporting CQA monitoring personnel (RPR, Engineering Technicians) as appropriate but generally during all construction activities including but not limited to earthwork, soil liner, geosynthetics, protective cover layers, leachate collection systems and critical landfill components.

1.5.5.1 Responsibilities

The CQA Officer will report directly to the Engineer during construction. In general, the responsibilities and authorities of the CQA Officer include:

- Complete understanding of the permit documents, design plans, and specifications in relation to all aspects of the CQA Plan;
- Scheduling, coordinating and performing CQA activities;
- Performing independent on-site observation of the work in progress to assess compliance with the CQA Plan, permit documents, design plans, and specifications;
- Recognizing and reporting deviations from the CQA Plan, permit documents, design plans, and/or specifications to the Engineer. Secure documents from the Engineer, which approve the changes;
- Verifying that the testing equipment meets testing and calibration requirements, and that tests are conducted according to standardized procedures defined in the CQA Plan or the specifications;
- Verifying that the raw data are properly recorded, validated, reduced, summarized, and interpreted;
- Recording and maintaining test data accurately;
- Identifying CQA-tested work that should be accepted, rejected, or further evaluated;
- Verifying that corrective measures are implemented;
- Documenting and reporting CQA activities;
- Collecting data needed for record documentation.
- Maintaining open line of communications with other parties involved in the construction.

The CQA Officer is also responsible for approving the work for major construction activities associated with the landfill construction and closure construction.

Approvals shall be issued by a Professional Engineer attesting that construction and all test evaluations are in compliance with South Carolina Rules and Application specifications and bear the seal of the Professional Engineer licensed in the state of South Carolina.

1.5.5.2 Qualifications

The CQA Officer shall be a Professional Engineer licensed by the State of South Carolina. The CQA Officer shall be experienced in the field of solid waste management and lined landfill construction and closure techniques and all applicable regulatory requirements.

The CQA Officer shall be pre-qualified and approved by the Owner. The CQA Officer shall be an engineering firm with experience in construction quality assurance and quality control, particularly on projects involving similar landfill construction systems. The CQA Officer shall be capable of assigning technically qualified personnel to the project, including an on-site CQA Resident Project Representative (RPR). The CQA RPR shall possess a

thorough knowledge of all aspects of earthwork, low permeability soil liners and geosynthetics construction.

1.5.6 Quality Assurance Laboratory

Quality Assurance Laboratory is a firm or firms, independent from the Contractor, Manufacturer, and Installer, responsible for conducting tests on samples of geosynthetics (geomembrane, geocomposites and geotextiles) and soils proposed for use or used in construction at the site.

The Soils CQA Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine soils characteristics as required by the specifications. The Soils CQA Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Soils CQA Laboratory shall also demonstrate to the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

The Geosynthetics CQA Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine geosynthetics characteristics as required by these specifications. The Geosynthetics CQA Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Geosynthetics CQA Laboratory shall also demonstrate the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports. The Geosynthetics CQA Laboratory shall hold current accreditation from the Geosynthetic Accreditation Institute (GAI) for all pertinent test methods.

1.5.6.1 Responsibilities

The Quality Assurance Laboratory shall be responsible for conducting the appropriate laboratory tests as directed by the CQA Officer and in accordance with the project plans and specifications.

1.5.6.2 Reporting

The Quality Assurance Laboratory shall be responsible for providing all tests results to the CQA Officer in written form within 24 hours of receipt of test samples results. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.5.7 CONTRACTOR

The Contractor is the party with which the Owner has entered into agreement to construct the project.

1.5.7.1 Responsibility

The Contractor is responsible for meeting the requirements of the contract documents and the successful completion of the landfill construction project. The Contractor is responsible for all items of work on the project including but not limited to earthwork, erosion and sedimentation control, soil liners, geosynthetic (HDPE) liners, geocomposite drainage nets, protective cover and drainage layers, piping and installation of roads, and all other associated appurtenances. The Contractor shall be responsible for the quality of the materials and installation of the materials in conformance with the contract documents. The Contractor shall be responsible for the quality of work and materials supplied by all of its subcontractors. Contractor shall be responsible for the quality of work and materials supplied by manufacturers.

It is the Contractor's sole responsibility to provide adequate CQC measures for the work to be performed. The Contractor shall not rely on the Owner's CQA services for determining compliance with the contract specifications. The Contractor's specific responsibilities include but are not limited to: providing qualified personnel to perform quality control, providing the CQC Officer, providing acceptable submittals for the various materials as required by the specifications, scheduling and coordinating the work with suppliers and subcontractors, providing a competent resident construction superintendent and an on-site CQC representative at all times during construction, providing licensed land surveying services well-versed in landfill construction, furnishing progress reports, drawings and record drawings, attending progress meetings, providing monthly updated schedules at minimum, and notifying the Owner of design inconsistencies or contradictions. The surveyor shall be a Registered Land Surveyor, licensed by the State of South Carolina.

1.5.7.2 Qualifications

The Contractor's Project Manager and Superintendent shall have a minimum of 10 years of progressive experience with landfill construction work and specifically with construction of low permeability soil liners and geosynthetic liners.

1.5.8 CQC Officer

The Contractor shall directly employ and pay for the services of an independent CQC Firm. The CQC Firm shall directly employ and designate a CQC Officer who is a Professional Engineer licensed in the State of South Carolina, with minimum qualifications as described in Article 1.5.8.2.

The QC Officer may employ a firm to provide QC field testing and laboratory testing services, however it shall be clear that CQC field personnel shall report to and work directly under the supervision and management of the QC Officer.

1.5.8.1 Responsibilities

The CQC Officer shall be solely responsible for the CQC personnel and their activities, as well as the preparation of a certification report to certify the project has been constructed in accordance with the CQA Plan, permit documents, design plans, and specifications.

The CQC Officer shall be responsible for identifying and coordinating quality control activities, testing and reporting requirements of the contract documents, and advising the

Contractor of discrepancies in the construction that do not meet the requirements of the contract documents (including report preparation and repair plan reports) as specified herein.

Additional responsibilities include:

- Complete understanding of the permit documents, design plans, and specifications in relation to all aspects of the CQA Plan.
- Recognizing and reporting deviations from the CQA Plan, permit documents, design plans, and/or specifications to the Contractor and Engineer.
- Documenting and reporting CQC activities.

1.5.8.2 Qualifications

The CQC Officer shall have a minimum of 10 years of progressive engineering and construction experience with work associated with landfill construction, including earthwork and geosynthetics installation.

Qualifications of the CQC firm and Resumes for the CQC Officer and CQC field personnel must be submitted to the Owner and CQA Officer for approval prior to commencement of the Project. The CQC firm and Officer shall demonstrate experience and familiarity with the installation of geosynthetics, low permeable soil liners and construction of lined landfill facilities in general. Field personnel shall have a minimum of 4 years of field experience with the material/operation being inspected and/or tested, and specifically with the construction of low permeable soil liners and geosynthetic installations. QC and QC Field personnel shall not be replaced unless approved by the Owner and Engineer.

1.5.9 Quality Control Laboratory

1.5.9.1 Definition

The Quality Control Laboratory is a firm, independent from the Contractor, Manufacturer, and Installer, responsible for conducting tests on samples of geosynthetics (geomembrane, geocomposites and geotextiles) and soils used in the construction of the facility.

The Soils CQC Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine soils characteristics as required by the specifications. The Soils CQC Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Soils CQC Laboratory shall also demonstrate to the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

The Geosynthetics CQC Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine geosynthetics characteristics as required by the specifications. The Geosynthetics CQC Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Geosynthetics CQC Laboratory shall also demonstrate

to the CQA Officer's satisfaction that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports. The CQC Geosynthetics Laboratory shall hold current accreditation from the Geosynthetic Accreditation Institute (GAI) for all pertinent test methods.

1.5.9.2 Responsibilities

The Quality Control Laboratory shall be responsible for conducting the appropriate laboratory tests as directed by the CQC Officer and in accordance with the project plans and specifications.

The Quality Control Laboratory shall be responsible for providing all tests results to the CQC Officer in written form within 24 hours of receipt of test samples results. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.5.10 Manufacturer

The Manufacturer is the firm or corporation responsible for production of material to be used in the project.

1.5.10.1 Responsibilities

The Manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for its product as specified in the construction specifications.

1.5.10.2 Qualifications of the Geosynthetic Manufacturer

Each geosynthetic Manufacturer shall provide sufficient production capacity and qualified personnel to meet the demands of the project as identified in the specification. Each Manufacturer shall have an internal quality control program for its product that meets the specified requirements.

Each Manufacturer shall meet the following requirements and submit the following information:

- Corporate background and information
- A list of material properties including certified test results, which are attached to geosynthetic samples, if applicable.
- For liner systems, a list of at least 10 completed landfill or surface impoundment facilities totaling a minimum of 3,000,000 SF for which the Manufacturer has manufactured a geosynthetic product. For each facility, the following information shall be provided: Name and purpose of facility, its location, and date of installation, name of owner, project manager, designer, fabrication (if any), and installer, type of geosynthetic and the surface area of installed geosynthetic, available information of the performance of the lining system and the facility.

- The Manufacturer's Quality Control Manual, including a description of the quality control laboratory facilities and pertinent accreditation.
- The Manufacturer's Field Installation Quality Control Manual. The Manufacturer's and Installer's QC Manual shall comply with the Contract Documents. At a minimum, the manual shall contain procedures and recommendations for the following: Geosynthetics deployment, field panel placement, geosynthetics field seaming, seam testing (destructive, non-destructive for field and laboratory settings), repair of defects
- The origin (supplier's name and production plant, and identification (brand name and number) or resin used to manufacture the product.

Pre-installation: Prior to the installation of any geosynthetic material, each Manufacturer must submit to the Engineer and CQA Officer all quality control documentation required by the appropriate section of the specifications. This documentation shall be reviewed and approved by the Engineer and CQA Officer before installation can begin.

1.5.11 Geosynthetics Installer

The Installer is the company responsible for the installation of a particular component of the landfill containment system such as the geosynthetic liner, geosynthetics, leachate collection piping, manholes, pumps and systems. This is not limited to synthetic products. The Installer is a Manufacturer or an approved installer trained and certified to install a Manufacturer's product.

The Installer shall be trained and certified to install the material used, and shall be able to provide qualified personnel to meet the demands of the project.

1.5.11.1 Responsibilities

The Installer shall be responsible for field handling, storing during the installation process, deploying, seaming, curing, temporary restraining, and all other aspects of the product installation. The Installer shall be responsible for submittal of the documentation listed to the Contractor.

Pre-installation: Prior to commencement of the installation, the Installer must submit to the CQA Officer through the Contractor:

- Resume of the Installation Supervisor to be assigned to this project, including dates and duration of employment, and relevant experience and qualifications.
- A preliminary (panel) layout drawing showing the installation layout identifying field seams (or connections) as well as any variance or additional details, which deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.
- Deviation from the layout plan must be approved by the CQA Officer prior to installation.
- Installation schedule

- A list of personnel performing field (seaming) operations along with pertinent experience information and certifications
- All required (HDPE, geosynthetic, etc.) quality control certificates
- Certification that HDPE extrudate to be used is comprised of the same resin as the geomembrane to be used for the geosynthetic phase of the project

This CQA Plan shall be reviewed by the Installer before installation during the applicable phase of construction (geosynthetics, piping, etc.) begins.

Installation (geomembrane liner): During the installation, the Installer shall be responsible for the submission of subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Installation Supervisor.

Completion: Upon completion of the installation, the Installer shall submit:

- The warranty obtained from the Manufacturer.
- The installation warranty
- Record drawings clearly delineating panels, seams, repairs, repair patches, and location of destructive samples
- All QC field reports and documents

The drawings shall be reviewed and certified by the CQC Officer for accuracy. The QC field report documents and drawings shall be submitted to the CQA Officer for review and acceptance.

The Installation Supervisor is the individual provided and assigned by the Installer to be the field representative providing supervision and guidance to the installation crew.

The Installation Supervisor is responsible for coordinating the installation of the material or system (geomembrane liner, geosynthetics, piping, connections, seaming, etc.). The Installation Supervisor is responsible for obtaining samples for field testing and for coordinating testing activities with the Contractor and CQA Officer. The Installation Supervisor is responsible for keeping a daily log of all activities related to geosynthetic products installation and testing and for attending all related project meetings.

1.5.11.2 Qualifications

The Installer shall provide, through the Contractor, the Engineer and CQA Officer with the information demonstrating qualifications as follow:

- Corporate background and information
- Description of installation capabilities:
- Information on equipment (numbers and types), and personnel (number of site managers and number of crews)
- Average daily production anticipated.

- Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.
- Experience as required by individual Specification Sections. For each installation, the following information shall be provided:
 - Name and purpose of facility, its location, and date of installation
 - Name of owner, project manager, designer, manufacturer, fabricator (if any), and name of contact at the facility who can discuss the project
 - Name and qualifications of the Superintendent(s) of the Installer's crew(s)
 - Type of geosynthetic and surface area installed.
 - Type of seaming and type of seaming apparatus used
 - Duration of installation
 - Available information on the performance of the lining system and the facility
 - The Installer's quality control manual. Should the manual be in conflict with the specifications or drawings, the specifications and drawings shall control.
 - A copy of a letter of recommendation supplied by the geomembrane Manufacturer

The Installation Supervisor must be qualified based on previously demonstrated experience, management ability, and authority. The Geosynthetic Installation Supervisor shall have previously managed the installation of seaming apparatus to be used at the site. The Drainage Net Supervisor must have installed at least one net system. The pipe installer must have completed manufacturers training for fusing pipe.

PART 2: PRODUCTS

Not applicable.

PART 3: EXECUTION

3.1 Communication between Involved Parties

To achieve a high degree of quality during construction and to assure a final product that meets all project requirements, clear, open channels of communication are essential; it is essential that lines of communication are open and active in addition to conducting regular project meetings at the site.

3.1.1 Pre-construction Conference

A **Pre-Construction conference** shall be held prior to commencement of the work. At a minimum, the meeting shall include the Owner, Engineer, CQA Officer, Contractor (Project Manager and Superintendent); CQC Officer and Installers as applicable. The Permitting Agency will be notified of the meeting will attend as deemed appropriate.

The meeting will include, but not be limited to, a review of the project site, project documents, modifications of these documents, the responsibilities and duties of each party,

lines of authority and communication, the construction work plan, the proposed schedule and critical path, a discussion of the procedures and schedule for periodic reporting for testing and construction activities, testing protocols, locations of soils, stockpiling, etc.. The Contractor shall present and distribute schedules at the meeting.

3.1.2 Progress Meetings

At minimum, monthly progress meeting shall be held between the Owner, Engineer, CQA Officer, Contractor, CQC Officer, and other involved parties. Those attending will discuss current progress, planned activities for the next week, and new business or revisions to the work. The Engineer will log problems, decisions, or questions arising at this meeting. Minutes of these meeting will be submitted by the Engineer to the Owner for approval and distributed to the appropriate parties within 5 workdays from the meeting.

3.1.3 Problem or Work Deficiency Meeting

A special meeting may be held when and if a problem or work deficiency is present or likely to occur. At a minimum, the meeting should be attended by the Owner, Engineer, CQA Officer, Contractor, and the CQC Officer as appropriate. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- A. Define and discuss the problem or deficiency;
- B. Review alternate solutions; and
- C. Implement an action plan to resolve the problem or deficiency.

The Engineer shall document the meeting and minutes shall be transmitted to the parties involved.

3.2 Quality Assurance Testing

The Contractor shall be aware (and allow for in his schedule) that the CQA Officer will observe or inspect at their discretion, any or all portion of the work and the Contractor shall afford all necessary assistance to the CQA Officer in carrying out such quality assurance tests and checks. The Contractor shall immediately make any necessary corrections to the work. Such checking by the CQA Officer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work. The Contractor shall factor this quality assurance inspection and testing into his schedule and sequence of operations. Any such quality assurance inspection and/or testing by the CQA Officer will not be grounds for request by Contractor for time extensions or extras. Special elements of the CQA testing will require coordination with respect to scheduling of field personnel. The Contractor shall notify the CQA Officer within 72 hours of that need.

3.3 Deficient/Substandard Work

If the quality control or quality assurance testing shows a pattern or trend of the Contractor's work not meeting the minimum standards established in the Contract Documents, the Contractor shall immediately adjust and/or change his mode of operation, his equipment, his on-site personnel, his construction methods and techniques, his quality

control efforts, etc. as necessary (and subject to the approval of the Engineer and CQA Officer) to bring the work into compliance with the minimum quality standards. If the Contractor's work is consistently and/or frequently failing to comply with the minimum quality standards, then the Owner may assess the Contractor the cost for the quality assurance time and expenses and testing associated with (1) retesting where previous tests showed the work not to be in compliance with the minimum standards; and (2) increased quality assurance testing efforts and frequency as deemed necessary by the CQA Officer to confirm that the previously deficient work is being done in accordance with the Contract Documents.

3.4 Anticipated Testing Type and Frequency

The quality control/quality assurance testing anticipated for the work and the type and frequency of such testing is stated in each individual specification section. These testing methods and frequencies are the anticipated level of effort and may be increased or decreased as deemed necessary by the CQA Officer to ascertain the quality of work.

3.5 Documentation

3.5.1 Introduction

The ultimate value of a CQA plan depends to a large extent on recognition of all of the construction activities that should be inspected and the assignment of responsibilities to CQA and CQC inspection personnel for the inspection of each activity. This is most effectively accomplished by documenting CQA activities. The CQA Officer and CQC Officer shall provide the Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The CQA Officer and CQC Officer shall also maintain a complete file of design plans, permit specifications, the CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

3.5.2 Daily Record Keeping

Standard daily reporting procedures should include preparation of the following documents:

- Daily Summary Report from the field (CQA and CQC)
- Observation Logs and Test Data Sheets (CQA and CQC)
- Construction Problem and Solution Report (Engineer or CQA Officer)
- Photographic Reporting (CQA and Contractor)

3.5.2.1 Daily Summary Report (Daily Field Reports)

Daily summary reports should be prepared daily by the CQA Officer and CQC Officer and/or their designated representative in the field. This daily report provides the chronological framework for identifying and recording all other reports. At a minimum, the summary reports should include the following information:

- An identifying sheet number for cross-referencing and document control as applicable;
- Date, project day, project name, location, and other identification;
- Data on weather conditions;

- Reports on any meetings held and their results;
- A reduced-scale site plan showing all proposed work areas and test locations;
- Descriptions and locations of ongoing construction;
- Descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- Locations where tests and samples were taken or reference to specific observation logs and/or test data sheets where such information can be found;
- A summary of field/laboratory test results or reference to specific observation log and/or test data sheets;
- Calibrations or recalibrations of test equipment and actions taken as a result of recalibration, or reference to specific observation logs and/or test data sheets;
- Off-site materials received, including quality and quantity verification documentation;
- Decisions made regarding approval of units of material or of work, and/or corrective actions to be taken in instances of substandard quality;
- The CQA representative's and/or the CQC Officer and his/her on-site representative's signature as appropriate.

3.5.2.2 Observation Logs and Test Data Sheets

All observations, and field and/or laboratory tests, should be recorded on project-specific logs and data sheets. Recorded observations may take the form of notes, charts, sketches, photographs, or any combination of these. Where possible, a checklist may be useful to ensure that no pertinent factors of a specific observation are overlooked. These logs and data sheets may include the following information:

- An identifying sheet numbered for cross referencing and document control;
- Date, project name, location, and personnel involved in the inspection activity.
- Description or title of activity monitored;
- Location of inspection activity and locations of samples collected;
- Type of inspection activity; procedure used (reference to standard method when appropriate);
- Results of laboratory tests received;
- Results of monitoring activity in comparison to specifications; and
- The CQA monitor's or CQC Officer's signature as appropriate.

3.5.2.3 Problem Identification and Solution Reports

A problem is defined herein as material or workmanship that does not meet the specified design. Problem Identification and Solution Reports should be cross-referenced to specific observation logs (or daily filed reports) and test data sheets (or summary tables). The report shall include the following information, as applicable:

- An identifying sheet number for cross-referencing and document control;
- A detailed description of the situation or deficiency;
- The location and probable cause of the situation or deficiency;
- How and when the situation or deficiency was found or located; Documentation of the response to the situation or deficiency;
- Final results of any responses;

- Any measures taken to prevent a similar situation from occurring in the future; and
- The signature of the Engineer.

The Owner shall be made aware of any significant recurring nonconformance with the permit specifications. The Engineer shall then determine the cause of the non-conformance and recommend appropriate changes in procedures or specifications. Any changes will be submitted to the Owner for approval. When this type of evaluation is necessary, the results shall be documented and any revision to procedures or permit specifications will be approved by the Owner, Engineer, and, if necessary, the Permitting Agency.

3.5.2.4 Photographic Reporting

Photographic reporting may be cross-referenced with observation logs and test data sheets and/or construction problem and solution reports. Photographic reporting should include the following information:

- Identification for cross-referencing and document control;
- The size, scale, and orientation of the subject matter photographed; Location and description and date of the work;
- The purpose of the photograph;
- The name of the photographer

These photographs will serve as a photographic record of work progress, issues, and corrective measures. They should be kept in a permanent protective file in the order in which they were taken.

3.6 Final Documentation

At the completion of the work, the CQC Engineer shall submit to the Engineer a signed Final Certification Documentation. At a minimum, the Certification Report shall include:

- Summary reports of all construction activities;
- Observation logs, test data sheets and test results and summary tables including sample location maps and supporting field and laboratory tests results;
- Construction issues and solutions reports;
- Record surveys;
- A summary statement sealed and signed by a Professional Engineer licensed in the State of South Carolina; and
- All approvals or certifications pertinent to the landfill project and as specified in the individual specification sections.

The record plans shall include scale plans depicting the location of the construction and details pertaining to the extent of construction (e.g., depths, plan dimensions, elevations, soil component thicknesses, etc.). Surveying and base maps required for development of the record plans shall be done by a qualified land surveyor licensed in the State of South Carolina.

Approval of the Final QC Certification Report by the Engineer shall be required prior to the

Work being eligible for Substantial Completion.

END OF SECTION

SECTION 01050
FIELD ENGINEERING

PART 1: GENERAL

1.01 SCOPE OF WORK

- A The CONTRACTOR shall retain the services of a registered land surveyor licensed in the State of South Carolina.
 - 1. Identify existing control points and property line corner stakes indicated on the Drawings, as required.
 - 2. Verify all existing structure locations and all proposed equipment locations.
 - 3. Maintain an accurate location of all buried piping.

1.02 RELATED WORK

- A Section 01025: Measurement and Payment
- B Section 01040: CQA Plan

1.03 SUBMITTALS

- A Submit name, address and copy of licensure of the registered land surveyor proposed to be used on this PROJECT to the ENGINEER within 15 days of the Notice to Proceed.
- B On request of the ENGINEER, submit documentation to verify accuracy of field engineering work.
- C The CONTRACTOR is required to perform surveys signed and sealed by the registered land surveyor. All surveys shall be tied to the existing permanent survey monuments at the site, as identified on the drawings. These drawings shall be included with, and made a part of, the PROJECT record documents. The CONTRACTOR shall also submit each survey on CD-ROM in AutoCAD Release 2000 or newer and/or Terramodel software format. All elevation information in the file must be at appropriate 3-D elevation. All entities shall be placed on layer names which adequately describe the entity being mapped.
- D The CONTRACTOR is required to perform the following surveys and submit to the ENGINEER.
 - 1. The CONTRACTOR shall provide certified topographic map surveys and Digital Terrain Models (DTM) of the following:
 - a. **Pre-work Survey:** Immediately following clearing and grubbing and stripping and prior to starting excavation and/or backfill. Pre-Work Survey shall include surveys of existing surface utilities.

- b. **Subgrade Plan Survey:** Immediately following completion of excavation and backfill per the Subgrade Plan and prior to starting placement of the subsequent layer (compacted soil liner, protective cover layer, drainage layer, stone road paving).
- c. **Post-work Survey (as-built):** Following completion of placement of landfill compacted soil liner and protective cover layer; to include landfill operational berms, diversion berms, ditches, and roads where applicable.

The surveys shall meet the following criteria: 1" = 100' scale reproducible plot produced at national map accuracy standards for 1" = 100' scale maps with 2' contour interval.

The DTM must contain adequate 3-D points and 3-D break lines required to accurately model the photographed surface to within above stated accuracy. The DTM must also provide a 2-D polyline defining the limits of the area surveyed. The points, break lines, and survey limits line shall be on separate layers. AutoCAD files of the DTM model must be compatible for use with Terramodel software.

2. Compacted Soil Liner, Geosynthetics and Protective Cover Surveys

The CONTRACTOR shall provide Surveys that show the constructed horizontal limits of Compacted Soil Liner, and geosynthetics (geomembrane liner, geocomposites, fabriform, etc.) and Protective Cover layers, respectively.

- a. The Compacted Soil Liner and Protective Cover Surveys shall also include a grid survey that shows the elevations of each of the following components of the liner system: 1) elevations of the Compacted Soil Liner subgrade, 2) elevations of the finish grade of the Compacted Soil Liner, and 3) elevations of the finish grade of the Protective Cover, taken on a grid pattern of 50-foot centers, and at all breaks in grade (max 50' spacing,) and along all boundaries/edges of the liner system (max 50' spacing). Identical horizontal points for all three grades shall be required.

CONTRACTOR shall submit *proposed* grid survey points for approval by the ENGINEER. The grid pattern shall remain in the same location for each survey layer. No soil liner, geomembrane or overlaying layer shall be placed until a certified survey is submitted and approved by the Engineer demonstrating that the surface of the Compacted Soil Liner conforms to the Project Drawings and that the thickness of the Compacted Soil Liner is a

minimum of 24-inches at all grid points within the landfill or as specified in the Contract Documents, i.e. an alternate liner system. The actual bottom elevation of the Compacted Soil Liner shall be at or above the plan subgrade elevation at all grid points and within 0.10' of plan elevation.

All grid points shall be accompanied by a spreadsheet (survey grid table), certified by the Surveyor, indicating point number, subgrade elevation, top of soil liner elevation, thickness, top of protective cover, and protective cover thickness.

- b. The Surveyor shall provide a map locating the anchor trench, edge-of-liner, FML panels, all destructive test sample locations, all FML repairs, and limits of each layer of geosynthetics and locations of all unique structures. The survey shall represent as-built final elevations. The 3D surface area(s) of the geosynthetics shall be shown on the survey.
3. Certified survey of the limits of work, and surface and subsurface structures installed by CONTRACTOR shall be provided after completion of the PROJECT and shall include the following:
- a. Limits of Work – Including, but not limited to:
 - i. limits of cleared and grubbed
 - ii. limits of road pavement
 - iii. limits of seeded and mulched
 - b. Surface Facilities – Including, but not limited to:
 - i. Rip-rap aprons, ditches and outlet energy dissipaters
 - ii. Stormwater management structures (ditches, berms)
 - iii. Collection pipes and lines (drainage aggregate limits), header pipes, stub-outs, tie-ins and clean-outs
 - iv. Manholes and pumping systems
 - v. Any other surface facilities installed by the Contractor.
 - c. Subsurface Facilities – Including, but not limited to:
 - i. Pipes (indicating alignment and invert elevations, size, elbows, valves, stub-outs, tie-ins, clean-outs, etc.)
 - ii. Pipe drop inlets (including grate elevations and pipe inverts)
 - iii. Pump station pipe invert elevations
 - iv. Force main pipe alignment
 - v. Buried electrical conduit
 - vi. Any other subsurface facilities installed by the Contractor.
4. The OWNER reserves the right to withhold final payment on any or all work items requiring confirmation as-built surveys until such

time that the final as-built survey is submitted and approved by the OWNER.

1.04 QUALIFICATIONS OF SURVEYOR and EQUIPMENT

- A Registered land surveyor of the discipline required for the specific service on the PROJECT, currently licensed in the State of the South Carolina.
- B All survey instruments should be capable of reading to a precision of 0.01 ft and with a setting accuracy of 20 sec. (5.6×10^{-3} degrees).

1.05 SURVEY REFERENCE POINTS

- A Existing basic horizontal and vertical control points for the PROJECT are those designated on Drawings.
- B Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to the ENGINEER.
 - 2. Report to the ENGINEER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to correctly replace PROJECT control points which may be lost or destroyed.
 - a. Establish replacements based on original horizontal and vertical survey control.

1.06 PROJECT SURVEY REQUIREMENTS

- A Establish a minimum of two permanent benchmarks on site, referenced to data established by survey control points.
 - 1. Record locations, with horizontal and vertical data, on PROJECT Record Documents.
 - 2. Clearly identify the benchmarks in the field with marker post. Install protection around the benchmarks.
- B Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:
 - 1. Site improvements
 - a. Stakes for grading, fill and topsoil placement.

b. Utility slopes and invert elevations.

C From time to time, verify layouts by same methods.

D Establish all lines and grades prior to construction of line work for all pipelines at 100-ft increments and at defined breaks in grade.

1.07 RECORDS

A Maintain a complete, accurate log of all control and survey work as it progresses.

B Update the PROJECT Record Drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests.

C Maintain an accurate record of piping changes, revisions, and modifications.

D All field survey notes will be retained by the Surveyor. The results from the field surveys will be documented on a set of Survey Record Drawings signed and sealed by a registered Professional Engineer or Professional Land Surveyor licensed in the State of South Carolina for submittal to the ENGINEER. The CONTRACTOR shall certify to the ENGINEER that the results of the survey demonstrate compliance with the Contract Documents. These drawings shall, at a minimum, show the final elevations and locations of all surfaces and appurtenances surveyed.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 01055

DUTIES, RESPONSIBILITIES AND LIMITATIONS OF AUTHORITY
OF RESIDENT PROJECT REPRESENTATIVE

PART 1:

A. GENERAL

ENGINEER'S Resident Project Representative (RPR) will act as directed by and under the supervision of the ENGINEER, and will confer with ENGINEER regarding his actions. Resident Project Representative's dealings in matters pertaining to the on-site work shall in general be only with ENGINEER and CONTRACTOR, and dealing with Subcontractors shall only be through or with the full knowledge of CONTRACTOR.

B. DUTIES AND RESPONSIBILITIES

Resident Project Representative will:

1. Schedule:

- a. Review the progress schedule, schedule of Shop Drawing submissions and schedule of values prepared by CONTRACTOR and consult with ENGINEER concerning their acceptability.

2. Meetings:

- a. Attend pre-construction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with ENGINEER and notify those expected to attend in advance. Attend meetings, and maintain and circulate copies of minutes thereof.

3. Liaison:

- a. Serve as ENGINEER'S liaison with CONTRACTOR, working principally through CONTRACTOR'S superintendent and assist him in understanding the intent of the CONTRACT Documents. Assist ENGINEER in serving as OWNER'S liaison with CONTRACTOR when CONTRACTOR'S operations affect OWNER'S on-site operations.
- b. As requested by ENGINEER, assist in obtaining from OWNER additional details or information, when required at the job site for proper execution of the PROJECT.

4. Shop Drawings and Samples:

- a. Receive and record data of receipt of Shop Drawings and samples, receive samples that are furnished at the site by CONTRACTOR, and notify ENGINEER of their availability for examination.

- b. Advise ENGINEER and CONTRACTOR or his superintendent immediately of the commencement of any work requiring a Shop drawing or sample submission if the submission has not been approved by the ENGINEER.

5. Review of PROJECT, Rejection of Defective Work, Inspections and Tests:

- a. Conduct on-site observations of the work in progress to assist ENGINEER in determining if the PROJECT is proceeding in accordance with the CONTRACT Documents and that completed Work will conform to the CONTRACT Documents.
- b. Report to ENGINEER whenever he believes that any work is unsatisfactory, faulty, or defective or does not conform to the CONTRACT Documents, or does not meet the requirements of any inspections, tests or approval required to be made or has been damaged prior to final payment; and advise ENGINEER when he believes work should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- c. Verify that tests, equipment, and system start-ups and operating and maintenance instructions are conducted as required by the CONTRACT Documents and in the presence of the required personnel, and that CONTRACTOR maintains adequate records thereof, observe, record, and report to ENGINEER appropriate details relative to the test procedures and start-ups.
- d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the PROJECT, record the outcome of these inspections and report to the ENGINEER.

6. Interpretation of CONTRACT Documents:

- a. Transmit to CONTRACTOR, ENGINEER'S clarifications and interpretations of the CONTRACT Documents.

7. Recommendations:

- a. Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report them with recommendations to ENGINEER

8. Records:

- a. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and sample submissions, reproductions of original CONTRACT Documents including all Addenda, change orders, field orders, additional Drawings issued subsequent to the execution of the CONTRACT, ENGINEER'S clarifications and interpretations of the

CONTRACT Documents, progress reports, and other PROJECT related documents.

- b. Keep a diary or log book, recording hours on the job site, weather conditions (temperature, estimated wind direction and speed, rainfall amounts, and time of occurrence), data relative to questions of extras or deductions, list of visiting officials and representatives of manufactures, fabricators, suppliers and distributors, daily activities, decisions, observations in general and specific observations in more detail as the case of observing test procedures. Send copies to ENGINEER.
- c. Record names, addresses and telephone numbers of all CONTRACTORS, Subcontractors and major suppliers of materials and equipment.
- d. Furnish ENGINEER periodic reports as required of progress of the PROJECT and CONTRACTOR'S compliance with the approved progress schedule and schedule of Shop Drawing submissions.
- e. Consult with ENGINEER in advance of scheduled major tests, inspections, or start of important phases of the PROJECT.
- f. Report immediately to ENGINEER upon the occurrence of any accident.

9. Payment Requisitions:

- a. Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward them with recommendations to ENGINEER, noting particularly their relation to the schedule of values, work completed, and materials and equipment delivered at the site but not incorporated in the PROJECT.

10. Certificates, Maintenance and Operation Manuals:

- a. During the course of the PROJECT, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by CONTRACTOR are applicable to the items actually installed; and deliver this material to ENGINEER for his review and forward to OWNER prior to final acceptance of the PROJECT.

11. Completion:

- a. Before ENGINEER issues a Certificate of Substantial Completion, submit to CONTRACTOR a list of observed items requiring completion or correction.
- b. Conduct final inspection in the company of ENGINEER, OWNER, and CONTRACTOR and prepare a final list of items to be completed or corrected.

- c. Verify that all items on final list have been completed or corrected and make recommendations to ENGINEER concerning acceptance.

C. LIMITATIONS OF AUTHORITY

Except upon written instructions of ENGINEER, Resident Project Representative:

1. Shall not authorize any deviation from the CONTRACT Documents or approve any substitute materials or equipment.
2. Shall not exceed limitations on ENGINEER'S authority as set forth in the CONTRACT Documents.
3. Shall not undertake any of the responsibilities of CONTRACTOR, Subcontractor, or CONTRACTOR'S Superintendent, or expedite the PROJECT.
4. Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the CONTRACT Documents.
5. Shall not advise on or issue directions as to safety precautions and programs in connection with the PROJECT.
6. Shall not authorize OWNER to occupy the PROJECT in whole or in part.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A The ENGINEER shall schedule and administer a pre-construction meeting, periodic progress meetings, and specially called meetings throughout progress of the work. The ENGINEER shall:
 - 1. Prepare agenda for meetings.
 - 2. Make physical arrangements for meetings.
 - 3. Preside at meetings.
 - 4. Keep a record of the meeting, to include significant proceedings and decisions.
 - 5. Reproduce and distribute copies of the record within five working days after each meeting:
 - a. To participants in the meeting.
 - b. To parties affected by decisions made at the meeting.
- B Representatives of the CONTRACTOR, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C The CONTRACTOR shall provide an updated schedule at each PROJECT meeting.
- D The CONTRACTOR shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 RELATED REQUIREMENTS

- A Section 00700: General Conditions.
- B Section 00800: Supplementary Conditions.
- C Section 01310: Construction Schedules.
- D Section 01340: Shop Drawings, Product Data, Working Drawings, and Samples.

E Section 01720: PROJECT Record Documents

1.03 PRE-CONSTRUCTION MEETING

A The ENGINEER will schedule a pre-construction meeting in accordance with Article 2.8 of the General Conditions.

B Location: A central site, convenient for all parties, designated by the OWNER.

C Attendance:

1. ENGINEER.
2. OWNER Representative.
3. CONTRACTOR'S Superintendent.
4. Major Subcontractors.
5. Major suppliers.
6. Utilities
7. Others as appropriate.

D Agenda:

1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected Construction Schedules.
2. Critical work sequencing.
3. Major equipment deliveries and priorities.
4. PROJECT Coordination.
 - a. Designation of responsible personnel.
5. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.

- d. Change Orders.
- e. Applications for Payment (monthly date of Payment to be determined).
6. Adequacy of distribution of Contract Documents.
7. Procedures for maintaining Record Documents.
8. Use of premises:
 - a. Office, work and storage areas.
 - b. OWNER'S requirements.
9. Construction facilities, controls and construction aids.
10. Temporary utilities.
11. Housekeeping procedures.
12. Safety

1.04 PROGRESS MEETINGS

- A. The ENGINEER will schedule regular progress meetings. The progress meetings will be held approximately every 14 days with the first meeting 15 days after the pre-construction meeting or no later than 30 days after the date of Notice to Proceed.
- B ENGINEER, OWNER, or CONTRACTOR may hold or call meetings as required by progress of the work.
- C Location of the meetings: PROJECT field office of CONTRACTOR or ENGINEER.
- D Attendance:
 1. OWNER'S Representative
 2. ENGINEER
 3. RPR
 4. CONTRACTOR'S Superintendent
 5. Subcontractors as appropriate to the agenda.
 6. Suppliers as appropriate to the agenda.

7. Others as appropriate.

E Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Measures and procedures to maintain projected schedule.
7. Revisions to Construction Schedule.
8. Progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the PROJECT.
14. Construction Schedule
15. Critical/long lead items.
16. Other business.

F The CONTRACTOR is to attend progress meetings and is to study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of the work, etc.

G The CONTRACTOR is to provide a current submittal log at each progress meeting in accordance with Section 01340.

END OF SECTION

SECTION 01310
CONSTRUCTION SCHEDULES

PART 1: GENERAL

1.01 WORK INCLUDED

- A Promptly after award of the Contract and within five days after the effective date of the Agreement, prepare and submit to the ENGINEER estimated construction progress schedules for the Work, with sub-schedules of related activities which are essential to its progress.
- B Submit revised progress schedules on a monthly basis.

1.02 RELATED REQUIREMENTS

- A Section 00700: General Conditions.
- B Section 00800: Supplemental Conditions
- C Section 01010: Summary of Work.
- D Section 01027: Application for Payment
- E Section 01200: Project Meetings.
- F Section 01340: Shop Drawings, Product Data and Samples.
- G Section 01026: Schedule of Values

1.03 FORM OF SCHEDULES

- A Prepare schedules in the form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation for each item of work.
 - 2. Horizontal time scale: In weeks from start of construction and identify the first work day of each month.
 - 3. Scale and spacing: To allow space for notations and future revisions.
- B Format of listings: The chronological order of the start of each item of work.
- C Identification of listings: By major specification section numbers as applicable.

1.04 CONTENT OF SCHEDULES

A Construction Progress Schedule:

1. Show the complete sequence of construction by activity.
2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two-week increment scale. Specifically list, but not limit to:
 - a. Notice to Proceed
 - b. Substantial Completion
 - c. Final Completion
 - d. Mobilization
 - e. Temporary Erosion Control Measures
 - f. Stripping and Fine Grading Intermediate Cover
 - g. Backfill Installation
 - h. Compacted Soil Liner Installation (including QC Testing)
 - i. Major Material Deliveries (separate different materials)
 - j. HDPE Liner Installation
 - k. Geocomposite Drainage Net Installation
 - l. Leachate Collection System
 - m. Protective Cover Layer Installation
 - n. Stormwater Collection and Conveyance System Installation
 - o. Seeding and Mulching
 - p. Restoration
3. Show projected percentage of completion for each item, as of the first day of each month.
4. Show projected dollar cash flow requirements for each month of construction.
5. Highlight all activities on the critical path.

- B Submittals Schedule for Shop Drawings, Product Data and Samples in accordance with Section 01340. Show:
 - 1. The dates for CONTRACTOR'S submittals.
 - 2. The dates submittals will be required for OWNER-furnished products, if applicable.
 - 3. The dates approved submittals will be required from the ENGINEER.
 - C A list of all long lead items (equipment, materials, etc.)
- 1.05 PROGRESS REVISIONS
- A Indicate progress of each activity to date of submission.
 - B Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- 1.06 SUBMISSIONS
- A Submit initial schedules to the ENGINEER within 5 days after the effective date of the Agreement. Resubmit revised schedules within 5 days after receiving Engineer's review comments.
 - B Submit revised progress schedules with that month's application for payment.
- 1.07 DISTRIBUTION
- A Distribute copies of the reviewed schedules to:
 - 1. ENGINEER (four copies).
 - 2. CONTRACTOR'S job site file.
 - 3. Subcontractors.
 - 4. Other concerned parties.
 - B Instruct recipients to report promptly to the CONTRACTOR, in writing, any

problems anticipated by the projections shown in the schedules.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION

3.01 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A The CONTRACTOR agrees that whenever it becomes apparent from the current monthly schedule that delays to the project schedule have resulted, and hence, that the contract completion date will not be met, he will take some or all of the following actions at no additional cost to the OWNER, submitting to the OWNER for approval, a written statement of the steps he intends to take to remove or arrest the delay in the approved schedule.

