Augusta GEORGIA

Procurement Department

Andy Penick, CPSM, GCPM, GCPA, MBA
Procurement Director

RFP ITEM #26-272
DEANS BRIDGE ROAD MSW LANDFILL
PHASE III, STAGE II SOUTH CELL 2 - PHASE 1
ADDENDUM #001
ANSWERS TO BIDDER'S QUESTIONS

TO: All Bidders

CC: Tywanna Scott, Procurement Issuing Officer
Hameed Malik, Engineering and Environmental Services Department

FROM: Andy Penick, Procurement Director

DATE: Tuesday, July 14, 2026

RFP DUE: Thursday, August 6, 2026 at 2:00 p.m.

This Addendum #001 Answers to Bidder's Questions shall form a part of the referenced RFP item and any agreement entered into in connection therewith equally as if bound into the original document. Please acknowledge receipt of all Addenda on Exhibit A of the RFP Solicitation Document. Questions and Answers are listed below;

Clarifications to the Specifications:

When you are instructed to **ADD A NON-RFP ITEM PAGE(S), OR PORTIONS THEREOF**, you **MUST CONSIDER** it/them in developing your RFP, but the physical insertion of the new page(s) into the proposal is not necessary.

Project Manual Changes/Clarifications:

1. **Table of Contents:** Section 7: Technical Specifications & Construction Design Plan. **Add** Technical Specifications which are included with this Addendum No. 1

Response to Questions:

1. Question: What are the number of days allowed for the project?
   Response: 180 Calendar Days.
2. Question: What are the liquidated damages for this project?
   Response: $2000/day.
3. Question: Are there any Technical Specifications supposed to be included in the bid documents?
   Response: Yes, see the attached Technical Specifications.
4. Question: Can we get the CAD file for the RFP #26-272 Deans Bridge Road MSW Landfill Ph 3, St 2, South Cell 2 - Phase 1 project? This is necessary for an accurate earthwork takeoff.

Response: Yes. The CAD Files can be acquired directly from SCS Engineering. You are required to complete the Agreement for Transfer of Electronic Files form which is included with this Addendum No. 1. The form will need to be emailed to one of the contacts below:

Blanton, Robbie JBlanton@scsengineers.com
Samuel Sin ssin@scsengineers.com

Please acknowledge addendum in your submittal

Andy Penick, Director

END ADDENDUM

ATTACHMENTS:	**TECHNICAL SPECIFICATIONS**	**(170 PAGES)**
	AGREEMENT FOR TRANSFER OF ELECTRONIC FILES	**(2 PAGES)**

AGREEMENT FOR TRANSFER OF ELECTRONIC FILES
FOR

_____

_____

This Agreement is made between Stearns, Conrad and Schmidt, Consulting Engineers, Inc. dba SCS Engineers ("SCS") and _____ ("RECIPIENT"), and is subject to the following terms and conditions to which the parties mutually agree:

1. SCS agrees to provide and RECIPIENT agrees to accept the electronic documentation or data listed below ("Electronic Files") on the terms and conditions stated herein:

   DESCRIPTION OF ELECTRONIC FILES

   _____

   _____

   _____

   _____

2. RECIPIENT's acceptance and use of the Electronic Files signifies RECIPIENT's consent to be fully bound by the terms of this Agreement, whether or not RECIPIENT signs this Agreement.
3. RECIPIENT agrees not to use the Electronic Files, in whole or in part, for any purpose other than for the _____ ("Project"). RECIPIENT agrees not to transfer the Electronic Files to others without the prior written consent of SCS.
4. In accepting and using the Electronic Files provided by SCS, RECIPIENT agrees that all Electronic Files are instruments of service of SCS, and SCS shall be deemed the author, and shall retain all common law, statutory and other rights, including copyrights, in the Electronic Files and any derivative works thereof. By this Agreement SCS grants RECIPIENT only a non-exclusive, non-transferable, limited license to use the Electronic Files solely for purposes of the Project. Neither this Agreement nor the license hereby granted may be transferred, sold or assigned.
5. If SCS's name, title block and/or logo appear in the Electronic Files, RECIPIENT agrees to delete same prior to using the Electronic Files.
6. SCS makes no representation or warranty as to the compatibility of the Electronic Files with RECIPIENT's hardware or software, or that the means or media of electronic transfer of the Electronic Files is free of computer virus.
7. RECIPIENT is aware that differences may exist between the Electronic Files delivered and the data or hard copy files from which the Electronic Files are derived. It shall be RECIPIENT's responsibility to determine the accuracy, correctness and completeness of the information contained in the Electronic Files and whether any conflicts exist with other data or records.
8. RECIPIENT acknowledges that the Electronic Files have not been prepared for the purposes of determining exact locations of features or dimensions. SCS makes no warranties or guarantees, express or implied, as to the accuracy, correctness or completeness of the information contained in the Electronic Files, including any warranty of merchantability or

warranty of fitness for a particular purpose. RECIPIENT agrees to independently verify the accuracy, correctness and completeness of the Electronic Files for its needs. Use of the Electronic Files provided herewith is solely at the risk of the RECIPIENT, and RECIPIENT covenants not to sue and waives and releases SCS, its officers, directors, employees and subconsultants from and against any claims or liability resulting from such use, whether in tort, contract or otherwise.