1. Increased construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
2. Increase the number of working hours per shift, shifts per working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.
3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.
4. Costs incurred by the OWNER arising from such lengthening of hours, including extended time for the RPR or furnishing of Inspectors, shall be the CONTRACTOR'S responsibility and shall be deducted from monies due him. Failure of the CONTRACTOR to comply with these requirements may be grounds for determination by the ENGINEER that the CONTRACTOR is not proceeding at such rates as will insure completion within the specified time and may result in the termination of the right of the CONTRACTOR to continue the work.

3.02 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

A If the CONTRACTOR desires to make changes in his method of operating which affect the approved schedule, he shall notify the ENGINEER in writing, stating what changes are proposed and the reason for the change. If the ENGINEER approves these changes, the CONTRACTOR shall revise and submit for approval, without additional cost to the OWNER, all of the affected portion of the schedule. The schedule shall be adjusted by the CONTRACTOR only after prior approval of his proposed changes by the ENGINEER.

B The contract completion time will be adjusted only for causes specified in this contract. In the event the CONTRACTOR requests an extension of

any contract completion date, he shall furnish such justification and supporting evidence as the ENGINEER may deem necessary for a determination as to whether the CONTRACTOR is entitled to an extension of time under the provisions of this contract. ENGINEER will, after receipt of such justification and supporting evidence make findings of fact and will advise the CONTRACTOR in writing thereof. If the ENGINEER finds that the CONTRACTOR is entitled to any extension of any contract completion date under the provisions of this contract, the ENGINEER'S determination as to the total number of days extension shall be based upon the currently approved schedule and on all data relevant to the extension. Such data shall be included in the next monthly updating of the schedule. The CONTRACTOR acknowledges and agrees that actual delays in activities which, according to the schedule, do not affect any contract completion date shown by the critical path in the schedule do not have any effect on the contract completion date or dates, and therefore, will not be the basis for a change.

3.03 ADJUSTMENT BY ENGINEER

- A From time to time it may be necessary for the Contract schedule and/or completion time to be adjusted by the ENGINEER due to the effects of job conditions, acts or omissions of other CONTRACTORS not directly associated with this contract, weather, technical difficulties, unavoidable delays and other enforceable conditions which may indicate schedule adjustments and/or completion time extension. Under such conditions, the ENGINEER shall direct the CONTRACTOR to reschedule the work to reflect the changed conditions, and the CONTRACTOR shall revise his schedule accordingly. Schedule extensions affecting the Contract completion time shall be granted only by the ENGINEER in writing. No additional compensation shall be made to the CONTRACTOR for such schedule changes except for unavoidable overall Contract time extensions beyond the actual completion of all unaffected Work in the Contract, in which case the CONTRACTOR shall take all possible action to minimize any time extension and any additional cost to the Owner.

3.04 COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES

- A Where work is to be performed under this contract concurrently with and/or contingent upon work performed on the same facilities or area under other contracts, the CONTRACTOR'S schedule shall be coordinated with the schedules of the other contracts. The CONTRACTOR shall obtain the schedules of the other appropriate contracts for the preparation and updating of his schedule and shall make the required changes in his schedule when indicated by changes in corresponding schedules.
- B The OWNER controls the float time in the approved schedule and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates set out in the schedule, the OWNER may initiate changes to the work that absorb float time only. OWNER

January 2010

initiated changes that affect the Critical Path on the approved schedule shall be the sole grounds for extending said completion dates. CONTRACTOR-initiated changes that encroach on the float time identified in the approved schedule may be accomplished with the OWNER'S concurrence. Such changes, however, shall give way to OWNER-initiated changes competing for the same float time.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS, AND SAMPLES

PART 1: GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data and Samples. Detailed submittal requirements are specified in the technical specifications sections.
- B All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A Shop Drawings

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
2. All shop drawings submitted by subcontractors for approval shall be sent directly to the CONTRACTOR for checking. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
3. The CONTRACTOR shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

B Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and

test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C Working Drawings

1. When used in the Contract Documents, the term "working drawings" shall be considered to mean the CONTRACTOR'S plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and false work; and for such other work as may be required for construction but does not become an integral part of the PROJECT.
2. Working drawings shall be prepared and sealed by a registered Professional ENGINEER, currently licensed to practice in the State of South Carolina. The CONTRACTOR shall submit a letter of certification from the Professional ENGINEER stating that he/she has prepared the designs and has verified that the materials/equipment have been installed as designed. No working drawings or calculations/computations relating to the working drawings shall be submitted to the ENGINEER unless specifically requested in writing.

D Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the ENGINEER or OWNER for independent inspection and testing, as applicable to the Work.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A The CONTRACTOR shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
1. Field measurements
 2. Field construction criteria
 3. Catalog numbers and similar data
 4. Conformance with the Specifications
- B Each shop drawing, sample and product data submitted by the CONTRACTOR shall have affixed to it the following Certification Statement including the CONTRACTOR'S Company name and signed by the CONTRACTOR: "Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the OWNER'S Representative a copy of each submittal

transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the ENGINEER.

- C The CONTRACTOR shall utilize a 10-character submittal identification numbering system in the following manner:
1. The first character shall be a D, S, P, M, or R, which represents Shop/Working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M), or Request for Information (R).
 2. The next five digits shall be the applicable Specification Section Number.
 3. The next three digits shall be the numbers 001-999 to sequentially number each initial separate item or drawing submitted under each specific Section number.
 4. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same Drawing, i.e., "A=1st submission, B=2nd submission, C=3rd submission, etc. A typical submittal number would be as follows:

D-03300-008-B

| | | |
|-------|---|--|
| D | = | Shop Drawing |
| 03300 | = | Specification Section for Concrete |
| 008 | = | The eighth initial submittal under this specification section |
| B | = | The second submission (first resubmission) of that particular shop drawing |

- D Notify the ENGINEER in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.
- E The review and approval of shop drawings, samples or product data by the ENGINEER shall not relieve the CONTRACTOR from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the CONTRACTOR and the ENGINEER will have no responsibility therefor.
- F No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the CONTRACTOR'S risk. The OWNER will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- G PROJECT work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.04 SUBMISSION REQUIREMENTS

- A Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other CONTRACTOR.
- B Each submittal, appropriately coded, will be returned within 14 calendar days following receipt of submittal by the ENGINEER.

C Number of submittals required:

1. Shop Drawings as defined in Paragraph 1.02 A: Eight copies (seven copies to be sent to the ENGINEERS home office, one copy to be sent to ENGINEERS site office).
2. Product Data as defined in Paragraph 1.02 B: Four copies (three copies to be sent to the ENGINEERS home office, one copy to be sent to ENGINEERS site office).
3. Samples: Submit the number stated in the respective Specification Sections.

D Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The PROJECT title and number.
3. CONTRACTOR identification.
4. The names of:
 - a. CONTRACTOR
 - b. Supplier
 - c. Manufacturer
5. Identification of the product, with the specification section number, page and paragraph(s).
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Identification of deviations from Contract Documents.
10. Identification of revisions on resubmittals.
11. An 8-in x 3-in blank space for CONTRACTOR and ENGINEER stamps.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

1. as permitting any departure from the Contract requirements;
2. as relieving the CONTRACTOR of responsibility for any errors, including details, dimensions, and materials;
3. as approving departures from details furnished by the ENGINEER, except as otherwise provided herein.

- B The CONTRACTOR remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- C If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which ENGINEER finds to be in the interest of the OWNER and to be so minor as not to involve a change in Contract Price or time for performance, the ENGINEER may return the reviewed drawings without noting an exception.
- D Submittals will be returned to the CONTRACTOR under one of the following codes.

Code 1 - "REVIEWED" is assigned when there are no notations or comments on the submittal. When returned under this code the CONTRACTOR may release the equipment and/or material for manufacture.

Code 2 - "FURNISH AS CORRECTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the CONTRACTOR. The CONTRACTOR may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. The CONTRACTOR may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the ENGINEER within 10 calendar days of the date of the ENGINEER'S transmittal requiring the resubmittal.

Code 4 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The CONTRACTOR must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 5 - "SUBMIT SPECIFIC ITEM" is assigned where there are comments attached to the returned submittal which provide additional data to aid the CONTRACTOR.

Codes 1 through 4 designate the status of the reviewed submittal with Code 5 showing there has been an attachment of additional data.

In each case above, ENGINEER does not assume responsibility for accuracy of the product referenced on the submittal. CONTRACTOR is responsible for complying with the Contract Documents in all submittals unless so stated by the ENGINEER.

- E Resubmittals will be handled in the same manner as first submittals. On resubmittals the CONTRACTOR shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the ENGINEER, on previous submissions. Any such revisions

which are not clearly identified shall be made at the risk of the CONTRACTOR. The CONTRACTOR shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the ENGINEER.

F Partial submittals may not be reviewed. The ENGINEER will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the CONTRACTOR, and will be considered "Rejected" until resubmitted. The ENGINEER may at his/her option provide a list or mark the submittal directing the CONTRACTOR to the areas that are incomplete.

G Repetitive Review

1. Shop drawings and other submittals will be reviewed no more than twice at the Owner's expense. All subsequent reviews will be performed at times convenient to the ENGINEER and at the CONTRACTOR'S expense, based on the ENGINEER'S then prevailing rates. The CONTRACTOR shall reimburse the OWNER for all such fees invoiced to the OWNER by the ENGINEER. Submittals are required until approved.
2. Any need for more than one resubmission, or any other delay in obtaining ENGINEER'S review of submittals, will not entitle CONTRACTOR to extension of the Contract Time.

H If the CONTRACTOR considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the CONTRACTOR shall give written notice thereof to the ENGINEER at least seven working days prior to release for manufacture.

I When the shop drawings have been completed to the satisfaction of the ENGINEER, the CONTRACTOR shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the ENGINEER.

1.06 DISTRIBUTION

A Distribute reproductions of reviewed shop drawings and copies of reviewed product data and samples, where required, to the job site file and elsewhere as directed by the ENGINEER. Number of copies shall be as directed by the ENGINEER but shall not exceed 6.

1.07 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A If specifically required in other Sections of these Specifications, the CONTRACTOR shall submit a P.E./RLS Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.08 GENERAL PROCEDURES FOR SUBMITTALS

A Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the CONTRACTOR'S failure to transmit submittals sufficiently in advance of the Work.

P.E./R.L.S. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer/Registered Land Surveyor registered in the State of South Carolina and that he/she has been employed by

_____ (Name of Contractor)
to design

_____ in accordance with Specification Section _____ for the
_____ (Name of Project)

The undersigned further certifies that he/she has performed the design of the

_____,
that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E./R.L.S. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the
_____ (Insert Name of Owner)

or OWNER'S representative with five working days following written request therefore by the OWNER.

P.E./R.L.S. Name

Signature

Address

Contractor's Name

Signature

Title

Address

END OF SECTION

This page intentionally left blank

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A Employ competent photographer to take construction record photographs periodically during course of the Work.

1.02 RELATED REQUIREMENTS

- A Section 01010: Summary of Work.
- B Section 01720: PROJECT Record Documents.

1.03 PHOTOGRAPHY REQUIRED

- A Provide photographs of the general construction area prior to starting construction.
- B Provide photographs taken on cutoff date for each scheduled Application for Payment.
- C Provide photographs taken at each major stage of construction:
 - 1. Prior to initiation of construction.
 - 2. Completion of temporary erosion controls.
 - 3. Completion of stripping.
 - 4. Completion of excavations/grading.
 - 3. During installation of compacted soil liner
 - 4. During installation of HDPE Liner and Geocomposite Drainage Net
 - 5. During installation of Leachate Collection System
 - 6. During installation of drainage and erosion layer
 - 7. During installation of stormwater collection and conveyance structures
 - 8. Upon completion of stabilization
- D Views and Quantities Required:

1. At each specified time, photograph PROJECT from a minimum of five different locations, as approved and/or requested by the ENGINEER.
2. Provide five prints of each view.
3. Digital copies of photographs may be provided by the CONTRACTOR in lieu of paper copies. All digital photographs shall be submitted on a compact disc (CD) and shall be a resolution of 4 megapixels or greater.
4. Aerial photographs may be used upon prior approval by the OWNER.

E Negatives:

1. Remain property of photographer.
2. Require that photographer maintain negatives for a period of two years from Date of Completion of entire PROJECT.
3. Photographer shall agree to furnish additional prints to OWNER and the ENGINEER at commercial rates applicable at time of purchase.

1.04 COSTS OF PHOTOGRAPHY

A Pay costs for specified photography and prints.

1. Parties requiring additional photography or prints will pay photographer directly.

PART 2: PRODUCTS

2.01 PRINTS

A Color:

1. Paper: Single weight, color print paper.
2. Finish: Smooth surface, glossy.
3. Size: 8-inch x 10-inch.

B Identify each print on back, listing:

1. Name of PROJECT.
2. Description of subject and orientation of view.
3. Date and time of exposure.

4. Name and address of photographer.
5. Photographer's numbered identification of exposure.

C Aerial photographs to be color.

PART 3: EXECUTION

3.01 TECHNIQUE

- A Factual presentation.
- B Correct exposure and focus.
 1. High resolution and sharpness.
 2. Maximum depth-of-field.
 3. Minimum distortion.

3.02 VIEWS REQUIRED

- A Photograph from locations to adequately illustrate condition of construction and state of progress.
 1. At successive periods of photography, take at least one photograph from the same overall view as previously.
 2. Consult with the ENGINEER at each period of photography for instructions concerning views required.

3.03 ASSEMBLY OF PRINTS

- A Prints shall be mounted on muslin with a one-inch hinge or binding edge.
- B Provide a suitably sized 3-ring binder for each set of prints. Binders shall be furnished in sufficient quantities to hold all photographs taken for the duration of the contract. Each binder shall be engraved on the front and spine with the PROJECT name.

3.04 DELIVERY OF PRINTS

- A Deliver prints to the ENGINEER to accompany each Application for Payment.
- B Distribution of prints as soon as processed, is anticipated to be as follows:
 1. OWNER (one set).
 2. ENGINEER (two sets).

January 2010

3. PROJECT Record File (one set to be stored by CONTRACTOR).
4. CONTRACTOR (one set).

END OF SECTION

SECTION 01400

CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PLAN (CQA PLAN)

PART 1 GENERAL

1.1 SUMMARY

This section addresses the Construction Quality Assurance/Quality Control Plan (CQA Plan) for the installation of critical items of work associated with this project.

The CQA Plan is a joint effort between the Contractor and the Owner. This section presents the principals and practices to be implemented during construction. Additional quality assurance/quality control measures are stated in the individual specifications sections contained in the appendix of the plan.

1.2 MEASUREMENT AND PAYMENT

Work required for the CQA Plan by the Contract Documents shall not be measured for direct payment. All costs in connection with this work shall be reflected and included in the unit price for the items to which they pertain.

1.3 ELEMENTS OF THE CQA PLAN

Responsibility and Authority – The responsibility and authority of organizations and key personnel (by title) involved in permitting, designing, and constructing the landfill facility.

Inspection Activities – The observations and tests that will be used to ensure that the construction or installation meets or exceeds all design criteria, plans, specifications, and regulations for each landfill component of the construction project. Inspection activities are discussed in section for each specific work item that is presented in the appendix of the plan.

Sampling Strategies – The sampling activities, sample size, methods for determining sample locations, frequency of sampling, acceptance and rejection criteria, and methods for ensuring that corrective measures are implemented as addressed in the design criteria, plans, specifications, and regulations. Sampling strategies are discussed in section for each specific work item.

Documentation – Reporting requirements for CQA activities, including daily summary reports, inspection data sheets, problem identification and corrective measures reports, acceptance reports, and final documentation.

1.4 CONSTRUCTION QUALITY ASSURANCE AND CONSTRUCTION QUALITY CONTROL

In the context of this CQA Plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance refers to the means and methods employed by the Owner to assure conformity of construction of the landfill final cover system (compacted soil liner, LLDPE geomembrane liner, geocomposite drainage net, drainage and erosion layer, etc.) and their materials, workmanship, and installation with this CQA/CQC Plan, Contract Drawings, and the Specifications. CQA is provided by the CQA OFFICER as a representative of the Owner and independent from construction and installation.

Construction Quality Control refers to those actions taken by manufacturers, installers, Quality Control Agency, or Contractor to ensure that the materials and the workmanship meet the requirements of this CQA/CQC Plan and the Specifications. In the case of soils and geosynthetics, CQC is provided by the Contractor's CQC Engineer.

1.5 DEFINITION, RESPONSIBILITIES, AND QUALIFICATIONS OF PARTIES

1.5.1 General

The principal parties involved in the CQA Plan for the landfill facility include the Owner, Permitting Agency, Engineer, CQA Officer, Quality Assurance Laboratory, Resident Project Representative, Contractor, CQC Officer, Quality Control Laboratory, Contractor's Surveyor, Manufacturers, and Installers. The general responsibilities, authorities and qualifications, as applicable, of each of these parties are described in the following paragraphs. The responsibility and/or authority of a given party may be modified or expanded as dictated by specific project needs during the Pre-Construction Meeting. The changes shall be incorporated into the CQA Plan prior to construction.

1.5.2 Owner

1.5.2.1 Definition

The Owner is Georgetown County.

1.5.2.2 Responsibilities

The Owner is responsible for the design, construction, and operation of the landfill facility. This responsibility includes compliance with the permit and submission of CQA documentation demonstrating that the facility was constructed in accordance with the permit documents and the design plans and specifications.

The Owner has the authority to select and dismiss parties charged with design, CQA, and construction activities. The Owner also has the authority to accept or reject design plans and specifications, CQA plans, reports and recommendations of the CQA Officer or CQC Officer, and the materials and workmanship of Contractors.

1.5.3 Permitting Agency

1.5.3.1 Definition

The Permitting Agency is the South Carolina Department of Health and Environmental Control, Division of Mining and Solid Waste Management (DHEC or the Department).

1.5.3.2 Responsibilities

As construction progresses, DHEC has the responsibility and authority to review and accept or reject design revisions or requests for variance submitted by the Owner.

1.5.4 Engineer

1.5.4.1 Definition

The Engineer is Garrett and Moore, Inc., who was retained by the Owner to perform the engineering design and prepare the associated drawings and specifications.

1.5.4.2 Responsibilities

The Engineer is responsible for approving all design and specification changes, clarifying the design, reviewing and approving shop drawings, and other tasks as required during construction. The Engineer is also responsible for preparing the permit documents for acceptance by the Permitting Agency. The permit documents include forms, narratives, CQA Plan, design plans, and specifications that support the closure of the landfill. During construction, the Engineer may be requested to clarify discrepancies or contradictions in the construction and contract documents or the CQA Plan.

During construction, the Engineer may approve substantive changes to the design plans or specifications of the facility. Substantive changes may require DHEC notification and/or approval prior to making any changes in the field. Substantive changes include any changes that modify or impact the technical basis for any engineered component of the facility design.

1.5.4.3 Qualifications

The Engineer shall be a Professional Engineer licensed by the State of South Carolina. The Engineer shall be familiar with earthwork and geosynthetics (including detailed geosynthetics design methods and procedures) and all applicable regulatory requirements.

1.5.5 CQA Officer

The CQA Officer is a party, independent from the Contractor, which is responsible for observing, testing, and documenting activities related to the construction quality assurance of the earthworks at the site. The CQA Officer is also responsible for issuing a certification report, sealed by a Professional Engineer registered in the State of South Carolina. The CQA Officer may be the Engineer.

1.5.5.1 Definition

The CQA Officer is a company or individual responsible for observing and documenting activities related to the permit documents and the CQA Plan. The CQA Officer is represented on-site by supporting CQA monitoring personnel as appropriate.

1.5.5.2 Responsibilities

The CQA Officer will report directly to the Engineer during construction. In general, the responsibilities and authorities of the CQA Officer include:

- Complete understanding of the permit documents, design plans, and specifications in relation to all aspects of the CQA Plan;
- Scheduling, coordinating and performing CQA activities;
- Performing independent on-site observation of the work in progress to assess compliance with the CQA Plan, permit documents, design plans, and specifications;
- Recognizing and reporting deviations from the CQA Plan, permit documents, design plans, and/or specifications to the Engineer. Secure documents from the Engineer, which approve the changes;

- Verifying that the testing equipment meets testing and calibration requirements, and that tests are conducted according to standardized procedures defined in the CQA Plan or the specifications;
- Verifying that the raw data are properly recorded, validated, reduced, summarized, and interpreted;
- Recording and maintaining test data accurately;
- Identifying CQA-tested work that should be accepted, rejected, or further evaluated;
- Verifying that corrective measures are implemented;
- Documenting and reporting CQA activities;
- Collecting data needed for record documentation.
- Maintaining open line of communications with other parties involved in the construction.

The CQA Officer is also responsible for approving the work for major construction activities associated with the landfill construction.

Approvals shall be issued by a Professional Engineer attesting that construction and all test evaluations are in compliance with South Carolina Rules and Application specifications and bear the seal of the Professional Engineer licensed in the state of South Carolina.

The CQA Officer shall be pre-qualified and approved by the Owner. The CQA Officer shall be a qualified engineering firm with experience in construction quality assurance and quality control, particularly on projects involving similar landfill construction systems. The CQA Officer shall be capable of assigning technically qualified personnel to the project, including an on-site CQA Resident Project Representative (RPR) as needed. The CQA RPR shall possess a thorough knowledge of all aspects of earthwork and geosynthetics construction.

1.5.5.3 Qualifications

The CQA Officer shall be a Professional Engineer licensed by the State of South Carolina. The CQA Officer shall be familiar with lined landfill construction and closure techniques and all applicable regulatory requirements.

1.5.6 Quality Assurance Laboratory

1.5.6.1 Definition

Quality Assurance Laboratories is a firm, independent from the Contractor, Manufacturer, and Installer, responsible for conducting tests on samples of geosynthetics (geomembrane, geonet and geotextile) and soils obtained from the site.

The Soils CQA Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine soils characteristics as required by the specifications. The Soils CQA Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Soils CQA Laboratory shall also demonstrate to the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

The Geosynthetics CQA Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine geosynthetics characteristics as required by these specifications. The Geosynthetics CQA Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Geosynthetics CQA Laboratory shall also demonstrate the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

1.5.6.2 Responsibilities

The Quality Assurance Laboratory shall be responsible for conducting the appropriate laboratory tests as directed by the CQA Officer and in accordance with the project plans and specifications.

1.5.6.3 Reporting

The Quality Assurance Laboratory shall be responsible for providing all tests results to the CQA Officer in written form within 24 hours of receipt of test samples results. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.5.7 CONTRACTOR

1.5.7.1 Definition

The Contractor is the party with which the Owner has entered into agreement to construct the project.

1.5.7.2 Responsibility

The Contractor is responsible for meeting the requirements of the contract documents and the successful completion of the landfill construction project. The Contractor is responsible for all items of work on the project including but not limited to earthwork, sedimentation and erosion control, compacted soil and HDPE liners placement, geocomposite drainage net placement, protective cover layer placement, crushed stone road placement, and all other associated appurtenances. The Contractor shall be responsible for the quality of the materials and installation of the materials in conformance with the contract documents. The Contractor shall be responsible for the quality of work and materials supplied by all of its subcontractors. Contractor shall be responsible for the quality of work and materials supplied by manufacturers.

It is the Contractor's sole responsibility to provide adequate CQC measures for the work to be performed. The Contractor shall not rely on the Owner's CQA services for determining compliance with the contract specifications. Some of the Contractor's specific responsibilities include: providing qualified personnel to perform quality control, providing the CQC Officer, providing submittals for the various materials as required by the specifications, scheduling and coordinating the work with suppliers and subcontractors, providing a competent resident superintendent and an on-site CQC representative at all times during construction activity, providing licensed land surveying services, furnishing progress and record drawings, attending progress meetings, providing monthly updated

schedules (or more frequently, if needed), and notifying the Owner of design discrepancies or contradictions. The surveyor shall be a Registered Land Surveyor, licensed by the State of South Carolina.

1.5.7.3 Qualifications

The Contractor's Project Manager and Superintendent shall have a minimum of 10 years of progressive construction management experience with work associated with a landfill construction.

1.5.8 CQC Officer

1.5.8.1 Definition

The Contractor shall employ and pay for the services of an independent CQC Firm. The CQC Firm shall employ and designate CQC Officer who is a Professional Engineer licensed in the State of South Carolina, with minimum qualifications as described in Article 1.5.8.3.

1.5.8.2 Responsibilities

The CQC Officer shall be solely responsible for the CQC personnel and their activities, as well as the preparation of a certification report to certify the project has been constructed in accordance with the CQA Plan, permit documents, design plans, and specifications.

The CQC Officer shall be responsible for identifying and coordinating quality control activities, testing and reporting requirements of the contract documents, and advising the Contractor of discrepancies in the construction that do not meet the requirements of the contract documents (including report preparation and repair plan reports) as specified herein.

Additional responsibilities include:

- Complete understanding of the permit documents, design plans, and specifications in relation to all aspects of the CQA Plan.
- Recognizing and reporting deviations from the CQA Plan, permit documents, design plans, and/or specifications to the Contractor and Engineer.
- Documenting and reporting CQC activities.

1.5.8.3 Qualifications

The CQC Officer shall have a minimum of 10 years of progressive engineering and construction experience with work associated with landfill construction, including earthwork and geosynthetics installation.

1.5.9 Quality Control Laboratory

1.5.9.1 Definition

The Quality Control Laboratory is a firm, independent from the Contractor, Manufacturer, and Installer, responsible for conducting tests on samples of geosynthetics (geomembrane, geonet and geotextile) and soils used in the construction of the facility.

The Soils CQC Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine soils characteristics as required by the specifications. The Soils CQC Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Soils CQC Laboratory shall also demonstrate to the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

The Geosynthetics CQC Laboratory shall be a qualified laboratory with experience in performing laboratory tests to determine geosynthetics characteristics as required by the specifications. The Geosynthetics CQC Laboratory shall demonstrate that it follows the standard test methods listed in the specifications and maintains the appropriate, calibrated equipment to perform the tests. The Geosynthetics CQC Laboratory shall also demonstrate to the CQA Officer that it adheres to a formal in-house QA/QC program and can provide the required analytical documentation and reports.

1.5.9.2 Responsibilities

The Quality Control Laboratory shall be responsible for conducting the appropriate laboratory tests as directed by the CQC Officer and in accordance with the project plans and specifications.

The Quality Control Laboratory shall be responsible for providing all tests results to the CQC Officer in written form within 24 hours of receipt of test samples results. Written test results shall be in an easily readable format and include references to the standard test methods used.

Note: Resumes for all CQC field personnel must be provided to the Engineer and CQA Officer for approval. Field personnel shall have a minimum of 4 years of field experience with the material/operation being inspected/tested. Field personnel shall not be replaced unless approved by the Engineer and CQA Officer.

1.5.10 Installer

1.5.10.1 Definition

The Installer is the company responsible for the installation of a particular component of the landfill containment system such as the synthetic liner, geosynthetics or leachate collection pipe. This is not limited to synthetic products. The Installer is a Manufacturer or an approved installer trained and certified to install a Manufacturer's product.

The Installer shall be trained and certified to install the material used, and shall be able to provide qualified personnel to meet the demands of the project.

1.5.10.2 Responsibilities

The Installer shall be responsible for field handling, storing during the installation process, deploying, seaming, curing, temporary restraining, and all other aspects of the product installation. The Installer shall be responsible for submittal of the documentation listed to the Contractor.

Pre-installation: Prior to commencement of the installation, the Installer must submit to the CQA Officer through the CQC Officer and Contractor:

- Resume of the Installation Supervisor to be assigned to this project, including dates and duration of employment, and relevant experience and qualifications.
- A panel layout drawing showing the installation layout identifying field seams as well as any variance or additional details, which deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.

Deviation to the panel layout plan must be approved by the CQA Officer prior to installation.

- Installation schedule.
- A list of personnel performing field seaming operations along with pertinent experience information.
- All geosynthetic quality control certificates required.
- Certification that extrudate to be used is comprised of the same resin as the geomembrane to be used.

This CQA Plan shall be reviewed by the Installer before installation of the geosynthetic begins.

Installation: During the installation, the Installer shall be responsible for the submission of subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Installation Supervisor.

Completion: Upon completion of the installation, the Installer shall submit:

- The warranty obtained from the Manufacturer.
- The installation warranty.
- Record drawings clearly delineating panels, seams, repairs, and location of destructive samples.

The drawings shall be reviewed and certified by the CQC Officer for accuracy.

The Installation Supervisor is the individual provided and assigned by the Installer to be the field representative providing supervision and guidance to the installation crew.

The Installation Supervisor is responsible for coordinating the installation of the synthetic liner; fusing the pipes, or the seaming and installation of the geosynthetic products. The Installation Supervisor is responsible for obtaining samples for field testing and for coordinating testing activities with the Contractor and CQA Officer. The Installation Supervisor is responsible for keeping a daily log of all activities related to geosynthetic products installation and testing and for attending all related project meetings.

1.5.10.3 Qualifications

The Installer shall provide, through the Contractor, the Engineer and CQA Officer with the information demonstrating qualifications as follow:

- Corporate background and information.
- Description of installation capabilities:
- Information on equipment (numbers and types), and personnel (number of site managers and number of crews).
- Average daily production anticipated.
- Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.
- Experience as required by individual Specification Sections. For each installation, the following information shall be provided:
 - Name and purpose of facility, its location, and date of installation.
 - Name of owner, project manager, designer, manufacturer, fabricator (if any), and name of contact at the facility who can discuss the project.
 - Name and qualifications of the Superintendent(s) of the Installer's crew(s)
 - Type of geosynthetic and surface area installed.
 - Type of seaming and type of seaming apparatus used.
 - Duration of installation.
 - Available information on the performance of the lining system and the facility.
 - The Installer's quality control manual. Should the manual be in conflict with the specifications or drawings, the specifications and drawings shall control.
- A copy of a letter of recommendation supplied by the geomembrane Manufacturer.

The Installation Supervisor must be qualified based on previously demonstrated experience, management ability, and authority. The Geosynthetic Installation Supervisor shall have previously managed the installation of seaming apparatus to be used at the site. The Drainage Net Supervisor must have installed at least one net system. The pipe installer must have completed manufacturers training for fusing pipe.

1.5.11 Manufacturer

1.5.11.1 Definition

The Manufacturer is the firm or corporation responsible for production of material to be used in the project.

1.5.11.2 Responsibilities

The Manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for its product as specified in the construction specifications.

1.5.11.3 Qualifications

Each geosynthetic Manufacturer shall provide sufficient production capacity and qualified personnel to meet the demands of the project as identified in the specification. Each

Manufacturer shall have an internal quality control program for its product that meets the specified requirements.

Each Manufacturer shall meet the following requirements and submit the following information:

- Corporate background and information.
- A list of material properties including certified test results, which are attached to geosynthetic samples, if applicable.
- For liner systems, a list of at least 10 completed landfill or surface impoundment facilities totaling a minimum of 3,000,000 SF for which the Manufacturer has manufactured a geosynthetic product. For each facility, the following information shall be provided:
 - Name and purpose of facility, its location, and date of installation.
 - Name of owner, project manager, designer, fabrication (if any), and installer,
 - Type of geosynthetic and the surface area of installed geosynthetic.
 - Available information of the performance of the lining system and the facility.
 - The Manufacturer's quality control manual, including a description of the quality control laboratory facilities.
 - The Manufacturer's Field Installation Quality Control Manual. The Manufacturer's and Installer's QC Manual shall comply with the Contract Documents. At a minimum, the manual shall contain procedures and recommendations for the following:
 - Geomembrane deployment
 - Field panel placement
 - Geomembrane Field seaming
 - Seam testing (destructive, non-destructive for field and laboratory settings)
 - Repair of defects
 - The origin (supplier's name and production plant, and identification (brand name and number) or resin used to manufacture the product.

Pre-installation: Prior to the installation of any geosynthetic material, each Manufacturer must submit to the Engineer and CQA Officer all quality control documentation required by the appropriate section of the specifications. This documentation shall be reviewed and approved by the Engineer and CQA Officer before installation can begin.

PART 2: PRODUCTS

Not applicable.

PART 3: EXECUTION

3.1 Communication Between Involved Parties

To achieve a high degree of quality during construction and to assure a final product that meets all project requirements, clear, open channels of communication are essential. To that end, meetings are critical.

3.1.1 Pre-Construction Conference

A pre-construction conference shall be held before construction. At a minimum, the meeting shall include the Owner, Permitting Agency, Engineer, CQA Officer, Contractor (including the Project Manager and Superintendent), CQC Officer, and Installer.

The meeting will include, but not be limited to, a review of the project documents, any modification of these documents, the responsibilities and duties of each party, lines of authority and communication, the construction strategy, the proposed schedule and critical path, a discussion of the procedures and schedule for periodic reporting for testing and construction activities, testing protocols, locations for soil, and geosynthetic material stockpiling. The Contractor shall provide 5 copies of the schedule to the Engineer.

3.1.2 Progress Meetings

A bi-weekly progress meeting shall be held between the Owner, Engineer, CQA Officer, Contractor, CQC Officer, and other involved parties. Weekly progress meetings will be held as needed. Those attending will discuss current progress, planned activities for the next week, and new business or revisions to the work. The Engineer will log problems, decisions, or questions arising at this meeting. Minutes of this meeting will be submitted by the Engineer to the Owner for approval and distributed to the appropriate parties within 5 workdays of the meeting time.

3.1.3 Problem or Work Deficiency Meeting

A special meeting shall be held when and if a problem or work deficiency is present or likely to occur. At a minimum, the meeting shall be attended by the Owner, Engineer, CQA Officer, Contractor, and the CQC Officer. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternate solutions; and
- Implement an action plan to resolve the problem or deficiency.

The Engineer shall document the meeting and minutes shall be transmitted to the parties involved.

3.2 Quality Assurance Testing

The Contractor shall be aware (and allow for in his schedule) that the CQA Officer will check all or any portion of the work and the Contractor shall afford all necessary assistance to the CQA Officer in carrying out such quality assurance tests and checks. The Contractor shall immediately make any necessary corrections to the work. Such checking by the CQA Officer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work. The Contractor shall factor this quality assurance checking and testing into his schedule and sequence of operations, and such quality assurance testing and checking by the CQA Officer will not be grounds for request by Contractor for time extensions or extras. Special elements of the CQA testing will require coordination with respect to scheduling of field personnel. The Contractor shall notify the CQA Officer within 72 hours of that need.

3.3 Deficient/Substandard Work

If the quality control or quality assurance testing shows a pattern or trend of the Contractor's work not meeting the minimum standards established in the Contract

Documents, the Contractor shall immediately adjust and/or change his mode of operation, his equipment, his on-site personnel, his construction methods and techniques, his quality control efforts, etc. as necessary (and subject to the approval of the Engineer and CQA Officer) to bring the work into compliance with the minimum quality standards. If the Contractor's work is consistently and/or frequently failing to comply with the minimum quality standards, then the Owner may assess the Contractor the cost for the quality assurance time and expenses and testing associated with (1) retesting where previous tests showed the work not to be in compliance with the minimum standards; and (2) increased quality assurance testing efforts and frequency as deemed necessary by the CQA Officer to confirm that the previously deficient work is being done in accordance with the Contract Documents.

3.4 Anticipated Testing Type and Frequency

The quality control/quality assurance testing anticipated for the work and the type and frequency of such testing is listed in each individual specification section. These testing types and frequencies are the average anticipated level of effort and may be increased or decreased as deemed necessary by the CQA Officer to ascertain the quality of work.

3.5 Field Engineering

CQA Plan requirements for field engineering are provided in Specification Section 01050, "Field Engineering."

3.6 Site Preparation

CQA Plan requirements for site preparation are provided in Specification Section 02100, "Site Preparation."

3.7 Excavation, Backfill, and Compaction

CQA Plan requirements for excavation, backfill, and compaction are provided in Specification Section 02200, "Excavation, Filling, and Backfilling."

3.8 Fabric Cushion

CQA Plan requirements for Fabric Cushion are provided in Specification Section 02271, "Fabric Cushion."

3.9 Filter Fabric

CQA Plan requirements for Filter Fabric are provided in Specification Section 02272, "Filter Fabric."

3.10 Geocomposite Drainage Nets

CQA Plan requirements for the geocomposite drainage nets are provided in Specification Section 02274, "Composite Drainage Nets."

3.11 Compacted Soil Liner

CQA Plan requirements for the compacted soil liner are provided in Specification Section 02275, "Compacted Soil Liner."

3.12 Erosion and Sediment Control

CQA Plan requirements for erosion and sediment control are provided in Specification Section 02276, " Erosion and Sediment Control."

3.13 Crushed Stone Paving

CQA Plan requirements for crushed stone paving provided in Specification Section 02505, "Crushed Stone Paving."

3.14 Geomembrane Leak Detection Survey

CQA Plan requirements for the geomembrane leak detection survey are provided in Specification Section 02589, "Geomembrane Leak Detection Survey."

3.15 Precast Concrete Manholes and Structures

CQA Plan requirements for precast concrete manholes and structures are provided in Specification Section 02605, " Precast Concrete Manholes and Structures."

3.16 Reinforced Concrete Pipe

CQA Plan requirements for reinforced concrete pipe are provided in Specification Section 02612, " Reinforced Concrete Pipe."

3.17 HDPE Pipe

CQA Plan requirements for hdpe pipe are provided in Specification Section 02623, " HDPE Pipe."

3.18 Protective Cover

CQA Plan requirements for protective cover are provided in Specification Section 02700, " Protective Cover."

3.19 HDPE Liner

CQA Plan requirements for high density polyethylene (HDPE) liner are provided in Specification Section 02776, "HDPE Liner."

3.20 Guardrail

CQA Plan requirements for guardrail are provided in Specification Section 02820, "Guardrail."

3.21 Seeding and Mulching

CQA Plan requirements for seeding and mulching are provided in Specification Section 02985, "Seeding and Mulching."

3.22 Documentation

3.22.1 Introduction

The ultimate value of a CQA plan depends to a large extent on recognition of all of the construction activities that should be inspected and the assignment of responsibilities to CQA and CQC inspection personnel for the inspection of each activity. This is most effectively accomplished by documenting CQA activities. The CQA Officer and CQC Officer shall provide the Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The CQA Officer and CQC Officer shall also maintain a complete file of design plans, permit specifications, the CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

3.22.2 Daily Record Keeping

Standard daily reporting procedures should include preparation of the following documents:

- Daily Summary Report (CQA and CQC)
- Observation Logs and Test Data Sheets (CQA and CQC)
- Construction Problem and Solution Report (Engineer)
- Photographic Reporting Data Sheets (CQA)

3.22.2.1 Daily Summary Report

Daily summary reports should be prepared daily by the CQA Officer and CQC Officer. This report provides the chronological framework for identifying and recording all other reports. At a minimum, the summary reports should include the following information:

- An identifying sheet number for cross-referencing and document control;
- Date, project name, location, and other identification;
- Data on weather conditions;
- Reports on any meetings held and their results;
- A reduced-scale site plan showing all proposed work areas and test locations;
- Descriptions and locations of ongoing construction;
- Descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- Locations where tests and samples were taken or reference to specific observation logs and/or test data sheets where such information can be found;
- A summary of field/laboratory test results or reference to specific observation log and/or test data sheets;
- Calibrations or recalibrations of test equipment and actions taken as a result of recalibration, or reference to specific observation logs and/or test data sheets;
- Off-site materials received, including quality and quantity verification documentation;
- Decisions made regarding approval of units of material or of work, and/or corrective actions to be taken in instances of substandard quality;
- The CQA Officer and his/her on-site representative's and/or the CQC Officer and his/her on-site representative's signature as applicable.

3.22.2.2 Observation Logs and Test Data Sheets

All observations, and field and/or laboratory tests, should be recorded on project-specific logs and data sheets. Recorded observations may take the form of notes, charts, sketches, photographs, or any combination of these. Where possible, a checklist may be useful to ensure that no pertinent factors of a specific observation are overlooked. At a minimum, the logs and data sheets shall include the following information:

- An identifying sheet numbered for cross referencing and document control;
- Date, project name, location, and personnel involved in the inspection activity.
- Description or title of activity monitored;
- Location of inspection activity and locations of samples collected;
- Type of inspection activity; procedure used (reference to standard method when appropriate);
- Results of laboratory tests received;
- Results of monitoring activity in comparison to specifications; and
- The CQA monitor's or CQC Officer's signature as applicable.

3.22.2.3 Problem Identification and Solution Report

A problem is defined herein as material or workmanship that does not meet the specified design. Problem Identification and Solution Reports should be cross-referenced to specific observation logs and test data sheets. The report shall include the following information:

- An identifying sheet number for cross-referencing and document control;
- A detailed description of the situation or deficiency;
- The location and probable cause of the situation or deficiency;
- How and when the situation or deficiency was found or located; Documentation of the response to the situation or deficiency;
- Final results of any responses;
- Any measures taken to prevent a similar situation from occurring in the future; and
- The signature of the Engineer.

The Owner shall be made aware of any significant recurring nonconformance with the permit specifications. The Engineer shall then determine the cause of the non-conformance and recommend appropriate changes in procedures or specifications. These changes will be submitted to the Owner for approval. When this type of evaluation is made, the results shall be documented, and any revision to procedures or permit specifications will be approved by the Owner, Engineer, and, if necessary, the Permitting Agency.

3.22.2.4 Photographic Reporting Data Sheet (CQA)

Photographic reporting data sheets, where used, shall be cross-referenced with observation logs and test data sheets and/or construction problem and solution reports. At a minimum, photographic reporting data sheets should include the following information:

- A unique identifying number on data sheets and photographs for cross-referencing and document control;
- The size, scale, and orientation of the subject matter photographed; Location and description of the work;
- The purpose of the photograph;
- Signature of the photographer and concurrence of the CQA Officer's representative.

These photographs will serve as a pictorial record of work progress, problems, and corrective measures. They should be kept in a permanent protective file in the order in which they were taken. The file should contain color prints; negatives should be stored in order in a separate file.

3.23 Final Documentation

At the completion of the work, the CQC Engineer shall submit to the Engineer a signed Final Certification Document. At a minimum, the Final Certification Document shall include:

- Summaries of all construction activities;
- Observation logs and test data sheets including sample location plans and supporting field and laboratory tests results;
- Construction problems and solutions reports;
- Record surveys;
- A summary statement sealed and signed by a Professional Engineer licensed in the State of South Carolina; and
- All approvals or certifications pertinent to the landfill closure project.

The record plans shall include scale plans depicting the location of the construction and details pertaining to the extent of construction (e.g., depths, plan dimensions, elevations, soil component thicknesses, etc.). Surveying and base maps required for development of the record plans shall be done by a qualified land surveyor licensed in the State of South Carolina.

Approval of the Final Certification Report by the Engineer shall be required prior to the Work being eligible for Substantial Completion.

END OF SECTION

SECTION 01510
TEMPORARY UTILITIES

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A Furnish, install and maintain temporary utilities required for construction and remove on completion of work.

1.02 RELATED REQUIREMENTS

- A Section 01010: Summary of Work.
- B Section 01590: Field Offices.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A Comply with National Electric Code.
- B Comply with Federal, State and local codes and regulations and with utility company requirements.
- C Comply with South Carolina Department of Transportation Regulations.

PART 2: PRODUCTS

2.01 MATERIALS, GENERAL

- A Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A OWNER will provide installation of electrical service to ENGINEER's office trailer. For the duration of the contract, CONTRACTOR shall pay all monthly fees for power to ENGINEER's trailer.
- B OWNER will provide installation of electrical service to the existing office trailer made available by the OWNER for the CONTRACTOR's use, as identified on the drawings. For the duration of the contract, CONTRACTOR shall pay all monthly fees for power to CONTRACTOR's trailer.
- B CONTRACTOR will pay all costs for maintenance and service charges for ENGINEER's and CONTRACTOR's electrical service needs.

2.03 TEMPORARY VENTILATION

- A Provide temporary ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work to meet specified OSHA requirements.
- B Provide temporary ventilation, if necessary, to protect materials from damage due to temperature or humidity.

2.04 TEMPORARY TELEPHONE SERVICE

- A OWNER will provide installation of telephone service to ENGINEER's office trailer. CONTRACTOR will pay all monthly service charges for local calls and up to \$300.00 per month in toll charges placed by ENGINEER. ENGINEER's ISDN computer line monthly charges will be included as part of toll charges placed by ENGINEER.
- B CONTRACTOR will pay all costs for installation, maintenance and removal, and service charges for CONTRACTOR's telephone needs.

2.05 TEMPORARY WATER

- A Make all necessary arrangements for obtaining water for construction purposes in accordance with Georgetown County standards and requirements.

2.06 TEMPORARY SANITARY FACILITIES

- A Provide sanitary facilities in compliance with laws and regulations.
- B Service, clean and maintain facilities and enclosures.

2.07 TEMPORARY PUMPS

- A Provide temporary pumps for removal of water from the excavation when required by the Work to maintain proper conditions for construction.

PART 3: EXECUTION

3.01 GENERAL

- A Maintain and operate systems to assure continuous service.
- B Modify and extend systems as work progress requires.

3.02 REMOVAL

- A Completely remove temporary materials and equipment when their use is no longer required.

January 2010

- B Clean and repair damage caused by temporary installations or use of temporary facilities.
- C Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

This page intentionally left blank

SECTION 01590
FIELD OFFICES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The CONTRACTOR shall furnish, install and maintain physical building and furnishing for the daily use of the Resident Project Representative and for the purpose of holding Project Meetings.
- B. Do not use mobile trailers for living quarters.

1.02 REQUIREMENTS FOR FACILITIES

- A. Construction:
 - 1. Structurally sound, weathertight, with floors raised above ground.
 - 2. At CONTRACTOR's option, portable or mobile buildings may be used. Mobile trailers, when used, shall be modified for office use.
 - 3. Size: As required to provide meeting room for Project Meetings with minimum dimensions of 14' x 14' and a bathroom.
- B. Furnishings:
 - 1. Two (2) six-foot (6') conference tables, 10 folding chairs.
 - 2. One Whiteboard, 36 inches x 24 inches with color markers and eraser.
 - 3. Office Desk, 36 inches x 72 inches, and Office Chair.
 - 4. Two drawer metal file cabinet.
 - 5. Furnish washroom with flush toilet, wash basin, medicine cabinet, toilet tissue holder, and paper towel holder.
- C. Services:
 - 1. The CONTRACTOR shall make all provisions and pay all installation fees, permitting fees, and other costs for the Field Office in order to provide power, water, sewer, telephone service, internet service, and exterior lights at the project site.

1.03 USE OF PERMANENT FACILITIES

- A. Permanent facilities shall not be used for field offices or for storage.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

- A. May be new or used, but must be serviceable, adequate for required purpose, and must not violate applicable codes or regulations.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Fill and grade sites for temporary structures to provide surface drainage.
- B. Obtain any necessary permits and approvals prior to installation.

3.02 INSTALLATION

- A. Locate construction office facilities at the location acceptable to the OWNER/ENGINEER within the project area.
- B. Construct temporary field offices per local governing code.
- C. Provide connections for utility services.
- D. Have office equipped and ready for use 15 days before work begins at the site.

3.03 MAINTENANCE AND CLEANING

- A. Maintain office in first class condition for the duration of the project. Furnish, replace and replenish light bulbs, toilet paper, paper towels, soap and other items required to maintain the office in a clean condition.
- B. Wash floor and clean washroom fixtures at least once each week. Wash windows when needed or when requested by OWNER/ENGINEER. Sweep floor and dust furnishings daily.

3.04 REMOVAL

- A. Remove field offices, contents, foundation and debris, grade site to required elevations and clean the areas within 15 days after Final Completion.

January 2010

END OF SECTION

January 2010

This page left intentionally blank.

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

A Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the ENGINEER.
3. Manufactured and Fabricated Products
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 RELATED REQUIREMENTS

- A Section 00700: General Conditions
- B Section 00800: Supplementary Conditions
- C Section 01010: Summary of Work
- D Section 01030: Special Project Procedures
- E Section 01340: Shop Drawings, Product Data, Working Drawings, and Samples
- F Section 01630: Substitutions and Product Options

G Section 01710: Cleaning

H Section 01740: Warranties and Bonds

1.03 APPROVAL OF MATERIALS

A Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the CONTRACTOR shall be subject to the inspection and approval of the Engineer. No material shall be incorporated into the work without prior approval of the Engineer.

B The CONTRACTOR shall submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work. Any delay of approval resulting from the CONTRACTOR'S failure to submit samples or data promptly shall not be used as a basis of claim against the OWNER or the ENGINEER.

C In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the CONTRACTOR shall provide such samples of workmanship or finish as may be required.

D The materials and equipment used on the work shall correspond to the approved samples or other data.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including five copies to the ENGINEER.

1. Maintain one set of complete instructions at the job site during installation and until completion.

B Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with ENGINEER for further instructions.

2. Do not proceed with work without clear instructions.

C Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

- A Arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
 - 1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.
- B Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.06 STORAGE AND PROTECTION

- A The CONTRACTOR shall furnish a covered, weather-protected storage structure providing a clean, dry, non-corrosive environment for all mechanical equipment, valves, and special equipment and materials to be incorporated into this project. Storage of materials shall be in strict accordance with the "instructions for storage" of each supplier and manufacturer. The CONTRACTOR shall furnish a copy of the manufacturer's instructions for storage to the ENGINEER prior to storage of all equipment and materials. Corroded, damaged or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.
- B Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weathertight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C All materials and equipment to be incorporated in the work shall be handled and stored by the CONTRACTOR before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

- D Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking, and spalling to a minimum.
- E All materials which, in the opinion of the ENGINEER, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the CONTRACTOR shall receive no compensation for the damaged material or its removal.
- F Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specified conditions, and free from damage or deterioration.
- G Protection After Installation
 - 1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.
- H The CONTRACTOR shall be responsible for all material, equipment, and supplies sold and delivered to the OWNER under this Contract until final inspection of the work and acceptance thereof by the OWNER. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the CONTRACTOR shall replace same without additional cost to the OWNER.
- I Should the CONTRACTOR fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the OWNER retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from any amounts due and payable to the CONTRACTOR. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.07 SPECIAL TOOLS

- A Manufacturers of equipment and machinery shall furnish any special tools required for normal adjustment, operations and maintenance, together with instructions for their use. The CONTRACTOR shall preserve and deliver to the OWNER these tools and instructions in good order upon receipt but no later than ten (10) days prior to equipment start-up.

1.08 STORAGE AND HANDLING OF EQUIPMENT ON SITE

- A Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed.

1. Equipment shall not be shipped until approved by the ENGINEER. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the ENGINEER. Operation and maintenance data as described in Section 01730 shall be submitted to the ENGINEER for review prior to shipment of equipment.
2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer, until such time as the equipment is to be installed.
3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. A copy of the manufacturer's storage instructions shall be given to the ENGINEER and shall be carefully studied by the CONTRACTOR and reviewed with the ENGINEER by him. These instructions shall be carefully followed and a written record of this kept by the CONTRACTOR.
5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the CONTRACTOR shall start the equipment, at least half load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the OWNER.
7. Prior to acceptance of the equipment, the CONTRACTOR shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the CONTRACTOR's expense.

1.09 WARRANTY

- A For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740.

1.10 SPARE PARTS

- A The CONTRACTOR shall collect and store all spare parts as required by the manufacturer in accordance with paragraph 1.08 of this Section. In addition, the CONTRACTOR shall furnish to the ENGINEER an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost. The CONTRACTOR shall deliver the spare parts to the OWNER not more than thirty (30) nor less later than ten (10) days prior to plant start-up.
- B All spare parts shall be the products of the original equipment manufacturer.

1.11 GREASE, OIL, AND FUEL

- A All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The OWNER shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer, and approved by the OWNER, with each item of equipment supplied under Divisions 11, 12, 13, 14, 15 and 16. Refer to paragraph 2.01 for additional requirements for lubricants.
- B The CONTRACTOR shall be responsible for furnishing and changing the oil in all drives and intermediate drives of each piece of mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

PART 2: PRODUCTS

2.01 LUBRICANTS

- A All lubricants furnished on this Project shall be 100 percent paraffin based lubricants, that contain Monolec or Amosol, such as the products offered by Lubrication Engineers, Inc. (LE), Fort Worth, TX. Only LE lubricants, or approved equal paraffin based lubricants shall be used for factory testing of equipment. In the event that other lubricants are used for factory testing or furnished with the delivered equipment, the CONTRACTOR shall be responsible for draining, flushing and replacing the unapproved lubricants with acceptable products. Shop drawings shall indicate the manufacturer's recommended LE products, or proposed equal.

PART 3: EXECUTION (Not Used)

END OF SECTION

SECTION 01630
SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A Furnish and install Products specified, under options and conditions for substitutions stated in this Section.
- B Whenever a product, material or item of equipment is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, followed by the phrase "or equal," the specific item mentioned shall be the basis upon which bids are to be prepared, and shall be understood as establishing the type, function, dimension, appearance and quality desired. Other manufacturer's or vendor's products not named will be considered as substitutions, provided the required information is submitted in the manner set forth in this section and provided the substitution will not require substantial revision to the Contract Documents.

1.02 RELATED REQUIREMENTS

- A Section 00100: Instruction to Bidders.
- B Section 00300: Bid Form.
- C Section 00460: Substitute Suppliers.
- D Section 00700: General Conditions.
- E Section 00800: Supplementary Conditions.
- F Section 01153: Change Order Procedures.
- G Section 01600: Material and Equipment.

1.03 SUBMITTALS

- A Bidders shall submit their list of proposed substitutions and the proposed monetary changes associated therewith to the OWNER on the standard form (Section 00460) provided together with their bids.

1.04 CONTRACTOR'S OPTIONS

- A For products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B For products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.
- C For products specified by naming one or more products or manufacturers and stating "or equal," submit a request as for substitutions, for any product or manufacturer which is not specifically named.
- D For products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.

1.05 SUBSTITUTIONS

- A In order for substitutions to be considered, the CONTRACTOR shall submit, within 30 days of issuance of Notice of Award, complete data as set forth herein to permit complete analysis of all proposed substitutions noted on his/her substitutions list. No substitution shall be considered unless the CONTRACTOR provides the required data in accordance with the requirements of this Section within the 30-day period.
- B Submit separate request for each substitution. Support each request with:
1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - 4) Operation and maintenance data.
 - c. Samples, as applicable.
 - d. Name and address and contact with phone number of similar projects on which product has been used and date of each installation.
 2. Itemized comparison of the proposed substitution with product specified; list significant variations. Substitution shall not change design intent and shall perform equal to that specified.
 3. Data relating to impact on construction schedule occasioned by the proposed substitution.
 4. Any effect of substitution on separate contracts.
 5. List of changes required in other work or products.
 6. Accurate cost data comparing proposed substitution with product specified.
 - a. Amount of any net change to Contract Sum.
 7. Designation of required license fees or royalties.
 8. Designation of availability of maintenance services, sources of replacement materials.
- C Substitutions will not be considered for acceptance when:
1. They are indicated or implied on shop drawings or product data submittals without a formal request from CONTRACTORS.
 2. They are requested directly by a subcontractor or supplier.

3. Acceptance will require substantial revision of Contract Documents.
- D Requests for substitutions submitted after Notice of Award will not be considered unless evidence is submitted to the Engineer that all of the following circumstances exist:
1. The specified product is unavailable for reasons beyond the control of the CONTRACTOR. Such reasons shall consist of strikes, bankruptcy, discontinuance of manufacturer, or acts of God.
 2. The CONTRACTOR placed, or attempted to place, orders for the specified products within ten days after Notice of Award.
 3. Request for substitution is made in writing to the ENGINEER within ten days of the date on which the CONTRACTOR ascertains that he/she cannot obtain the item specified.
 4. Complete data as set forth herein to permit complete analysis of the proposed substitution is submitted with the request.
- E The ENGINEER'S decision regarding evaluation of substitutions shall be considered final and binding. Requests for time extensions and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed. All approved substitutions will be incorporated into the Agreement by Change Order.

1.06 CONTRACTOR'S REPRESENTATION

- A In making formal request for substitution, CONTRACTOR represents that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitution as for product specified.
 3. He will coordinate installation of accepted substitution into the Work and will make such changes as may be required for the Work to be complete in all respects.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 5. Cost data is complete and includes related costs under his/her Contract, but not:
 - a. Costs under separate contracts.
 - b. ENGINEER'S costs for redesign or revision of Contract Documents.

1.07 ENGINEER DUTIES

- A Review CONTRACTOR'S requests for substitutions with reasonable promptness.
- B Notify CONTRACTOR, in writing, of decision to accept or reject requested substitution.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

- A Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 RELATED REQUIREMENTS

- A Section 00700: General Conditions.
- B Section 00800: Supplementary Conditions.
- C Section 01710: Cleaning.
- D Section 01720: Project Record Documents.
- E Section 01740: Warranties and Bonds.
- F The respective sections of Specifications: Closeout Submittals Required of Trades, Vendors, Suppliers, and Manufacturers.

1.03 FINAL INSPECTION

- A When CONTRACTOR considers the Work is complete, he shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in the presence of the OWNER'S representative and are operational.
 - 5. Work is completed and ready for final inspection.
- B The ENGINEER will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C Should the ENGINEER consider that the Work is incomplete or defective:
 - 1. The ENGINEER will promptly notify the CONTRACTOR in writing, listing

the incomplete or defective work.

2. CONTRACTOR shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the ENGINEER that the Work is complete.
3. The ENGINEER will re-inspect the Work.

D When the ENGINEER finds that the Work is acceptable under the Contract Documents, he shall request the CONTRACTOR to make closeout submittals.

1.04 REINSPECTION FEES

- A Should the ENGINEER perform re-inspections due to failure of the Work to comply with the claims of status of completion made by the CONTRACTOR:
1. OWNER will compensate the ENGINEER for such additional services.
 2. OWNER will deduct the amount of such compensation from the final payment to the CONTRACTOR.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A Evidence of compliance with requirements of governing authorities.
- B Project Record Documents: To requirements of Section 01720.
- C Warranties and Bonds: To requirements of Section 01740.
- D Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

- A Submit a final statement of accounting to the ENGINEER.
- B Statement shall reflect all adjustments to the Contract Sum.
1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.
 - c. Unit Prices.
 - d. Deductions for uncorrected Work.

- e. Deductions for liquidated damages.
 - f. Deductions for re-inspection payments.
 - g. Other adjustments.
- 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.

C ENGINEER will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

A Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the General Conditions of the Contract.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION

This page intentionally left blank

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1: GENERAL

1.01 REQUIREMENTS INCLUDED

A Maintain at the site for the OWNER one record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. ENGINEER'S Field Orders or written instructions.
6. Approved Shop Drawings, Working Drawings and Samples.
7. Field Test records.
8. Construction photographs.
9. All other construction related permits.

1.02 RELATED REQUIREMENTS

- A Section 01050: Field Engineering.
- B Section 01200: Project Meetings.
- C Section 01340: Shop Drawings, Product Data, Working Drawings, and Samples.
- D Section 01380: Construction Photographs.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A Store documents and samples in CONTRACTOR'S field office apart from documents used for construction.
 1. Provide files and racks for storage of documents.
 2. Provide locked cabinet or secure storage space for storage of samples.
- B File documents and samples in accordance with CSI format.

- C Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D Make documents and samples available at all times for inspection by the ENGINEER.
- E As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit the currently updated "Project Record Documents" and survey data in accordance with Section 01050 for review by the ENGINEER and OWNER.

1.04 MARKING DEVICES

- A Provide felt tip marking pens for recording information in the color code designated by the ENGINEER.

1.05 RECORDING

- A Label each document "PROJECT RECORD" in neat large printed letters.
- B Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
- C Drawings: Legibly mark to record actual construction:
 - 1. Depths of various elements of foundation in relation to grade elevation.
 - 2. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.
 - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 4. Field changes of dimension and detail.
 - 5. Changes made by Field Order or by Change Order.
 - 6. Details not on original contract drawings.
 - 7. Equipment and piping relocations.
 - 8. Major architectural and structural changes including relocation of doors, windows, etc.
 - 9. Architectural schedule changes according to CONTRACTOR'S records and shop drawings.

D Specifications and Addenda; legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Field Order or by Change Order.

E Shop Drawings (after final review and approval):

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

1.06 SUBMITTAL

A At Contract close-out, deliver Record Documents to the ENGINEER for the OWNER.

B Accompany submittal with transmittal letter in duplicate, containing:

1. Date.
2. PROJECT title and number.
3. CONTRACTOR'S name and address.
4. Title and number of each Record Document.
5. Signature of CONTRACTOR or his authorized representative.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION

This page intentionally left blank

SECTION 01740
WARRANTIES AND BONDS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.02 RELATED WORK

- A Instructions to Bidders: Bid or Proposal Bonds.
- B Section 00700: General Conditions.
- C Section 00800: Supplementary Conditions.
- D Section 01030: Special Project Procedures.
- E Section 01700: Contract Closeout.
- F Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Division 2 through 16.
- G Certifications and other commitments and agreements for continuing services to OWNER are specified elsewhere in the Contract Documents.

1.03 SUBMITTALS

- A Submit written warranties to the OWNER prior to the date fixed by the ENGINEER for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the OWNER.
- B When a designated portion of the Work is completed and occupied or used by the OWNER, by separate agreement with the CONTRACTOR during the construction period, submit properly executed warranties to the OWNER within fifteen days of completion of that designated portion of the Work.
- C When a special warranty is required to be executed by the CONTRACTOR, or the CONTRACTOR and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the OWNER for approval prior to final execution.
- D Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.04 WARRANTY REQUIREMENT

- A Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of

such failure or that must be removed and replaced to provide access for correction of warranted Work.

- B Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether the OWNER has benefited from use of the Work through a portion of its anticipated useful service life.
- D OWNER's Recourse: Written warranties made to the OWNER are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the OWNER can enforce such other duties, obligations, rights, or remedies.
- E Rejection of Warranties: The OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.
- F The OWNER reserves the right to refuse to accept Work for the PROJECT where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the CONTRACTOR of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the CONTRACTOR.
- H Separate Prime Contracts: Each Prime CONTRACTOR is responsible for warranties related to its own Contract.

1.05 DEFINITIONS

- A Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the OWNER.
- B Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the OWNER.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, and equipment required and perform all clearing and grubbing, including stripping of vegetation and topsoils complete as shown on the Drawings and as specified herein
- B Obtain all permits required for site preparation work prior to proceeding with the work, including clearing and grubbing.

1.02 RELATED WORK

- A Section 02200: Excavation Backfill, and Compaction
- B Section 02276: Erosion and Sedimentation Control
- D Section 02985: Stabilization

1.03 SUBMITTALS

- A Submit all required permits prior to clearing and grubbing work.
- B CONTRACTOR shall supply grid elevations (pre-work survey) immediately after Vegetation Removal and Fine Grading of existing intermediate cover layer certified by a Registered Land Survey in accordance with Section 01050.

PART 2: PRODUCTS - Not Used

PART 3: EXECUTION

3.01 SURVEY

- A The CONTRACTOR shall locate and mark the limits of the clearing and grubbing and project area.

3.02 CLEARING

- A Complete clearing, only those areas required to install the erosion control measures as shown on the plans prior to starting overall clearing operations.

- B Cut and remove timber, trees, stumps, brush, shrubs, roots, grass, weeds, rubbish, and any other objectionable material resting on or protruding through the surface of the ground.
- C Trees and other vegetation designated on the Drawings or directed by the ENGINEER to remain shall be preserved and protected as specified.

3.03 GRUBBING

- A Grub and remove all stumps, roots in excess of 1-1/2 inches in diameter, matted roots, brush, timber, logs, concrete rubble, and all other debris encountered.
- B All grubbing holes and depressions excavated below the original ground surface shall be refilled with common fill and compacted to a density conforming to the surrounding ground surface.

3.04 DISPOSAL

- A All vegetation and debris within the areas to be cleared shall become property of the CONTRACTOR upon the start of work
- B The CONTRACTOR shall dispose of all material and debris from the clearing and grubbing operation at an approved location or as otherwise approved by the OWNER.
- C Burning of combustible materials removed by clearing and grubbing may be allowed if approved by the OWNER and provided the CONTRACTOR obtains all required permits and operates in compliance with all pertinent federal, state, and local agencies.

3.05 PROTECTION

- A Trees and other vegetation designated on the Drawings or directed by the ENGINEER to remain shall be protected from damage by all construction operations by erecting suitable barriers, guards, and enclosures, or by other approved means. Clearing operations shall be conducted in a manner to prevent falling trees from damaging trees and vegetation designated to remain and to the work being constructed and so as to provide for the safety of employees and others.
- B Protection shall be maintained until all work in the vicinity of the work being protected has been completed.
- C Heavy equipment operation or stockpiling of materials shall not be permitted within the branch spread of existing trees.

- D Any damage to existing tree crowns, trunks, or root systems shall be repaired immediately. Roots exposed and/or damaged during the work shall immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces shall be treated with an acceptable tree wound paint, and topsoil spread over the exposed root area.
- E When work is completed, all dead and downed trees shall be removed. Live trees shall be trimmed of all dead and diseased limbs and branches. All cuts shall be cleanly made at their juncture with the trunk or preceding branch without injury to the trunk or remaining branches. Cuts over 1-in in diameter shall be treated with an acceptable tree wound paint.
- F Construction activities shall be restricted to those areas within the limits of construction designated on the Drawings, within public rights-of-way, and within easements provided by the OWNER. Adjacent properties and improvements thereon, public or private, which become damaged by construction operations shall be promptly restored to their original condition, to the full satisfaction of the property owner.

3.06 EXISTING INTERMEDIATE COVER PREPARATIONS (for closure only)

- A Strip existing organics and vegetation and stockpile as indicated on the Drawings.
- B Proofroll exposed intermediate cover (subgrade) after stripping organics, prior to placement of geomembrane liner, with a minimum of two complete passes of a rubber tired vehicle as approved by the CQA OFFICER. All proofrolling shall be conducted in the presence of the CQA Officer. The CQA OFFICER may require excavation and grading of existing intermediate cover and waste mass and replacement with Backfill and/or installation of geogrid fabric, or other remediation as necessary to provide a firm, dry, stable subgrade in areas that appear to be rutting, pumping, leaching, or otherwise appear unstable while proof-rolling. Geogrid shall consist of BX-1100 geogrid, or equivalent, as provide via submittal and approved by the CQA OFFICER.
- C The CQA OFFICER and/or RPR shall be notified if unpredicted subsurface conditions are encountered during excavation, grading, fill placement or flexible membrane liner placement. Areas that indicate excessive rutting, pumping, shoving, or movement during proof-rolling may require repair. Any and all repairs shall be performed as approved by the CQA OFFICER. All Backfilling shall be performed as approved by the CQA Officer and according the Section 02200, Excavation, Backfill, and Compaction.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 02200
EXCAVATION, BACKFILL, AND COMPACTION

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, compaction and grading required to complete the work shown on the Drawings and specified herein. The work shall include, but not limited to excavation, backfilling, stockpiling, grading, compaction, placing crushed stone, construction of berms, and all related work such as sheeting, bracing and de-watering.
- B. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards 29 CFR Part 1926, Subpart P and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.
- C. Excavated topsoil and excess cut material will be stockpiled at locations as shown on the Drawings. Excess topsoil material shall not be used unless otherwise authorized by the OWNER.

1.02 RELATED WORK

- A. Section 01050: Field Engineering
- B. Section 01040: Construction Quality Assurance Plan
- C. Section 02100: Site Preparation
- D. Section 02276: Erosion and Sedimentation Control
- E. Section 02985: Stabilization

1.03 SUBMITTALS

- A. If an off-site soil source is proposed, a signed certification letter, with all necessary permits, that the borrow source is in full compliance with State, County and local laws and regulations for each source.
- B. The CONTRACTOR shall furnish a representative sample weighing approximately 75 pounds of each fill material, stone and crushed stone to the CQA Officer for approval, at least 15 calendar days prior to the date anticipated for use of each such material.

- C. Excavation support designs shall be prepared by a licensed professional engineer, registered in the State of South Carolina, having a minimum of five years of professional experience in the design and construction of excavation support systems.

1.04 QUALITY ASSURANCE / QUALITY CONTROL

- A. OWNER shall employ a CQA Officer and Quality Assurance Laboratory to perform observation of the earthwork and discretionary soils testing services for quality assurance of fill material. CONTRACTOR shall employ Quality Control Officer and a Quality Control Laboratory to perform soils inspection and testing services for quality control of the placement of fill material.

1.05 PROTECTION

- A. Sheeting and Bracing (if required)

1. Furnish, put in place and maintain such sheeting and bracing as may be required by Federal, State and local safety requirements to support the sides of excavations; to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction; and to protect adjacent structures from undermining or other damage. If the Engineer is of the opinion that at any location sufficient or proper supports have not been provided, he/she may order additional supports put in, and compliance with such order shall not relieve or release the CONTRACTOR from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill. All voids shall be filled to the satisfaction of the CQA Officer.
2. Construct the sheeting outside the neat lines of the foundation, unless indicated otherwise, to the extent deemed desirable for the method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall be adequate to withstand all pressures to which the structure or trench will be subjected. Any movement or bulging which may occur shall be corrected to provide the necessary clearances and dimensions.
3. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately re-filled with sand, which must be approved by the CQA Officer, by ramming with tools especially adapted to that purpose, or otherwise as may be directed.

4. The right of the CQA Officer to order sheeting and bracing left in place shall not be construed as creating any obligation on his/her part to issue such orders and his/her failure to exercise his/her right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
5. No sheeting is to be withdrawn if driven below mid-diameter of any pipe and under no circumstances shall any sheeting be cut off at a level lower than 1-ft above the top of any pipe.

B Drainage and De-watering

Any dewatering activities that may be planned by the CONTRACTOR shall be submitted in detail to the OWNER for review prior to implementation.

1. De-watering shall be performed as specified during the excavation of organics and unstable soils from the site. Limited dewatering may be required during the excavation and filling of ponds, ditches and where the topsoil layer extends below the water table.
2. At all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade condition until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water into the excavated areas. Groundwater shall be lowered to at least 1 foot below the bottom of excavations.
3. De-watering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation. Well or sump installations shall be constructed with proper sand filters to prevent drawing of finer grained soil from the surrounding ground.
4. Surface runoff shall be collected, drained to sumps and pumped from the disposal unit to maintain a excavation bottom free from standing water.
5. De-watering of ponds or ditches filled with water shall be performed in such a manner as to control discharge water by use of sediment basins and/or check dams or other erosion control structures approved by SCDHEC.
6. Take all additional precautions to prevent uplift of any structure during construction.

7. Drainage shall be disposed of so that flow or seepage back into the excavated area will be prevented.
8. Flotation shall be prevented by maintaining a positive and continuous operation of the dewatering system. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure of this system.
9. Remove the dewatering equipment after the system is no longer required.
10. Take all necessary precautions to preclude the accidental discharge of fuel, oil, etc in order to prevent adverse effects on groundwater or surface water quality.

C. SLOPE STABILITY

1. The CONTRACTOR shall be solely responsible for the stability of roadway embankments, unbalanced fills, stockpiles, and all other construction operations.

1.06 SOIL TESTING

- A. Previous to the placement of any fill and during such placement, the CQA Officer may select areas within the limits of the fill for testing. The CONTRACTOR shall cooperate fully in obtaining the information desired.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Materials for use as fill shall be as described below. The CONTRACTOR shall notify the CQA Officer of the source of each material. If applicable, off-site materials shall be furnished as required from approved off-site sources (see 1.03.A) and hauled to the site.
- B. Backfill shall consist of mineral soil free from organic materials, loam, wood, trash and other objectionable materials which may be compressible or which cannot be properly compacted. Common fill shall not contain stones larger than 4 inches in largest diameter and shall have at least 60 percent passing the No. 4 sieve, a maximum of 60 percent passing No. 200 Sieve, a maximum liquid limit of 60, and a maximum plasticity index of 25. Common Fill shall not contain granite blocks, broken concrete, masonry rubble or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Snow, ice and frozen soil will not be permitted. Common Fill shall be compacted to at least 95% of the standard Proctor (ASTM D698) maximum dry density or as otherwise shown on the drawings.

- C. Select Fill shall be as specified above for Backfill except that the material shall contain no stones larger than two inches in largest dimension, a maximum of 50 percent passing the No. 200 Sieve, a maximum liquid limit of 50 and a maximum plasticity index of 15. Select Fill shall be compacted to 98% of the standard Proctor (ASTM D698) maximum dry density.
- D. The soils shall be wetted or dried as necessary so that the moisture content during compaction is within 3% of the optimum moisture content as determined by ASTM D698.
- E. Highly micaceous and elastic silts shall not be used for Common, Select Fill or Structural Fill.
- F. Crushed Stone
 - 1. Shall conform to Specification Section 02505 and/or as otherwise shown on the Drawings

2.02 CONFORMANCE TESTING

Conformance testing shall be performed by the CONTRACTOR's QC Laboratory on samples from each source of backfill material. Materials identified for use as backfill shall be tested at the frequency specified in Table 1 and at every change in the material, identified by the CQC Officer of CQA Officer:

TABLE 1

| Test | Method | Frequency |
|------------------|---------------|------------------|
| Grain Size | ASTM D422 | Every 10,000 cy |
| Atterberg Limits | ASTM D4318 | Every 10,000 cy |
| Moisture/Density | ASTM D698 | Every 20,000 cy |
| Natural Moisture | ASTM D2216 | Every 10,000 cy |

Results of the tests will be submitted to the OWNER's CQA Officer within 24 hours of test completion. The CQA Officer reserves the right to reject material based on the results of the conformance tests.

PART 3: EXECUTION

3.01 GENERAL EXCAVATION

- A. Mass excavation is expected to consist of removing soil material to achieve the lines and grades established on the Subgrade Plan.

1. The excavation area shall be monitored by the CONTRACTOR'S CQC representative to ensure that soil materials are used and stockpiled appropriately according to type and suitability as follows: low permeability soil liner, general backfill (structural fill), topsoil (vegetative cover) and unsuitable soils. Only suitable soils meeting the project specifications shall be transported and used in the project.
 2. Initial evaluation of various soil types (beyond pre-construction conformance testing) by the CQC personnel during construction shall be largely visual; therefore, the CQC personnel must be experienced with visual-manual soil classification procedures. CQC personnel shall observe soils for application as mentioned in 3.01.A as well as deleterious materials (e.g., roots, stumps, rocks, and large objects). When necessary, the visual-manual procedure for the description and identification of soils shall be conducted by the CQC Officer and the description shall be in accordance with test method ASTM D2488.
- B. Soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structures, earthen or man-made, as a result of excavation, backfilling, de-watering, proofrolling, or other construction methods and required as part of the work represented on the Drawings shall be excavated and replaced as required by the CQA Officer at the CONTRACTOR's expense.

Excavation and replacement of unsuitable soils shall be performed only in the presence of the CQA Officer/RPR. It shall be necessary for the CONTRACTOR to coordinate excavation and monitoring of the segregation by excavation of substandard materials. The bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the CQA Officer.

- C. Excavation and de-watering shall be accomplished by methods that preserve the undisturbed state of subgrade soils. De-watering shall lower the groundwater to at least 1-foot below excavation subgrade and prevent "boiling" condition or detrimental underseepage at the base of the excavation as specified herein.
- D. Excavation equipment shall be satisfactory for carrying out the work in accordance with the Specifications.
- E. In the presence of the CQA Officer, proofroll exposed subgrades after stripping topsoil and organics with a minimum of two complete passes of a rubber tired heavy machine by methods approved by the CQA Officer. All proofrolling shall be conducted in the presence of the CQA Officer or designated representative. The CQA Officer may require excavation and replacement or other remediation as necessary to provide a firm, stable subgrade in areas that appear to be rutting, pumping, or otherwise appear unstable while proofrolling. The repair procedure shall be determined by the CQA Officer.

3.02 TRENCH EXCAVATION

- A. Excavation for all trenches required for the installation of pipes shall be made to the depths indicated on the Drawings and in such a manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting the trench sides and for pumping and drainage facilities. CONTRACTOR shall render the bottom of the excavations firm and stable and in all respects acceptable to the CQA Officer.
- B. The trench may be excavated by machinery to, or just below the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.
- C. Where pipe is to be installed in fill, fill shall be placed and compacted to at least 2 ft. above the top of the pipe (rough grade elevation) and then trenches re-excavated for pipe installation.

3.03 MISCELLANEOUS EXCAVATION

- A. The CONTRACTOR shall perform all excavations necessary for the placing of seeding and plants, for constructing roadways, and any other miscellaneous earth excavation required under this Contract.

3.04 GENERAL BACKFILL

- A. Materials placed in fill areas shall be placed to the lines and grades shown on the Drawings.
- B. Fill shall be placed in accordance with the Contract Document.
- C. Material conforming to the requirements of Backfill shall be placed in layers having a maximum compacted thickness of 8-inches measured before compaction and shall be compacted to at least 95 percent of its maximum density as determined by ASTM D698. The minimum frequency of testing shall be 1 test per lift per 10,000 square feet or as directed by the CQA Officer in irregular-shaped fill areas. CQC personnel shall perform testing of Backfill.

CQA personnel shall observe the backfill work and perform discretionary field and laboratory testing and may identify areas for additional QC testing as necessary to assure quality of the structural fill. Special testing frequency shall be implemented at the discretion of the CQA Officer when observations and construction performance indicate a potential issue.

- D. The surfaces of filled areas shall be graded to smooth true lines, conforming to grades indicated on the grading plan and no soft spots or un-compacted areas will be allowed in the work.

- E. No compacting shall be done when the material is covered with frost or is frozen or is too wet either from rain or from excess application of water. At such times, work shall be suspended until the previously placed and new materials have thawed and/or dried sufficiently to permit proper compaction.
- F. All backfill material shall be placed with a moisture content within 3% of Standard Proctor (ASTM D698) optimum moisture content.

3.05 TRENCH BACKFILL

- A. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected. All backfilling shall be performed expeditiously.
 - 1. Backfill shall be placed around the lower half of the pipe and thoroughly rodded and tamped to fill all voids and provide uniform support of the pipe in the bedding zone. Backfill shall be thoroughly compacted by machine tamping in 6-inch layers as required to provide 98% of the Standard Proctor maximum dry density per ASTM D-698.
 - 2. Backfill shall be placed around the upper half of the pipe and to a minimum depth of 12-inches over the top of the pipe. Backfill shall be thoroughly compacted by machine tamping in 6-inch layers as required to provide 98% of the Standard Proctor maximum dry density per ASTM D-698.
 - 3. The remainder of the trench shall be backfilled with Backfill in loose layers not to exceed 8-inches and thoroughly compacted with mechanical tampers as required to obtain the specified 95% compaction.
 - 4. Backfilling under haunches shall be performed manually by tamping rods or similar hand equipment to eliminate voids underneath sides of the pipe or haunch.
 - 5. The minimum frequency for density tests shall be 1 test per lift per 25 feet of trench for all material types or as specified by the CQA Officer. CQC personnel shall perform testing of Trench Backfill

3.06 ROAD SUBGRADE

- A. The road subgrade for bituminous, concrete, and crushed stone pavement areas in fill sections shall consist of a two-foot thick layer of Backfill compacted to a minimum 98% of the Standard Proctor maximum dry density per ASTM D-698. CQC personnel shall perform testing of Road Subgrade Backfill. The minimum frequency of density testing for road subgrade shall be 1 test per lift per 10,000 square feet.

- B. The road subgrade for bituminous, concrete, and crushed stone pavement areas in cut sections shall consist of firm natural soils as approved by the CQA Officer.
- C. Road subgrades shall be proofrolled as described in Section 02200, 3.01 E.

3.07 HANDLING OF SURPLUS MATERIAL

- A. Excavated materials shall not be removed from the site except as specifically directed by the OWNER. Surplus materials shall be segregated (see 3.01.A) and neatly stockpiled on-site at locations shown on the Drawings or as otherwise directed by the OWNER. Surplus materials shall be compacted in stockpiles and stabilized. CONTRACTOR shall provide erosion and sedimentation control measures as shown and as noted on the Drawings and specified in the Contract Documents.

3.08 GRADING

- A. Grading in preparation for placing soil liner material shall be performed to the elevations shown on the Drawings and otherwise as directed by the Engineer. During the process of grading, the subgrade shall be maintained in such condition that it will be well drained at all times. Newly graded areas shall be monitored to verify the CONTRACTOR is protecting these areas from traffic and erosion. When required, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the performance or condition of the work.
- B. If at the time of grading it is not possible to place material in its final location, it shall be stockpiled in approved areas. Stockpiled material shall be placed, compacted and smooth-rolled at the end of each day to deter water infiltration. No extra payment will be made for the stockpiling or double handling of excavated material.
- C. Engineer reserves the right to make minor adjustments in lines or grades if deemed necessary as the work progresses, in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 3-inches in their greatest dimensions will not be permitted in the top 6-inches of the finished subgrade of all fills or embankments.