9. SCS shall have no obligation to notify RECIPIENT of, or to provide to RECIPIENT, any revisions or changes to the data or information contained in the Electronic Files.
10. RECIPIENT agrees, to the fullest extent permitted by law, to indemnify, defend and hold harmless SCS, its officers, directors, employees and subconsultants against all claims, damages, liabilities or costs, including reasonable attorneys' fees and defense costs, whether in tort, contract or otherwise, arising from RECIPIENT'S use of the Electronic Files. In no event shall SCS be liable for indirect or consequential damages as a result of RECIPIENT's use of the Electronic Files.
11. The Uniform Computer Information Transactions Act (UCITA) does not apply to this Agreement.
12. This Agreement shall be construed in accordance with the laws of the Commonwealth of Virginia, without regard to Virginia's choice of law rules. Venue for any dispute arising out of or related to this Agreement shall lie exclusively in the state and federal courts of Fairfax County, Virginia and the parties hereby submit to the jurisdiction of such courts.
13. The Agreement constitutes the sole and entire agreement between SCS and RECIPIENT regarding the Electronic Files. This Agreement replaces and supersedes all prior discussions and agreements between RECIPIENT and SCS with respect to the matters contained herein.

By executing this Agreement, the undersigned affirms that he/she is duly authorized to enter into contractual agreements on behalf of RECIPIENT and RECIPIENT agrees to the terms of this Agreement.

RECIPIENT:

By: _____

Name: _____

Title: _____

Date: _____

SCS ENGINEERS

Deans Bridge Road Landfill
Phase III, Stage II, South Cell 2
Phase 1 Construction
Technical Specifications

Presented to:

City of Augusta
Engineering & Environmental Services Department
4330 Deans Bridge Road
Blythe, Georgia 30805

Presented by:

SCS ENGINEERS
3175 Satellite Blvd., Bldg. 600, Suite 100
Duluth, GA 30096
(678) 319-9849

April 2026
File No. 09221050.30

Deans Bridge Road Landfill
Phase III, Stage II, South Cell 2
Phase 1 Construction
Technical Specifications

Prepared for:

City of Augusta
4330 Deans Bridge Road
Blythe, Georgia 30805

Prepared by:

SCS ENGINEERS
3175 Satellite Blvd., Bldg. 600, Suite 100
Duluth, GA 30096
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Table of Contents

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall receive and accept the compensation provided in the Contract as full payment for furnishing all labor, equipment, and materials and for performing all construction/operations necessary to complete the WORK as described in the Contract, and in full payment for all losses or damages incurred during the WORK, for any discrepancies between actual and estimated quantities, or from any unanticipated difficulties which may arise during the WORK until final acceptance by the Owner.

B. Payment for the various Items on the Contractor's Bid Proposal Form, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles and for all labor, operations, supervision, overhead, profit, and incidentals appurtenant to the Items of WORK being described as necessary to complete the various Items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor.

C. No separate payment will be made for any Item that is not specifically set forth on the Contractor's Bid Proposal Form and all costs therefore shall be included in the prices named on the Contractor's Bid Proposal Form for the various appurtenant Items of WORK. Payment for complying with the safety requirements for construction on the WORK site shall be included in the contract unit price paid for the various Items of WORK wherein it is required, and no separate payment will be made therefore.

D. The total Bid amount shall cover all WORK required by the Contract Documents. All costs in connection with the proper and successful completion of the WORK, including furnishing all materials (except geosynthetics), equipment, supplies, and appurtenances; providing all construction equipment and tools; including all costs and expenses for taxes, commissions, transportation charges and expenses, permit fees, patent fees, royalties, handling and tests; and performing all necessary labor and supervision to fully complete the WORK shall be included in the Bid. All WORK not specifically set forth as a pay Item on the Contractor's Bid Proposal Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the Unit Prices bid and/or the Lump Sum Price.

E. The quotations for the various Items of WORK are intended to establish a total price for completing the WORK in its entirety. Should the Contractor feel that the cost for any Item of WORK has not been established by the Contractor's Bid Proposal Form, Contractor shall include the cost for that WORK in some other applicable Bid Item, so that his proposal for the project does reflect his total price for completing the WORK in

its entirety.

F. All estimated quantities stipulated on the Contractor's Bid Proposal Form are approximate and are to be used only (a) as a basis for estimating the probable cost of the WORK and (b) for the purpose of comparing the Bids submitted for the WORK. The actual amount of WORK done and materials under Unit Price Items may differ from the estimated quantities. The basis of payment for WORK and materials will be the actual amount of WORK done and materials furnished unless it exceeds the estimated quantities in which case a change order must be approved prior to payment for quantities exceeding the estimated quantity.

G. The Contractor shall field-verify all quantities and dimensions shown on the Drawings or contained in the Contract Specifications.

H. The Contractor shall be responsible for establishing contracts with its subcontractors, which have a measurement and payment in accordance with this Section. If the Contractor establishes a contract with its subcontractors, which is in conflict with this Section, any additional cost incurred will be borne by the Contractor.

I. Restoration is not a separate pay item but is considered to be an integral part of the work under the contract, and all contract bid prices include the cost of restoration necessitated by the work related to that bid item. Restoration includes existing structure and property, paving, stabilized roads, drainage piping and ditches, catch basins, head walls, yard culverts, driveways, lawns and ground areas, walkways, and irrigation systems, which are altered, removed or damaged during construction. Cleanup is an integral part of restoration.