3.09 OBSERVATION AND TESTING

- A. CQA Plan – CQA/CQC Observation and testing will be a joint effort between the CONTRACTOR and the OWNER.
- B. Construction QA/QC observation, inspection and testing – OWNER shall employ

a CQA Officer and Quality Assurance Laboratory to perform discretionary soils observation and confirmation testing services for quality assurance of the fill material. CONTRACTOR shall employ Quality Control Officer and a Quality Control Laboratory to perform soils inspection and testing services for quality control of the placement of fill material. CONTRACTOR shall factor the Quality Assurance observations and confirmation testing and Quality Control testing into its schedule and sequence of operations.

- C. Coordination – CONTRACTOR shall be responsible for coordination of field services with the CONTRACTOR's CQC Officer, Quality Control Laboratory, and with the OWNER's CQA Officer.
- D. Initial Observation – Compacted fill and backfill operations shall be performed after the surface has been properly prepared and has been observed and approved by CQA Officer. No Compacted fill shall be placed unless the CQA Officer approves the operation. Any fills placed without CQA Officer's observation and prior approval shall be removed in a manner to avoid damage or disturbance to the existing approved work, and the excavation shall be filled as specified herein, at no additional cost to OWNER.
- E. Field Control – The minimum testing frequencies for field tests to be performed by the CONTRACTOR's Quality Control personnel are identified in Sections 3.04, 3.05, and 3.06. The intent of the field tests is to insure that the specified density and moisture contents are being obtained.

One-point compaction tests shall be performed to interpolate between laboratory compaction (ASTM D 698) curves for at least every 5 in-place density tests or per change in material. The one-point compaction tests shall be performed on either the field density test sample or soil from a location immediately adjacent to the field density test sample, using the ASTM D 698 procedure. The results of the one-point tests shall then be compared with the full compaction curves of similar soils to estimate the maximum dry density applicable to the field density test sample.

Note: A nuclear density test gauge can be used to provide the required density testing. However, the in-situ density shall be determined using the sand cone method (ASTM D 1556) and/or the drive cylinder method (ASTM D 2937) of a minimum of one test per ten nuclear density tests or one per day, whichever is greater. The sand cone and/or drive cylinder test should be performed at the same location as a nuclear density test. The sand cone and/or drive cylinder tests shall be continued until a correlation between the density and moisture contents obtained by the nuclear density gauge and the sand cone and/or drive cylinder tests has been demonstrated.

3.10 CQC REPORTING

- A. The CONTRACTOR's CQC Firm shall provide a final Construction Quality Control Report at the end of the project. The report shall certify that the work associated with Excavation, Backfill and Compaction was performed in accordance with the Contract Documents and be prepared and sealed by a Professional Engineer registered in the State of South Carolina. The report shall include a narrative of construction methods and QC procedures employed, summary tables of all field test results, including locations and notations regarding any re-work performed, identification of failed tests, and documentation of re-worked areas with passing tests, as appropriate.
- B. Submittal and acceptance of an administratively complete Construction Quality Control Report shall be required for the Work to be considered Substantially Complete.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 02271
FABRIC CUSHION

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to install fabric cushion complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Section 02623 HDPE Pipe
- B Section 02700 Protective Cover Layer
- C Section 02776 Textured High Density Polyethylene (HDPE) Liner
- D Section 03350 Fabric Formed Concrete Revetment

1.03 SUBMITTALS

- A 45 days prior to the materials scheduled installation, submit the following information in accordance with Section 01340:
 - 1. Manufacturer's background information.
 - 2. Information on factory size, equipment, personnel, number of shifts per day and production capacity per shift.
 - 3. List of typical material property values corresponding to the requirements of the specification and samples of the fabric cushion.
 - 4. Manufacturer's quality control program and manual including description of laboratory facilities.
 - 5. A list of three projects where heavy weight geotextile fabric cushion was used in similar application to the PROJECT, including:
 - a. Name and purpose of project, location, and date of installation.
 - b. Name of OWNER, design engineer and installer.
 - c. Fabric mass per unit area and surface area.

- d. Information on performance of the fabric cushion.
6. Shop Drawing, including:
 - a. Details of overlap, seaming, anchoring, connections and other construction details as well as any variance or additional details which deviate from the Drawings.
7. Installer qualifications and installation schedule
8. A manual that specifically defines the quality control and quality assurance program during installation.
9. Copy of quality control certificates in conformance with Paragraph 2.02. Upon request the CONTRACTOR shall supply documentation which will include supporting test data and EPA 9090 test data to assist the CQA Officer in determining the suitability of the fabric cushion for the intended application.

1.04 REFERENCE STANDARDS

A American Society for Testing and Materials (ASTM)

1. ASTM D 5199-91 - Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
2. ASTM D 5261-92 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
3. ASTM D 3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
4. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
5. ASTM D 4632 - Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
6. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 FABRIC APPLICATIONS

The fabric cushion is to be used for protection of the geomembrane liner. By placement of the fabric cushion directly on the geocomposite or HDPE liner, the fabric cushion is to prevent damage from the overlying layer (aggregate drainage materials, fabric-formed concrete, etc.).

1.06 DELIVERY, STORAGE, AND HANDLING

- A The fabric cushion shall be shipped, stored, and handled in accordance with ASTM D 4873 and the manufacturer's recommendations with a minimum being as specified herein.
- B Each roll will be labeled either by printing directly on the fabric or tagged with a roll identification number, product identification number, manufacturer, product grade, and physical dimensions, thickness and manufacturer's lot number.
- C The fabric cushion shall be shipped and stored in opaque protective covering. Upon delivery, the fabric cushion shall be inspected for damage, unloaded and stored with minimal handling. The CONTRACTOR will assist the CQA Officer in conducting inventory, handling and sampling of the fabric cushion at no additional charge.
- D No hooks, tongs or other sharp tools or instruments shall be used for handling the fabric rolls. Acceptable methods of transport include the use of slings or a pole that extends a minimum of 1 ft beyond each end to unload or handle individual rolls. The fabric cushion shall not be dragged along the ground.
- E The fabric cushion shall be stored with a cover so that it is protected from exposure to sunlight, soil, puncture, and cutting. The rolls shall be elevated from the ground a minimum of 3 inches.

1.07 MATERIAL WARRANTY

- A The manufacturer shall warrant the material against manufacturing defects and material degradation for a period of five years from the date of installation. The manufacturer shall replace any material which fails within the warranty period. The manufacturer shall furnish a written warranty covering the requirements of this Paragraph.

1.08 GUARANTEE

- A The CONTRACTOR shall guarantee the fabric cushion against defects in installation and workmanship for the period of two years commencing with the date of Final Acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the OWNER.

PART 2: PRODUCTS

2.01 GENERAL

- A The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration.

2.02 MATERIALS

A Nonwoven Fabric

1. The fabric cushion shall be a nonwoven, needle punched fabric consisting of polypropylene or polyester fibers or filament formed into a stable network, such as SKAPS GE-280 or equal. The fabric cushion shall not be heat bonded.
2. The fabric cushion shall be inspected by the manufacturer for broken needles by permanently installed on-line metal detectors at the production facility.
3. The fabric cushion shall be non-biodegradable, nonreactive within a Ph range of three to eleven, resistant to ultraviolet light exposure, and resistant to insects and rodents. The fabric cushion shall have achieved a minimum value of 97 percent for the EPA 9090 chemical resistance test. Test results from any sampled roll in the lot, when tested in accordance with ASTM D4759, shall meet or exceed the values listed in Table 1. All strength values are for the weaker principal direction.

TABLE 1

**MINIMUM AVERAGE ROLL VALUES (MARV)
FOR
FABRIC CUSHIONS**

| PROPERTIES | TEST METHOD | UNIT | MARV |
|--------------------------------|-------------|---------------------|----------------------|
| Mass per Unit Area | ASTM D5261 | oz./yd ² | 28 |
| Thickness | ASTM D5199 | mils | 265 _± 10% |
| Grab Tensile Strength (MD/CMD) | ASTM D4632 | lbs | 500/400 |
| Grab Elongation | ASTM D4632 | % | 50 |
| Mullen Burst Strength | ASTM D3786 | psi | 650 |
| Trapezoidal Tear | ASTM D4533 | lbs | 120 |

2.03 QUALITY CONTROL DOCUMENTATION

- A Prior to installation, the CONTRACTOR shall provide to the OWNER the following information certified by the manufacturer for the delivered fabric.
1. Each roll delivered to the Project site shall have the following identification information:
 - Manufacturer's name
 - Product identification
 - Gross roll weight
 - Roll number
 - Roll dimensions
 2. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have a roll identification number, testing procedures, frequency and test results. The following test results shall be provided in accordance with ASTM D4354 Table 1 and the test requirements specified in Paragraph 2.02.
 - Thickness
 - Mass per Unit Area
 - Mullen Burst Strength
 - Grab Tensile Strength
 - Trapezoid Tear

2.04 CONFORMANCE TESTING

- A CQA Conformance testing shall be performed by an independent Quality Assurance Laboratory (QAL) approved by the CQA Officer. CQA Officer shall obtain samples from the material proposed for the project, mark the machine direction and identification number. One sample shall be taken per 100,000 square feet, or one sample per lot, whichever results in the greater number of conformance tests. A Lot number will be defined as a continuous production process without changes to raw material or manufacturing methods. This sampling frequency may be increased as deemed necessary by the CQA Officer. The CONTRACTOR shall pay for the initial test for every change in Lot number. The samples shall be taken across the entire roll width and shall not include the first three feet of material on the roll. The following conformance tests shall be conducted at the QAL:
1. Mass per unit area (ASTM D5261)
 2. Mullen burst strength (ASTM D3786)
 3. Grab tensile (ASTM D4632)
 4. Thickness (ASTM D5199)
 5. Trapezoidal Tear (ASTM D4533)

- B All conformance test results shall be reviewed by the CQA Officer and accepted, prior to the deployment of the fabric. All test results shall meet, or exceed, the property values listed in Paragraph 2.02.
- C Test specimens shall be obtained from each conformance sample in accordance with the respective ASTM standard. Average values shall be calculated from the test specimen results and compared to the minimum average roll values listed in Table 1. If any average value of a conformance sample is less than the minimum average value specified in Table 1, the sample shall be determined to be a failing sample. If a conformance sample fails, all rolls within the sampled 100,000 sf or lot will be rejected for use on the project unless the CQA Officer approves additional testing.
- D If the CQA Officer approves additional testing, the CONTRACTOR may obtain two additional samples from the failing roll and one sample each from the rolls manufactured immediately before and after a failing roll and have them tested by the QAL at the CONTRACTOR's expense. If all four samples pass, then all rolls will be accepted. If either of the samples from the failing roll fails, then that roll will be rejected. If either of the samples from the other rolls fails, then all the rolls within the same 100,000 square feet or lot will be rejected.
- E The cost of initial material conformance testing shall be borne by the OWNER and shall be performed by an independent Quality Assurance Laboratory (QAL) selected by the OWNER. If the fabric fails the initial material conformance tests, the CONTRACTOR shall pay for the cost of subsequent conformance testing until all conformance tests are passed and the fabric is accepted by the Engineer.

PART 3: EXECUTION

3.01 REQUIREMENTS PRIOR TO INSTALLATION

- A Preparation of the subgrade shall be in accordance with Section 02200, Section 02275, and Section 02776.
- B The geomembrane and geocomposite shall be cleaned of stones, liner scrap, and all other materials, and a final inspection of the liner shall be performed by the CQA Officer or designated CQA representative.
- C The fabric cushion shall be inspected by the CQA Officer for imperfections and damage. All defective rolls shall be removed from the site at the expense of the CONTRACTOR.

3.02 INSTALLATION

- A Fabric Cushion Placement

1. The fabric cushion shall be installed as shown on the Drawings and as specified herein.
2. The fabric cushion shall only be cut using a hook blade knife, scissors with rounded tips or as otherwise approved by the CQA Officer.
3. The CONTRACTOR shall exercise extreme care during installation to prevent damage to the HDPE liner. The CONTRACTOR shall prevent rocks, soil, waste materials and other debris from being entrapped between the HDPE liner and the fabric cushion. Only smooth soled shoes approved by the CQA Officer shall be worn by the installers. The CONTRACTOR shall not use the installed fabric cushion as a storage area for tools and supplies.
4. The CQA Officer shall have the authority to order the immediate stoppage of work as a result of improper installation procedures or any reason that may cause defective installation.

B Seaming Method

1. Adjoining fabric cushion panels shall be overlapped a minimum of 4 inches and heat seamed using a hot-wedge welder. The heat seam shall be continuous along the length of the overlap. The area to be welded shall be clean and dry. The hot-wedge welding equipment shall be capable of continuously controlling and monitoring the temperature of the hot wedge platen.
2. All seams constructed on sloped surfaces that are 4 to 1 or greater shall be vertical seams. All vertical panels placed on 4 to 1 slopes or greater shall extend 5 feet beyond the toe of slope.

C Cover

1. All fabric cushion shall be covered in accordance within the manufactures recommended exposure period, but shall not exceed 45 days. If delay of rock layer installation exceeds 45 days, a protective cover such as a woven geotextile with high UV resistance shall be temporarily placed over the fabric cushion until rock placement occurs.

D Repairs

1. Fabric repairs shall be made with patches of the same material, using an approved seaming system. The patch size shall be twenty-four inches larger in all directions than the area to be repaired. The corners of the patch shall be rounded.

3.03 FIELD QUALITY CONTROL

- A Prior to placement of the stone drainage layer or the fabric-formed concrete matting, the fabric cushion installation and related work shall be inspected by the CQA Officer (RPR). All work in the system therein being inspected shall be complete, clean and prepared for use. All work shall meet the requirements of cleanliness and workmanship, as determined by the CQA Officer (RPR).
- B Probe testing may be conducted on all seams by the CQA Officer (RPR). A dull pointed probe is run along the edge of a seam to detect defects. All defects shall be marked for repair. Defective seams shall be repaired by hot wedge welding. If the location of the defective seam prevents hot wedge welding, an air leister gun shall be used.
- C Discrepancies shall be noted and repaired at no additional expense. Final acceptance of the system shall be contingent upon the approval of the Engineer.

END OF SECTION

SECTION 02272

FILTER FABRIC

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to install filter fabric complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Section 02200: Excavation, Backfill and Compaction
- B Section 02290: Protective Cover Layer
- C Section 02276: Erosion and Sedimentation Control
- D Section 02274: Geocomposite Drainage Net
- E Section 02505: Crushed Stone Paving

1.03 SUBMITTALS

- A At least 30 calendar days prior to filter fabric installation, submit the following information:
 - 1. Manufacturer's background information.
 - 2. List of material properties and samples of filter fabric with attached certified test results.
 - 3. Manufacturer's quality control program and manual including description of laboratory facilities.
 - 4. A list of ten completed facilities where the filter fabric is used including:
 - a. Name and purpose of facility, its location and date of installation.
 - b. Name of Owner, project manager, design engineer and installer.
 - c. Fabric thickness and surface area.
 - d. Specific application and information on performance of the facility.

5. Shop Drawings, including:
 - a. Proposed panel layout showing the installation layout identifying field seams as well as any variance or additional details which deviate from the Drawings, if applicable.
 - b. Details of overlap, seaming, anchoring, connections and other construction details.
6. Installation schedule and locations of areas designated for installation
7. A manual that specifically defines the quality control and quality assurance program during installation including manufacturer's installation guidelines.
8. Copy of quality control certificates in conformance with Paragraphs 2.02 and 2.03.

1.04 REFERENCE STANDARDS

A American Society for Testing and Materials (ASTM)

1. ASTM D5199 - Standard Test Method for Measuring Thickness of Textile Materials.
2. ASTM D5261 - Standard Test Method for Mass per Unit Area (Weight) of Woven Fabric.
3. ASTM D3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
4. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
5. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
6. ASTM D4632 - Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
7. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
8. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

- B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 FABRIC APPLICATIONS

The filter fabric is to be used for placement beneath erosion control stone and structures, beneath crushed stone paving where called for; bonded to both sides of drainage net for geocomposite; and, installed as operational cover over the leachate collection lines as shown on the Drawings. The unit weights of the filter fabric for each use are specified herein.

1.06 DELIVERY, STORAGE AND HANDLING

- A The filter fabric shall be shipped, stored and handled in accordance with manufacturer's recommendations and as specified herein.
- B The fabric shall be stored with a cover so that it is protected from exposure to sunlight and shall be elevated from the ground (a minimum of 3-in) to protect the fabric from stones and other sharp objects and saturation.

1.07 REQUIREMENTS PRIOR TO INSTALLATION

- A For use in erosion control structures, the subgrade shall be inspected and approved by the CQA Officer (RPR) prior to installation of the filter fabric. The subgrade shall be smooth, uniform and compacted for the installation of the fabric.
- B For the leachate collection system installation *or similar* whereas an area is excavated in the protective layer, the area shall be inspected and approved by the CQA Officer prior to installation of the filter fabric to ensure against damage to the drainage net and liner system.
- C Prior to installation of the geocomposite, the material shall be inspected, conformance tested and Approved by the CQA Officer and Quality Assurance Laboratory to ensure the filter fabric is sufficiently bonded to the net.

1.08 MATERIAL WARRANTY

- A The manufacturer shall warrant the material, against manufacturing defects and material degradation for a period of five years from the date of installation. The manufacturer shall replace any material which fails within the warranty period. The manufacturer shall furnish a written warranty covering the requirements of this Paragraph.

1.09 GUARANTEE

- A The Contractor shall guarantee the filter fabric against defects in installation and workmanship for the period of two years commencing with the date of Final Acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the Owner.

PART 2: PRODUCTS

2.01 GENERAL

- A The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration.

2.02 MATERIALS

A Nonwoven Fabric

1. All fabric shall be a nonwoven needle punched polypropylene fabric consisting of filaments formed into a stable network.
2. A nominal 8 oz/yd² unit weight fabric shall be used as bedding for rip-rap lined stormwater structures, ditches, outlets and operational cover. The 6 oz/yd² unit weight fabric shall be heat bonded to both sides of the drainage net as specified in Section 02274.
3. The fabric shall be non-biodegradable, nonreactive within a pH range of 2 to 13, resistant to ultraviolet light exposure, and resistant to insects and rodents. Test results from any sampled roll in the lot, when tested in accordance with ASTM D4759, shall meet or exceed the values listed in Table 1 on the following page.

TABLE 1
MINIMUM AVERAGE ROLL VALUES (MARV)
GEOTEXTILE FABRICS

| PROPERTIES | TEST METHOD | UNIT | MARV | |
|-----------------------|-------------|-------------------------|-------|-------|
| | | | 6 OZ. | 8 OZ. |
| Fabric Weight | ASTM D5261 | oz./yd ² | 5.7 | 7.3 |
| Thickness | ASTM D1777 | mils | 80 | 90 |
| Grab Tensile Strength | ASTM D4632 | lbs | 150 | 205 |
| Grab Elongation | ASTM D4632 | % | 50 | 50 |
| Puncture Resistance | ASTM D4833 | lbs | 85 | 110 |
| Mullen Burst Strength | ASTM D3786 | PSI | 220 | 320 |
| Permittivity | ASTM D4491 | gal/min/ft ² | 110 | 110 |
| Apparent Opening Size | ASTM D4751 | US Sieve | 70 | 80 |

2.03 QUALITY CONTROL DOCUMENTATION

- A Prior to installation, the Contractor shall provide to the Owner the following information certified by the manufacturer for the delivered fabric.
1. Each roll delivered to the Project site shall have the following identification information:
 - Manufacturer's name
 - Product identification
 - Thickness
 - Roll number
 - Roll dimensions

 2. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, testing frequency and test results. At a minimum the following test results shall be provided every 50,000 square feet of manufactured fabric in accordance with test requirements specified in Paragraph 2.02.
 - Thickness
 - Grab Tensile Strength
 - Grab Elongation
 - Puncture Resistance

- Mullen Burst Strength

2.04 CONFORMANCE TESTING

A Conformance testing may be performed at the discretion of the CQA Officer. An independent Quality Assurance Laboratory (QAL) approved by the Owner will test samples obtained by the CQA Officer from the material proposed. The machine direction and identification number will be identified. The Owner shall pay for conformance testing at the frequency of one test per 100,000 square feet. For every change in Lot number, the Contractor shall perform conformance testing on the initial roll at the Contractor's expense. The samples shall be taken across the entire roll width and shall not include the first 3-ft. The following conformance tests shall be conducted at the laboratory.

1. Mass per unit area (ASTM D5261)
2. Mullen burst strength (ASTM D3786)
3. Puncture resistance (ASTM D4833)
4. Grab tensile (ASTM D4632)
5. Permittivity (ASTM D4491)
6. Apparent opening size (ASTM D4751)

B These conformance tests shall be performed in accordance with test requirements Paragraph 2.02.

C All conformance test results shall be reviewed by the CQA Officer and accepted, prior to the deployment of the fabric. All test results shall meet, or exceed, the property values listed in Paragraph 2.02.

D The manufacturer may obtain samples from rolls manufactured immediately before and after the failing roll and request testing by the QAL at the manufacturer's expense. If these rolls pass, then only the failing roll will be rejected. If they fail, then the entire lot will be rejected.

E The cost of a first-run conformance testing shall be borne by the Owner and shall be performed by the CQA Officer or his/her representative and an independent Quality Assurance Laboratory (QAL) selected by the Owner. If the fabric fails the first-run unit conformance tests, the contractor shall pay for the cost of subsequent conformance testing until all conformance tests are passed and the fabric is accepted by the CQA Officer.

PART 3: EXECUTION

3.01 PREPARATION

A General

1. Preparation of the subgrade shall be in accordance with Section 02200, or otherwise depending on the specific application.
2. The subgrade shall be inspected by the CQA Officer (RPR) prior to installation of the filter fabric.

3.02 INSTALLATION

A Fabric Placement

1. The subgrade shall be maintained in a smooth, uniform and compacted condition during installation of the filter fabric beneath the erosion control stone.
2. No mechanical equipment shall be driven directly on top of the filter fabric.
3. Granular fill materials shall be installed in accordance with Section 02700.
4. Protective Cover Layer materials shall be placed with mechanical equipment; however, no mechanical equipment shall be allowed directly on top of the filter fabric. Equipment shall be driven on pre-deposited material at approved thicknesses.
5. Protective Cover Layer materials shall be brought to the work area with earth-carrying equipment, deposited on the previously spread soil cover (minimum of 2-ft. thick), then pushed onto the uncovered portion of the filter fabric with bulldozers or excavator loaders.
6. Protective cover soils for the side slopes of the filter fabric shall be placed at the bottom and pushed uphill to reduce any tension in the fabric or underlying 60 mil textured HDPE liner.
7. Damage to the filter fabric occurring during the placement of protective cover shall be repaired immediately at no additional expense to the Owner.

B Field Overlap

1. The fabric shall be overlapped according to the manufacturers recommended installation guidelines for a particular application.

3.03 FIELD QUALITY CONTROL

- A Two duplicate documentation files for fabric placement shall be maintained. One shall be maintained by the Contractor and the other by the Engineer. At the end of each work week, the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The Contractor shall submit daily copies of the documentation to the Engineer.

- B The filter fabric installation and related work shall be inspected by the Engineer. All work in the system therein being inspected shall be complete, clean and ready for use. All work shall meet the requirements of cleanliness and workmanship, as determined by the Engineer.
- C Discrepancies shall be noted and repaired at no additional expense. Final acceptance of the system shall be contingent upon the approval of the ENGINEER.

END OF SECTION

SECTION 02274a

GEOCOMPOSITE DRAINAGE NET (BASE LINER SYSTEM)

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required and install geocomposite drainage net consisting of high quality polyethylene (HDPE) drainage net with nonwoven filter fabric bonded to both sides in the locations shown on the Drawings and as specified herein. [Note: Specifications for the nonwoven filter fabric that is bonded to both side of the drainage net are included in Section 02272.

1.02 RELATED WORK

- A Section 02200 Excavation, Backfill and Compaction
- B Section 02700 Protective Cover
- C Section 02271 Fabric Cushion
- D Section 02272 Filter Fabric
- E Section 02275 Compacted Soil Liner
- G Section 02776 Textured High Density Polyethylene (HDPE) Liner.

1.03 SUBMITTALS

- A At least 60 days prior to geocomposite drainage net installation submit the following information:
 - 1. Manufacturer's background information.
 - 2. List of material properties and samples of geocomposite drainage net with attached certified test results.
 - 3. Manufacturer's quality control program and manual including description of laboratory facilities.
 - 4. A list of ten completed facilities where the geocomposite drainage net is used including:
 - a. Name and purpose of facility, its location and date of installation.

- b. Name of Owner, project manager, design engineer and installer.
 - c. Geocomposite drainage net thickness and surface area.
 - d. Information on performance of the facility.
5. Shop Drawing, including:
- a. Proposed panel layout or plan showing the installation layout identifying field seams as well as any variance or additional details that deviate from the Drawings.
 - b. Details of overlap and seaming of the geocomposite drainage net, anchoring, connections and other reconstruction details.
6. Installation schedule.
7. A manual that specifically defines the quality control and quality assurance program during installation including manufacturer's installation instructions.
8. Copy of quality control certificates in conformance with Paragraph 2.02 and 2.03.

1.04 REFERENCE STANDARDS

A American Society for Testing and Materials (ASTM)

1. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.
2. ASTM D1238 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
3. ASTM D1603 - Standard Test Method for Carbon Black in Olefin Plastics.
4. ASTM D1777 - Standard Method for Measuring Thickness of Textile Materials.
5. ASTM D3776 - Standard Test Method for Mass Per Unit Area (Weight) of Woven Fabric.
6. ASTM D4716 - Standard Test Method for Constant Head Hydraulic Transmissivity (In Plane Flow) of Geotextile and Geotextile Related Products.
7. ASTM D751 - Standard Method for Testing Coated Fabrics

- B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 DELIVERY, STORAGE AND HANDLING

- A The drainage net shall be shipped, stored and handled in accordance with manufacturer's recommendations.
- B The geocomposite drainage net shall be stored such that it is protected from exposure to sunlight and it shall be elevated from the ground (a minimum of 3-in) to protect the geocomposite drainage net from puncture and soil staining.

1.06 PROJECT/SITE REQUIREMENTS

- A The underlying geomembrane material shall be inspected and found acceptable by the CQA Officer (RPR) prior to installation of the geocomposite drainage net.

1.07 MATERIAL WARRANTY

- A The geocomposite drainage net manufacturer shall warrant the material, against manufacturing defect and material degradation (prorated basis) for a period of five years from the date of installation. The manufacturer shall replace any material which fails from the above causes within the warranty period. The manufacturer shall furnish a written warranty covering the requirements of this Paragraph.

1.08 GUARANTEE

- A The Contractor shall guarantee the drainage net against defects in installation and workmanship for the period of two years commencing with the date of Final Acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the Owner.

PART 2: PRODUCTS

2.01 GENERAL

- A The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration.

2.02 MATERIALS

- A The drainage net shall be manufactured by extruding two sets of polyethylene strands to form a three dimensional structure to provide planar water flow.

- B A geotextile filter fabric shall be heat bonded to both sides of the drainage net. Heat bonding shall be performed by the manufacturer prior to shipping to the site. The geotextile filter fabric shall be 6 oz/yd² nonwoven needle punched polypropylene fabric as specified in Section 02272 (QC testing for the geotextile is specified therein).
- C The geocomposite drainage net shall contain UV inhibitors.
- D The geonet and geocomposite shall conform to the following minimum properties:

| Property | Test Method | Required Value |
|---------------------------------------|-------------|--|
| Density | ASTM D1505 | 0.940 g/cm ² |
| Melt Flow Index (Condition 0/2.16) | ASTM D1238 | 1.0 g/10 min. (max) |
| Carbon Black Content (Net) | ASTM D4218 | 2 - 3% |
| Thickness (Net) | ASTM D5199 | 200 mils |
| Tensile Strength (Net) | ASTM D5035 | 45 lbs/in |
| Ply Adhesion (composite) | ASTM 7005 | 1.0 lb/in. |
| Transmissivity ¹ | ASTM D4716 | 2.5 x 10 ⁻⁵ m ² /s |
| Transmissivity ² | | 3.5 x 10 ⁻⁵ m ² /s |

- Notes:
- ¹ Transmissivity measured using water at 21 +/- 2° C (70 + 4° F) with a gradient of 0.1 and a confining pressure of 2088 psf between steel plates after 15 minutes.
 - ² Transmissivity measured using water at 21 +/- 2° C (70 + 4° F) with a gradient of 0.1 and a confining pressure of 208 psf between steel plates after 15 minutes.

- E Geocomposite drainage net shall be SKAPS TRANSNET 220-2-6, equivalent AGRU America 200-mil. geocomposite or other equivalent.

2.03 QUALITY CONTROL DOCUMENTATION

- A Prior to installation of any drainage net material, the Contractor shall provide to the Owner the following information certified by the manufacturer for the delivered drainage net.

1. Each roll delivered to the Project site shall have the following identification information:
 - # Manufacturer's name
 - # Product identification
 - # Thickness
 - # Roll number
 - # Roll dimensions

2. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, testing frequency and test results. At a minimum the following test results shall be provided every 50,000 square feet of manufactured drainage net in accordance with test requirements specified in Paragraph 2.02.

- # Resin Density
- # Melt Flow Index
- # Thickness
- # Carbon Black Content
- # Tensile Strength
- # Ply Adhesion
- # Transmissivity
- # Mass Per Unit Area

2.04 CONFORMANCE TESTING

- A Conformance testing shall be performed by the CQA Officer and an independent Quality Assurance Laboratory (QAL) as approved by the Owner. CQA Representative shall obtain samples from the delivered material, mark the machine direction and identification number. One sample shall be taken per 100,000 square feet, or one sample per lot, whichever results in the greater number of conformance tests. A Lot number will be defined as a continuous production process without changes to raw material or manufacturing methods. This sampling frequency may be increased as deemed necessary by the Engineer. The Owner shall pay for conformance testing at the frequency of one test per 100,000 square feet. For every change in Lot number, the Contractor shall pay for conformance testing on the initial roll at the Contractor's expense. The samples shall be taken across the entire roll width and shall not include the first 3-ft. The following conformance tests shall be conducted at the laboratory:

1. Resin Density (ASTM D1505)
2. Carbon Black Content (ASTM D1603)
3. Melt Index (ASTM D1238)
4. Thickness (ASTM D5199)
5. Transmissivity (ASTM D4716)
6. Mass per Unit Area (ASTM D3776)

- B These conformance tests shall be performed in accordance with test requirements specified in Paragraph 2.02.
- C All conformance test results shall be reviewed by the Engineer and accepted or rejected, prior to the deployment of the geocomposite drainage net. All test results shall meet, or exceed, the property values listed in Paragraph 2.02. In case of failing test results, the Contractor may request that another sample be

retested by the QAL with manufacturer's technical representative present during the testing procedures. The costs for retesting including engineering, analyses and all associated expenses shall be paid for by the Contractor. The Contractor may also have the sample retested at two different laboratories approved by the Owner. If both laboratories report passing results the material shall be accepted; if both laboratories do not report passing results, all material from the lot representing the failing sample will be considered out of specification and rejected. The manufacturer may obtain additional samples from rolls immediately before and after the failing roll or as directed by the Engineer and have them tested by the QAL at his/her own expense. If these rolls pass, then only the failing roll will be rejected. If they fail, then the entire lot will be rejected.

PART 3: EXECUTION

3.01 PREPARATION

A General

Prior to installation, the following actions shall occur:

1. The underlying liner or geomembrane shall be swept clean of debris, waste material, equipment, and other miscellaneous objects.
2. The underlying liner or geomembrane shall be inspected by the CQA Representative and the installer prior to installation of the drainage net to check for damage such as; tears, punctures, scratches, and defects.
3. The CQA Officer shall confirm with the installer that all seams and patches have been tested and approved and that all necessary survey information has been obtained.

3.02 INSTALLATION

A Panel Placement

1. Care shall be taken to keep the geocomposite drainage net clean and free from debris prior to installation.
2. The geocomposite drainage net shall be installed in such a manner as to ensure that it is not damaged in any way, and the following shall be complied with during installation:
 - a. Geocomposite drainage net shall be anchored as shown on the Drawings.
 - b. On slopes, the geocomposite drainage net shall be secured and rolled down the slope in such a manner as to continually keep the

geocomposite drainage net sheet in tension. If necessary, the geocomposite drainage net shall be positioned by hand after being unrolled to minimize wrinkles.

- c. In order to protect against wind uplift, all geocomposite drainage net shall be weighted with sandbags or by other means. Such sandbags shall be installed during placement and shall remain until replaced with cover material.
- d. Geocomposite drainage net shall only be cut using scissors or J-hook blades. Care shall be taken not to leave tools on the drainage net.
- e. Necessary precautions shall be taken to prevent damage to underlying layers during placement of the drainage net.
- f. During placement of geocomposite drainage net, care shall be taken not to entrap soil in the geocomposite drainage net or stones that could damage the underlying liner. If soil is entrapped in the drainage net, it should be hosed clean or replaced. In this regard, care shall be taken in handling the sandbags, to prevent rupture of the sandbag.

B Field Seams and Overlaps

1. The following requirements shall be met during installation of the drainage net:
 - a. The geocomposite drainage net of adjacent panels shall be overlapped by at least 4-in. For end widths of panels, the geocomposite drainage net shall overlapped a minimum of 4-inches with the upslope panel placed over the downslope panel.
 - b. Seams shall be secured by tying. Tying can be achieved by plastic fasteners or polymer braid. Tying devices shall be a color that contrasts with black for easy inspection. Metallic devices are not allowed.
 - c. Tying shall be every 5-ft along seams, at minimum.
 - d. The unbonded fabric on the top side of the geocomposite drainage net shall be sewn or hot-wedge welded along side seams of adjacent panels.
 - e. For end width seams and patches, a 24-inch strip of fabric shall be placed over the seam and held in place with soil.
 - f. Horizontal seams on 4 to 1 slopes shall not be allowed unless it is demonstrated to the CQA Officer that it is absolutely necessary.

3.03 FIELD QUALITY CONTROL

- A Two duplicate documentation files for panel placement shall be maintained. One shall be maintained by the Contractor and the other by the CQA Officer. At the end of each work week, the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The Contractor shall submit daily copies of the documentation to the CQA Officer.
- B Any holes or tears in the geocomposite drainage net shall be repaired by placing a patch extending 1-ft beyond the edges of the hole or tear. The patch shall be secured to the original geocomposite drainage net by placing ties every 6-in. Tying devices shall be as specified in Paragraph 3.02B. All repairs and patches shall be approved by the CQA Officer.
- C Damage to the geocomposite drainage net occurring during the placement of the material overlying the geocomposite drainage net shall be repaired immediately at no additional expense to the Owner.

3.04 DISPOSAL OF WASTE MATERIAL

- A Upon completion of installation, the Contractor shall dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat and acceptable condition.

END OF SECTION

SECTION 02275

COMPACTED SOIL LINER

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish all labor, materials, equipment and incidentals required to install compacted soil liner with a maximum in-place permeability and minimum thickness as shown on the Drawings and specified herein. Associated work includes quality control testing, borrow source excavation, hauling, screening, constructing a test pad, placement, moisture conditioning, harrowing, compaction, and grading of natural soil or soil-bentonite materials for compacted soil liner construction of the landfill.

1. Landfill Liner System Option 1 (Soil Liner and 60-mil HDPE liner)

- a) Maximum Permeability – 1.0×10^{-7} cm/sec
- b) Minimum Thickness – 24 inches

2. Landfill Liner System Option 2 (Soil Liner, Geosynthetic Clay Liner, 60-mil HDPE liner)

- a) Maximum Permeability – 1.0×10^{-5} cm/sec
- b) Minimum Thickness – 24 inches

1.02 RELATED WORK

- A Section 01040: CQA Plan
- B Section 01050: Field Engineering
- C Section 02200: Excavation, Backfill, and Compaction
- D Section 02776: Textured High Density Polyethylene (HDPE) Liner.

1.03 SUBMITTALS

A At least 45 days prior to test pad construction, the CONTRACTOR shall submit the following information in accordance with Section 01340:

- 1. Identification of the compacted soil liner type (natural soil or CONTRACTOR prepared soil-bentonite mix.)
- 2. If a natural soil is proposed, submit the following documentation:
 - a. Name and location of the proposed natural soil borrow source,

- b. Test results and other documentation as necessary to verify that the proposed natural soil meets the requirements of 2.01A of this Section, and
 - c. Anticipated volume of suitable natural soil available to the project.
 3. If a soil-bentonite mixture is proposed, submit the following documentation:
 - a. Name and location of the proposed soil source,
 - b. Test results and other documentation as necessary to verify that the proposed soil meets the requirements of 2.01B of this Section,
 - c. Name and location of the bentonite supplier,
 - d. Test results and other documentation as necessary to verify that the proposed bentonite meets the requirements of 2.01C of this Section,
 - e. Anticipated bentonite application rate, and
 - f. Manufacturer's literature describing the pugmill to be used for preparing the soil-bentonite mix.
 4. A signed certification letter, with all necessary permits, that the material source is in full compliance with State, County, and local laws and regulations.
 5. A description and schedule of the installation procedure and a list of installation equipment.
 6. A Construction Quality Control (CQC) Plan for the compacted soil liner installation including:
 - a. Names and qualifications of the construction quality control firm and laboratory including the CQC Officer to be retained by the CONTRACTOR
 - b. Number, names and qualifications of CQC field personnel.
 - c. CQC procedures for borrow excavation and test pad construction.
 - d. CQC procedures for installation including exclusion and removal of oversized particles and organic matter from the compacted soil

liner material, moisture control, placement, mixing, compaction and lift thickness control.

- e. Site plan or map with 1-acre grid blocks to track and demonstrate field Quality Control testing described in Paragraph 3.04 of this Section.
 - f. Procedure for protection of liner from adverse weather conditions (precipitation, frost, or intense heat) and all other relevant procedures.
- 7. Experience and performance credentials, resumes, etc. in conformance with Paragraph 1.06A.
 - 8. Samples from the material source to be used in the liner installation, to be collected by CQC.
 - 9. Subgrade elevations in a form acceptable by the Engineer.
- B. At least 21 calendar days prior to test pad construction, submit the results of testing conducted by CQC that demonstrates the proposed compacted soil liner material meets the requirements of Paragraphs 2.01A and 2.01B.
 - C. At least 21 calendar days prior to test pad construction, submit at least 100 lbs of the proposed compacted soil liner material contained in sealed 5-gallon pails and at least a 10 sf. section of the approved textured high density polyethylene (HDPE) liner (Section 02776) to the Engineer.

1.04 REFERENCE STANDARDS

- 1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
- 2. ASTM D698 - Standard Test Method for Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 5.5-lb (2.49 kg) Hammer and 12-in (305 mm) Drop.
- 3. ASTM D854 - Standard Test Method for Specific Gravity of Soils.
- 4. ASTM D1140 - Standard Test Method for Amount of Material in Soils Finer Than the Number 200 (75 micrometer) Sieve.
- 5. ASTM D1556 - Standard Test Methods for Density and Unit Weight of Soil In Place by Sand-Cone Method.
- 6. ASTM D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.

7. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes.
8. ASTM D2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).
9. ASTM D2937 - Standard Test Method for Density of Soils in Place by the Drive-Cylinder Method.
10. ASTM D2922 - Density of Soil in Place by Nuclear Methods (Shallow Depth).
11. ASTM D3017 - Standard Test Method for Water Content of Soil in Place by Nuclear Methods (Shallow Depth).
12. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
13. ASTM D4767 - Test method for Consolidated - Undrained Triaxial Compression Test on Cohesive Soils.
14. ASTM D5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
15. ASTM D5321 - Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic friction by the Direct Shear Method.

B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE AND QUALITY CONTROL

A The OWNER will retain a geotechnical CQA Officer who is experienced in the construction of compacted soil liners. The CQA Officer and his/her representatives shall observe the CONTRACTORs work and perform tests as specified to provide assurance that the liner meets the requirements of this specification.

B The CONTRACTOR will retain an independent geotechnical CQC Officer that is experienced in the construction of compacted soil liners and who is capable of performing the tests specified herein and who has sufficient hydraulic conductivity testing equipment to provide test results in a timely manner (5-7 days) in accordance with the Specification. The CQC Officer shall provide direction and testing as necessary to control the quality of the borrow material (material property requirements specified in Paragraphs

2.01A and B) mixing procedures and thoroughness, bentonite application rate, moisture control for the pugmill operation, and proper construction of the test pad and the compacted soil liner.

- C An “acceptable zone” and testing shall be submitted as detailed in Section 2.02C by the CQC Officer.
- D After the acceptable zone testing has been performed and approved by the CQA Officer, a test pad shall be constructed on site using the same equipment and installation procedures that will be used during full-scale liner construction.

The purpose of the test pad is to assure that the construction procedures proposed for full scale liner installation will produce an acceptable liner. Construction requirements and testing procedures for the test pad are specified in Paragraph 3.01.

1.06 QUALIFICATIONS

- A The work shall be performed by personnel that have experience in processing and installation of a low permeability soil liners.

1.07 DELIVERY, STORAGE AND HANDLING

- A Materials may be stockpiled on-site in designated approved areas. Each type of material shall be stockpiled separately. Removal and placement of material shall be done in a manner to minimize mixing with soils adjacent to and beneath the stockpile.
- B If a soil-bentonite mixture is used, both the stockpiled soil to be used in the mix and the soil-bentonite mixture, if stockpiled, shall be sealed or covered with an impermeable cover at the end of each day and during rain events.
- C The bentonite storage sites should be cleared and level. Bentonite material shall be contained and covered to preserve the fitness and quality of the material.
- D The CONTRACTOR shall protect the natural soil or the soil-bentonite mixture materials delivered to the site from inclement weather conditions and any traffic that may occur near the stockpile.

PART 2: PRODUCT

2.01 MATERIALS

- A Compacted soil liner materials, **whether natural soil or soil-bentonite mixtures**, shall conform to the properties listed in Table 1:

TABLE 1

| PROPERTY | TEST METHOD | REQUIREMENT |
|--|-------------|-----------------------------------|
| Passing the 1.5-inch Sieve (%) | ASTM D422 | 100% minimum |
| Passing the 10 Sieve (%) | ASTM D422 | 90% minimum |
| Passing the 200 Sieve (%) | ASTM D1140 | 50% minimum |
| Liquid Limit | ASTM D4318 | 40% minimum |
| Plasticity Index | ASTM D4318 | 15% minimum |
| USCS Soil Classification | ASTM D2488 | CH, CL, MH, ML, SC |
| Hydraulic Conductivity – Option 1 | ASTM D5084 | 1.0×10^{-7} cm/s maximum |
| Option 2 | ASTM D5084 | 1.0×10^{-5} cm/s maximum |
| Interface Effective Friction Angle ¹ (w/Textured HDPE) | ASTM D5321 | 24° minimum ¹ |
| Internal Effective Friction Angle ¹ | ASTM D4767 | 24° minimum ¹ |
| Organic Content | ASTM D2974 | 3% maximum |

¹ – Shear strength value shall be a minimum 24° friction angle, or a shear strength envelope inclusive of the material's friction angle and adhesion that yields a total shear strength in excess of the specified 24° friction angle (assumed zero adhesion) to the requirements of these specifications including, but not limited to, the requirements of 2.02.C.5, as demonstrated and sealed by the CQC Officer and approved by the Engineer and Owner.

Permeability is the regulatory soil liner requirement and is therefore the primary project requirement. Other project required soil liner test requirements to include Atterberg Limits (ASTM D4318), Percent Passing the 200 Sieve (ASTM D1140), and USCS Soil Classification (ASTM D2488) are considered secondary indices, tested at greater frequencies than permeability and used to monitor soil liner material quality to ensure consistency with project established acceptable zone criteria. Variations from the subject specified requirements (Atterberg Limits, Percent Passing the 200 Sieve, USCS Soil Classification) identified in Table 1 are allowed provided the Contractor, as part of their initial conformance testing and acceptable zone criteria determinations, demonstrates that the proposed soil liner materials and methods can produce uniform, homogenous soil liner meeting the project permeability requirements. Deviations from the specified requirements shall be addressed by the Contractor as part of their initial conformance test acceptable zone testing and reporting.

- B If a soil-bentonite mixture is used for the compacted soil liner, the soil to be used for the mixture shall consist of a natural mineral soil that is free from fill materials, organic materials, loam, wood, trash, snow, ice and other objectionable materials and shall conform to the properties in Table 1.
- C If a soil-bentonite mixture is used for the compacted soil liner, the bentonite used in the mixture shall be a free flowing, high swelling, sodium-based, Wyoming bentonite. The bentonite shall conform to all items of this specification. Certified test data shall be submitted to the Engineer for approval. The requirements are as follows:
 - 1. The bentonite shall meet the contamination resistance criterion defined as the ability of the bentonite, when pre-hydrated with fresh water for a minimum of 72 hours, and tested at the rate of 2.5 lbs. per square foot mixed into a 2-inch layer of SP type sand to maintain hydraulic conductivity for a minimum of 200 days after introduction of a solution containing 3% ammonium chloride into the testing device, or equivalent certification that meets the approval of the Engineer.
 - 2. The bentonite shall be covered by the manufacturer's warranty against defects in material and workmanship and shall have a useful life of 30 years under normal weathering and normal use conditions.
- D The natural soil or soil-bentonite mixture material proposed for liner construction shall be uniform in character, and after compaction, shall have an in-place saturated hydraulic conductivity as specified in Table 1 or less based on testing according Paragraph 3.01H.
- E If a soil-bentonite mixture is used for the compacted soil liner, the soil-bentonite blending shall be accomplished using a pugmill and the CONTRACTOR shall demonstrate to the satisfaction of the Engineer that the proposed blending method will produce a consistent end product.
- F. The CONTRACTOR shall show evidence of an adequate, homogenous supply of material within a designated area which is properly permitted by the appropriate local, State and Federal agencies.

2.02 CONFORMANCE TESTING

- A Initial conformance testing shall be performed by CQC on samples from the natural soil source, or soil source for a soil-bentonite mixture, to assure compliance with the Specifications. The samples will be obtained from multiple test pits to be dug by the CONTRACTOR under the direction of CQC. The following tests shall be performed on the samples. For soil to be used in a soil-bentonite mix, tests 5, 8 and 9 are to be performed on the soil-bentonite mixture. Normal stresses representing field conditions should be

used for the internal and interface shear tests. The effective and total shear strength friction angle should be reported.

1. Soil Classification (ASTM D2487)
 2. Sieve Analysis (ASTM D422) – *including hydrometer analysis*
 3. Atterberg Limits (ASTM 4318)
 4. Moisture-Density Relationship Curves (ASTM D698)
 5. Laboratory Hydraulic Conductivity (ASTM D5084, except as modified in Paragraph 3.01H)
 6. Natural Moisture (ASTM D2216)
 7. Specific Gravity (ASTM D854)
 8. Shear Tests for compacted soil liner material (ASTM D4767 or as approved by the Engineer)
 9. Interface Shear Tests (soil/synthetic liner or soil-bentonite/synthetic liner) – *using a direct shear, rotational shear, or as approved by Engineer*
- B If a soil-bentonite mixture is proposed for the compacted soil liner, the CONTRACTOR shall be responsible for establishing the percentage of bentonite to be used for the test pad construction based on the results of laboratory testing conducted by CQC specified in 2.02A, above, on the soil-bentonite mixture. This testing shall be completed with the results furnished to the Engineer at least 21 calendar days prior to beginning test pad construction.
- C For natural soil sources, the CQC Officer shall determine an acceptable zone of moisture contents and dry unit weights for which permeabilities are less than or equal to that specified in Table 1 by performing the following testing and analysis procedures:
1. Using the samples extracted from the proposed soil source, perform a Standard Proctor compaction test to develop a moisture-density curve for a representative sample of material. Use five specimens at incremental moisture contents to develop the compaction curve showing dry density for each molding water content.
 2. Permeate compacted specimens, compaction to different moisture contents and densities, to determine their hydraulic conductivity. The compacted soil liner shall be compacted to a dry density equal to or greater than 95 percent of the compacted soil liner's maximum dry density and wet of the material's optimum moisture content as determined by ASTM D698
 3. On the graph of dry density vs. moisture content, identify the samples which have hydraulic conductivities less than or equal to 1.0×10^{-7} cm/s.

4. Draw an "acceptable zone" of water content and dry density around the passing samples.
5. Perform Internal Shear Tests (ASTM D4767) and Interface Shear Tests (ASTM D5321 and Paragraph 2.01E) on one specimen of the compacted soil liner material. The sample for each test should be remolded wet of the optimum moisture content and within the acceptable zone for the percent compaction and the moisture content that is anticipated for construction. The CQA Officer may require additional internal shear tests and interface shears tests if the compacted soil liner's proposed placement moisture content and percent compaction differs substantially from the shear test result's moisture content and percent compaction presented above. Additional shear strength tests will be at the cost of the CONTRACTOR.

For Internal Shear Tests (ASTM D4767), use the following parameters:

- A. Strain rate/shear rate required: As recommended in ASTM D4767
- B. Consolidation pressures required: 1.5 psi, 5 psi, 40 psi
- C. Consolidation/seat time for samples: As recommended in ASTM D4767

For Interface Shear Tests (ASTM D5321), use the following parameters:

- A. Strain rate/shear rate required: See ASTM D5321, Paragraph 8.2 and Paragraph 11.6. Due to varying soil types, if strain rate adjustments to the above referenced Paragraphs are required due to pore pressure dissipation problems, submit recommended adjustments for review by Engineer.
 - B. Normal stresses required: 1.5 psi, 5 psi, 40 psi
 - C. Consolidation/seat time for samples: As recommended in ASTM D5321, typically, 16-24 hours per normal stress application prior to initiating shear rate
6. Based on the shear test results and other pertinent factors such as constructability, shrink/swell potential, potential for desiccation cracks, and consolidation, the CQC Officer shall modify the acceptable zone as required.
 7. CQC shall provide the graphs described above to the CONTRACTOR. If additional sources are used, the tests described above shall be performed by the CQC and the costs will be paid by the CONTRACTOR.

- D For soil-bentonite mixes, once the CONTRACTOR has selected the bentonite application rate and completed the testing and submitted the test

data and results as indicated in 2.02B, above, CQC shall perform the acceptable testing described in 2.02C above, prior to constructing the test pad.

- E The natural soil or soil (for soil-bentonite mixture) source shall be tested by the CQC at the minimum frequencies specified in Table 2. If changes in material, as identified by the CQA Officer or CQC representative, occur within the frequency prescribed below, additional tests shall be performed at the expense of the CONTRACTOR.

TABLE 2

| TEST | METHOD | FREQUENCY |
|-------------------------|---------------|------------------|
| Grain Size w/Hydrometer | ASTM D422 | Every 2,500 cy |
| Atterberg Limits | ASTM D4318 | Every 2,500 cy |
| Moisture/Density | ASTM D698 | Every 5,000 cy |
| Natural Moisture | ASTM D2216 | Every 2,500 cy |

Results of the tests shall be submitted to the CQA Officer within 24 hours of test completion. The Engineer reserves the right to reject material based on the results of the conformance tests.

PART 3: EXECUTION

3.01 TEST PAD

- A A test pad of a dimension of no less than 40-ft by 60-ft, installed in lifts to full thickness of 24-inches as shown on the Drawings shall be constructed on-site using the same equipment, processing and installation procedures that will be used during full-scale liner construction. The compacted soil liner material to be used for the test pad shall be the same material that the CONTRACTOR proposes to use for construction of the base liner. If approved by the Engineer, the test pad may be installed within the liner limits and incorporated in the work, provided the pad passes all testing requirements. Test pad soils tests shall be independent of and not be included in the full-scale soil liner testing results.
- B The construction of the pad shall be directed by the CQC Engineer. The CQC Engineer shall use the acceptable zone established to set moisture contents and percent compaction. CQC shall perform tests as needed to assist in the construction of the test pad. Both the CQC and CQA field and laboratory testing will be evaluated for determining the performance of the test pad

- C The compacted soil liner in the test pad shall be compacted to a dry density equal to or greater than 95 percent of the compacted soil liner's maximum dry density and wet of the material's optimum moisture content as determined by ASTM D698.
- D The final compacted thickness of each lift shall be a maximum 6" lift thickness. For each lift, the CQC shall perform testing of moisture content and density at a minimum of three test locations. Two thin-wall tube samples shall be obtained per lift by the CQC. One tube will be used to perform a permeability test. The second tube will be kept as a backup in case of damage to the first sample.
- E If the initial test pad does not provide the specified results, additional test pad(s) shall be performed, at the CONTRACTOR's cost (including CQA costs), until the specified requirements are met.
- F For compacted soil liner consisting of a soil-bentonite mix, the bentonite content used for the test pad shall be set by the CONTRACTOR and written notification of the mix ratio will be submitted to the Engineer prior to constructing the test pad.
- G The CONTRACTOR may construct test pads for more than one source of compacted soil liner material or soil-bentonite mix ratios. However, only one test pad will be tested and evaluated at the OWNER's cost as a part of the specified construction quality assurance (CQA). All costs associated with subsequent test pads shall be paid for by the CONTRACTOR. If the CONTRACTOR changes the source of natural soil or soil (for the soil-bentonite mixture) or if the characteristics of the natural soil or the soil within the selected source changes significantly, the Engineer may order the construction of additional test pads and subsequent tests as specified above as may be necessary to evaluate the performance of the compacted soil or soil-bentonite liner. Construction of additional test pads and the related CQA work shall be paid for by the CONTRACTOR.
- H One triaxial hydraulic conductivity test (ASTM D5084) will be performed on each lift of the test pad. These tests will be performed on undisturbed thin-wall tube samples collected by CQC in accordance with ASTM D1587. The samples shall be trimmed if needed, encapsulated within a flexible latex membrane, and mounted in permeameters conforming to the requirements of ASTM D5084. Each test specimen shall be consolidated under an effective stress of 8 to 12 psi and permeated under a backpressure as recommended in paragraph 8.3 of ASTM D5084 to achieve saturation. The maximum hydraulic gradient across the sample shall not exceed thirty (30) as per paragraph 8.5.1 of ASTM D5084 or as specified by Engineer. The hydraulic gradient shall be increased slowly in increments with careful observations of the test sample for consolidation, piping, etc. Test samples

that are consolidated in volume by more than 5 percent during the test shall be voided. The inflow and outflow from the sample shall then be monitored and the hydraulic conductivity calculated for each recorded flow increment. The tests will continue until steady state flow is achieved as specified in paragraph 8.5 of ASTM D5084.

- I The compacted soil liner thickness shall be determined from three test locations per lift selected by CQC per test pad using a method consisting of hand augering or push tube sampling (with a minimum of a 3/4" diameter sample) or as approved by the Engineer. Holes in the compacted soil liner shall be backfilled by the CONTRACTOR with dry powdered or chipped bentonite.

3.02 SUBGRADE PREPARATION

- A The subgrade shall be graded to elevations in accordance with the plans.
- B The compacted soil liner subgrade shall be proofrolled by the CONTRACTOR in accordance with Section 02200 and examined by the CQA Officer or the RPR to detect unstable or loose soils. Based on observation during the proofrolling operation, the CQA Officer and the RPR reserves the right to select the number and direction of passes to be used. Any unsuitable soils encountered at subgrade elevation shall be removed and replaced as directed by the CQA Officer and/or the RPR at no additional cost to the OWNER.
- C The subgrade surface shall not be smooth rolled. The subgrade surface shall be left in a roughened condition to allow good adherence between the subgrade and the initial lift of the compacted soil liner.
- D The CQA Officer shall observe and approve the subgrade and the survey plan of subgrade elevation submitted by the CONTRACTOR before installation of the compacted soil liner can proceed. It shall be the CONTRACTOR's responsibility to properly prepare and maintain the subgrade in a uniform and compacted condition during installation of the liner.
- E If the subgrade is damaged during liner installation, the CONTRACTOR shall restore and re-compact the area; CQC shall re-test the subgrade in accordance with ASTM D1556, D2922, or D2937 prior to installing the liner. All costs related to the re-test and restoration of the subgrade shall be paid for by the CONTRACTOR.

3.03 SOIL OR SOIL-BENTONITE LINER PLACEMENT

- A The CQC Officer and his/her site representatives shall supervise the liner installation. Work shall not be performed by the CONTRACTOR without the

CQA Officer and/or the RPR onsite. CQA and CQC shall perform field tests (i.e. moisture content, densities, etc.) as required to ensure proper installation. CQA and CQC shall perform tests as described in section 3.04 to determine acceptance of the in-place liner.

- B. The compacted soil liner material shall be compacted to a dry density equal to or greater than 95 percent of its maximum dry density and wet of the material's optimum moisture content as determined by ASTM D698.
- C The placement moisture content shall be within the acceptable zone of moisture content as determined by the CQC Officer during the conformance testing of the natural soil or soil-bentonite mixture described in paragraph 2.02C. The acceptable zone may be modified by the Engineer based on results and observations of the test pad.
- D Water for Construction of the Soil Liner
 - 1. The CONTRACTOR shall make arrangements to provide water as required to achieve the required moisture content, unless otherwise specified in the Contract Documents.
 - 2. The water shall be from an approved source.
 - 3. Prior to installing the liner, the CONTRACTOR shall inspect the subgrade to ensure that it has been sufficiently wetted to prevent excessive absorption of moisture from the installed material.
 - 4. Should the compacted soil liner material be stockpiled for any length of time, the CONTRACTOR shall slope, seal and compact the stockpile to prevent erosion and oversaturation.
 - 5. Should the material become oversaturated, the CONTRACTOR shall spread and dry the material as needed to adjust the moisture to the proper percentage.
- E The materials shall be uniformly compacted to no less than the minimum dry density of the acceptable zone that corresponds to the placement moisture content or 95 percent of its maximum dry density, whichever is greater. The acceptable zone shall be as specified by the CQC Officer in accordance with the procedures outlined in 2.02C. Density shall be uniformly obtained throughout the entire thickness of the liner. The compacted soil liner shall be constructed in lifts with a maximum compacted thickness of 6 inches per lift. The surface of a lower lift shall be scarified, if needed, prior to placement of an upper lift. During placement of the initial lift care should be taken to avoid mixing of the liner material and subgrade material.

- F To achieve the specified compaction the CONTRACTOR shall use a self-propelled compactor (CAT 815 or equivalent) equipped with steel kneading feet capable of fully penetrating the loose lift and into the previously compacted lift. A smooth wheel compactor shall be used with sufficient number of passes to smooth the upper surface of the compacted soil liner. A smooth wheel compactor shall be used only for final smoothing of the surface and not be used for achieving the specified compaction.
- G Liner material shall be mixed, disced, harrowed, tilled and kneaded as necessary to break down all clods and produce a uniform homogenous layer that is free of clods. A clod is defined for the purposes of construction as any subrounded ball of soil exceeding 1/2" in diameter, typically with the core containing less than the specified moisture. If the CQA Officer or the RPR observe that all clods have not been broken down, the CONTRACTOR shall re-work the material to the satisfaction of the CQA Officer and/or the RPR.
- H The surface of each lift shall be scarified prior to placement of subsequent lifts.
- I Liner material which has been contaminated with clusters of rock or gravel, sand lenses, organic debris or other deleterious material shall be removed and replaced with uncontaminated soil materials.
- J In the case of soil-bentonite mix for the compacted soil liner, the CONTRACTOR shall use a pugmill to blend the soil-bentonite mix at the required moisture content. Soil borrow material to be used for soil-bentonite compacted soil liner construction shall be shredded and screened by power methods to provide a uniform soil free of roots, stumps, and other organic materials, rocks, and debris and to provide particle sizes to be used in the compacted soil liner less than 1.5 inches in its longest dimension for natural soil and 1.5 inches in its longest dimension for soil-bentonite mixes.
- K For the final lift, the CONTRACTOR shall employ a crew of laborers to remove all rocks prior to smooth rolling.
- L No liner material shall be placed, spread, or compacted while the ground or the liner material is frozen/thawing, saturated, desiccated, during unfavorable weather conditions or periods of precipitation. The liner surface must be made smooth and free from ruts or indentations at the end of any working day when significant precipitation is forecast and/or at the completion of the compaction operations in that area in order to prevent saturation of the liner material. Any re-grading due to the above conditions or final preparation should be re-tested at those locations for liner thickness prior to placement of the next lift or HDPE liner. Thickness measurements should be performed as indicated in Section 3.04 A. Areas previously meeting the conformance test requirements that are re-worked in excess of

the top 3-inch per lift shall be re-tested. Re-testing will be at the cost of the CONTRACTOR.

- M Should desiccation cracks develop, the liner shall be scarified, disced, re-wetted, re-homogenized and re-compacted in accordance with the Specifications to the depth of any such cracks or as instructed by the Engineer and/or the RPR. If desiccation extends below half of the lift thickness, the entire lift shall be reworked and retested as described above. Re-testing will be at the expense of the CONTRACTOR.
- N During construction, the CONTRACTOR shall make all necessary provisions to deal with inclement weather conditions. The CONTRACTOR shall be fully responsible for control of stormwater during installation of the liner system and for moisture control and protection of the compacted soil liner.
- O After finish grading and smooth rolling is completed, the compacted soil liner shall not be less than 24-inches thick. Liner thickness will be tested by CQA and CQC personnel on a per lift basis at a frequency specified in 3.04A using a method of hand augering or push tube sampling (minimum 3/4" sample). This testing is primarily to estimate liner lift thickness and shall not be used to verify total dry liner thickness. The final compacted soil liner thickness will be determined from the CONTRACTOR's survey. Areas not meeting the thickness requirements shall be augmented with additional soil material. The CONTRACTOR's surveyor shall be available to assist in determining the areal extent of compacted soil liner that is not meeting the minimum required thickness. Any additional testing or CQA services associated with corrective action for achieving the required soil liner thickness requirement will be at the cost of the CONTRACTOR. The added material shall be worked into the in-place liner to ensure homogeneity and proper bonding. This shall be done by scarification of the surface prior to addition of the new material. As a minimum, the top 3-inches of the liner shall be wetted, kneaded, compacted and re-worked with the additional material to obtain the required thickness.

3.04 QUALITY ASSURANCE DURING PLACEMENT

- A The CQC/CQA personnel shall conduct tests during installation of the compacted soil liner at the minimum frequencies specified in Table 3. The CQC Officer will provide direction and testing as necessary to the CONTRACTOR to control quality of the compacted soil liner materials to meet the specifications listed in Section 2.01; however, the results of CQC and CQA testing will both be considered in accepting or rejecting compacted soil liner materials.

TABLE 3

| TEST | METHOD | FREQUENCY | |
|-------------------------------|--|--------------------------------------|---------------|
| | | CQC | CQA |
| Grain Size w/Hydrometer | ASTM D422 | 1/acre/lift | 1/acre |
| Atterberg Limits | ASTM D4318 | 1/acre/lift | 1/acre |
| Undisturbed Permeability | ASTM D5084 | 1/acre/lift | 1/acre |
| Density ¹ | ASTM D2937 ASTM D2922 ASTM D1556 | 4/acre/lift | 2/acre |
| Natural Moisture ¹ | ASTM D2216 ASTM D3017 ASTM D1556 | 4/acre/lift (at density location) | 2/acre |
| Liner thickness | Hand Auger or push tube | 4/acre/lift | Discretionary |

- B The minimum testing frequencies for field tests to be performed by the CONTRACTOR's Quality Control personnel and the OWNER's Quality Assurance personnel are identified in Sections 3.04. A. The intent of the field tests is to insure that the specified density and moisture contents are being obtained.

One-point compaction tests shall be performed to interpolate between laboratory compaction (ASTM D 698) curves for at least every 5 in-place density tests. The one-point compaction tests shall be performed on either the field density test sample or soil from a location immediately adjacent to the field density test sample, using the ASTM D 698 procedure. The results of the one-point tests shall then be compared with the full compaction curves of similar soils to estimate the maximum dry density applicable to the field density test sample.

Note¹: A nuclear density test gauge can be used to provide the required density testing. However, the in-situ density shall be determined using the sand cone method (ASTM D 1556) and/or the drive cylinder method (ASTM D 2937) of a minimum of one test per ten nuclear density tests or one per day, whichever is greater. The sand cone and/or drive cylinder test should be performed at the same location as a nuclear density test. The sand cone and/or drive cylinder tests shall be continued until a correlation between the density and moisture contents obtained by the nuclear density gauge and the sand cone and/or drive cylinder tests has been demonstrated.

- C All holes made as a result of depth measurements, permeability samples, density tests, grade stakes or other means shall be completely filled by the CONTRACTOR and/or CQC Officer with dry powdered or chipped bentonite, as instructed by the CQA Officer and the RPR.
- D The CQA Officer shall have the authority to request additional permeability tests in areas that, in the CQA Officer's judgment, may be suspect or deficient. Hydraulic conductivity tests shall be conducted in accordance with ASTM D5084 except as modified in Paragraph 3.01G. For each sample tested, one back-up sample will be extracted in the proximity of the sample location. This sample will be held in a controlled environment at the CQA/CQA laboratories as a precautionary measure. If adequate demonstration is presented that a sample was not representative of the compacted soil liner or that an error in testing occurred, the backup sample will be tested and the original test will be disregarded.
- E If applicable, Grade stakes for liner construction shall be numbered by the CONTRACTOR and located on an inventory map. The inventory map shall be submitted to the CQA Officer. Upon completion of an area, the removed stakes will be compared to the inventory map to ensure that none were left in-place.
- F The CONTRACTOR shall submit a survey plan with final elevation of top of compacted soil liner for CQA Officer's approval in accordance with Section 01050 prior to installing the geomembrane liner.

3.05 Corrective Action

- A If soil has been desiccated to a depth less than or equal to the thickness of a single lift, the desiccated lift shall be disced, moistened, and re-compacted. However, discing may produce large, hard clods of soil that will require pulverization. Also, it should be recognized that if the soil is wetted, time must be allowed for water to be absorbed into the clods of soil and hydration to take place uniformly. For this reason it will be necessary to remove the desiccated soil from the construction area, to process the lift in a separate processing area, and to replace the soil accordingly.
- B Any sample or area tested shall be rejected, removed and replaced if it does not meet the requirements of the technical specifications. Reconstructed areas shall have feathered, overlapping edges that tie into adjacent liner areas.

3.06 Reporting

- A The CONTRACTOR's CQC Officer shall provide a final Construction Quality Control Report at the end of the project. The report shall certify that the Work associated with Compacted Soil Liner was performed in accordance

with the Contract Documents and shall be prepared and sealed by a Professional Engineer registered in the State of South Carolina. The report shall include a narrative describing construction methods and QC procedures employed, summary tables of all field test results, including location and notations regarding any re-work performed, identification of failed tests, and discussions and documentation of re-worked areas with passing tests, as appropriate.

- B Submittal of an administratively complete Construction Quality Control Report and approved as-built survey in accordance with Section 01050 shall be required for the Work to be considered Substantially Complete.

END OF SECTION

SECTION 02276

EROSION AND SEDIMENTATION CONTROL

PART 1: GENERAL

1.01 SCOPE OF WORK

- A The work specified in this Section consists of providing, installing and maintaining erosion and sedimentation controls as necessary during construction. The CONTRACTOR is responsible for providing effective erosion and sediment control measures throughout construction.
- B Erosion controls include, but are not limited to, surface stabilization which shall be accomplished with vegetation and mulch, erosion control matting, earthen diversion berms and ditches, and minimization of disturbed acreage. CONTRACTOR is responsible for preventing excessive on-site erosion during construction.
- C Sedimentation controls include, but are not limited to, silt fences, sediment traps, temporary earthen diversion berms and ditches, check dams and appurtenances at the foot of sloped surface. Sedimentation pollution shall be prevented from off-site migration.
- D CONTRACTOR shall be responsible for maintaining all existing erosion control structures in their existing conditions as they exist on the date of the Notice to Proceed for the duration of the PROJECT. This work includes, but is not limited to, all existing sedimentation ponds, rock check dams, and diversion ditches and berms. Maintenance shall include but not be limited to making all repairs necessary to maintain the structures as well as remove all accumulated sediment as necessary to maintain the structures in proper working condition.
- E CONTRACTOR shall be responsible for maintaining all new erosion control structures including but not limited to, all sedimentation ponds, diversion ditches, rock check dams, and silt fence. Maintenance shall include but not be limited to making all repairs necessary to maintain the structures as well as remove all accumulated sediment as necessary to maintain the structures in proper working condition. The frequency of sediment removal from all on-site erosion control structures shall be bi-weekly at a minimum. All erosion control measures shall be inspected following each rainfall event. CONTRACTOR shall be responsible for constructing whatever diversion structures are necessary to ensure that all disturbed on-site drainage/run-off (within the limits described above) is routed through one of the existing on-site rock check dams, sediment traps, or sediment ponds. Silt fence shall be installed as needed to insure against off-site runoff until all diversion structures are constructed and operational.

- F Any stockpiles established shall be protected from erosion by providing silt fences along the toe of the slopes, seeding the side slopes and by maintaining stable slopes.

1.02 REFERENCE DOCUMENTS

- A The Facility's Approved Stormwater Pollution Prevention Plan (SWPPP)
- B The SEQUENCE OF CONSTRUCTION as described on the Drawings
- C South Carolina Stormwater Management and Sediment Control Handbook
- D EPA Storm Water Management for Industrial Activities

PART 2: PRODUCTS

2.01 EROSION AND SEDIMENT CONTROL

- A Stabilization by seeding and mulching
- B Erosion Control and Turf Reinforcement Matting
- C Rip-rap and washed stone
- D Silt fence
- E Temporary earthen diversion berm and ditches
- F Sediment Traps, check dams and energy dissipaters
- G Sediment Ponds, outlet structures and spillways

PART 3: EXECUTION

3.01 EROSION CONTROL

- A Maintain all existing erosion and sediment control structures and appurtenances as detailed on the plans.
- B Install and maintain new erosion and sediment control structures and appurtenances as detailed on the plans.
- C Install and maintain temporary erosion and sediment control structures and appurtenances as necessary to prevent erosion from CONTRACTOR'S work.

3.02 PERFORMANCE

- A CONTRACTOR shall immediately take whatever steps are necessary to maintain any existing erosion and sediment control structures and appurtenances in the condition as they existed on the date of the Notice to Proceed.
- B CONTRACTOR shall construct all new erosion and sediment control structures and appurtenances as detailed on the plans in a manner that minimizes erosion from areas of the CONTRACTOR'S work.
- C Should any temporary erosion and sediment control measures employed by the CONTRACTOR fail to produce results which comply with the State and local enforcement requirements, CONTRACTOR shall immediately take whatever steps are necessary to correct the deficiency at his own expense.
- D CONTRACTOR shall inspect all erosion and sediment control devices for each period of precipitation to ensure proper operation. Any erosion and sediment control devices found not to be properly functioning, shall be immediately corrected.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 02277

GEOSYNTHETIC CLAY LINER (GCL)

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to install bentonite contained reinforced geosynthetic clay liner (GCL) as shown on the Drawings and as specified herein. Associated work includes sample collection, testing, loading, delivery, storage and handling and placement. All work shall be in accordance with the procedures provided herein and in the contract drawings.

1.02 RELATED WORK

- A Section 02200 Excavation, Backfill and Compaction
- B Section 02776 HDPE Liner

1.03 SUBMITTALS

- A 45 days prior to the materials scheduled installation, submit the following information in accordance with Section 01340:
 1. Identification of the GCL manufacturer.
 2. Documentation that the GCL manufacturer and installer meet the requirements of Paragraph 1.06 of this Section.
 3. A signed certification from the manufacturer stating that materials are first quality products designed and manufactured specifically for the purposes of this work and which has been satisfactorily demonstrated by prior use to be suitable and durable for such use.
 4. A description of the installation procedures and a schedule to include GCL installation and a list of installation equipment.
 5. A Quality Control Plan for the GCL manufactured product and installation.
 6. Three samples of the GCL material to be used for laboratory testing.

1.04 REFERENCE STANDARDS

- A American Society for Testing Materials (ASTM)

1. ASTM D5890 - Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
 2. ASTM D5891 - Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
 3. ASTM D5993 - Standard Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners.
 4. ASTM D6768 - Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.
 5. ASTM D6496 - Standard Test Method for Determining Average Bonding Peel Strength between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.
 6. ASTM D5887 - Standard Test Method for Measurement of Index Flux through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.
 7. ASTM D6243 - Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method
 8. ASTM D6766 - Hydraulic Properties of GCLs Permeated with Potentially Incompatible Aqueous Solutions (Applicable for coal combustion residual waste only).
- B GRI-GCL3 – test methods, required properties and testing frequencies of Geosynthetic Clay Liners (GCL's)
- C Where reference is made to one of the above standards, the revision in effect at the time of bid opening will apply.
- 1.05 QUALITY ASSURANCE
- A Quality control and quality assurance consists of laboratory conformance testing of samples supplied from the manufacturer and observation and quality control during installation.
- B The CONTRACTOR will retain an independent geotechnical Quality Assurance Laboratory (QAL) who has specific permeability equipment to provide test results in a timely manner in accordance with the Specifications. The CONTRACTOR shall coordinate and schedule all tests as required by the Drawings and Specifications.

- C Conformance testing requirements are specified in Paragraph 2.01. The purpose of conformance testing is to assure that the supplied material conforms to the Specifications and specified permeability.
- D Field quality control requirements are specified in Paragraph 3.04. The purpose of field quality control procedures is to assure that the GCL has been installed in accordance with the specifications and achieved the specified hydraulic conductivity.

1.06 QUALIFICATIONS

A Material shall be supplied and the work shall be performed by a firm that has experience in processing and installation of GCL.

B Manufacturer

1. The manufacturer of the GCL shall have a minimum of 3 years of continuous experience in the manufacture of similar GCL products.
2. The manufacturer must demonstrate, by submitting a list of previous projects, a minimum of 2 million square feet of manufacturing experience of similar GCL products.
3. The manufacturer shall submit a list of not less than 10 previous jobs. The list shall include the following for each project:
 - Name of Project/Date Installed
 - Brief Description of Project
 - Quantity of GCL
 - Owner's Name, Address, Contact and Phone
 - CQA Officer's Name, Address, Contact and Phone
 - Installer's Name, Address, Contact and Phone

C Installer

1. The installer must demonstrate previous GCL experience for projects totaling at least 1 million square feet. A project reference list and the same information as listed in Paragraph 1.06.B.3 shall be submitted.

1.07 DELIVERY, STORAGE AND HANDLING

A Delivery, Storage and Handling of GCL shall be the responsibility of the Contractor. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well drained.

B The GCL shall be shipped, stored, and handled in accordance with the manufacturer's recommendations, but at a minimum shall be protected from UV

exposure and elevated from the ground a minimum of three inches. All stored GCL materials and the accessory bentonite must be covered with a plastic sheet or tarpaulin until their installation.

1.08 MATERIAL WARRANTY

- A The GCL Manufacturer shall warrant the material against manufacturing defects for a period of at least five years from the date of installation. The manufacturer shall replace any material that fails from the above causes within the warranty period. The manufacturer shall furnish a written warranty covering the requirements of this paragraph.

1.09 GUARANTEE

- A The Contractor shall guarantee the GCL against defects in installation and workmanship for a period of two years commencing with the date of Final Acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the Owner.

PART 2: PRODUCTS

2.01 GENERAL

- A. The GCL shall consist of a layer of granular sodium bentonite clay needle punched between two geotextiles and shall comply with all of the criteria listed in this Section.
- B. Bentonite shall be a high-swelling sodium bentonite, with a minimum swell index of 24 mL/2g and a maximum fluid loss of 18 mL. Bentonite shall be CG-50 granular bentonite, mined and processed by American Colloid Company.
- C. Bentonite shall have a granular consistency (1 percent max. passing a No. 200 sieve [75 μ m]), to ensure uniform distribution throughout the GCL and minimal edge loss during handling and installation.
- D. For coal combustion residual waste applications, manufacturer shall successfully demonstrate that the GCL is compatible with anticipated site-specific leachates. It shall be the manufacturer's responsibility to, in consultation and agreement with the Engineer/Owner, obtain representative samples of the anticipated landfill leachate for GCL compatibility testing. Multiple samples of the leachate shall be obtained and analyzed to develop a range of anticipated conditions for use in testing the GCL. Compatibility testing and analysis shall be performed by the manufacturer to demonstrate the GCL will meet and maintain the specified hydraulic properties of this section using ASTM D6766 - 18 (Standard Test Method for Evaluation of Hydraulic Properties of Geosynthetic Clay Liners Permeated with Potentially Incompatible Aqueous Solutions) using the test pressures specified to

include:

1. Test Method 4.3.1 (Scenario 1 – Hydrated/Saturated with Water Prior to Contact with Test Liquid)
2. Test Method 4.3.2 (Scenario 2 – Hydrated/Saturated with Test Liquid)

The manufacturer shall submit a final report of the compatibility study for the Owner/Engineer's review and approval. Failure to demonstrate capability to the satisfaction of the Owner/Engineer shall render the material unapproved for use in construction.

- E. Prior to using an alternate GCL, the Contractor must furnish independent test results demonstrating that the proposed alternate material meets all requirements of this specification. Contractor must also provide evidence of successful use of the proposed alternate material on past similar projects. This evidence can include past direct shear results against similar materials under similar site conditions, and/or past permeability/compatibility test results with a similar leachate or waste stream. The CQA Officer must approve any alternate GCL materials.
- F. Reinforced GCL shall be used for the entire project.
- G. No desiccation of GCL components from the bentonite core shall occur.
- H. GCL panels shall be a minimum of 4 feet wide.
- J. The GCL shall be rolled onto a substantial core, clearly labeled, and enclosed in a waterproof wrapper that is resistant to photo-degradation by ultraviolet (UV) light. Packaging must be adequate for safe transportation to the point of delivery.
- D. The label should include manufacturer, style, lot and/or roll number, weight, length and width.
- K. The GCL shall comply with the following properties as listed in Table 1.

TABLE 1

| MATERIAL PROPERTY | TEST METHOD | REQUIRED VALUES ⁽¹⁾ |
|---|--------------------|---------------------------------------|
| Bentonite Swell Index | ASTM D5890 | 24 mL/2g min. |
| Bentonite Fluid Loss | ASTM D5891 | 18 mL max. |
| Bentonite Mass/Area ⁽²⁾ | ASTM D5993 | 0.75 lb/sf min. |
| GCL Tensile Strength ⁽³⁾ | ASTM D6768 | 30 lbs/in. MARV |
| GCL Peel Strength | ASTM D6496 | 3.5 lbs/in min. |
| GCL Hydraulic Conductivity ⁽⁴⁾ | ASTM D5887 | 5 x 10 ⁻⁹ cm/sec max. |
| GCL Internal Hydrated Shear Strength ⁽⁵⁾ | ASTM D5321 | 500psf |

Notes:

- (1) All values are minimum average roll values unless otherwise noted.
- (2) Reported at 0-percent moisture content
- (3) Performed in the machine direction
- (4) De-aired, distilled tap water @ 80psi cell pressure, 77psi headwater pressure, 75 tailwater pressure
- (5) Measured at 200psf normal stress; hydrated at 48-hours.

2.02 MANUFACTURERS QUALITY CONTROL DOCUMENTATION

- A Prior to installation of any GCL, the Contractor shall provide to the CQA Officer, the following information certified by the manufacturer for the proposed GCL:
1. Each roll delivered to the Project site shall have the following identification information:
 - a. Manufacturer's name
 - b. Product information
 - c. Roll dimensions
 - d. Lot and roll number
 2. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, testing frequency and test results. At minimum, the following test results shall be provided in accordance with the requirements specified in Section 2.01.
 - a. Bentonite free swell and fluid loss (1 test every 50 tonnes, which corresponds to about 1 test every 130,000 square feet)

- b. Bentonite Fluid Loss (1 test every 50 tonnes)
- c. Bentonite mass/area (1 test every 40,000 square feet)
- d. GCL tensile strength (1 test every 200,000 square feet)
- e. GCL peel strength (1 test every 40,000 square feet)
- f. GCL permeability (1 test per lot)
- g. GCL hydrated internal shear strength (per manufacturer's standard test frequency)

2.03 CONFORMANCE TESTING

- A Conformance testing shall be performed by an approved Independent Quality Assurance Laboratory (QAL) approved by the Owner and CQA Officer. The Laboratory (prior to shipping) or RPR (upon delivery) shall obtain samples from the proposed material, mark the machine direction, lot number and roll identification number. One sample shall be taken per 100,000 square feet, or one sample per lot, whichever results in the greater number of conformance tests. A Lot number will be defined as a continuous production process without changes to raw material or manufacturing methods. This sampling frequency may be increased as deemed necessary by the CQA Officer. The Contractor shall pay for the initial test for every change in Lot number. The samples shall be taken across the entire roll width and shall not include the first three feet. The following conformance tests shall be conducted on the GCL samples at the QAL.
- 1. Bentonite mass per unit area (ASTM D5993)
 - 2. Bentonite Swell Index (ASTM D5890)
 - 3. GCL Grab Strength (ASTM D6768)
 - 4. GCL Peel Strength (ASTM D6496)
- B For coal combustion residual waste applications, Conformance compatibility testing shall be performed by an approved Independent Quality Assurance Laboratory (QAL) approved by the Owner and CQA Officer. The RPR (upon delivery) shall obtain samples from the proposed material, mark the machine direction, lot number and roll identification number. At a minimum, one sample shall be taken per lot. A Lot number will be defined as a continuous production process without changes to raw material or manufacturing methods. This sampling frequency may be increased as deemed necessary by the CQA Officer. The Contractor shall pay for the initial test for every change in Lot number. The samples shall be taken across the entire roll width and shall not include the first three feet. The following conformance tests shall be conducted on the GCL samples at the QAL.
- 1. Hydraulic Properties of GCLs Permeated with Potentially Incompatible Aqueous Solutions (ASTM D6766)
 - a. Test Method 4.3.1
 - b. Test Method 4.3.2

The leachate used in the above testing shall be the same leachate material as used in the compatibility testing specified in 2.01.D.