J. Unit prices provided by Contractor on Bid Proposal Form shall be valid and applicable for quantities up to 130 percent of the estimated quantities shown on the Bid Proposal Form.

1.2 GENERAL

A. The following paragraphs describe measurement of and payment for the WORK to be done under the respective Items listed in the itemized Bid for this Contract.

B. Each Lump Sum and Unit Price stated in the itemized Bid shall constitute full compensation for all labor, equipment and materials necessary and required to complete all WORK specified under that particular Item including cleanup and all costs for doing related WORK as set forth in the Contract Documents, Specifications and/or on the Contract Drawings or implied in carrying out their intent.

1.3 COMPUTATION OF QUANTITIES

A. Measurement of quantities expressed as area shall be based upon a horizontal, planimetric projection to the WORK limits as determined by survey record drawings prepared by a surveyor licensed in the State of Georgia. Cost of surveying shall be paid by the Contractor, and incorporated into Bid Items, as appropriate.

B. Measurement of linear Items will be for quantities actually field installed to the specified WORK limits, based upon surveyed stations recorded along the straight or curved centerline of each respective Item. Measurement conducted by survey is to be conducted by the Contractor's approved surveyor licensed in the State of Georgia.

C. Measurement of quantities expressed as volume will be based upon a neat plan line projection to the WORK limits (planimetric measure) as determined by survey Record Drawings for each Item, with no additional allowances for shrinkage, swelling, or creep. Quantities expressed as volume will be in-place volumes to the dimensions indicated on the Contract Drawings. The average end area method or other methods acceptable to the Owner/Engineer will be used.

D. Payment will be made to the limits as specified in the Contract Documents. If the constructed limits are less than the specified limit, payment will be made to the actual limits of construction as shown on the Record Drawings. Payment for quantities that exceed the specified contract limits will only be made with the approval of the Owner with acceptable supporting documentation from the Contractor. Payment for quantities that exceed the Contract quantities can only be obtained through an approved Change Order.

E. No partial payments shall be made for the installation of Items which have not been tested and approved by the Engineer.

F. Partial payment will be made for material delivered to the site, and adequately stored and protected until installation. Materials will be paid for at direct cost plus shipping, upon presentation of a valid receipt of bill with the payment request. All such requests must have material quantities verified by the Engineer prior to payment. Conditions for payment of stockpile of material will be discussed during the Pre-Construction Meeting. At a minimum, the materials must have an approved Shop Drawing and or Manufacturer's materials certification.

G. Payment will be made monthly until completion of each Unit Price Item and or Lump Sum cost based on quantity completed by Contractor, and verified by the Engineer. Final payment will be based on quantity calculated from Record Drawings prepared by surveyor licensed in the State of Georgia and confirmed by field measurement by the Engineer and Owner.

H. Payment for Lump Sum Items will be made as described for each individual Lump Sum Bid Item. The Contractor shall not rely on the estimated quantities given, but shall instead estimate all quantities for the Item independently for the basis of their bid. No claim shall be made by the Contractor for deviations between the Contractor's estimated quantity and the Engineer's estimated quantity including the quantity required to complete the WORK. The Contractor shall base their bid solely on the Contractor's independently estimated quantity.

I. If Contractor is required to use the scales located at the facility to measure and obtain average unit wastes for material disposed, the Contractor shall select either off-road or on-road vehicles that can access the scales with dimensions and specifications as

directed by the Owner. The Contractor shall coordinate with the Owner regarding the actual trucks proposed for the project, and confirm the suitability of the truck to be able to be weighed on the scales. A load count for bases of billing, without an average unit weight obtained from tonnages recorded through the scales for the pay items requiring tonnage across the scale for payment, will not be accepted.

1.4 VARIATIONS IN ESTIMATED QUANTITIES

A. The quantities provided in the Contract Documents are approximate only, and are given as a basis for the uniform comparison of bids. The Owner does not expressly or by implication agree that the actual amount of WORK will correspond therewith.

B. The Contractor must provide, for Unit Price Work, a proposed contract price determined on the basis of estimated quantities required for each Item. The estimated quantities of Items are not guaranteed and are solely for the purpose of comparing bids. Each such unit will be deemed to include an amount for overhead, profit and indirect costs for each separately defined Item.

1.5 BID PROPOSAL FORM

A. The Bid Proposal Form for the items contained within this Section can be found in the contract documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MEASUREMENT AND PAYMENT

A. Bid Item No. 001 - Mobilization/Demobilization (Lump Sum)

Measurement: The various Items and WORK required for Mobilization / Demobilization will not be measured for payment. All Items and WORK for this Bid Item shall be included in one Lump Sum (LS) price quantity pro-rated as a percentage of work completed.
Payment: The LS price for Mobilization shall constitute full compensation for all preparatory WORK and operations in mobilizing for beginning WORK on the project including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site and for the establishment of temporary offices, buildings, safety equipment and first aid supplies, sanitary and other facilities as required by the Contract Documents and Specifications and State and local laws and regulations. The costs of bonds and any required insurance and any other pre-construction expense necessary for the start of the WORK, excluding the cost of construction materials. This Bid Item will include mobilization/demobilization for all parts or phases of the total project.

The Contract Price for mobilization/demobilization shall be subject to the following provisions:

a. Partial payments for mobilization/demobilization will be made in accordance with the following schedule.

Condition or Percent of Total Contract Amount Earned	Allowable Percent of the Lump Sum Price for the Item
Submittal/completion of items listed in Section 01510 and Section 01590	25
10 percent total contract amount	40
25 percent total contract amount	60
50 percent total contract amount	80
100 percent total contract amount	100

The final payment for mobilization/demobilization will not be made until all the temporary facilities, excess materials, resources, equipment, utilities that were used to perform the WORK, and all remaining construction debris at the completion of the project have been removed from the site. Additionally, this shall include the submittal of all final record drawings, record survey project photos, release of liens and other incidentals as specified as requirements of project close-out.

B. Bid Item No. 002 - Project Survey (Lump Sum)

Measurement: Measurement for the WORK specified in this Bid Item shall be based on the schedule below for payment and all Items related to survey the WORK shall be included in the Contract Lump Sum Price. Payment shall be full compensation for the preparatory WORK, establishing construction controls, baseline surveys, location of utilities, stakeout of elevation and positional information required to complete the construction, record keeping, and obtaining all survey information required to compile Record (As-Built) Drawings. As-built drawings must be signed and sealed by a surveyor licensed in the State of Georgia.

Payment: Payment for this Bid Item will be made at the Contract Lump Sum Price, which price and payment shall be full compensation for surveying in accordance with the Contract Documents and Specifications and accepted by the Engineer based on the following schedule:

Preconstruction Survey	20%
Final Survey	80%
Record Drawings	100%

The following defines complete documents for the surveys notated above:

a. Preconstruction Survey: The preconstruction survey shall include a survey of the existing conditions within the limits of construction of the Cell 2 Phase 1. The preconstruction survey will be used as the baseline for determining soil fill quantities and payment of those items for the project. The preconstruction survey shall include, but not limited to, surveying the existing 60-mil HDPE geomembrane for certification grid, existing elevation of the geomembrane and proposed elevation for protective

cover sand; proposed location of the leachate forcemain pipe and connection points to existing forcemain system, and ground survey of certified geomembrane liner.

b. Final Survey: The final survey will include all features of the project installed as part of the construction project and all existing features within the limits of construction. The final survey will include, but is not limited to, the protective cover grades, stormwater structures, piping, LFG components, limits of liner, underground piping, sod/or seeding limits, berms and access roads, and all other features related to the Cell 2 Phase 1.

c. Record Drawings: The Contractor shall, throughout the project, maintain a redline set of construction drawings noting deviations or actual installed conditions for the Cell 2 Phase 1. As part of the Final Completion, the Contractor must submit a complete set of final Record Drawings based on the red lines maintained throughout the project, which identify the actual constructed conditions. These record drawings shall use the Construction Drawings as a base and show changes by cloud and strikethrough in electronic format (AutoCAD 2018 or later version). The Record Drawings shall incorporate the surveys listed above and any other changes made to the project components into the set in order to create a single Record Drawing Set for the project. Draft Record Drawing sets, in both hardcopy and AutoCAD format in accordance with the specifications, must be submitted to the Owner and Engineer for review in order to grant Substantial Completion. Final Completion cannot be granted until the certified Record Drawings (hardcopy and AutoCAD format) signed and sealed by a Georgia licensed Professional Land Surveyor is submitted to and approved by the Owner and Engineer. The Record Drawings are critical to the Owner and must be accurate to receive approval by the Georgia EPD for operation of the facility.

C. Bid Item No. 003 - Erosion and Sediment Control (Lump Sum)

Measurement: Measurement for the WORK specified in this Bid Item shall be on a lump sum basis based on percentage of work completed.

Payment: Payment for this Bid Item will be made on a lump sum basis based on percentage of work completed for the various components of temporary erosion and sediment control maintained for the duration of construction until the project site is stabilized. This pay item shall include, but is not limited to, furnishing, installing, and maintaining: silt fence, temporary or intermediate seeding and mulching, removal of surface water as necessary, installing all necessary pumps, temporary stormwater channels, pipes, and diversions, temporary construction entrances, removal of sediment from roads and stormwater channels resulting from Contractor's work and placed in a designated stockpile area, removal of all such temporary work and equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents. This Work shall include erosion and sediment control for landfill expansion, and any other land disturbing activities performed by the Contractor on the landfill property.

D. Bid Item No. 004 – Subgrade - Cut (Cubic Yards)

Measurement: Measurement for the Work specified in this Bid Item will be on a cubic yard basis for cut (removing existing soil above base grades after site clearing, grubbing, and stripping) required to meet design base grades. Measurement for this bid item will

be made by comparing the Preconstruction (less grubbing and stripping) and Subgrade Surveys.

Payment: Payment for this Bid Item will be made on a cubic yard basis. This pay item shall include all necessary labor, equipment, establishing construction controls, surveying, excavation, loading, hauling, placement, stockpiling, testing, and all other appurtenances and incidentals required to complete the Work in accordance with the Contract Documents. The Contractor shall be responsible for loading, transporting, and stockpiling the material generated from the landfill cell excavation for reuse. Material not incorporated back into the Work shall be loaded and transported to a designated on-site area as directed by the Owner.