- C All conformance test results shall be reviewed by the CQA Officer and accepted, prior to the deployment of the GCL. All test results shall meet, or exceed, the property values listed in Section 2.01. The course of action implemented for retesting a failed test shall be approved by the CQA OFFICER.

PART 3: EXECUTION

3.01 SUBGRADE PREPARATION

- A Preparation of the subgrade shall be as specified Sections 02275.
- B The CONTRACTOR and the CQA Officer or RPR shall inspect and approve the subgrade before installation of the GCL can proceed. The CONTRACTOR is responsible for properly preparing and maintaining the subgrade free of water, rocks and debris and in a smooth, clean, uniform, and compacted condition during installation of the GCL.

3.02 GCL PLACEMENT

A Panel Placement

1. At minimum, the Manufacturer's recommended installation procedures shall be followed.
2. GCL rolls shall be brought to the area to be lined in their original packaging. Only immediately prior to deployment, the packaging should be carefully removed. Unless otherwise specified, the GCL shall be installed such that the side of the GCL with the lamination on it faces up.
3. Rolls shall be handled utilizing a solid steel bar inserted through the core and slings or chains attached to the ends of a spreader bar. The core bar shall be suspended from the spreader bar so that the edges of the liner are not damaged by the suspending straps or chains.
4. Dragging of the GCL panels over the surface shall be minimized. A slip or rub sheet shall be used to minimize friction during placement. In addition, during installation of the HDPE liner over the GCL, a slip or rub sheet shall also be used to allow the HDPE liner to move more freely into place.
5. The GCL will be placed over the prepared surface in such a manner as to assure minimum handling.
6. The GCL panels shall be placed parallel to the direction of the slope.

7. All GCL panels should lie flat on the underlying surface, with no wrinkles or fold, especially at the exposed edges of the panels.
8. The GCL shall not be wet prior to installation or installed in standing water or during rain. The GCL must be dry when installed, dry when covered and not get wet while exposed. Only as much GCL shall be deployed as can be covered at the end of the working day with soil or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material.
9. The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Bentonite-enhanced seams are required.
10. The minimum dimension of the longitudinal overlap should be 6 inches. End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 24 inches.
11. Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone.
12. Bentonite-enhanced seams are constructed between the overlapping adjacent panels described above. The underlying edge of the longitudinal overlap is exposed and then a continuous bead of granular sodium bentonite is applied along a zone defined by the edge of the underlying panel and the 6-inch line. A similar bead of granular sodium bentonite is applied at the end-of-roll overlap.
13. The granular bentonite shall be applied at a minimum application rate of one quarter pound per lineal foot (0.4 kg/m). The granular bentonite sealing clay used for overlap seaming, penetration sealing and repairs shall be made from the same natural sodium bentonite as used in the GCL and shall be as recommended by the GCL manufacturer. Seaming of GCLs shall be conducted in accordance with the manufacturer's specifications for each particular GCL.
14. Only as much GCL shall be deployed as can be covered at the end of the working day with a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight.

B Cover Placement

1. Cover soils shall be free of angular stones or other foreign matter that could

damage the Geomembrane and underlying GCL.

2. Cyclical wetting and drying of GCL covered with geomembrane can cause overlap separation. Soil cover should be placed promptly to avoid this problem. Geomembranes should be covered with a white geotextile and/or operations layer without delay to prevent the geomembrane from absorbing heat and desiccating the bentonite in the GCL. If the GCL is covered only with a geomembrane for an extended period, the overlapping of the longitudinal seams needs to be increased to 12”.

3.04 FIELD QUALITY CONTROL

A Construction Inspection Procedures

1. The field quality control (QC) documentation shall be reviewed by the CQA Officer to ensure the finished GCL meets or exceeds all of the criteria listed in Table 1 with the testing frequency listed.
2. All delivered GCL rolls shall be visually inspected and approved by the CQA Officer prior to installation. Defects or damage from shipping and handling shall be grounds for rejection at the discretion of the CQA Officer.
3. Each day, the Contractor's and/or installer's superintendent and the CQA Officer should inspect and provide written certification that the subgrade for the GCL has been prepared in accordance with the specifications.
4. As each GCL panel is being deployed, the Contractor and/or installer's superintendent and CQA Representative shall provide inspection of the installation. This shall include:
 - a. Inspection of overlap
 - b. Visual inspection of geotextile quality, bentonite uniformity, and the degree of hydration, if any, on the GCL; marking of any areas as appropriate for repair.
 - c. If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area. The patch shall be obtained from a new GCL roll and shall be cut to size such that a minimum overlap of 12 inches is achieved around all of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. An adhesive shall be used to affix the patch in place so that it is not displaced during cover placement.

END OF SECTION

SECTION 02290

FINAL COVER

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install the Final Cover of 24-inch minimum thickness as shown on the Drawings and as specified herein. Associated work includes quality control testing, borrow source excavation, hauling, installation, compaction, and grading of Final Cover Layer.

1.02 RELATED WORK

- A. Section 01050: Field Engineering
- B. Section 01340: Shop Drawings, Product Data, Working Drawings, Samples
- C. Section 01400: Construction Quality Assurance/Quality Control Plan (CQA Plan)
- D. Section 02200: Excavation, Backfill, and Compaction
- E. Section 02985: Stabilization

1.03 SUBMITTALS

- A. Identification of the proposed final cover soil source. A signed certification letter, with copies of all necessary permits, stating that the source is in full compliance with State, County, and local laws and regulations.
- B. The CONTRACTOR shall furnish representative samples of proposed Final Cover soils, each weighing approximately 75 pounds to the CQA OFFICER for approval at least 14 calendar days prior to the date of anticipated use of such material.
- C. A description and schedule of the installation procedure and a list of installation equipment.

1.04 REFERENCE STANDARDS

- A. ASTM - American Society for Testing and Materials:
 - 1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

2. ASTM D698 - Standard Test Method for Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 5.5-lb (2.49 kg) Hammer and 12-in (305 mm) Drop.
3. ASTM D854 - Standard Test Method for Specific Gravity of Soils.
4. ASTM D1140 - Standard Test Method for Amount of Material in Soils Finer than the Number 200 (75 micrometer) Sieve.
5. ASTM D1556 - Standard Test Methods for Density and Unit Weight of Soil In-Place by Sand-Cone Method.
6. ASTM D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
7. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes.
8. ASTM D2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).
9. ASTM D2922 - Density of Soil in Place by Nuclear Methods (Shallow Depth).
10. ASTM D3017 - Standard Test Method for Water Content of Soil in Place by Nuclear Methods (Shallow Depth).
11. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
12. ASTM D5268 - Standard Specifications for Topsoil Used for Landscaping Purposes
13. ASTM D2974 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE AND QUALITY CONTROL

- A. The quality control consists of laboratory conformance testing of samples supplied from each soil source and quality control and quality assurance sampling and testing of the placed final cover.
- B. Conformance testing requirements are specified in Paragraph 1.07

1.06 PROTECTION

- A. The CONTRACTOR is solely responsible for protection of the work. Completed work that is damaged by weather or other means shall be repaired by the CONTRACTOR at no additional cost to the OWNER.

1.07 SOIL TESTING

- A. Prior to the placement of the Final Cover and during such placement, the CQA OFFICER shall select areas within the limits of the work for testing. The CONTRACTOR shall cooperate fully in obtaining the information desired.
- B. The CONTRACTOR'S CQC OFFICER shall perform the following laboratory soil testing in accordance with the standards listed in paragraph 1.04.
 - 1. Perform particle size distribution test (ASTM D422) and Atterberg limits (ASTM D4318) for every 10,000 cubic yards (or change in material) of Final Cover soil used. Organic Content (loss on ignition, ASTM D2974) tests shall be performed for every 4,000 cubic yards of soil to be used in the top 6 inches.
 - 2. Perform Standard Proctor compaction test (5 point curve, ASTM D 698), Internal Effective Friction (ASTM D4767) and Hydraulic Conductivity (ASTM D5084) for each soil type proposed for use as Final Cover soils and for every 40,000 cubic yards (or change in material) of Final Cover soil used.
- C. Final Cover Soil Analysis: CONTRACTOR shall furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil. Report suitability of Final Cover for lawn growth, recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory growth layer.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Stockpiled materials shall be located at designated areas within the limits of construction. At the end of each day, the material shall be sloped, tracked and secured to minimize erosional impact on the stockpile. Removal of stockpile material shall be done in a manner to minimize intrusion of soils adjacent to and beneath the stockpile.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Materials for use as Final Cover soils shall be as described below. The CONTRACTOR shall notify the ENGINEER of the source of each material. **Materials shall be furnished as required from approved off-site sources and hauled to the site.**

- B. The soil used to construct the Final Cover shall be capable of maintaining vegetation and conform to the following criteria.
1. The soil shall have 100% passing the 3-inch sieve.
 2. Soil shall be classified according to the USCS as SC, SM, ML, ML-CL, or CL.
 3. The organic content shall be at least 4% (upper 6" only).
 4. pH range of 5.5 to 7
 5. Free of extraneous materials harmful to plant growth
 6. Internal Friction Angles no less than 23.5° or as approved by the ENGINEER as determined by ASTM D4767 (unconsolidated undrained, 3 point series, remolded)
 7. Maximum Permeability of 1.0×10^{-4} cm/s (re-compacted to 93% of the material's maximum dry density and optimum moisture content)

2.02 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.
1. Provide lime in the form of dolomitic limestone.
- B. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
1. When site treated, mix with at least 0.15 lb of ammonium nitrate or 0.25 lb of ammonium sulfate per cu. ft. of loose sawdust or ground bark.
- G. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

- H. Herbicides: EPA registered and approved, of type recommended by manufacturer.
- I. Water shall be obtained and used from an ENGINEER approved source only

PART 3: EXECUTION

3.01 FINAL COVER PLACEMENT

- A. Placement of the Final Cover Layer shall not initiate until the underlying liner and geocomposite drainage net is accepted by the CQA Officer and all required surveying and testing is completed by the CONTRACTOR and/or CQA Officer and accepted by the CQA Officer.
- B. During the placement of the Final Cover soil material, no construction equipment shall be allowed directly on the liner or GDN. Any damage to these components shall be repaired immediately in accordance with the specifications and under the observation of the CQA Officer. A 4-foot-thick traffic surface shall be constructed over the liner to support haul trucks and other non-low ground pressure equipment. A minimum 1.5-foot-thick layer of Final Cover material shall be maintained for low ground pressure equipment. No equipment will be allowed on Final Cover Layer that is less than 1.5 feet thick. Soil for the Final Cover Layer shall be compacted to at least 93% of its maximum dry density as determined by ASTM D698. Subsequent lifts of final cover material shall not exceed 10-inches loose measure
- C. Care shall be taken to protect the liner. Sand ramps shall be provided on slope locations used for entry and exit and in other heavily traveled areas. Only large radius turns by equipment shall be permitted as sharp turns may damage the liner.
- D. Only low-ground-pressure equipment (6 psi maximum contact pressure) shall be used for spreading and grading of the Final Cover.
- E. Final Cover soil shall be placed on the side slopes starting at the toe of the slope and working toward the top of the slope.
- F. Not used.
- G. The surfaces of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan and no soft spots or uncompacted areas will be allowed in the work.
- H. No compacting shall be done when the material is too wet either from precipitation, surface water runoff, or from excess application of water. At such times, work shall be suspended until the previously placed and new materials have dried sufficiently to permit proper compaction.
- I. Water for Compaction

1. The CONTRACTOR shall utilize water as required to guarantee constructability and protection of the in-place and stored soil.
 2. The water shall be of suitable quality from an approved source
- J. During construction, the CONTRACTOR shall make all necessary provisions to deal with inclement weather conditions. The CONTRACTOR shall be fully responsible for control of stormwater during installation of the Final Cover.
- K. No material shall be placed, spread, or compacted while the ground or the soil material is frozen/thawing, saturated, desiccated, during unfavorable weather conditions or periods of precipitation. The Final Cover surfaces must be made smooth and free from ruts or indentations at the end of any working day when significant precipitation is forecast and/or at the completion of the compaction operations in that area in order to prevent saturation of the material. Any regrading due to the above conditions or final preparation shall require retesting at those locations for thickness and density and shall be at the cost of the CONTRACTOR.
- L. Prior to seeding and mulching the CONTRACTOR shall scarify the finished surface of the Final Cover to a depth of 3 inches. The surface shall be mechanically or hand raked to remove any loose roots or rocks.

3.02 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

- A. CQA Plan: Inspection/testing will be a joint effort between the CONTRACTOR's CQC Firm and the OWNER's CQA Firm.
- B. Coordination: CONTRACTOR shall be responsible for coordination of field services with the CONTRACTOR's CQC' Firm and with the OWNER's CQA Firm.
- C. Initial Observation: Final Cover layer placement operations shall be performed after the surface has been properly prepared and has been observed and approved by CQA OFFICER. No final cover layer materials shall be placed unless the CQA OFFICER approves the operation. Any fills placed without CQA OFFICER's observation and prior approval shall be removed in a manner to avoid damage or disturbance to the existing approved work, and the excavation shall be filled as specified herein, at no additional cost to OWNER.
- D. Field Control: The minimum testing frequencies for field tests to be performed are provided in the following table.

| TEST METHOD | METHOD | FREQUENCY | |
|-------------|--------|-----------|-----|
| | | CQC | CQA |
| | | | |

| | | | |
|-------------------------------|--|--|----------------------|
| Density ¹ | ASTM D2937 ASTM D2922 ASTM D1556 | 2/acre/lift | <i>discretionary</i> |
| Moisture Content ¹ | ASTM D2216 ASTM D3017 ASTM D1556 | 2/acre/lift <i>At density test location</i> | <i>discretionary</i> |
| | | | |

Note¹: A nuclear density test gauge can be used to provide the required density testing. However, the in-situ density shall be determined using the sand cone method (ASTM D 1556) and/or the drive cylinder method (ASTM D 2937) of a minimum of one test per ten nuclear density tests or one per day, whichever is greater. The sand cone and/or drive cylinder test should be performed at the same location as a nuclear density test. The sand cone and/or drive cylinder tests shall be continued until a correlation between the density and moisture contents obtained by the nuclear density gauge and the sand cone and/or drive cylinder tests has been demonstrated.

- E. One-point compaction tests shall be performed to interpolate between laboratory compaction (ASTM D 698) curves for at least every 5 in-place density tests. The one-point compaction tests shall be performed on either the field density test sample or soil from a location immediately adjacent to the field density test sample, using the ASTM D 698 procedure. The results of the one-point tests shall then be compared with the full compaction curves of similar soils to estimate the maximum dry density applicable to the field density test sample.
- F. The CONTRACTOR'S CQC Officer shall provide a final Construction Quality Control Report at the end of the project. The report shall certify that the Work, as associated with Final Cover was performed in accordance with the Contract Documents and shall be prepared and sealed by a Professional Engineer registered in the State of South Carolina. The report shall include a narrative describing construction methods and QC procedures employed, summary tables of all field test results, including location and notations regarding any re-work performed, identification of failed tests, and discussions and documentation of re-worked areas with passing tests, as appropriate.
- G. The CONTRACTOR shall submit a survey plan with final elevation of top of Final Cover Layer for CQA Officer's approval in accordance with Section 01050.
- H. Submittal and acceptance of an administratively complete Construction Quality Control Report shall be required for the Work to be considered Substantially Complete.

3.03 DISPOSAL OF SURPLUS MATERIAL

- A. No excavated materials shall be removed from the site of the work or disposed of by the CONTRACTOR except as specified by the CQA Officer. Materials shall be neatly piled on-site at locations directed by the ENGINEER so as not to inconvenience the public and adjoining property owners until used or otherwise disposed of as specified below.
- B. Surplus Final Cover soil shall become the property of the OWNER and be stockpiled as directed by the ENGINEER.

3.04 GRADING

- A. Grading shall be performed at all places that are indicated on the Drawings, to the lines, grades and elevations shown and otherwise as directed by the ENGINEER. During the process of grading, the subgrade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the performance or condition of the work.
- B. If at the time of grading it is not possible to place material in its final location, it shall be stockpiled for later use in areas approved by the ENGINEER. Stockpiled material shall be smooth rolled at the end of each day to promote runoff of stormwater. No extra payment will be made for the stockpiling or double handling of excavated material.
- C. The ENGINEER reserves the right to make minor adjustments or revisions in lines or grades if found necessary as the work progresses, in order to obtain satisfactory construction.

END OF SECTION

SECTION 02505
CRUSHED STONE PAVING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to construct access and service roads as shown on the Drawings.
- B The CONTRACTOR shall maintain access and service roads under this Contract during the **guarantee period of one year** and shall promptly refill and grade areas that have settled or are otherwise unsatisfactory for traffic.

1.02 RELATED WORK NOT INCLUDED

- A Section 02200: Excavation, Backfill, and Compaction.
- B. Section 02272: Filter Fabric

1.03 REFERENCE SPECIFICATIONS

- A Except as otherwise specified herein, the Standard Specifications for Highway Construction as issued by the State of South Carolina, Department of Transportation, shall apply to material requirements for access and service road construction.

1.04 SUBMITTALS

- A The CONTRACTOR shall submit to the ENGINEER two 75-lb samples of the proposed graded aggregate base course material and the results of recent gradation and modified Proctor moisture-density tests performed by SCDOT or from the Department approved source for which the material is manufactured.

PART 2 - PRODUCTS

2.01 SUBGRADE MATERIAL

- A Subgrade in cut areas shall consist of firm, hard natural soils and shall be proofrolled as described in Section 3.02. Subgrade in fill areas shall consist of backfill, as defined in Section 02200 and compacted to at least 95% of its standard Proctor (ASTM D698) maximum dry density. . The uppermost two feet of road subgrade shall consist of a two-foot thick layer of backfill

compacted to at least 98% of its Standard Proctor (ASTM D-698) maximum dry density.

2.02 CRUSHED STONE

- A Crushed Stone paving material shall conform to SCDOT standards for Graded Aggregate Base or Coquina Base, and shall be compacted to at least 98 percent of the maximum dry density as determined by AASHTO T 180 or equivalent.

PART 3 - EXECUTION

3.01 GENERAL

- A Materials for the perimeter access roads shall be delivered, placed and compacted in accordance with the contract specifications and drawings.
- B The CONTRACTOR shall perform all general unclassified excavation, rough or overall grading, borrow and fill, to the subgrades of the road, road shoulders and slopes to match the existing grades.
- C Finished excavation and grading shall be uniformly smooth, well compacted, and free from irregular surface changes. The degree of finish shall be that obtainable from either blade-grader or scraper operations. The finished surface shall not be more than 0.10 ft above or below the new grade.

3.02 INSTALLATION

- A Prior to placing backfill to create the pavement subgrade in fill areas, or Crushed Stone paving in cut areas, the exposed natural soil subgrade shall be proofrolled in the presence of the ENGINEER and/or the RPR. Proofrolling shall be performed with at least four complete coverages of the rear wheels of a fully loaded CAT D300D truck or equivalent or as directed by the ENGINEER. Soft, wet, organic, or other unsuitable materials or conditions identified during proofrolling shall be undercut by at least 12 inches and backfilled with suitable fill as directed by the ENGINEER at no additional cost the OWNER.
- B Backfill for pavement subgrade shall be placed in layers in accordance with Section 02200 and compacted to at least 95% of its standard Proctor (ASTM D698) maximum dry density. The uppermost two feet of road subgrade for crushed stone pavement areas in fill sections shall consist of a two-foot thick layer of Backfill compacted to at least 98% of its Standard Proctor (ASTM D-698) maximum dry density. CQC shall perform compaction testing of the pavement subgrade fill.

- C Crushed Stone paving shall be placed over the prepared subgrade where shown on the contract documents. The first lift of Crushed Stone shall be at least 8-inches-thick and less than 10-inches-thick. The Crushed Stone shall be spread with track-mounted equipment. Subsequent lifts of Crushed Stone shall have a maximum loose-lift thickness of 6 inches. Each lift of Crushed Stone shall be compacted to at least 100% of its maximum laboratory density as determined by SCDOT SC T 140. CQC shall perform compaction testing of the crushed stone paving. The minimum frequency of testing shall be 1 test per lift per 10,000 square feet or as directed by the ENGINEER.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 02589
GEOMEMBRANE LEAK LOCATION SURVEY

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Requirements for performance of a geomembrane leak location survey using electrical methods for post-geomembrane installation performance for a geomembrane covered with geocomposite or geotextile (fabric cushion) and earth materials, and underlain by earth materials.
- B. Requirement to perform a geomembrane leak location survey after protective cover material is placed on the geocomposite or geotextile and geomembrane. The leak location survey is conducted after the geocomposite or geotextile and protective cover materials are installed to detect leaks resulting from construction damage caused during placement of the protective cover layer.
- C. Requirements to perform a geomembrane leak location survey after installation of geomembrane and fabric cushion and prior to placement of fabric-formed concrete in areas not having protective cover soil layer.
- D. The optimum performance of a geomembrane leak location survey using electrical methods requires the conductive media above and below the geomembrane to be electrically isolated from each other except through the leaks being located in the geomembrane. It is also necessary to have a continuous electrically conducting pathway through an electrically conducting material above the geomembrane, through the leaks, and through an electrically conducting media under the geomembrane.

1.02 RELATED SECTIONS

- A. Section 02700: Protective Cover
- B. Section 02271: Fabric Cushion
- C. Section 02274: Geocomposite Drainage Net
- D. Section 02275: Compacted Soil Liner
- E. Section 02776: Textured High Density Polyethylene (HDPE) Liner
- F. Section 03350: Fabric Formed Concrete Revetment

1.03 REFERENCES

- A. ASTM D6747 – Standard Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembranes
- B. ASTM D7007 – Standard Practices for Locating Leaks in Geomembranes Covered with Water or Earth Materials
- C. ASTM D7002 – Standard Practice for Leak Location on Exposed Geomembranes Using the Water Puddle System
- D. ASTM D7703 – Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance System

1.04 SUBMITTALS

- A. CONTRACTOR shall submit a Leak Location Survey Work Plan to the Engineer for approval prior to commencement of the leak location survey. The Leak Location Survey Work Plan shall include:
 - 1. Qualifications of the proposed Leak Location Contractor to include the number of years the Leak Location Contractor has performed the proposed survey methods;
 - 2. Resumes of proposed on-site supervisors;
 - 3. Description of the proposed survey methods and procedures for each survey, site preparations, and planned duration of the Work;
 - 4. Quality control and field calibration procedures;
 - 5. A list of projects demonstrating the qualifications and experience where the proposed Leak Location Contractor and leak location supervisor has met the requirements of paragraph 2.1 of this specification.
 - 6. Sample of a final report (per ASTM D7007) provided by the Leak Location Contractor following the completion of the survey.

1.05 CONSTRUCTION QUALITY ASSURANCE

- A. The leak location survey shall be observed by the CQA Officer.
- B. The CONTRACTOR shall be aware of the leak location survey work plan and activities outlined herein and shall account for these activities in the construction schedule.

PART 2: PRODUCTS

2.01 LEAK LOCATION CONTRACTOR AND SUPERVISOR QUALIFICATIONS

- A. The Leak Location Contractor shall have qualifications and experience in conducting the proposed survey method including having tested a minimum of 15,000,000 square feet of geomembrane liner within the previous three years. In addition, the leak location surveys must be supervised by a professional or technician with a minimum of three years and 1,000,000 square feet of liner testing experience using the proposed leak location survey methods. The leak location supervisor must be on-site full-time during the performance of the leak location survey.

PART 3: EXECUTION

3.01 INFORMATION REQUIRED

- A. The Engineer shall provide the Leak Location Contractor with drawings showing:
 - 1. All layers constituting the lining system and details of all liner penetrations.
 - 3. Peripheral details, including welds to adjacent lining systems.
 - 4. Structures and obstructions above the liner.

3.02 SITE PREPARATION

- A. Leak Location Contractor will identify actions required by CONTRACTOR to prepare the site for the leak location survey.
- B. CONTRACTOR shall ensure that the earth materials above and below the geomembrane contain sufficient moisture to conduct a leak location survey or as otherwise required in areas without protective cover soils (perimeter ditches). Typically, a moisture content of the earth materials of one to two percent by weight is sufficient to conduct the survey. If the moisture content of the earth materials layer is not sufficient per the requirements of the Leak Location Contractor, then the Contractor shall add sufficient water to the earth materials as required.
- C. CONTRACTOR shall provide electrical isolation around the perimeter of the area being surveyed for leaks. Electrical isolation is achieved by leaving approximately a one-foot wide area of dry geomembrane exposed around the perimeter of the section or leaving a minimum of six-inches of bare liner protruding from the back-filled anchor trench. Any other electrically

conducting paths through the geomembrane such as metal pipes, battens, or concrete structures should be likewise isolated.

3.03 EXECUTION

- A. The Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.
- B. Any discrepancy in the required site preparation described in the Leak Location Survey Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.
- C. After the protective cover is placed above the geomembrane where called for, and is complete, conduct a leak location survey on the earth materials (where existing) using the procedures for surveys with earth materials covering the geomembrane described in the latest version of ASTM Standard D 7007 or other approved method for areas not covered with earthen materials.
- D. The Leak Location Contractor shall inform the Engineer and mark the locations of all identified or indicated leaks with markers, flags, spray paint, or written coordinates.
- E. The CONTRACTOR shall, in the presence of the CQA Officer and/or their on-site representatives, shall expose the geomembrane at the identified or indicated leak locations, inspect the leak, and repair the leak in a manner acceptable to the Engineer. Repairs to the geomembrane shall be performed by the geomembrane installer. Non-destructive air testing shall be performed on the repair.

3.04 REPORTING

- A. Provide a written report to the Engineer within 14 calendar days of completion of the leak location survey field work as described in ASTM D7007 and the approved method for areas not covered with earthen materials.

END OF SECTION

SECTION 02612

REINFORCED CONCRETE PIPE AND FITTINGS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A The CONTRACTOR shall furnish all labor, equipment, materials and incidentals necessary to install and test reinforced concrete pipe fittings for storm drain complete as shown on the Drawings and as specified herein.
- B All pipes shall be manufactured for this project and no pipe shall be furnished from stock.
- C This work shall include, but not be limited to installing reinforced concrete pipe including all excavation, backfilling, sheeting, slope protection, drainage, concrete work, riprap, grading and all other work necessary to complete the construction, installation and testing of the reinforced concrete pipe.

1.02 RELATED WORK

- A Excavation, backfill and grading, including bedding material is included in Section 02200.

1.03 QUALIFICATIONS

- A All reinforced concrete pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable and qualified to manufacture the pipe to be furnished.
- B Reinforced concrete pipe and fittings shall conform to all Applicable ASTM Standards and these specifications.

1.04 SUBMITTALS

- A At least 45 days prior to Reinforced Concrete Pipe installation submit the following:
 - 1. The names of the suppliers
 - 2. Shop Drawings of pipe and fittings including: pipe class or design, backup computations including reinforcement, class coding, joints, list of abbreviated terms with meaning.

- B The locations of all pipes shall conform to the locations indicated on the Drawings. In most cases, a certain amount of flexibility in positioning of pipes will be allowed, especially where new pipes will connect to existing structures or piping. Horizontal and vertical deflections may require beveled, special deflection, or short pipe. The deflection of joints shall not exceed 75 percent of that recommended by the manufacturer.
- C The pipe manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The manufacturer shall furnish to the ENGINEER a notarized affidavit stating all pipe meets the requirements of ASTM, ASCE, ANSI, AWWA, etc., these Specifications, and the joint design with respect to square ends and out-of-round joint surfaces.
- D Furnish in duplicate to the ENGINEER sworn certificates that all tests and inspections required by the Specifications under which the pipe is manufactured have been satisfied.

1.05 INSPECTION

- A All pipe and fittings to be installed under this contract may be inspected at the site of manufacture for compliance with these Specifications by an independent laboratory selected by the OWNER. The manufacturer's cooperation shall be required in these inspections. The cost of inspection by an independent laboratory, will be borne by the OWNER.

PART 2: PRODUCTS

2.01 REINFORCED CONCRETE PIPE

- A Except as otherwise specified herein or as indicated on the Drawings, pipe shall conform to ASTM Standard Specifications for Storm Drain, and Designation C76, Class IV Wall B. Reinforcement shall be full circular cage. Neither elliptical nor quadrant reinforcement will be allowed.
- B The pipe shall be capable of withstanding construction equipment loading which may be encountered during the progress of the work. Any pipe damage during construction operations shall be promptly and satisfactorily repaired or replaced at the CONTRACTOR's expense.
- C Non-air-entraining portland cement conforming to ASTM Specification C150, Type II shall be used, except as otherwise approved in writing by the ENGINEER. The use of any other admixture will not be permitted.
- D Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specifications C33, except for gradation, with a maximum loss of 8 percent when subjected to five cycles of the soundness test using magnesium sulfate.

- E Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM Specification C33, except for gradation, with a maximum loss of 8.0 percent when subjected to five cycles of the soundness test using magnesium sulfate.
- F The 28-day compressive strength of the concrete shall be not less than 4,000 psi. The pipe interior shall comprise a continuous integral cement skin and shall be smooth and even, free from roughness, projections, indentations, offsets or irregularities. The concrete mass shall be dense and uniform. The average absorption for the drainage pipe shall not exceed 5.0 percent of the dry weight and no specimen shall exceed 9.0 percent. Reinforcement in the bell and spigot shall be adequate to prevent damage to concrete during shipping, handling and installation.
- G The pipe shall be clearly marked as required by ASTM C76 in a manner acceptable to the ENGINEER. The markings may be at either end of the pipe for the convenience of the manufacturer, but for any one size shall always be at the same end of each pipe length. Pipe shall not be shipped until the compressive strength of the concrete has attained 3,000 psi and not before five (5) days after manufacture, and/or repair, whichever is the longer.
- H Piping shall have a minimum laying length of approximately 8 feet, except for closure and other special pieces as approved by the ENGINEER. The length of the concrete pipe at each structure shall be as shown but in any case, shall not exceed 3 feet.
- I Unsatisfactory or damaged pipe will be either permanently rejected or returned for minor repairs. All pipe which has been damaged after delivery will be rejected. If damaged pipe already has been laid in the trench it shall be acceptably repaired or removed and replaced at the sole discretion of the ENGINEER entirely at the CONTRACTOR's expense. Pipe may be rejected for any of the following reasons:
1. Exposure of any wires and positioning spacers or chairs used to hold the reinforcement cage in position, or steel reinforcement in any surface of pipe, except for ends of longitudinal reinforcing. Type 304 stainless steel chairs and spacers may be used in lieu of this requirement.
 2. Transverse reinforcing steel found to be in excess of 1/4-inch out of specified position after the pipe is molded.
 3. Any shattering or flaking of concrete at a crack.
 4. Air bubble voids (bugholes) on the interior and exterior surfaces of the pipe exceeding 1/4-inch in depth unless properly and soundly filled with mortar or other approved material.

5. Unauthorized application of any wash coat of cement or grout.
6. A hollow spot (identified by tapping the internal surface of the pipe) which is greater than 30 inches in length or wider than 3 times the specified wall thickness. Repair of such defective areas not exceeding these limitations may be made.
7. Defects that indicate imperfect molding of concrete; or any surface defect indicating honeycomb or open texture (rock pockets) greater in size than an area equal to a square with a side dimension of 2-1/2 times the wall thickness or deeper than two times the maximum graded aggregate size or local deficiency of cement resulting in loosely bonded concrete, the area of which exceeds in size the limits or area described in Paragraph 6 above, when the defective concrete is removed. Repair of such defects not exceeding these limits may be made as provided in Paragraph 6 above.
8. Any of the following cracks:
 - a. A crack having a width of 0.005 inch to 0.01 inch throughout a continuous length of 36 inches or more.
 - b. A crack having a width of 0.01 inch to 0.03 inches or more throughout a continuous length of 1 foot or more.
 - c. Any crack greater than 0.005 inch extending through the wall of the pipe and having a length in excess of the wall thickness.
 - d. Any crack showing two visible lines of separation for a continuous length of 2 feet or more, or an interrupted length of 3 feet or more anywhere in evidence, both inside and outside.
 - e. Cracks anywhere greater than 0.03 inch in width.
9. Transverse reinforcing steel found to be in excess of 1/4-inch out of specified position after the pipe is molded.
10. A deficiency greater than 1/4-inch from the specified wall thickness of pipe.
11. A deficiency greater than 1/4-inch from the specified wall thickness of pipe 30 inches or smaller in internal diameter.
12. A deficiency greater than 6 percent from the specified wall thickness of pipe larger than 30 inches in internal diameter, except that the deficiency may be 8 percent adjacent to the longitudinal form joint, provided that the additional deficiency does not lie closer than 20 percent of the internal diameter of the pipe. The deficiencies in wall thickness permitted herein do not apply to gasket contact surfaces in gasketed joint pipe.

13. A variation from the specified internal diameter in excess of 1 percent, or interior surfaces which have been reworked after placing of concrete. The variation in internal diameter permitted herein does not apply to gasket contact surface in gasketed joint pipe.
- J Pits, blisters, rough spots, breakage, and other imperfections may be repaired, subject to the approval of the ENGINEER, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Non-shrink cement mortar used for repairs shall have a minimum compressive strength of 6,000 psi at the end of 7 days and 7,000 psi at the end of 28 days, when tested in 3-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the ENGINEER.
- K Joints for concrete pipe shall be the tongue and groove type of joint with provisions for using a round rubber "O-Ring" gasket in a recess in the spigot end of the pipe. The bevel on the bell of the pipe shall be between 1-1/2 degree and 2-1/2 degree and the annular open space at the gasket when the joint is made up and pipes are centered and in line shall not exceed 3/16-inch. The faces of pipe in contact with the gasket shall be true, and free of irregularities.
1. The round rubber "O-Ring" gaskets shall conform to ASTM C443 Specifications for Joints for Circular Concrete Sewer and Culvert Pipe using Rubber Gaskets.
 2. The manufacturer shall supply test data and affidavits showing compliance with these requirements. Tests shall have been conducted within six months of the start of manufacture of the pipe.
 3. The pipe manufacturer shall furnish information and supervise the installation of at least the first five joints installed by the CONTRACTOR. The ends of the pipe shall be made true to form and dimension by casting against steel forms.
- L Reinforced concrete bends shall be cast to the degree of curvature required or fabricated by cutting the pipe at the required angle and then rejoining the sections. Bends may be smooth or mitered providing mitered angles do not exceed 22-1/2 degrees and bends have a radius divided by the pipe diameter greater or equal to one.
- M Joints for concrete pipe shall be the tongue and groove or bell and spigot type of joint with provisions for using a round rubber "O-Ring" gasket in a recess in the spigot end of the pipe. The bevel on the bell of the pipe shall be between 1-1/2 degrees and 2-1/2 degrees. The diameters of the joint surfaces which compress the gasket shall not vary from the true diameters by more than 1/16-inch.

PART 3: EXECUTION

3.01 GENERAL

- A Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the ENGINEER.
- B All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being laid or installed. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the OWNER. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.
- C All buried piping shall be installed to the lines and grades as shown on the Drawings. All underground piping shall slope uniformly between joints where elevations are shown.
- D All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means.
- E Bevel and short pipe shall be used as necessary to meet site conditions and to provide a pipe installation as shown in the Drawings. The cost of all such pipe shall be included within the bid price for the pipe.

3.02 REINFORCED CONCRETE PIPE

- A As soon as the excavation is completed to the normal grade required, the CONTRACTOR shall immediately place screened gravel bedding material in the trench, and then the pipe shall be firmly bedded in this gravel to conform accurately to the lines and grades indicated on the Drawings. Bedding material for bedding the pipe shall conform to the specifications under Section 02200.
- B Bedding material, as specified, shall be placed and compacted to give complete vertical and lateral support for the lower section of the pipe. A depression shall be left in the bedding material at the joint to prevent bedding material from entering the bell and interfering with seating the spigot.
- C The pipe bedding shall be compacted to give complete vertical and lateral support for the lower half of the pipe. A depression shall be left in the supporting materials at the joint to prevent contamination of the rubber gasket immediately before being forced home. Before the pipe is lowered into the trench, the bell and spigot

must be cleaned and free from dirt. The gasket and bell shall be lubricated by a vegetable lubricant, which is not soluble in water, furnished by the pipe manufacturer and harmless to the rubber gasket. As soon as the spigot is centered in the bell of the previously laid pipe, it shall be brought fully home. Each gasket shall be carefully checked for proper positioning around the full circumference of the joint. Special measures shall be taken to ensure that the gaskets are properly positioned. For example, steel inserts may be required to prevent the pipe from going home until a feeler gauge is used to check the final position of the gasket, with special attention being given to the bottom half of the pipe. The CONTRACTOR shall be responsible for the means of forcing the pipe home and shall take care to prevent damage to the pipe ends. Any pipe so damaged shall be repaired or replaced at no cost to the OWNER. If necessary, the CONTRACTOR shall employ hand methods of pipe joining. For example, the pipe may be forced home by using jacks or come-alongs which shall be anchored sufficiently back along the pipeline so that the pulling force will not dislodge the pieces of pipe already in place, or by the proper manipulation of a backbone and cable sling.

- D It is the contractor's responsibility to lay the pipe to the lines and grades shown on the Drawings.
- E All joint gaskets are to be checked for position prior to full insertion in the bell in order to assure final correct jointing. Following full joint insertion, the space outside of the gasket shall be immediately filled with grout, followed by full joint grouting in accordance with the pipe manufacturer's recommendations.
- F The CONTRACTOR shall have the option of using a joint filler approved by the ENGINEER in place of the diaper-grout operation, except for restrained joints.

3.03 STRUCTURE AND MANHOLE CONNECTIONS

Pipe stubs for all structure and manhole connections shall not exceed 2 feet in length.

3.04 TESTING

- A All pipelines shown as reinforced concrete pipe shall be tested in accordance with ASTM C 1103 Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.

3.05 CLEANING

- A At the conclusion of the work, thoroughly clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Debris cleaned from the lines shall be removed from the low end of the pipeline. If after this cleaning, obstructions remain, they shall be removed. After the pipelines are cleaned and if

May 2016

the groundwater level is above the pipe or following a heavy rain, the ENGINEER will examine the pipes for leaks. If any defective pipes or joints are discovered, they shall be repaired.

END OF SECTION

SECTION 02623
HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required and install high density polyethylene leachate pipe, fittings and appurtenances as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Section 02777: Linear Low Density Polyethylene (LLDPE) Liner
- B Section 02200: Excavation, Backfill, and Compaction

1.03 SUBMITTALS

- A Within 30 days following the Effective Date of the Agreement, submit the following information in accordance with Section 01340:
 - 1. List of materials to be furnished, the names of the suppliers and the scheduled date of delivery of materials to the site.
 - 2. The origin of the resin to be used in the manufacturing of the pipe including the suppliers name and production plant, as well as brand name and number.
 - 3. Documentation from the resin's manufacturer showing results of tests for resin identification, including:
 - a. Melt Flow Index ASTM D1238
 - b. Density ASTM D1505
 - 4. Manufacturer quality control manual describing implementation of quality control procedures during pipe manufacturing process.
 - 5. Pipe Manufacturer's Certification of compliance with these Specifications.
 - 6. Complete, detailed shop drawings of all polyethylene pipe and appurtenances, including the location of all fittings, joints and connections to structures.
 - 7. Manufacturer's recommendations for handling, storing and installing pipe and fittings.

8. For each shipment of pipe a manufacturer's certification that the pipe was manufactured from the same resin identified in Paragraph 1.03.A1.
9. Certification demonstrating that the joining technician was trained by the pipe manufacturer and is qualified to perform heat fusion welding.

1.04 REFERENCE STANDARDS

A American Society for Testing and Materials (ASTM)

1. ASTM D1238 - Standard Test Method for Flow Rates Thermoplastics by Extrusion Plastometer.
2. ASTM D1248 - Standard Specification for Polyethylene Plastic Molding and Extrusion Materials.
3. ASTM D1505 - Standard Test Method for Density of Plastic by the Density Gradient Technique.
4. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
5. ASTM D3350 - Specification for Polyethylene Plastic Pipe and Fitting Materials.
6. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

B Where reference is made to one of the above standards, the revision in effect at the time of construction shall apply.

1.05 QUALITY ASSURANCE

A Resin Evaluation

1. All incoming resin shall be sampled for conformance testing against test results supplied by the resin manufacturer. Samples shall be taken from the top and bottom of each compartment from every hopper car received. The following conformance tests shall be performed on the sample:

- | | | |
|----|-----------------|------------|
| a. | Melt Flow Index | ASTM D1238 |
| b. | Density | ASTM D1505 |

The results of these tests shall become part of the manufacturer's permanent quality control records.

B Finished Product Evaluation

1. Each length of pipe produced shall be checked by production staff for the items listed below. The results of all measurements shall be recorded on production sheets which become part of the manufacturer's permanent records.
 - a. Pipe in process shall be checked visually, inside and out for cosmetic defects (grooves, pits, hollows, etc).
 - b. Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformance with ASTM F714.
 - c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with ASTM F714.
 - d. Pipe length shall be measured.
 - e. Pipe marking shall be examined and checked for accuracy.
 - f. Pipe ends shall be checked to ensure they are cut square and clean.
 - g. Subject inside surface to a "reverse bend test" to ensure the pipe is free of oxidation (brittleness).

C Stress Regression Testing

1. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific polyethylene resin being utilized in the manufacture of this product. This stress regression testing shall have been done in accordance with ASTM D2837 and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi as determined in accordance with ASTM D2837.

1.06 WARRANTY

- A The pipe material manufacturer shall provide an unconditional extended warranty for the pipe covering the cost of materials for repair or replacement plus installation manpower should the pipe fail within the warranty period. The manufacturer's extended warranty shall be for ten years after the final acceptance of the project by the OWNER. The manufacturer shall guarantee that the pipe furnished is suitable for the purpose intended and free from defects of material and workmanship for the duration of the extended warranty. In the event the pipe fails to perform as specified, the pipe manufacturer shall promptly replace defective pipe without any cost to the OWNER.

PART 2: PRODUCT

2.01 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- A The pipe supplied shall be high density, high molecular weight, polyethylene (HDPE) pipe. The pipe shall conform to ASTM D3350 with a minimum cell classification value of 345434C.
- B All fittings shall be made from polyethylene resin which meets this same specification as in 2.01A.
- C HDPE pipe shall be of size as identified on the Drawings and Standard Dimension Ratio (SDR) 17.0
- D All polyethylene pipes shall meet the requirements of ASTM F714.
- E Pipe shall be furnished in standard laying lengths not exceeding 50 feet.

2.02 PIPE IDENTIFICATION

- A The following shall be continuously printed on the pipe or spaced at intervals not exceeding 5-ft:
 - 1. Name and/or trademark of the pipe manufacturer.
 - 2. Nominal pipe size.
 - 3. Dimension ratio.
 - 4. The letters PE followed by the polyethylene grade in accordance with ASTM D1248, followed by the hydrostatic design basis in 100's of psi, e.g., PE 3408, PE 4710.
 - 5. Manufacturing standard reference, e.g., ASTM F714.
 - 6. A production code from which the date and place of manufacture can be determined.

2.03 PERFORATIONS

- A PERFORATED PIPE: locations for perforated pipe, perforation sizes and hole patterns are detailed in the Contract Drawings.
- B For accuracy and uniformity, the pipe shall be drilled to design specifications by machines designed for perforating pipe.

PART 3: EXECUTION

3.01 INSTALLATION

- A High Density Polyethylene (HDPE) Pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein. All heat fusion joints shall be done by a qualified joining technician as designated by the pipe manufacturer.
- B Pipe shall be laid to lines and grade shown on the Drawings with bedding and backfill as shown on the Drawings.
- C PERFORATED PIPE: Tape covering perforations shall be removed during installation. The pipe shall be installed such that perforations face the bottom of trench. The perforations of pipe sections shall be aligned when connected. The pipe shall be joined by butt fusion or by a method of coupling as approved by the ENGINEER.
- D When installation is not in progress, including breaks in work, the open ends of the pipe shall be closed by fabricated plugs, or by other approved means.
- E HANDLING OF PIPE: Pipe shall be stored on clean level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp or rough objects and/or areas. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 10 percent of wall thickness. The interior pipe surface shall be free of cuts, gouges or scratches.
- F REPAIR OF PIPE: Sections of pipe with cuts, scratches or gouges deeper than allowed shall be removed completely and the undamaged sections of the pipe re-joined.
- G JOINING: The pipe shall be joined by the method of thermal butt fusion, as outlined in ASTM D2657. All joints shall be made in strict compliance with the manufacturer's recommendations. In locations where butt fusion cannot be achieved (ex. tie-in to bootless pipe penetration), a thermal coupling such as electro-fusion connections may be used as approved by the ENGINEER. Hot air welding is not permitted.
- H MECHANICAL CONNECTIONS: Flange adaptors shall be used to connect pipe to auxiliary equipment such as valves, pumps and tanks, and shall consist of the following:
 - 1. A stainless steel back-up, polyethylene flange shall be thermally butt-fused to the stub end of the pipe.
 - 2. A 316 stainless steel back up ring on both sides of the connection shall be used as approved by the ENGINEER.
 - 3. Flange connections shall be provided with a full face neoprene gasket.

- I Fused segments of the pipe shall be handled so as to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting fused sections of pipe. Nylon slings are preferred. Spreader bars are recommended when lifting long fused sections.
- J BACKFILLING: All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction. Marking tape shall be installed in the backfill of all piping installed outside the lined areas, i.e. force main.
- K Installation of pipe shall be observed and accepted by the CQA Officer prior to backfilling.

3.02 TESTING

- A All non-perforated pipe shall be field tested (with the exception of non-perforated cleanouts). The CONTRACTOR shall supply all labor, equipment, material, gages, pumps, meters and incidentals required for testing.
- B All non-perforated pipe shall be tested at a pressure of 130 psi. The test pressure shall be measured at the highest point along the test section by a recording type pressure gage and a copy of the readout shall be submitted to the ENGINEER upon completion of the test. All testing shall be conducted in the presence of the ENGINEER or the RPR.
- C Testing shall be conducted after backfilling has been completed and before placement of permanent surface.
- D Testing procedure shall be as follows:
 - 1. Fill line slowly with water; maintain flow velocity less than two feet per second.
 - 2. Expel air completely from the line during filling and again before applying test pressure.
 - 3. Apply initial test pressure and allow to stand without makeup pressure for three hours, to allow for diametric expansion or pipe stretching to stabilize.
 - 4. After this equilibrium period, apply the specified test pressure and turn the pump off. The final test pressure shall be held for three hours.
 - 5. Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the RPR. The point where the pressure is being monitored shall show on the recorded pressure readout submitted to the ENGINEER.

- E Allowable amount of makeup water for expansion during the pressure test shall conform to Table 5, Allowance for Expansion Under Test Pressure, Technical Report TR 31/88, published by the Plastic Pipe Institute (PPI). If there are no visual leaks or significant pressure drops during the final test period, the installed pipe passes the test.
- F If any test of pipe laid disclosed leakage or significant pressure drop greater than that allowed, the CONTRACTOR shall, at his/her own expense, locate and repair the cause of leakage and retest the line.
- G All visible leaks are to be repaired by an approved method, regardless of the amount of leakage.

3.03 CLEANING

- A At the conclusion of the work, thoroughly clean all of the new pipelines to remove all dirt, stones, and pieces of wood or other material that may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed.
- B Special attention shall be given to clean free and remove HDPE shavings and particles resultant of fusion welding activities. Any area where these activities occurred shall be inspected by the CQA Representative and Contractor prior to acceptance of the Work; this includes sump areas, header line areas and low points of drainage.

END OF SECTION

This page intentionally left blank.

SECTION 02625

CORRUGATED POLYETHYLENE PIPE

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to install corrugated polyethylene pipe, couplings, fittings and appurtenances as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Section 02200: Excavation, Backfill, and Compaction.
- B Section 02290: Final Cover Layer

1.03 SUBMITTALS

- A Within 30 days following the Effective Date of the Agreement, submit the following information in accordance with Section 01340:
 - 1. List of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
 - 2. Pipe manufacturer's certification of compliance with these Specifications for each type of pipe furnished.
 - 3. Complete, detailed shop drawings of all polyethylene pipe, including the location of all fittings, joints and connections to structures.
 - 4. Manufacturer's recommendations for handling, storing and installing pipe and fittings.

1.04 REFERENCE STANDARDS

- A American Society for Testing and Materials (ASTM)
 - 1. ASTM D168 - Conditioning Plastics and Electrical Insulating Materials for Testing.
 - 2. ASTM D883 - Terms Relating to Plastics.
 - 3. ASTM D1693 - Environmental Stress Cracking of Ethylene Plastics.
 - 4. ASTM D2122 - Determination of Thermoplastic Pipe and Fittings.

5. ASTM D2412 - Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
6. ASTM D2444 - Test for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
7. ASTM D3550 - Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
8. ASTM F412 - Terms Relating to Plastic Piping Systems.
9. AASHTO Standard - Standard Specification for Highway Bridges - M294
10. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe 12" to 36" Diameter.

B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A Finished Product Evaluation

1. Each length of pipe produced shall be checked by production staff in accordance with AASHTO M-294. The results of all measurements shall be recorded on production sheets which become part of the manufacturer's permanent records and at a minimum shall include:
 - a. Pipe in process shall be checked visually, inside and out for cosmetic defects (grooves, pits, hollows, etc).
 - b. Pipe inside diameter shall be measured in accordance with ASTM D2122.
 - c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with ASTM F714.
 - d. Pipe length shall be measured.
 - e. Pipe marking shall be examined and checked for accuracy.
 - f. Pipe ends shall be checked to ensure they are cut square and clean.
 - g. Subject inside surface to a "reverse bend test" to ensure the pipe is free of oxidation (brittleness).

B Pipe Testing

1. The polyethylene pipe manufacturer shall provide certification that testing has been performed for the following: Pipe stiffness (ASTM S2412), brittleness (ASTM D2444), environmental stress cracking (ASTM D1693).

1.06 WARRANTY

- A The pipe material manufacturer shall provide a warranty for the pipe covering the cost of materials for repair or replacement should the pipe fail. The manufacturer shall guarantee that the pipe furnished is suitable for the purpose intended and free from defects of material and workmanship. In the event the pipe fails to perform as specified, the pipe manufacturer shall promptly replace defective pipe in accordance with the manufacturer's warranty without any cost to the OWNER.

PART 2: PRODUCT

2.01 CORRUGATED POLYETHYLENE (PE) PIPE

- A Corrugated polyethylene pipe shall conform to the following: AASHTO M-294.
- B Corrugated Polyethylene (PE) Pipe shall be manufactured from high-density polyethylene (HDPE) virgin compounds and shall conform to the cell classifications as listed in AASHTO M 294.
- C All corrugated polyethylene pipe shall be manufactured with annular corrugation conforming to AASHTO M-294.
- D All joints shall be made in strict compliance with the manufacturer's recommendations; gasketed watertight couplers are required.
- E Pipe shall be furnished in standard laying lengths not exceeding 50 feet.
- F The Corrugated Polyethylene Pipe covered by this specification is classified as follows:

Type S - This pipe shall have a full circular cross-section, with an outer corrugated pipe wall and a smooth interior. Pipe shall be watertight according to the requirements of ASTM D3212. Joints shall be integrated bell and spigot with gaskets made from polyisoprene meeting the requirements of ASTM F477. Pipe and bell must be of one homogeneously molded piece. Welded or friction bells will not be accepted.

- G Repair coupling bands and fitting connections for corrugated polyethylene pipe shall demonstrate soil tightness requirements of AASHTO section 26.4.2.4, "Standard Specifications for Highway Bridges". Coupling bands shall lap equally on each side of the pipe or fittings being connected to form a tightly closed joint after installation. The corrugations in the band shall index the corrugations in the pipe or fitting ends to engage the first or second corrugation from the end of each pipe or fitting.

2.02 PIPE IDENTIFICATION

- A The following shall be continuously printed on the pipe or spaced at intervals not exceeding 5-ft:
 1. Name and/or trademark of the pipe manufacturer.
 2. Nominal pipe size.
 3. Dimension ratio, class, and AASHTO designation.
 4. The letters PE followed by the polyethylene grade in accordance with ASTM standards.
 5. Manufacturing standard reference, e.g., ASTM F714.
 6. A production code from which the date and place of manufacture can be determined.

PART 3: EXECUTION

3.01 INSTALLATION

- A Polyethylene (PE) Pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein.
- B Pipe shall be laid to lines and grade shown on the Drawings with bedding and backfill as shown on the Drawings. The tape covering the perforations shall be removed during installation. The pipe shall be installed such that perforations face the bottom of trench.
- C When installation is not in progress, including lunchtime, the open ends of the pipe shall be closed by rubber gasket pipe plugs, such as ADS type 2433AA or other approved equal.
- D Pipe shall be stored on clean level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 10

percent of wall thickness. The interior pipe surface shall be free of cuts, gouges or scratches.

- E Sections of pipe with cuts, scratches or gouges deeper than allowed shall be removed completely and the ends of the pipeline rejoined.
- F All joints shall be made in strict compliance with the manufacturer's recommendations.
- G Mechanical connections of the polyethylene pipe to auxiliary equipment such as valves, pumps and tanks shall be through flanged connections which shall consist of the following:
 - 1. A stainless steel back-up, polyethylene flange shall be thermally butt-fused to the stub end of the pipe.
 - 2. A 316 stainless steel back up ring on both sides of the connection shall be used as approved by the ENGINEER.
- H Flange connections shall be provided with a full face neoprene gasket.
- I All PE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.
- J Installation of pipe shall be observed and accepted by the CQA Officer prior to backfilling.

3.02 CLEANING

- A At the conclusion of the work, thoroughly clean all of the new pipe lines to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 02700

PROTECTIVE COVER

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to furnish and install the protective cover soil materials associated with the leachate collection system and protective cover layer over the textured HDPE base liner as shown on the Drawings and as specified herein. Associated work includes sample collection and testing, excavation, loading, hauling, and installation of granular fill materials and quality control.

- B The protective cover layer consists of 24-inches of material placed over a geocomposite drainage net (filter fabric bonded to both sides of drainage net). Leachate collection pipes surrounded by SCDOT No. 57 stone, No. 789 stone and C-33 sand will be constructed in the protective cover layer. The locations of leachate collection pipes and details showing the protective cover layer are indicated on the Contract Drawings. The protective cover soil, granular materials and sand are specified in this Section. The leachate collection pipes, fabric cushion, and composite drainage net are specified in the Sections listed in paragraph 1.02.

1.02 RELATED WORK

- A Section 02200: Excavation, Backfill, and Compaction
- B Section 02271: Fabric Cushion
- C Section 02274: Geocomposite Drainage Net
- D Section 02623: High Density Polyethylene Pipe
- E Section 02776: Textured High Density Polyethylene (HDPE) Liner

1.03 SUBMITTALS

- A Within 30 calendar days following the Effective Date of the Agreement and before installing the protective cover materials, the CONTRACTOR shall submit the following information in accordance with Section 01340:
 - 1. Identification of the suppliers for each protective cover soil material.

2. A signed certification letter, with all necessary permits, that the material source or sources, is in full compliance with State, County, and local laws and regulations.
3. A schedule and description of the procedures and equipment for installation of the protective cover layer and leachate collection system.
4. A Quality Control Plan for the protective cover layer and leachate collection system installation.
5. Documentation and related past experience in accordance with Paragraph 1.06.
6. One 75-pound sample for laboratory testing from each soil material to be used for the protective cover layer and leachate collection system.
7. A substantially complete record drawing of the installed HDPE liner approved by the ENGINEER.

B Within two weeks after completion of the protective cover layer and leachate collection system installation, the CONTRACTOR shall submit to the ENGINEER a survey plan certified by a Land Surveyor Registered in the State of South Carolina showing the elevations of the top of the protective cover layer.

1.04 REFERENCE STANDARDS

A American Society for Testing and Materials (ASTM)

1. ASTM C33 - Standard for Fine Concrete Aggregate.
2. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
3. ASTM D698 - Standard Test Methods for Moisture-Density Relationship of Soil and Soil-Aggregate Mixtures Using 5.5-lb (2.49 kg) Hammer and 12-in (305 mm) Drop.
4. ASTM D854 - Standard Test Method for Specific Gravity of Soils.
5. ASTM D2992 - Density of soil in place by nuclear methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

7. ASTM D4254 - Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
8. ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
9. ASTM C136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
10. ASTM C289 - Standard Test Method for Potential Reactivity of Aggregates (Chemical Method).
11. ASTM D75 - Standard Practice for Sampling Aggregates.
12. ASTM D3042 - Standard Test Method for Insoluble Residue in Carbonate Aggregate.
13. ASTM D4373 - Standard Test Method for Calcium Carbonate Content of Soils.
14. ASTM 2434 - Permeability of granular soils by constant head tests.

B Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE / QUALITY CONTROL

- A The Quality Control and Quality Assurance consists of laboratory conformance testing of samples supplied from each soil material and quality control testing during installation.
- B The CONTRACTOR will retain a CQC Officer and a Quality Control Laboratory (QCL) that has appropriate equipment and experience to conduct and provide the test results in a timely manner in accordance with the Specifications. The CONTRACTOR shall coordinate and schedule all tests as required.
- C Conformance testing requirements are specified in Paragraph 2.02. The purpose of conformance testing is to assure that the supplied samples from each source conform to the Specifications.
- D Field quality control requirements are specified in Paragraph 3.02. The purpose of field quality control procedures is to assure that the protective cover and leachate collection system have been installed in accordance with the specifications meeting the specified hydraulic conductivity.

1.06 QUALIFICATIONS

- A The work shall be performed by a contractor with whom is and provides project management and field management that has experience in installation of leachate collection systems and protective cover soil materials over geosynthetic liners. The CONTRACTOR shall demonstrate proven experience by providing a minimum of one similar completed project with the following information:
1. Types and thicknesses of installed materials.
 2. Name and purpose of facility, its location, and date of installation.
 3. Name of owner and design engineer. Name and telephone number of contact at the facility that can discuss the project.
- B The CONTRACTOR demonstrate that material suppliers or sources will provide adequate supplies of each soil material to be provided within the schedule of construction and evidence that each source area can provide homogenous material and is properly permitted by the appropriate local, State and Federal agencies.

1.07 DELIVERY, STORAGE AND HANDLING

- A If materials are delivered to the site prior to placement approval, materials shall be stockpiled on site in areas as approved by the OWNER and/or CQA Officer. Provisions shall be implemented to minimize surface water impact on the stockpile. Removal and placement of granular fill material shall be done in a manner to minimize intrusion of soils adjacent to and beneath the stockpile.

PART 2: PRODUCT

2.01 MATERIAL

- A SCDOT No. 57 Stone and SCDOT No. 789 Stone

Washed rounded or sub-rounded stone meeting the gradation requirements of South Carolina Department of Transportation (SCDOT) No. 57 and No. 789 Stone to be used for filtration around the leachate collection pipes, as shown on the Drawings. SCDOT No. 57 and No. 789 Stone shall be sound, hard, durable and resistant to weathering, and shall be free of overburden, spoil, shale, limestone and organic material.

- B C-33 Sand

C-33 Sand shall be used for filtration near the leachate collection pipes, as shown in the Drawings. C-33 sand shall be inorganic, non-calcareous

granular soil material, free from organic matter and other deleterious material with particle size gradation (ASTM D422) within the limits in Table 1:

TABLE 1

| Sieve Size | Percent Passing by Weight (%) |
|-------------------|--------------------------------------|
| 3/8" | 100 |
| No. 4 | 95-100 |
| No. 8 | 80-100 |
| No. 16 | 45-95 |
| No. 30 | 25-75 |
| No. 50 | 8-30 |
| No. 100 | 0.5-10 |
| No. 200 | 0-3 |

C-33 Sand shall have a minimum permeability of 1×10^{-3} cm/sec or greater when compacted to 90 percent of standard Proctor maximum dry density (ASTM D698).

C Protective Cover

Protective Cover shall be inorganic, non-calcareous granular soil material, free from organic matter and other deleterious materials with particle size gradation (ASTM D422) within the limits in Table 2:

TABLE 2

| Sieve Size | Percent Passing by Weight (%) |
|-------------------|--------------------------------------|
| 3/8" | 100 |
| No. 4 | 80-100 |
| No. 200 | 0-20 |

Protective Cover shall have a minimum permeability of 1×10^{-4} cm/sec when compacted to 95 percent of standard Proctor maximum dry density (ASTM D698).

2.02 CONFORMANCE TESTING

- A The CONTRACTOR shall collect samples of protective cover material and C-33 sand for testing by the CQC Laboratory. If the samples do not meet the specified criteria, the CONTRACTOR may submit additional samples from other sources for conformance testing by the CQC Laboratory at the CONTRACTOR's expense.
- B The protective cover material shall be tested by the CONTRACTOR'S CQC Officer at the frequencies specified in Table 3. If changes in material, as identified by the CQA Officer or CQC Officer, occur within the frequency prescribed below, additional tests shall be performed at the expense of the CONTRACTOR.

TABLE 3

| TEST | METHOD | FREQUENCY |
|-------------------------|---------------|------------------|
| Grain Size w/Hydrometer | ASTM D422 | 1 per acre |
| Moisture/Density | ASTM D698 | 1 per 2-acres |
| Natural Moisture | ASTM D2216 | 1 per 2-acres |
| Permeability (remolded) | ASTM D2434 | 1 per 2-acres |

Results of the tests shall be submitted to the ENGINEER within 24 hours of test completion. The ENGINEER reserves the right to reject material based on the results of the conformance tests.

- C **The tests listed in Table 3 shall be performed by the CONTRACTOR'S CQC Laboratory on samples from each source of C-33 sand at a minimum frequency of 1 test per 3,000 cubic yards** to assure compliance with the Specifications. If changes in material, as identified by the CQA Officer or CQC Officer, occur within the frequency prescribed below, additional tests shall be performed at the expense of the CONTRACTOR.
- D Gradation analyses shall be performed by the CONTRACTOR'S CQC Laboratory on samples from each source of SCDOT No. 57 and SCDOT No.789 stone to assure compliance with the Specifications. If changes in material, as identified by the CQA Officer or CQC Officer, occur within the frequency prescribed below, additional tests shall be performed at the expense of the CONTRACTOR.

PART 3: EXECUTION

3.01 PROTECTIVE COVER SOIL MATERIAL PLACEMENT

- A After installation, completion and acceptance of the HDPE liner (and HDPE Record Drawing), geocomposite drainage net and related work activities, place the protective cover soil materials to thicknesses and areal extent as shown on the Drawings.
- B During the placement of the protective cover soil material, no construction equipment shall be allowed directly on the liner or drainage net. Any damage to these components shall be repaired immediately in accordance with the specifications. A minimum 4-foot-thick traffic surface shall be constructed over the liner to support haul trucks.
- C Care shall be taken to protect the liner. Sand ramps (minimum 4-foot thick) shall be installed on slope locations used for entry and exit and otherwise as necessary (heavy traffic areas, etc.). Only large radius turns by loader and other equipment shall be permitted; sharp turns may damage the liner.
- D A low-ground-pressure dozer (6 psi maximum contact pressure) shall be used for spreading and grading of the protective cover soil layer.
- E Protective cover soil shall be placed on the side slopes starting at the toe of the slope and working toward the top of the slope.
- F Protective cover soil layer material can only be spread when the liner is taut or stretched evenly over the base of the landfill. The protective cover soil layer material shall not be spread when the liner is elongated due to higher daytime temperatures and exposure to sun. The CONTRACTOR must make provisions to cover the liner under non-elongated conditions.
- G The final grade shall be laid to elevations as shown on the Drawings.
- H No protective cover soil material shall be placed or spread while the ground or protective cover soil material is frozen or thawing or during freezing or heavy wet weather conditions. The sand surface shall be made smooth and free from ruts or indentation at the end of any working day when significant precipitation is forecast and/or at the completion of the compaction operations in that area.
- I Protective cover materials shall not be installed when and if the materials are saturated or not suitable for supporting equipment.
- J If areas for piping are first covered where shown on the Drawings, trenches for leachate collection pipes shall be excavated through the protective cover soil material. The CONTRACTOR shall exercise special care not to disturb or cause damage to the fabric cushion, drainage net or HDPE liner. If a backhoe is used to construct the trench, a blade modification (i.e. rubber) section shall be installed on the bucket to protect the liner. Any liner damage shall be immediately repaired as directed by the ENGINEER at no additional cost to the Owner.

Note: Any and all excavations or removal of protective cover soil materials from over the lined area shall be observed by the CQA Officer (RPR). It is the responsibility of the CONTRACTOR to coordinate this work and provide adequate lead time notification.

- K A 2-in minimum layer of protective cover soil material shall be maintained in the bottom of the trench followed by pipe. Locations for leachate piping (and fabric cushion) shall be survey located and installed to the lines shown on the Drawings, and shall be backfilled with SCDOT No. 57 Stone to the depth and width shown on the Drawings. Care shall be taken during backfilling of the pipe to assure the pipe will not be crushed or otherwise damaged or shifted.
- L Following placement of the SCDOT No. 57 Stone, SCDOT No. 789 Stone shall be installed to the dimensions shown on the Drawings.
- M Following placement of the SCDOT No. 789, the C-33 sand shall be placed to the dimensions indicated on the drawings.
- N Following construction of the leachate piping, the protective cover soil material shall be brought to final grade and compacted as specified herein.
- O Alternate installation plans may be submitted as referred to in 1.03.A.3 and .4 of the Section and implemented with prior approval by the CQA Officer.

3.02 FIELD QUALITY CONTROL

- A. CQA Plan: Inspection/testing will be a joint effort between the CONTRACTOR and the OWNER.
- B. Testing and Inspection Services: OWNER shall employ a CQA Officer and Quality Assurance Laboratory to perform soils observation and testing services for quality assurance of the protective cover layer. CONTRACTOR shall employ Quality Control Officer and a Quality Control Laboratory to perform soils inspection and testing services for quality control of the placement of the protective cover layer. CONTRACTOR shall factor this quality assurance verification and testing and quality control testing into its schedule and sequence of operations.
- C. Coordination: CONTRACTOR shall be responsible for coordination of field services with the CONTRACTOR's CQC Officer, Quality Control Laboratory, and with the OWNER's CQA Officer.
- D. Initial Observation: Protective cover layer placement operations shall be performed after the surface has been properly prepared and has been observed and approved by CQA Officer. No protective cover layer materials

shall be placed unless the CQA Officer approves the operation. Any fills placed without CQA Officer's observation and prior approval shall be removed in a manner to avoid damage or disturbance to the existing approved work, and the excavation shall be filled as specified herein, at no additional cost to OWNER.

- E. Field Control: The minimum testing frequencies for field tests to be performed by the CONTRACTOR's Quality Control personnel are provided in the Table 4

TABLE 4

| TEST | METHOD | FREQUENCY |
|-------------------------------|--|-----------|
| Density ¹ | ASTM D2937 ASTM D2922 ASTM D1556 | 2/acre |
| Moisture Content ¹ | ASTM D2216 ASTM D3017 ASTM D1556 | 2/acre |

Note¹: A nuclear density test gauge can be used to provide the required density testing. However, the in-situ density shall be determined using the sand cone method (ASTM D 1556) and/or the drive cylinder method (ASTM D 2937) of a minimum of one test per ten nuclear density tests or one per day, whichever is greater. The sand cone and/or drive cylinder test should be performed at the same location as a nuclear density test. The sand cone and/or drive cylinder tests shall be continued until a correlation between the density and moisture contents obtained by the nuclear density gauge and the sand cone and/or drive cylinder tests has been demonstrated.

One-point compaction tests shall be performed to interpolate between laboratory compaction (ASTM D 698) curves for at least every 5 in-place density tests. The one-point compaction tests shall be performed on either the field density test sample or soil from a location immediately adjacent to the field density test sample, using the ASTM D 698 procedure. The results of the one-point tests shall then be compared with the full compaction curves of similar soils to estimate the maximum dry density applicable to the field density test sample.

- F. Any sample or area tested shall be rejected, removed and replaced or otherwise corrected if it does not meet the requirements of the technical specifications. Re-constructed areas shall have feathered, overlapping edges that tie into adjacent fill material to the satisfaction of the CQA Officer.

3.03 REPORTING

- A The Contractor's CQC Officer shall provide a final Construction Quality Control Report at the end of the project. The report shall certify that the Work, as associated with Protective Cover was performed in accordance with the Contract Documents and shall be prepared and sealed by a Professional Engineer registered in the State of South Carolina. The report shall include a narrative describing construction methods and QC procedures employed, summary tables of all field test results, including location and notations regarding any re-work performed, identification of failed tests, and discussions and documentation of re-worked areas with passing tests, as appropriate.

- B Submittal and acceptance of an administratively complete Construction Quality Control Report shall be required for the Work to be considered Substantially Complete.

END OF SECTION

May 2016

SECTION 02776

TEXTURED HIGH DENSITY POLYETHYLENE (HDPE) LINER

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to manufacture, supply and install Textured High Density Polyethylene (HDPE) liner as shown on the Drawings and as specified herein. This specification sets forth a set of minimum, physical, mechanical and chemical properties that must be met, or exceeded by the geomembrane being manufactured.

1.02 RELATED WORK

- A Section 02275: Compacted Soil Liner
- B Section 02274: Geocomposite Drainage Net
- C Section 02700: Protective Cover
- D Section 02589: Geomembrane Leak Location Survey

1.03 SUBMITTALS

- A At least 60 calendar days prior to HDPE liner installation, submit the following information:

1. Submittals relating to liner manufacturer and liner

a. Corporate Background

b. Manufacturing capabilities:

- (1) Information on factory size, equipment, personnel, number of shifts per day and production capacity per shift.
- (2) List of material properties and samples of liner with attached certified test results.
- (3) Manufacturer's quality control program and manual including description of laboratory facilities.
- (4) A list of ten completed facilities totaling a minimum of three million square feet, for which the manufacturer has manufactured a textured HDPE liner. The following information shall be provided for each facility.

Name and purpose of facility, its location and date of installation

May 2016

- # Name of Owner, project manager, design engineer and installer.
 - # Liner thickness and surface area
 - # Information on performance of the facility
- c. The origin of the resin to be used in the manufacturing of liner including the supplier's name and production plant, as well as brand name and number.
 - d. A fingerprint of the manufacturer's resin properties as listed in Appendix A, Table A1. The purpose of these tests is to identify the manufacturer's liner product. The results of these tests shall be submitted to the Engineer for approval of the product. Once the product is approved, all HDPE liner to be supplied for the Project shall be manufactured using the same resin type identified through fingerprinting tests.
 - e. Certification that all resin used in the manufacture of textured HDPE liner for this Project meets the approved fingerprinting protocol.
 - f. Copy of quality control certificates in conformance with Paragraphs 2.01 and 2.02.
 - g. Certification that the textured HDPE liner and extrudate produced for this project has the same properties.
2. Submittals relating to installation Contractor
- a. Background Information
 - b. Installation capabilities:
 - (1) Information on equipment (including tensiometer certification) and personnel.
 - (2) Anticipated average daily production (Complete including QC measures).
 - (3) A minimum of three field seam samples and a list of minimum values for seam properties.
 - c. A list of five completed facilities totaling two million square feet for which the installer has installed textured HDPE liner. The following information shall be provided for each facility:
 - (1) Name and purpose of facility, its location and date of installation.
 - (2) Name of Owner, design engineer, manufacturer and name and telephone number of contact at the facility who can discuss the project.

May 2016

- (3) Thickness of liner and surface area of the installed liner.
 - (4) Type of seaming, patching and tacking equipment.
 - (5) A copy of the manufacturer's certification or approval letter.
 - (6) And, prior to installation, provide resume(s) of the qualifications of the Installation Supervisor and Master Seamer, and Quality Control personnel to be assigned to this project.
- d. Shop drawings, including:
- (1) Proposed panel layout showing the installation layout identifying field seams as well as any variance or additional details which deviate from the Drawings.
 - (2) Details of seaming the liner, anchoring, connections, penetrations and other construction details.
- e. Installation schedule
- f. A quality control manual that specifically defines the quality assurance program during installation. The manual shall include daily procedures, welding techniques, field testing procedures, lab testing procedures, specific steps that are to be taken in the event of a failure or defect, personnel requirements, levels of authority and all other information necessary to ensure a high quality liner installation.

1.04 REFERENCE STANDARDS

- A American Society for Testing and Materials (ASTM)
1. ASTM D792 – Specific Standard Test Method for Tensile Properties of Plastics by Displacement.
 2. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 3. ASTM D751 - Standard Test Methods for Testing Coated Fabrics.
 4. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 5. ASTM D1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 6. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
 7. ASTM D1238 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

Commented [s1]: Reference / see GRI-GM13 section 2.1

May 2016

8. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.
9. ASTM D1603 - Standard Test Method for Carbon Black in Olefin Plastics.
10. ASTM D5397 – Procedure to perform single point notched constant tneil load – Appendix (SP-NCTL)
11. ASTM D1898 – Sampling of Plastics
12. ASTM D4833 – Index puncture resistance of geotextiles, gemembranes and related products
13. ASTM D5596 – Test method for microscopic evaluation of the dispersion of carbon black in polyolefin geosynthetics
14. ASTM D3895 - Standard Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis.
15. ASTM D4437 - Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
16. ASTM D7466 – Test method for measuring the asperity height of textured geomembranes
17. GRI Test Method GM13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
18. GRI Test Method GM19 - Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes

D Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

Commented [s2]: GP - delete

Commented [s3]: Add section prior to, referring to GRI - GM19

1.05 QUALITY ASSURANCE

- A Quality Assurance activities are performed to provide assurance that the materials were constructed as specified in the contract specifications and may include manufacturing facility inspections, verifications, audits and evaluation of raw materials and geosynthetic products to assess the quality of the manufactured materials.
- B In addition to manufacturer and installer requirements for qualifications and certification specified in Paragraph 1.03, the Quality Assurance Plan consists of conformance testing of the material manufactured for the project and delivered to the site, and field quality control during installation.
- C Conformance testing requirements are specified in Paragraph 2.03. The purpose of conformance testing is to assure that the supplied material is constructed as specified in the contract specifications and to the manufacturer's quality control certificates.
- D Field quality control requirements are specified in Paragraph 3.06. The purpose of field quality control procedures is to assure that the liner has been installed in accordance with the specifications and manufacturer's recommendations.

E Quality Control Plan

1. The forms in Appendix C for liner quality control documentation shall be used for field installation documentation. Alternative forms, which provide the same level of detail, may be used for documentation as approved by the Engineer.

F Geomembrane Quality Control Documentation

1. Pre-deployment Conference

- a. Prior to commencing work, a pre-deployment conference shall be held and the following project personnel shall be identified by name and recorded in the project files:

- # Contractor
- # Contractor's Representative
- # CQA Engineer
- # Resident Project Representative (RPR)
- # Installation Supervisor / Quality Control Personnel
- # Installer
- # CQC Personnel

- b. Two duplicate project files shall be maintained. One shall be maintained by the CQA Representative or Resident Project Representative (RPR) and the other shall be maintained by the Installation Supervisor. At the end of each work week the files shall be updated and checked to assure that copies of all pertinent project information is included in each file.
- c. Blank copies of the following nine project forms shall be available on-site throughout the duration of the project:

| <u>FORM ID</u> | <u>TITLE</u> |
|-----------------------|------------------------------------|
| CQC - 100 | LINER PROJECT QC LOG |
| CQC - 101 | SUBGRADE SURFACE ACCEPTANCE |
| CQC - 102 | RECEIVING QC LOG |
| CQC - 103 | PERSONNEL QC LOG |
| CQC - 104 | DAILY QC REPORT - PRE-WELD TESTING |
| CQC - 105 | DAILY SEAMING QC LOG |
| CQC - 106 | NON-DESTRUCTIVE TESTING LOG |
| CQC - 107 | DAMAGE AND FAILURE LOG |

G Record Drawings

1. The Contractor shall furnish record drawings showing changes, if any, from the approved installation drawings which are to include all destructive sample locations (if performed), any patches used to repair liner defects, all panels and panel seams and patch identifications assigned in the field; and a copy of complete documentation for final installation of the liner.

1.06 QUALIFICATIONS

A Manufacturer

1. The manufacturer of the lining material described hereunder shall have previously demonstrated their capability to produce this liner by having at least ten years continuous experience in the manufacture of textured HDPE liner and successfully manufactured a minimum of 50 million square feet of similar liner material for hydraulic lining installations.

B Installer

The installer shall be the manufacturer or an approved installer trained and certified to install the manufacturer's liner. Installation shall be performed under the constant direction of a single installation supervisor who shall remain on site and be in responsible charge, through the liner installation, for liner layout, seaming, patching, testing, repairs and all other activities required by the installer. The installation supervisor shall have installed or supervised the installation and seaming of a minimum of two million square feet of textured HDPE liner. The Installation contractor must be a manufacturer' approved installer for the product.

1.07 PACKAGING, DELIVERY, STORAGE AND HANDLING

- A The geomembrane shall be rolled onto a substantial core held firm by dedicated straps, slings or other suitable means approved by the Engineer. The liner rolls shall be packaged and shipped by appropriate means to prevent damage of the liner rolls. Off-loading and storage of the liner is the responsibility of the Contractor. The liner rolls shall be unloaded in the presence of the CQA Officer or his designated CQA representative. The Contractor shall be responsible for replacing any damaged or unacceptable material at no cost to the Owner.
- B Damage during off-loading shall be documented by the CQA Officer or CQA representative. Any damaged rolls must be separated from the undamaged rolls until the proper disposition of that material has been determined by the Engineer.
- C The liner rolls shall be stored so as to be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions and excessive heat that may damage the liner material. The rolls shall be stored on a prepared surface (not wooden pallets) and shall not be stacked more than two rolls high.

1.08 MATERIAL WARRANTY

- A A warranty for the textured HDPE liner manufacturer shall be provided by the manufacturer. It shall include on a pro-rated basis, warranty against manufacturing defects and material degradation under outdoor exposure for a period of five years from the date of installation. The manufacturer shall replace at no expense, any material which fails from the above causes within the warranty period. The manufacturer shall furnish a written warranty covering the requirements of this Paragraph.

1.09 GUARANTEE

May 2016

- A The Contractor shall guarantee the textured HDPE liner against defects in installation and workmanship for the period of two years commencing with the date of final acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the Owner.

1.10 DEFINITIONS AND RESPONSIBILITIES

A Contractor

1. The Contractor is the firm or corporation with whom the Owner has entered into agreement to construct the project. The Contractor is responsible for scheduling and coordination of the required work with the Engineer, manufacturer and the installer to complete the project. The Contractor is responsible for furnishing as built drawings and a copy of the complete documentation of the liner system. The Contractor is also responsible for daily updating of the design drawings onsite and for any and all deviations from these drawings. The Contractor is responsible for all submittals by the manufacturer and installer as required by the Specifications.

B Manufacturer

1. The manufacturer is the firm or corporation responsible for production of the liner material to be used in the project. The manufacturer shall produce a consistent product meeting the project specifications, and shall provide quality control documentation for the product specified herein. A Manufacturer's Certification that the material was manufactured and tested in accordance with this specification, together with a report of the test results shall be furnished prior to shipment.

C Installer

1. The installer is the firm responsible for installation of the liner. The installer shall be the manufacturer or an approved installer trained and certified to install the manufacturer's geomembrane. The Installer shall be responsible for field handling, storing, placing, seaming, field testing and all other aspects of the liner installation.

PART 2: PRODUCTS

2.01 MATERIALS

A General

1. The liner shall be manufactured of new, prime first-quality products designed and manufactured specifically for the purpose of liquid containment in hydraulic structures and chemically resistant to leachate. Product shall be *Agru America High Density Polyethylene Micro Spike® Liner* or equivalent.
2. The liner material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. The Engineer may reject all or portions of units (rolls) of geomembrane if significant quantities of production flaws are observed.

May 2016

3. The sheets shall be manufactured to a minimum 22-ft seamless width. Labels on each roll shall be legible and identify the information listed in Part 2.02, A.4
4. The textured sheet must not delaminate during tensile testing (i.e., textured layers and "particles" of texture must not separate). It shall be free from agglomerated texturing material and such defects that would affect the specified properties of the geomembrane.

Commented [s4]: Add comment referring to calendered structured, not blown film, or similar ...for textured liner

B Properties

1. The geomembrane liner rolls shall meet the minimum properties listed in Appendix B, Table B1.

C Other Materials

1. Extrudate welding rods shall be of the same compound as the liner and supplied by the manufacturer and shall be delivered in original sealed containers. Each container shall have a label bearing the brand name, manufacturer's lot number and complete directions as to proper storage. Manufacturer shall provide welding rod in an adequate quantity to complete the project.
2. When applicable, Nominal 40-mil flexible membrane liner (FML) leachate collection stone rain cover shall have minimum properties required by GRI Test Method GM13 (latest revision).

2.02 QUALITY CONTROL DOCUMENTATION

A Prior to shipment and installation of any liner material, the Manufacturer shall provide the following information certified by the manufacturer for the delivered liner.