E. Bid Item No. 005 – Subgrade - Fill – (Stockpile adjacent to construction area) (Cubic Yards)

Measurement: Measurement for the Work specified in this Bid Item will be on a cubic yard basis of fill material from a stockpile of soil adjacent to the construction area or re-located from within the construction limits required to complete the base grade for the landfill expansion, wherein measurement will be made by comparing required Preconstruction (less grubbing and stripping) and Subgrade Surveys to determine the quantity of additional approved off-site soil required to complete and achieve uniform grades as shown on the Contract Drawings. Additional partial surveys may be required to determine the additional off-site source fill material after using all approved soils obtained from Bid Item No. 004.

Payment: Payment for this bid item will be on a cubic yard basis of actual quantity of installed and accepted additional off-site fill to complete the base grade before placing the clay soil subbase. This pay item shall include all necessary materials, equipment, transportation, labor, and appurtenances, necessary to obtain soil from stockpile adjacent to the construction area or relocated from the construction limits, loading, hauling, placement, stockpiling, surveying, and all other appurtenances and incidentals required to complete the Work in accordance with the Contract Documents. The soil will be used to complete the subgrade within the Cell 2 Phase 1, construct roadbeds, berms, and other structures as shown on the Contract Drawings. No payment will be made for fill material installed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

F. Bid Item No. 006 – 24-inches of Compacted Clay Liner – On-Site Material (Cubic Yard)

Measurement for the work specified in this Bid Item will be on a cubic yard basis of 24 inches of Compacted Clay Liner below the Geosynthetics, from approved on-site source, installed and accepted within the Cell 2 Phase 1 footprint, wherein measurement will be made by estimating the volume between Subgrade Surveys and As-Built Liner Grades for Cell 2 Phase 1.

Payment: Payment for this Bid Item will be made on a cubic yard basis of actual in-place minimum 24 inches of Compacted Clay Liner below the Geosynthetics installed. This pay item shall include, but not limited to, all necessary labor, equipment, establishing

construction controls, surveying, excavation, loading, hauling, placement, stockpiling, and all other appurtenances and incidentals required to construct 24 inches of Compacted Clay Liner below the Geosynthetics within Cell 2 Phase 1 footprint in accordance with the Contract Drawings.

G. Bid Item No. 007 – Protective Cover/Drainage Sand Layer, 24-inches Minimum Thickness, (Onsite Material $1x10^{-2}$ cm/sec, less than 1/4") (Cubic Yard)

Measurement: Measurement for the WORK specified in this Bid Item will be on a cubic yard basis of Protective Cover/Drainage Sand Layer material, from approved on-site source, installed and accepted within the Cell 2 Phase 1 footprint, wherein measurement will be made by estimating the volume between As-Built Liner Grades within Cell 2 and the Protective Cover/Drainage Sand Layer system for Phase 1.

Payment: Payment for this Bid Item will be on a cubic yard basis of actual in-place quantity of installed and accepted Protective Cover Sand Layer material within the Cell 2 Phase 1 footprint. This pay item shall include all necessary materials, equipment, transportation, labor, and appurtenances necessary to obtain Protective Cover/Drainage Sand from approved on-site borrow areas, loading, hauling, stockpiling, placement, compaction, finish grading to achieve uniform grades, surveying, and all other incidentals required to install the 24 inches of Protective Cover Sand where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. Contractor shall locate the source of material for this line item on the landfill property and the unit price shall include all transportation costs, borrow area permitting fees, and all other incidentals. **No additional payment will be made for screening, if necessary, to meet particle size requirements.** No payment will be made for Protective Cover Sand placed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements or required depth without prior approval of the Engineer.

H. Bid Item No. 008 – 6-inch HDPE Leachate Collection System (Linear Feet)

Measurement: Measurement for the WORK specified in this Bid Item will be on a linear foot basis of 6-inch HDPE Leachate Collection Pipe (Perforated, All Inclusive), wherein measurement will be made in plan view for the LCRS system.

Payment: Payment for this Bid Item will be on a linear foot basis for actual quantity of installed and accepted 6-inch HDPE Leachate Collection Pipe. This pay item shall include all equipment, materials, labor and appurtenances, and incidentals necessary to install and tie-in the 6-inch HDPE Leachate Collection Pipe and rock trench between the existing Cell 1B and Cell 2 Phase 1 where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. This WORK shall include, but not be limited to, furnishing specified materials and documentation associated with the manufacture of the HDPE pipe materials, geotextile, and drainage stone, material delivery, stockpiling, inventory, placement, testing, tie-ins, pipe penetrations, surveying, cleaning of HDPE piping as necessary and supplying video documentation to prove it, fusion between existing and new 6-inch perforated pipe, installation of rock for the Leachate Collection System, fittings, quality control surveying, and all other incidentals for a complete and acceptable system associated with the WORK under this Bid Item. No

payment will be made for HDPE piping installed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

I. Bid Item No. 009 – Geosynthetic Clay Liner (Square Feet)

Measurement for the WORK specified in this Bid Item will be on a square foot basis of Geosynthetic Clay Liner (GCL) installed within the Cell 2 Phase 1 footprint, wherein measurement will be made in 3D area view using the Liner Survey including the anchor trench liner run out, and inter stage and inter phase berms, but not including overlaps, wastage, test samples, repairs, manufacturer's or installer's defect repairs, or other material required to complete installation.

Payment: Payment for this Bid Item will be made on a square feet basis for actual quantity of installed and accepted GCL. This pay item shall include all equipment, materials, labor, and appurtenances necessary to install the GCL where shown on the Contract drawings and in accordance with the Technical Specifications. This Work shall include, but not limited to, furnishing specified materials and documentation associated with manufacture of the GCL materials, delivery, stockpiling, inventory, deployment, manufacturer's quality control testing, placement, protection, cleaning, patching, tie-ins with existing Work, boots and connections required for liner penetrations, anchor trenches, welding, repairs. This bid item shall also include loading, hauling, and all other incidentals associated with the Work under this Bid Item. No payment will be made for GCL installed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

J. Bid Item No. 010 – 60-mil Textured HDPE Geomembrane Liner, (Square Feet)

Measurement: Measurement for the WORK specified in this Bid Item will be on a square feet basis of 60-mil Textured High Density Polyethylene (HDPE) Geomembrane Liner installed within the Cell 2 Phase 1 footprint, wherein measurement will be made in 3D area view using the HDPE Liner Surveys including the anchor trench, but not including overlaps, wastage, test sample, repairs, manufacturer's or installer's defect repairs, or other material required to complete the installation.

Payment: Payment for this Bid Item will be made on a square feet basis for actual quantity of installed and accepted 60-mil Textured HDPE. This pay item shall include all equipment, materials, labor and appurtenances necessary to install the 60-mil HDPE where shown on the Contract drawings and in accordance with the Technical Specifications. This Work shall include, but not limited to, furnishing specified materials and documentation associated with manufacture of the HDPE materials, delivery, stockpiling, inventory, deployment, manufacturer's quality control testing, placement, protection, cleaning, patching, tie-ins with existing Work, boots and connections required for liner penetrations, anchor trenches, welding, repairs, and all other incidentals associated with the Work under this Bid Item. No payment will be made for 60-mil HDPE geomembrane installed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

K. Bid Item No. 011 – Removal of Berm at Cell 1B and Cell 3A (Linear Feet)

Measurement: Measurement for the WORK specified in this Bid Item will be on a linear foot basis for the removal of Existing Stage Separation Berm for Cell 3A and Existing Phase Berm for Cell 1B. Measurement will be made in plan view from the as-built/installed survey. Contractor is responsible for the cut, removal, loading, unloading, on-site handling, and disposal of the existing 60-mil Rain Flap, existing 12-mil Rain Tarp with UV Resistant Sandbags, existing compacted soil as applicable, and waste removal for tie-in to existing protective cover.
Payment: Payment for this Bid Item will be made on a linear foot basis for actual quantity of Existing East Stage Separation Berm for Cell 3A and Existing South Phase Berm for Cell 1B removed. This pay item shall include all necessary materials, equipment, transportation, labor, appurtenances and incidentals, necessary for cutting, removing, loading, hauling, and disposal at a selected area adjacent to the active face (or as designated by the Owner) of the existing 60-mil Rain Flap, existing 12-mil Rain Tarp with UV Resistant Sandbags, existing compacted soil as applicable, and waste installed along the Existing East Stage Separation Berm for Cell 3A and Existing South Phase Berm for Cell 1B in accordance with the Technical Specifications and CQA Plan. Any damage to the existing certified 60-mil Geomembrane Liner shall be repaired by the Contractor at no cost to the Owner.

L. Bid Item No. 012 – East Stage Separation Berm Construction (Linear Feet)

Measurement: Measurement for the Work specified in this Bid Item will be on a linear feet basis wherein measurement will be made in plan view from the as-built/installed survey.

Payment: Payment for this Bid Item will be made on a linear foot basis of actual quantity of installed and accepted East Stage Separation Berm for Cell 2 Phase 1. This pay item shall include all equipment, materials, labor and appurtenances necessary to install the 60-mil HDPE where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan and all necessary materials, equipment, transportation, labor, and appurtenances necessary to obtain Structural Fill from approved on-site borrow areas, loading, hauling, stockpiling, placement, compaction, finish grading to achieve uniform grades, surveying, testing, and all other incidentals required to install the 12 inches minimum of Structural Fill for the East Stage Separation Berm where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. This WORK shall include, but not be limited to, inventory, on-site handling, deployment, CQC testing, placement, protection, cleaning, patching, fusion to existing certified 60-mil geomembrane for the liner system, boots and connections required for liner penetrations, anchor trenches, welding, repairs, securement with sandbags as necessary, as-built documentation, liner edge markers, and all other incidentals associated with the WORK under this Bid Item. No payment will be made for 60-mil HDPE geomembrane installed outside of the construction baseline shown on the Contract Drawings or where installation does not meet the specified requirements without prior approval of the Engineer. Contractor shall locate the source of material for this line item on the landfill property and the unit price shall include all transportation costs, borrow area permitting fees, and all other incidentals. No payment will be made for Structural Fill placed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements or required depth without prior approval of the Engineer.

M. Bid Item No. 013 – Temporary Stormwater Berm at Leachate Pipe Termination (South Berm) Construction (Linear Feet)

Measurement: Measurement for the Work specified in this Bid Item will be on a linear feet basis wherein measurement will be made in plan view from the as-built/installed survey.