1. Origin, identification and production of the resin (supplier's name, brand name and production plant).
2. Copies of quality control certificates issued by the resin supplier.
3. Each roll delivered to the project site shall have the following identification information:
 - a) Serial number
 - b) Lot number
 - c) Roll number
 - d) Resin type
 - e) Roll length
 - f) Material width
 - g) Weight
 - h) Thickness
 - i) Inspection identification
4. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency, and test results. At a minimum the following test results shall be provided in accordance with test requirements specified in Appendix B:

- # Thickness
- # Density
- # Tensile properties
- # Tear resistance
- # Carbon black content
- # Carbon black dispersion

2.03 CONFORMANCE TESTING

A Conformance testing shall be performed by the CQA Officer and an independent Quality Assurance Laboratory (QAL) as approved by the Owner. Engineer shall obtain samples from the delivered material, mark the machine direction and identification number. One sample shall be taken per 100,000 square feet, or one sample per lot, whichever results in the greater number of conformance tests. A Lot number will be defined as a continuous production process without changes to raw material or manufacturing methods. This sampling frequency may be increased as deemed necessary by the Engineer. The Owner shall pay for conformance testing at the frequency of one test per 100,000 square feet. For every change in Lot number, the Manufacturer shall pay for conformance testing on the initial roll at the Manufacturer's expense. The Engineer shall obtain the samples from the roll, and mark the machine direction and identification number. The following conformance tests shall be conducted at the laboratory:

- # Thickness
- # Density
- # Tensile properties
- # Tear resistance
- # Carbon black content
- # Carbon Black Dispersion

B These conformance tests shall be performed in accordance with Appendix B. All costs for the initial conformance testing will be paid by the Owner.

C All conformance test results shall be reviewed by Engineer and accepted or rejected, prior to the delivery and placement of the liner. All test results shall meet, or exceed, the property values listed in Appendix B. In case of failing test results, the manufacturer may request that another sample be retested by the independent laboratory with manufacturer's technical representative present during the testing procedures. This retesting shall be paid for by the manufacturer. The manufacturer may also have the sample retested at two different laboratories approved by the Owner. If both laboratories report passing results the material shall be accepted. If both laboratories do not report passing results, all liner material from the lot representing the failing sample will be considered out of specification and rejected.

PART 3: EXECUTION

3.01 COMPACTED SOIL LINER PREPARATION

A Preparation of the compacted soil liner surface shall be as specified in Section 02275.

May 2016

- B The surface of the compacted soil liner shall be smooth, uniform, and free from sudden changes in grade (such as vehicular ruts), rocks, stones, debris and deleterious materials. The moisture content of the compacted soil liner must be maintained within the project specifications until the synthetic liner has been installed. If excessive drying occurs, the contractor shall re-hydrate and compact the affected area to the Engineer's satisfaction. During actual placing and seaming of the liner, the compacted soil liner surface shall be kept free of all standing water. If the compacted soil liner surface below the liner becomes wet and unstable, it shall be dried and re-compacted to the Engineer's satisfaction. If drying and re-compacting the material is insufficient, the unstable material must be removed and replaced with approved material.
- C Prior to liner installation, the Contractor and installer shall verify in writing and submit to the CQA Officer:
 - 1. Lines and grades are in conformance with the Drawings and Specifications.
 - 2. The surface area to be lined has been rolled and compacted, free of irregularities and abrupt changes in grade.
- D The Contractor shall not proceed with liner installation until a complete report on the compacted soil liner thickness and hydraulic conductivity tests has been submitted and approved by the CQA Officer.

3.02 ANCHOR TRENCH

- A The anchor trench shall be constructed as shown on the Drawings and as specified herein.
- B Slightly rounded corners shall be provided in the trench to avoid sharp bends in the liner.
- C The anchor trench shall be adequately drained to prevent water ponding and softening to adjacent soils. The anchor trench shall be backfilled with local fill material and compacted to 92 percent standard proctor density, ASTM D698 as specified in Section 02200.
- D If the anchor trench is located in a clayey material susceptible to desiccation, the amount of trench open at any time shall be limited to one day of liner installation capacity.

3.03 LINER PLACEMENT

- A Weather Conditions
 - 1. Liner placement shall not proceed at an ambient temperature below 40 degrees F or above 104 degrees F unless otherwise authorized, in writing, by the CQA Officer or his/her field representative. Liner placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or excessive winds.
- B Method of Placement

May 2016

1. Each Liner panel shall be laid out in accordance with the approved shop drawings prepared by the Manufacturer. The layout shall be designed to keep field joining of the textured HDPE liner to a minimum and consistent with proper methods of textured HDPE liner installation.
2. Each liner panel shall be identified by panel number, roll number and date of deployment. The liner panel number shall be placed on the ends of each panel and in the middle.
3. For liner placed on 4 to 1 or steeper slopes, the seams shall be oriented in the direction of the slope. Horizontal seams on 4 to 1 slopes or steeper shall not be allowed except for cases in which it is unavoidable. In these instances, a cap strip shall be placed over the seam.
4. The equipment used to deploy the liner shall not cause rutting of the compacted soil liner surface. If rutting occurs, the Contractor shall suspend all liner placement activities and repair the ruts and immediately employ an alternative method for liner deployment. Liner rolls shall be placed using spreader and rolling bars with cloth slings. If a sheet must be relocated a distance greater than its width, a slip sheet shall be used.
5. The RPR shall inspect each panel, after placement and prior to seaming, for damage and/or defects. Defective or damaged panels shall be replaced or repaired, as approved by the CQA Officer.
6. The installer shall not drag the liner panels over the compacted soil liner.
7. All liner shall be anchored as shown on the Drawings and consistent with manufacturer's recommendations. Sufficient liner shall be installed within the anchor trench to ensure proper installation prior to backfilling the trench.
8. Personnel working on the liner shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the liner.
9. The liner shall be properly weighted with sand bags to avoid uplift due to wind.
10. Vehicular traffic across the liner shall not be allowed.
11. All damage shall be recorded and located on the record drawings.
12. When tying into existing liner, all excavation of previously installed liner shall be performed by hand to prevent damage.
13. The liner shall be kept free of debris, unnecessary tools and materials. In general, the liner area shall remain uncluttered in appearance. Any generators in use while on the liner shall have "drop" sheets placed underneath.
14. Fuel shall not be stored on the liner.
15. To prevent a "trampoline effect" from forming, the Contractor shall place sufficient sand bags on the liner along the toe of slopes to ensure full contact of the geomembrane liner with the compacted soil liner surface. In addition, the horizontal seams nearest the toe of slope shall remain unwelded until all other

May 2016

seams in the area are completed. The final seam shall be welded when the liner is cool and fully contracted. Care shall be taken to ensure that the liner contacts the subgrade in all locations before completing the seam.

3.04 FIELD SEAMS

- A Individual panels of liner shall be laid out and overlapped by a minimum of 4-in prior to welding. The area to be welded shall be cleaned and prepared in accordance with the installer's quality control welding procedures.
- B Double track hot wedge fusion welder shall be used for straight welds.
- C Extrusion welder shall be used for cross seam tees, patches, repairs, penetration boots and detailed work.
- D The welding equipment used shall be capable of continuously monitoring and controlling the temperature speed, and pressure in the zone of contact where the machine is actually fusing the liner material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.
- E No "fish mouths" will be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped and a patch fusion weld shall be applied. All welds upon completion of the work shall be tightly bonded. Any liner area showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of liner. The number of patches per 100-ft length shall not exceed five. If more than five patches per 100-ft length are necessary, then the entire 100-ft length of seam shall be removed. Further welding will cease at this time and the CQA Officer shall be notified.
- F All seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the record drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together.
- G All fusion welded "T" seams (i.e., the result of the liner panels placed perpendicular to each other) shall be double welded where possible. The extrusion process shall be used for the second weld.
- H All extrudate shall be free of dirt, dry and protected from damage.

April 2013

- I If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heat-degraded extrudate. All purged extrudate shall be placed on a sacrificial sheet and disposed of.
- J All seams constructed on sloped surfaces shall be vertical seams. Where horizontal seams can't be avoided (due to compounded slopes) on sideslope surfaces, a 18" wide cap strip of the same synthetic material shall be placed on top of the horizontal seam and welded to the adjacent panels to provide additional structural integrity. All cap strip seams shall be non-destructively tested.
- K All vertical panels placed on sloped surfaces shall extend 5-ft inward from the toe of slope or edge of trench.
- L All end seams shall be staggered a minimum of 5-ft in length between contiguous panels.
- M To prevent moisture buildup during fusion welding, it may be necessary to place a movable protective layer of plastic directly below each overlap of liner that is to be seamed.
- N If required, a firm substrate shall be provided by using a flat board or similar hard surface directly under the seam overlap to achieve proper support.
- O All seams shall extend to the full extent into the anchor trench.
- P All factory seams, field seams and repair welds shall meet seam strength requirements specified in Appendix B, Table B2.

3.05 SEAMING WEATHER CONDITIONS

A Normal Weather Conditions

1. The normal required weather conditions for seaming are:
 - a. Ambient temperature higher than 40 degrees F and lower than 104 degrees F.
 - b. No precipitation or other excessive moisture, such as fog or dew.
 - c. No excessive winds.
2. These weather conditions shall be fulfilled during seaming process.

B Cold Weather Conditions

1. If the ambient temperature is below 40 degrees F, the following conditions shall be met to ensure quality seaming process:
 - a. Preheating the surface of the liner to achieve normal temperature range.

April 2013

- b. Preheating may be waived by the CQA Officer or the RPR if the installer demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.
- c. Preheating devices shall be approved by the manufacturer.
- d. Care shall be taken to assure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.
- e. Additional destructive tests samples shall be taken at the discretion of the CQA Officer.
- f. Test seams, as described in Paragraph 3.06A, shall be performed under the same ambient temperature conditions as the actual seams.

C Warm Weather Conditions

- 1. If the ambient temperature is above 104 degrees F, no seaming of liner shall be permitted unless the installer can demonstrate to the satisfaction of the Engineer that liner seam quality is not adversely impacted.
- 2. Test seams shall be performed under the same ambient temperature conditions as the actual seams.
- 3. Additional destructive tests shall be taken at the discretion of the CQA Officer.

3.06 FIELD QUALITY CONTROL

A Pre-Weld Testing

- 1. A test weld 3-ft long from each welding machine shall be run upon the beginning of each shift and every four hours thereafter, under the same conditions as exist for the liner welding. The test weld shall be marked with date, ambient temperature and welder's name, temperature and speed, welding machine number. A tensiometer shall be required to be on-site before and during liner installation for the purpose of testing samples. Six specimens of welds 1-in wide shall be cut from the test weld and tested on site with the presence of the RPR for shear and peel strength (3 each) in accordance with Appendix B, Table B-2. No welder may start work until the sample weld has been approved by the RPR.
- 2. Test seams shall be performed under the same conditions as the actual seams and shall be at least 3-ft long, 1-ft wide after seaming. Test seam for welding shall be cut out of the liner rolls.

B Non-destructive Seam Testing

- 1. The installer shall perform nondestructive test on all field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion welds and single track hot wedge welds. The air pressure test shall be used for double track hot wedge welds.

If the CQA Officer at any time during the installation believes the seaming process may not be performing adequately, he may, to avoid destructive sampling of the actual liner system, request additional test seams. This shall be done by the Installer at no additional cost to the Owner.

2. Vacuum Testing

a. Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:

- (1) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly and a vacuum gage.
- (2) A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
- (3) A rubber pressure/vacuum hose with fittings and connections.
- (4) A plastic bucket and wide paint brush.
- (5) A soapy solution.

b. The following procedures shall be followed by the installer:

- (1) Excess sheet overlap shall be trimmed away.
- (2) Clean the window, gasket surfaces and check for leaks.
- (3) Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
- (4) Wet a strip of liner approximately 12-in by 48-in (length of box) with the soapy solution.
- (5) Place the box over the wetted area and compress.
- (6) Close the bleed valve and open the vacuum valve.
- (7) Ensure that a leak-tight seal is created.
- (8) For a minimum period of ten seconds, examine the liner through the viewing window for the presence of soap bubbles.
- (9) If no bubbles appear after ten seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3-in overlap and repeat the process.
- (10) All areas where soap bubbles appear shall be marked and repaired and then re-tested.

April 2013

- 11) All test locations which have passed vacuum testing shall be marked with the test date and individual performing the test.
 - c. If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the RPR for uniformity and completeness.
3. Air Pressure Testing.
- a. The following procedures are applicable to those processes which produce a double seam with an enclosed space.
 - b. Equipment for testing double fusion seams shall be comprised of the following:
 - (1) An air pump equipped with pressure gage capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the liner.
 - (2) A manometer equipped with a sharp hollow needle, or other approved pressure feed device.
 - c. The following procedures shall be followed by the installer.
 - (1) Seal both ends of the seam to be tested.
 - (2) Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.
 - (3) Energize the air pump to a pressure between 27 and 40 psi, close valve and sustain pressure for at least five minutes.
 - (4) If loss of pressure exceeds 3 psi, or pressure does not stabilize, locate faulty area, repair and re-test.
 - (5) If the faulty area cannot be isolated and repaired, the length of seam which cannot be tested shall be capped with liner strip, extrusion welded and vacuum tested. The seam shall be documented as a failed seam indicating the corrective measure.
 - (6) If loss of pressure is 3 psi or less, release air pressure at the opposite end of where the pressure is applied to verify that the full seam was pressurized and that there was no blockage in the air channel.
 - (7) Remove needle or other approved pressure feed device and seal.
 - (8) All test locations which have passed air pressure testing shall be marked with the test date and individual performing the test.

C Destructive Seam Testing

1. At the discretion of the CQA Engineer and/or RPR, destructive seam testing shall be performed on samples of the installed liner.
 - a. At any given sampling location, two types of samples shall be taken by the Installer at the request of the CQA Engineer and/or RPR.
 - b. First, two specimens for field testing shall be taken. Each of these specimens will be 12 in. by 12 in. long (minimum), with the seam centered parallel to the width. If both specimens pass on-site field test for peel and shear in accordance with Appendix B, Table B-2, a sample for laboratory testing may be taken.
 - c. The sample for laboratory testing shall be located between the two specimens for the peel and shear field testing. The destructive sample will be 12 in. wide by 42 in. long of the liner Installer requests a sample; otherwise, the destructive sample will be 30 inches with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:
 - One portion to the Installer for laboratory testing, if so requested, 12 in. x 12 in.;
 - One portion to the Owner for archive storage, 12 in. x 12 in.; and
 - One portion for CQA Laboratory testing, 12 in. x 18 in.
 - d. Destructive testing will include peel and shear testing. At least 5 specimens will be tested for each test method. A maximum of one non-FTB (Film Tear Bond) failure is acceptable provided that strength requirements are met on that sample.
 - e. The following procedures apply whenever a sample fails a destructive test, whether that test is conducted by the CQA Laboratory, the Installers laboratory, or by field tensiometer. The Installer has two options:
 - (1) The Installer can reconstruct the seam between any two passed destructive seam test locations, or
 - (2) The Installer can trace the seaming path to an intermediate location (at least 10 ft from the point of the failed test in each location) and take a small sample for an additional field test at each location. If these additional samples pass the field tensiometer testing, then full destructive laboratory samples are taken. If these destructive laboratory samples pass the tests, then the seam is reconstructed between these locations by capping for extrusion or fusion welds, at the direction of the Engineer. If either the field tensiometer or the laboratory sample fails, then the process is repeated to establish the zone in which the seam should be reconstructed.

3.07 ELECTRIC CONDUCTIVITY TESTING

April 2013

Following installation of the drainage layer, electric conductivity testing may be performed to ensure no puncturing of the liner occurred during installation. The Contractor will fully cooperate with the testing including providing survey service and laborers to establish testing points and vacating areas designated by the testers. The laborers will also perform excavation of sand and removal of fabric at locations of investigation. Repair of damaged liner and replacement of fabric and sand will be performed by the contractor at no additional cost to the Owner.

3.08 DISPOSAL OF WASTE MATERIAL

- A Upon completion of installation, the Contractor shall dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat and acceptable condition.

April 2013

APPENDIX A

TABLE A1

PROPERTIES and TEST METHODS FOR TEXTURED HIGH DENSITY
POLYETHYLENE (textured HDPE) LINER

| <u>PROPERTY</u> | <u>TEST METHOD</u> |
|--------------------------|----------------------------|
| Density | ASTM D792 or ASTM D1505 |
| Melt Index | ASTM D1238 |
| Carbon Black Content | ASTM D1603 |
| Oxidative Induction Time | ASTM 3895 |

Commented [s5]: Is this for resin? Do we need this sheet, as it holds no values...

Commented [s6]: Greater than 0.932g/cc

Commented [s7]: Less than 1.0g/cc

Commented [s8]: GP- delete all

The above tests shall be performed by the manufacturer of the textured HDPE liner for identification of the manufacturer's product. Test results shall be submitted to the Engineer for approval of the product. Properties shall meet listed test values of GRIM13 or its latest version.

APPENDIX B

02776-20

This page intentionally left blank.

02776-21

TABLE B1
MATERIAL PROPERTIES
TEXTURED HIGH DENSITY POLYETHYLENE (HDPE) LINER

| PROPERTY | UNIT | LIMIT | TEST METHOD | VALUE |
|-------------------------------------|-------|-----------|------------------------------|------------|
| Thickness ¹ | mils | minimum | ASTM D5994 | 60 |
| Density | g/cc | minimum | ASTM D1505; or ASTM D792 | 0.940 |
| Tensile Properties (Each Direction) | | | ASTM D6693 | |
| Yield Strength | lb/in | min. ave | | 126 |
| Break Strength | lb/in | min. ave. | | 90 |
| Elongation at Yield | % | min. ave. | | 12 |
| Elongation at Break | % | min. ave. | | 100 |
| Tear Resistance | lb. | min. ave. | ASTM D1004 | 42 |
| Puncture Resistance | lb. | min. ave. | ASTM D4833 | 90 |
| Carbon Black Content | % | Range | ASTM D1603; or ASTM D4218 | 2.0 to 3.0 |

1. Value represents lowest individual value

TABLE B2

**FACTORY AND FIELD SEAMS PROPERTIES
TEXTURED HIGH DENSITY POLYETHYLENE (HDPE) LINER**

Commented [s9]: Revise according to GRI GM19

| Property (ASTM D6392) | Units | Value |
|--|--------------|--------------|
| Hot Wedge Seams ⁽¹⁾ | | |
| - shear strength ⁽²⁾ | lb/in | 120 |
| - shear elongation at break ⁽³⁾ | % | 50 |
| - peel strength ⁽²⁾ | lb/in | 91 |
| - peel separation | % | 25 |
| Extrusion Fillet Seams | | |
| - shear strength ⁽²⁾ | lb/in | 120 |
| - shear elongation at break ⁽³⁾ | % | 50 |
| - peel strength ⁽²⁾ | lb/in | 78 |
| - peel separation | % | 25 |
| Notes for Table B2: 1. Also for hot air and ultrasonic methods 2. Value listed for shear and peel strengths are 4 of 5 specimens; the 5 th can be as low as 80% listed values 3. Elongation measurements should be omitted for field testing | | |

APPENDIX C
GEOMEMBRANE QUALITY CONTROL or
QUALITY ASSURANCE DOCUMENTATION FORMS

02776-24

This page intentionally left blank.

02776-25

The following forms are included and shall be completed by the responsible party as shown on the forms, unless otherwise approved by the Engineer:

| <u>FORM ID</u> | <u>TITLE</u> |
|-----------------------|------------------------------------|
| CQC - 100 | LINER PROJECT QC LOG |
| CQC - 101 | SUBGRADE SURFACE ACCEPTANCE |
| CQC - 102 | RECEIVING QC LOG |
| CQC - 103 | PERSONNEL QC LOG |
| CQC - 104 | DAILY QC REPORT - PRE-WELD TESTING |
| CQC - 105 | DAILY SEAMING QC LOG |
| CQC - 106 | NON-DESTRUCTIVE TESTING LOG |
| CQC - 107 | DAMAGE AND FAILURE LOG |

FORM CQC - 100
LINER PROJECT QC LOG
(one sheet per project)

PROJECT NAME: _____
PROJECT NUMBER: _____ INSTALLATION DATE: _____
PROJECT LOCATION: _____
PROJECT OWNER: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____
ENGINEERING FIRM: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____
GENERAL CONTRACTOR: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____
SPECIFIED LINER MATERIALS: _____ THICKNESS & TYPE: _____
SUPPLIER OF LINER MATERIALS: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____
MATERIAL CERTIFICATION RECEIVED: _____
DATE: _____ ACCEPTED: _____
FABRICATOR OF MATERIAL: _____
INSTALLER OF MATERIAL: _____
QC INSPECTION FIRM: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____
LINER TESTING LABORATORY: _____
ADDRESS: _____
CONTACT: _____ PHONE: _____

FORM CQC - 101
SUBGRADE SURFACE ACCEPTANCE
(one sheet per Day of Liner Deployment)

PROJECT NAME: _____ DATE: _____ PROJECT NUMBER: _____

EARTH CONTRACTOR: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

SUPERINTENDENT OF PROJECT: _____ PHONE: _____

GEOMEMBRANE INSTALLER: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

SUPERINTENDENT OF PROJECT: _____ PHONE: _____

CERTIFICATE OF ACCEPTANCE
 OF SUBGRADE SOIL BY INSTALLER

I, _____ the undersigned, duly authorized representative of _____ do hereby accept the soil surface as being acceptable for the placement of a geomembrane liner.

| | | | |
|------|-----------|-------|------|
| | | | |
| Name | Signature | Title | Date |

Certificate Accepted by Inspector - Company: _____

| | | | |
|------|-----------|-------|------|
| | | | |
| Name | Signature | Title | Date |

QC INSPECTOR: _____

SITE SUPERVISOR: _____

INSTALLING SUPERVISOR: _____

Use back for comments.

FORM CQC - 102
RECEIVING QC LOG
(one sheet per truck)

PROJECT NAME: _____

DATE: _____ TIME: _____ PROJECT NUMBER: _____

TRUCKERS ID: _____

NO. OF PIECES ON BOARD: _____ AGREE WITH PACKING LIST? _____

CONDITION OF PACKAGING: _____

VERIFY PROPER MATERIALS: _____ VERIFY PROPER THICKNESS: _____

IDENTIFY PANEL NUMBERS: _____

IDENTIFY ACCESSORIES (*adhesive, battens, boots, etc.*): _____

IDENTIFY DAMAGED ITEMS: _____

TYPE OF UNLOADING EQUIPMENT USED: _____

CONDITION: _____

OPERATOR: _____

COMMENTS: _____

STORAGE AREA

CONDITION (*surface*): _____

LOCATION TO PLACEMENT AREA: _____

MATERIAL PROPERLY COVERED: _____

WEATHER

CONDITIONS: _____ TEMP: _____

QC INSPECTOR: _____

SITE SUPERVISOR: _____

Use back for other comments.

FORM CQC - 103
PERSONNEL QC LOG
(installation & field seaming personnel)
(one sheet per mobilization or change of personnel)

PROJECT NAME: _____

DATE: _____ PROJECT NUMBER: _____

SAFETY MEETING CONDUCTED ON MATERIALS HANDLING: _____

GIVEN BY: _____ DATE: _____

SUPERINTENDENT OF INSTALLATION: _____

SEAMING CREW PERSONNEL

#1 CREW LEADER: _____ HELPER: _____

#2 CREW LEADER: _____ HELPER: _____

#3 CREW LEADER: _____ HELPER: _____

#4 CREW LEADER: _____ HELPER: _____

#5 CREW LEADER: _____ HELPER: _____

#6 CREW LEADER: _____ HELPER: _____

#7 CREW LEADER: _____ HELPER: _____

#8 CREW LEADER: _____ HELPER: _____

OTHER CREW MEMBERS

NAME: _____ NAME: _____

NAME: _____ NAME: _____

NAME: _____ NAME: _____

SIGNED: _____

QC Inspector

END OF SECTION

02776-36

SECTION 02820

GUARDRAILS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to install the guardrails at the locations shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Site preparation is included in Section 02100.

1.03 SUBMITTALS

- A Submit to the Engineer in accordance with Section 01340, shop drawings showing dimensions layouts and details of construction and accessories required.

1.04 REFERENCE STANDARDS

- A Except as otherwise specified herein, the current Standard Specifications for Highway Construction, including all addenda, issued by the SCDOT, shall apply to materials and workmanship required for the work of this Section

- B American Society for Testing and Materials (ASTM)

- 1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.

- C American Association of State Highway and Transportation Officials (AASHTO)

- 1. AASHTO M180 - Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail.

- D American Wood Preservers Association (AWPA)

- 1. AWPA Standard C1 - All Timber Products - Pressure Treatment (General Requirements)
 - 2. AWPA Standard C14 - Wood for Highway Construction - Pressure Treatment

3. AWWA Standard M4 - Standard for the Care of Preservative-Treated Wood Products.
 4. AWWA Standard P5 - Standards for Water Borne Preservatives.
- E Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2: PRODUCTS

2.01 MATERIALS

- A Guardrails shall be of the type and size as shown on the Drawings.
1. The steel guardrail shall conform to the requirements of AASHTO M180, 0.105-in thick, W beam shape and be fabricated of galvanized steel. Beams of corrosion resistant steel shall not be painted or galvanized. They shall be handled and stored so that the traffic face of these beams shall not show a distinctive color differential. End or buffer sections shall be of the same or greater thickness of metal and shall be of the same type of corrosion resistant steel. Only drilling or cutting necessary for special connections and for sampling will be permitted in the field. Warped or deformed beams will be rejected and beams erected on a radius of 150-ft or less shall be shop curved to the appropriate curvature.
 2. All connections or splices shall be formed with oval shoulder button head bolts and washers to minimize projections on the road side of the guardrail. Unless otherwise specified, bolts and nuts shall conform to or exceed requirements of ASTM A307 and shall be of an approved corrosion resistant material.
 3. Wood posts shall be southern yellow pine, seasoned pressure treated, as hereinafter specified. Posts shall be rectangular in Section, 6-in by 8-in with tops sloped 3/8-in from front to back and square butt, select structural grade, surfaced four sides (S4S) and shall conform to the requirements of the "Standard Grading Rules for Southern Yellow Pine" of the Southern Products Association. All timber shall be pressure treated with "Osiose K-33" (chromated copper arsenate) which meets AWWA standard P-5 and Federal Specification TT-W-550-Type II in accordance with AWWA Standards C1 and C14. Minimum retention of preservative shall be 0.50 lbs per square foot. Posts shall be free of shakes, excessive checking and other structurally weakening defects. No unnecessary cutting of treated posts will be allowed after treatment and all posts whose surfaces have been damaged by cutting, drilling or other causes shall be field treated with

a preservative solution in accordance with AWPAs Standard M4. The above grade portions of all posts shall be painted with two coats of dark brown Olympic Semi-Transparent oil stain.

4. Reflectors in the form of guardrail valley inserts shall be installed at 25-ft intervals at a post location and be visible from both directions of movement. Reflectors shall be K-LITE USA, Inc. Model KT-102B-2 or Engineer approved equal.

PART 3: EXECUTION

3.01 GUARDRAILS

- A Guard rails shall be installed at the locations and according to the details shown herein and on the Drawings.
- B Reflectors shall be installed on the guard rails in accordance with manufacturer's instructions.

END OF SECTION

SECTION 02901

MISCELLANEOUS WORK AND CLEANUP

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.
- B When applicable the CONTRACTOR shall perform the work in accordance with other sections of this Specification. When no applicable specification exists the CONTRACTOR shall perform the work in accordance with the best modern practice and/or as directed by the OWNER.
- C The work of this Section includes, but is not limited to, the following:
 - 1. Crossing, re-locating and marking existing utilities.
 - 2. Restoring of driveways and sidewalks.
 - 3. Cleaning-up; regular removal and disposal of waste material
 - 4. Incidental work.
 - 5. Project photographs.
 - 6. Protection and/or removal and reinstallation of signs.
 - 7. Restoration of and replacement of curbing.
 - 8. Protection and bracing of utility poles.
 - 9. Restoring easement and right-of-ways.
 - 10. Temporary facilities and removal
 - 11. Removal of existing piping and structures as shown on the Drawings

PART 2: PRODUCTS

2.01 MATERIALS

- A Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the CONTRACTOR may re-use existing materials that are removed.

PART 3: EXECUTION

3.01 CROSSING AND RELOCATING EXISTING UTILITIES

- A This Item includes any extra work required in crossing culverts, water courses, including brooks and drainage ditches, storm drains, gas mains, water mains, electric, telephone, gas and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill (except screened gravel) and any other work required for crossing the utility or obstruction not included for payment in other items of this specification.
- B In locations where existing utilities cannot be crossed without interfering with the construction of the work as shown on the Drawings, the CONTRACTOR shall remove and relocate the utility as directed by the OWNER or cooperate with the Utility Companies concerned if they relocate their own utility.
- C At pipe crossings and where designated by the OWNER, the CONTRACTOR shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid-diameter of the pipe crossed. Payment for screened gravel at pipe crossings will be made according to the unit price bid established in the Bid Form.

3.02 CLEANING UP DURING CONSTRUCTION

- A Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B Provide on-site containers for the collection of waste materials, debris and rubbish.
- C Remove waste materials, debris and rubbish from the site periodically and dispose of at an approved facility. Upon approval of the OWNER, selected waste may be disposed at the active facility disposal area (on-site).

3.03 FINAL CLEANING

- A The CONTRACTOR shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition.
- B Prior to final completion, OWNER shall conduct an inspection of all work areas to verify that the entire work area is clean.

3.04 INCIDENTAL WORK

- A Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Drawings.

3.05 TEMPORARY FACILITIES

- A The CONTRACTOR shall furnish, install, maintain and remove all temporary facilities required for construction or called for in the specifications.

END OF SECTION

This page intentionally left blank.

SECTION 02985

STABILIZATION

PART 1: GENERAL

1.01 WORK INCLUDED

The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary and finish grade, seed, and maintain all seeded areas as specified herein including all areas disturbed by the CONTRACTOR'S operations. **Contractor shall create a recommended seeding plan that includes all rates of application necessary to produce the required stand of grass.**

1.02 SUBMITTALS

- A Submit to the ENGINEER for review complete shop drawings for all materials and equipment furnished under this Section, including but not limited to soil analysis, recommended seeding plan and product label information.
 - 1. A soil analysis as described in Section 02290 Paragraph 1.07.C is required prior to all permanent cover operations; the soil analysis should be used to determine suitable grasses and adequate application rates of lime and fertilizers.
 - 2. The CONTRACTOR will provide a recommended seeding plan with seed types and mixtures, and determine all rates of application necessary to produce the required stand of grass
- B Samples of all materials shall be submitted for inspection and acceptance upon ENGINEER'S request.
- C The CONTRACTOR shall submit a certified survey in accordance with Section 01050.
- D Certification from seed vendor for each seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.
- E. Certification by Limestone and Fertilizers manufacturer that the products supplied comply with requirements:

PART 2: PRODUCTS

2.01 MATERIALS

- A Fertilizer shall be complete commercial fertilizer, 10-10-10 grade or as otherwise based on the soil analysis and accepted. It shall be delivered to the site in the original unopened containers each showing the manufacturer's guaranteed analysis. Store fertilizer so that when used it shall be dry and free flowing.
- B Lime: ASTM C 602, Class T, agricultural limestone in the form of dolomitic limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.
- C Seed shall be from the same or previous year's crop; each variety of seed shall have a percentage of germination not less than 90, a percentage of purity not less than 85, and shall have not more than one percent weed content.
- D The seed shall be furnished and delivered premixed in the proportions specified in Paragraph 3.02.E. A manufacturer's certificate of compliance to the specified mixes shall be submitted by the manufacturer for each seed type. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the CONTRACTOR has submitted the certificates.
- E Seed shall be delivered in sealed containers bearing the dealer's guaranteed analysis.
- F Mulch shall be one of the following:
 - 1. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
 - 2. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.
 - 3. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- G Tackifier shall be one of the following.
 - 1 Asphalt Emulsion Tackifier: Asphalt emulsion, ASTM D 977, Grade SS-1, nontoxic and free of plant growth- or germination-inhibitors.

2. Non-asphaltic tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

PART 3: EXECUTION

3.01 APPLICATION

- A Lime shall be applied at the rate of 4000 lbs per acre, or as recommended in reports from a qualified soil testing agency in analysis and as approved by the OWNER.
- B Fertilizer shall be applied at the rate of 1000 pounds per acre, or as recommended in reports from a qualified soil testing agency or the seeding subcontractor, if found to be acceptable by the OWNER.

3.02 SEEDING

- A Seed all disturbed areas of construction (excluding rip-rap lined ditches) and as directed by the OWNER.
- B No seeding should be undertaken in windy or unfavorable weather, when the ground is too wet to rake easily, when it is in a frozen condition, or too dry.
- C The subgrade of all areas to be seeded shall be raked and all rubbish, sticks, roots, and stones larger than 2 inches shall be removed.
- D Fertilizer shall be uniformly spread and disked or roto-tilled to a depth of at least 4 inches.
- E Immediately following this preparation the seed shall be uniformly applied and lightly raked into the surface. Lightly roll the surface and water with fine spray. Seed shall be applied, depending on the period of year, as shown on the engineering drawings:
- F. Unless otherwise provided, seed mixtures shall be developed in accordance with the **Supplemental Technical Specification for SEEDING, SCDOT Designation: SC-M-810-2(04/11)** and Tables included therein for the LowerState, as applicable to the project.
- G. All seeded areas shall be mulched with clean small-grain straw at a rate of 1-1/2 to 2 tons per acre. Asphalt emulsion shall be applied uniformly at a rate of 300 gallons per acre to tack the mulch, unless otherwise shown on the plans. Mechanical tacking will be considered on a case-by-case basis as approved by the ENGINEER.

- G. The CONTRACTOR shall keep all seeded areas watered and in good condition. Re-seeding shall be done if and when necessary until a good, healthy, uniform growth is established over the entire area seeded.
- H. On slopes, the CONTRACTOR shall provide against washouts by an approved method. Any washout which occurs shall be re-graded and reseeded at the CONTRACTOR'S expense until good sod is established.
- I. CONTRACTOR is responsible for installing temporary seeding and mulching as required to protect the work prior to the establishment of grass from permanent seeding and mulching. Temporary seeding shall be installed in accordance with Section 810, SEEDING, of the "South Carolina Department of Transportation Standard Specifications for Highway Construction," most recent edition.

3.03 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 - 1. Mix slurry with nonasphaltic tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
 - 3. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre.

3.04 MAINTENANCE

- A The CONTRACTOR shall maintain all seeded areas in a condition approved by the OWNER and/or ENGINEER until final acceptance of the Contract. Maintenance shall include, but not be limited to, repair of erosion and washed areas, re-seeding and re-applying fertilizer and mulch, irrigation, and weed control. Protection shall be provided for all seeded areas against trespassing and damage. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly.
- B All seeded areas shall be inspected on a regular frequency acceptable to the OWNER and any necessary repairs or re-seedings made within the planting season.

- C Erosion or other damage resulting from insufficient grassing shall be the responsibility of the CONTRACTOR and should be repaired accordingly.
- D Before acceptance of the seeding performed for the establishment of permanent vegetation, the CONTRACTOR will be required to produce a uniform perennial vegetative cover with a minimum density of 70% of the seeded area. The root system shall be developed sufficiently to survive dry periods and winter weather and be capable of re-establishment in the spring.
- E The CONTRACTOR shall monitor the seeded areas on a monthly basis at minimum, for a period no less than the warranty period stated in the CONTRACT. Any and all areas with insufficient vegetation or erosion as a result thereof shall be repaired and re-seeded and monitored and warranty provided according to the CONTRACT.

THIS PAGE INTENTIONALLY LEFT BLANK

END OF SECTION

SECTION 03350

FABRIC-FORMED CONCRETE REVETMENT

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, equipment, and incidentals required for installing of fabric formed concrete revetment (uniform section mat) as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A Section 02700 Protective Cover Layer
- B Section 02776 Textured High Density Polyethylene (HDPE) Liner
- C Section 02623 HDPE Pipe

1.03 CONTRACTOR QUALIFICATIONS

- A The CONTRACTOR shall furnish records of past successful experience in performing this type of work.
- B The CONTRACTOR shall provide a construction superintendent who is thoroughly familiar with the specified requirements, trained and experienced in the necessary skills, and who shall be present at the site for the duration of the installation and shall direct all work performed under this section.

PART 2: PRODUCTS

2.01 FABRIC FORMWORK

- A Fabric formwork material shall be constructed of permeable, continuously woven panels of double-layer, open-salvage synthetic fabric jointed together to form a formwork for placing fine aggregate concrete slurry. The fabric shall consist of synthetic yarns formed into a stable network such that the yarns retain their relative position to each other and withstand the pressure of the grout injection pump without breaking the layers of fabric.
- B The fabric formwork shall be furnished as six-inch uniform section mat.
- C Individual mill width panels shall be cut to the length required and the two layers of fabric separately joined edge-to-edge by means of sewing thread to form multiple -mill width panels. Multiple-mill width panels shall be field joined edge-

to-edge to adjacent panels by means of sewing thread, zippers or hook and loop-type fasteners. The grab tensile strength of all joints shall be not less than 100 lbs. per inch when tested in accordance with ASTM D-1682-75.

- D Immediately following receipt of fabric to the jobsite, fabric shall be inspected and stored in a clean, dry area where it will not be subject to mechanical damage, exposure to moisture or direct sunlight.
- E Not used
- F The average compressive strength of cast test cylinders shall be at least 20 percent higher at 7 days than that of companion test cylinders made in accordance with ASTM C-31, and not less than 2,500 psi at 28 days.

2.02 MORTAR GROUT

- A Fine aggregate concrete shall consist of a mixture of Portland cement, fine aggregate and water so proportioned and mixed as to provide a pumpable slurry. Admixtures and/or a pozzolan may be used with the approval of the ENGINEER.
- B Portland cement shall conform to ASTM C-150, Type I or Type II.
- C Fine aggregate shall conform to ASTM C-33, except as to grading. Aggregate grading shall be reasonably consistent and shall be well graded from the maximum size which can be conveniently handled with available pumping equipment.
- D Water for mixing shall be clean and free from injurious amounts of oil, acid, salt, alkali, organic matter or other deleterious substances.
- E Pozzolan, if utilized, shall conform to ASTM C-618 Type N, F or C.
- F Admixtures, if utilized, shall contribute to the nature of the specifications. a water reducer conforming to ASTM C-494 may be used to reduce segregation, increase workability and pumpability, improve strength and increase water tightness. If an air entraining agent is used, it shall conform to ASTM C-260, and it shall improve resistance to freezing and thawing. The air content shall not exceed seven percent of the volume of the grout.
- G Materials shall be proportioned to produce a hardened concrete with a minimum compressive strength of 2,500 psi at 28 days when specimens are made and tested in accordance with ASTM C-31 and C-39.

PART 3: EXECUTION

3.01 SLOPE PREPARATION

- A Areas on which fabric formwork is to be placed shall be constructed to the lines and grades shown on the Drawings.
- B Excavation and preparation of anchor trenches, side trenches, and toe trenches or aprons shall be done in accordance with the lines, grades, and dimensions shown on the Drawings.

3.02 FABRIC FORMWORK PLACEMENT

- A Position fabric loosely before grout injection; place an appropriate amount of weight at predetermined locations to allow for fabric compaction. STAKING OF FABRIC WITHIN THE LIMITS OF THE LINER WILL NOT BE PERMITTED. Do not approximate fabric locations.
- B Fabric panels are jointed in the field with a bag closer (portable sewing machine). Lay out the first panel and fold back the leading edge. Invert the adjacent abutting panel. Join the top layers of fabric. Join the bottom layers of fabric. Fold the jointed panels back of the bank with seams down.
- C To avoid field sewing as much as possible, prepare fabric assembly sketches in such detail that the great majority of the sewing can be done prior to delivery.
- D Provide a small quantity of uncut, unassembled fabric for special field tailoring.

3.03 MORTAR GROUT PLACEMENT

- A Following panel placement, small cuts shall be made in the top layer of the fabric formwork to allow for the insertion of the injection hose or nozzle. Fine aggregate concrete slurry shall be injected between the top and bottom layers of fabric, inflating the panel to the recommended thickness and configuration.
- B Fine aggregate concrete slurry shall be injected in such a way that excessive pressure on the fabric formwork and cold joint within any one panel are avoided.
- C Holes in the fabric left by the removal of the injection hose shall be temporarily closed by inserting a piece of burlap similar material. The burlap shall be removed when the concrete is no longer fluid and the surface firm is to the hand. Foot traffic on the filled mat shall be restricted to an absolute minimum for one hour after pumping.
- D Upon completion of the concrete placement, all the anchor trenches, side trenches, and toe trenches shall be backfilled, compacted, and completed as specified. All spilled mortar shall be cleaned up by hand. The mat shall be washed down with a water hose.

3.04 QUALITY CONTROL

- A One set of three test cylinders shall be taken each day: one cylinder shall be tested at seven days, two cylinders at 28 days. Copies of the test results shall be furnished to the Engineer.

- B The concrete for the test cylinders shall be taken from the injection hose after the fine aggregate concrete has passed through the pump. Test cylinder to consist of nylon fabric in the form of a test sock to give an accurate in-place test result.

END OF SECTION