Payment: Payment for this Bid Item will be made on a linear foot basis of actual quantity of installed and accepted East Stage Separation Berm for Cell 2 Phase 1. This pay item shall include all equipment, materials, labor and appurtenances necessary to install the 60-mil HDPE where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. This WORK shall include, but not be limited to, inventory, on-site handling, deployment, CQC testing, placement, protection, cleaning, patching, fusion to existing certified 60 mil geomembrane for the liner system, boots and connections required for liner penetrations, anchor trenches, welding, repairs, securement with sandbags as necessary, as-built documentation, liner edge markers, and all other incidentals associated with the WORK under this Bid Item. No payment will be made for 60-mil HDPE geomembrane installed outside of the construction baseline shown on the Contract Drawings or where installation does not meet the specified requirements without prior approval of the Engineer.

N. Bid Item No. 014 – 12-mil Rain Tarp with UV Resistant Sandbags (Square Feet)

Measurement: Measurement for the WORK specified in this Bid Item will be on a square foot basis of 12-mil Textured High Density Polyethylene (HDPE) geomembrane liner installed over the South Phase Berm, East Stage Separation Berm, and footprint for Cell 2 Phase 1. Measurements will be made in 3D area considering the surface of the South Phase Berm, East Stage Separation Berm, and the footprint of Cell 2 Phase 1, and will include anchors, but not include wastage, overlaps, test samples, repairs, manufacturer's or installer's defect repairs, or other material required to complete the installation. HDPE material will be purchased by the Contractor and delivered to the Landfill. Contractor is responsible for the unloading, on-site handling, storage, and installation of HDPE.

Payment: Payment for this Bid Item will be made on a square foot basis for actual quantity of installed and accepted 12-mil Textured HDPE. This pay item shall include all equipment, materials, labor and appurtenances necessary to install the 12-mil HDPE where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. This WORK shall include, but not be limited to, unloading, stockpiling, inventory, on-site handling, deployment, CQC testing, placement, protection, cleaning, patching, tie-ins with existing Work, boots and connections required for liner penetrations, anchor trenches, welding, repairs, securement with UV Resistant Sandbags as necessary, as-built documentation, and all other incidentals associated with the WORK under this Bid Item. No payment will be made for 12-mil HDPE geomembrane where installation does not meet the specified requirements without prior approval of the Engineer.

O. Bid Item No. 015 – Tie-In to Existing Liner (Linear Feet)

Measurement: Measurement for the specified in this Bid Item will be on a lump sum basis for tie-in to the existing leachate line and liner system wherein measurement will be made based on percentage of Work completed.

Payment: Payment for this Bid Item will be made on a lump sum basis based on a percentage of work completed and accepted by the Engineer. The pay item shall include all equipment, materials, labor and appurtenances necessary to connect to the existing liner system and leachate line. The Work shall include all exposing the existing bottom liners, cleaning exposed existing liner, and connections to the existing clay, GCL (if applicable), HDPE liner systems, and leachate piping. Excavation of waste to access the existing leachate piping and bottom liners should not be included in this Bid Item and shall be included in Bid Item 004.

P. Bid Item No. 016 – Investigate Existing Underdrains (Each)

Measurement: Measurement for this Work will be made on a completed unit basis of excavated potholes, wherein measurement will be made based on number of potholes excavated.

Payment: Payment for this Bid Item will be the contract unit price per excavated pothole to top of actual existing underdrain, at reasonably assumed 7-foot to 10-foot depth of existing underdrain. Excavation depths of each pothole may vary based on existing ground surface elevations and assumed underdrain elevation. Existing ground surface elevations and the assumed or previously surveyed elevations, if available, of the existing underdrain end points are provided in the Drawings. This pay item shall include all equipment, materials, labor and appurtenances necessary to excavate and discover the limits of the existing underdrain as shown on the Contract Drawings and in accordance with the Technical Specifications. This Work shall include, but is not limited to, installing shoring and protection measurements, removal of excavated materials to areas on-site designated by the Owner, surveying, de-watering, and all other incidentals associated with the Work under this Bid Item.

Q. Bid Item No. 017 – Under Drain (Linear Feet)

Measurement: The Work required for this bid item will be measured for payment on a linear cubic yard basis of under drain installed in compliance with the Specifications.

Payment: The Unit Price for this item shall be payment in full for the Contractor to provide all labor, materials, and equipment necessary to construct the under drain as indicated on the Drawings. Work shall include survey control, over-excavation as required, pipe, fittings, stone backfill, geotextile, backfill to subgrade, and all other work necessary for completion of the underdrain in accordance with the Contract documents.

Optional Bid Item No. 018 – All Weather Access Roads

Measurement: Measurement for the specified in this Bid Item will be on a square yard basis for all-weather access road wherein measurement will be made based on percentage of Work completed.

Payment: Payment for this Bid Item will be on a square yard basis for completed and accepted all-weather access road. This pay item shall include all equipment, materials, labor and appurtenances necessary to grade and compact the road subgrade, and install the geotextile, surge stone, and compacted crusher run as shown on the Contract Drawings and in accordance with the Technical Specifications. This Work shall include, but not limited to, subgrade preparation and proofrolling, removal and replacement of objectionable subgrade material, fine grading, compaction of subgrade, surge stone & compacted crusher run courses (furnishing, placing, and compacting), testing, and all other incidentals associated with the Work under this Bid Item. No payment will be made where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

R. Alternate Bid Item No. 007A – Protective Cover/Drainage Sand Layer, 24-inches Minimum Thickness, (Onsite Material, less than 3/4") (Cubic Yard)

Measurement: Measurement for the WORK specified in this Bid Item will be on a cubic yard basis of Protective Cover/Drainage Sand Layer material, from approved on-site source, installed and accepted within the Cell 2 Phase 1 footprint, wherein measurement will be made by estimating the volume between As-Built Liner Grades within Cell 2 and the Protective Cover/Drainage Sand Layer system for Phase 1.

Payment: Payment for this Bid Item will be on a cubic yard basis of actual in-place quantity of installed and accepted Protective Cover Sand Layer material within the Cell 2 Phase 1 footprint. This pay item shall include all necessary materials, equipment, transportation, labor, and appurtenances necessary to obtain Protective Cover/Drainage Sand from approved on-site borrow areas, loading, hauling, stockpiling, placement, compaction, finish grading to achieve uniform grades, surveying, and all other incidentals required to install the 24 inches of Protective Cover Sand where shown on the Contract Drawings and in accordance with the Technical Specifications and CQA Plan. Contractor shall locate the source of material for this line item on the landfill property and the unit price shall include all transportation costs, borrow area permitting fees, and all other incidentals. **No additional payment will be made for screening, if necessary, to meet particle size requirements.** No payment will be made for Protective Cover Sand placed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements or required depth without prior approval of the Engineer.

S. Alternate Bid Item No. 007B – Double-Sided Geocomposite (6-oz non-woven geotextile) (Square Feet)

Measurement for the WORK specified in this Bid Item will be on a square foot basis of Double-Sided Geocomposite (geocomposite) installed within the Cell 2 Phase 1 footprint, wherein measurement will be made in 3D area view using the Liner Survey including the anchor trench liner run out, and inter stage and inter phase berms, but not including overlaps, wastage, test samples, repairs, manufacturer's or installer's defect repairs, or other material required to complete installation.

Payment: Payment for this Bid Item will be made on a square feet basis for actual quantity of installed and accepted geocomposite. This pay item shall include all

equipment, materials, labor, and appurtenances necessary to install the geocomposite where shown on the Contract drawings and in accordance with the Technical Specifications. This Work shall include, but not limited to, furnishing specified materials and documentation associated with manufacture of the geocomposite materials, delivery, stockpiling, inventory, deployment, quality control testing, placement, protection, cleaning, patching, tie-ins with existing Work, boots and connections required for liner penetrations, anchor trenches, welding, repairs. This bid item shall also include loading, hauling, and all other incidentals associated with the Work under this Bid Item. No payment will be made for geocomposite installed outside of the construction baseline shown on the Contract Drawings or where testing has indicated the material does not meet the specified requirements without prior approval of the Engineer.

END OF SECTION

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.01 PROJECT DESCRIPTION

A. The project work to be performed by the CONTRACTOR consists of furnishing all labor, materials, equipment, tools, transportation, services, incidentals, and performing all work necessary to complete the project, in place and ready for service in accordance with the Plans and Specifications prepared therefore and entitled "Phase III, Stage I - Cell 3B2 Protective Cover Installation For Phase 3 Fill Sequence Plan ".

B. Geomembrane liner repair was completed in 2023 and covered with rain tarp. The WORK for this project includes, but is not limited to, excavation and grading, dewatering, and installation of the protective cover sand. Contractor shall peel rain tarp and provide notice to engineer and contractor for visual inspection of liner integrity, prior to protective cover installation in Phase 3 of Cell 3B2. Contractor to provide notice to engineer and leak detection testing contractor about leak detection test. The WORK also includes Installation of a constructing leachate collection trenches and piping, associated quality assurance testing, tie-ins to existing conditions, stormwater control structures and conveyances.

1.02 WORK SEQUENCE

Construction work is to be sequenced to accommodate work with any other contractors on site or COUNTY forces. WORK shall be sequenced in order to prevent disruption of leachate forcemain, landfilling activities, or any other critical operations at the landfill.

1.03 CONTRACTOR USE OF PREMISES

A. Limit use of premises for work, storage, and access to allow work by other contractors, owner occupancy, and normal landfill operations.

B. Access: No later than 10 days after notice to proceed, the CONTRACTOR shall arrange with the COUNTY a sequence of procedures, means of access, space for storage of materials and equipment, and use of approaches and roadways. CONTRACTOR's use of the premises shall be confined to the areas approved by the COUNTY.

C. Smoking: Smoking is prohibited at the landfill.

D. CONTRACTOR shall not dispose any refuse on site without approval of the COUNTY and in accordance with Section 02220, Excavation, Backfill, Fill, and Grading.

E. CONTRACTOR shall coordinate with the COUNTY for available area to locate CONTRACTOR's trailer and laydown/staging area.

F. Areas outside the limits of construction that have been disturbed by the CONTRACTOR shall be returned to its original condition or better upon completion of the WORK at no additional cost to the COUNTY.

1.04 WORK HOURS

A. Regular working hours are defined as detailed in the Owner's specifications, allowable work times shall be Monday through Saturday from 7:00 a.m. to 5:00 p.m., excluding Sundays and Facility observed Holidays. Contractor shall request in writing to the Facility 48 hours prior to Sunday or Facility observed Holidays to work.

B. Requests for approval by the COUNTY to work other than regular working hours must be submitted to the COUNTY at least 48 hours prior to any proposed weekend work or scheduled extended workweek hours.

C. Periodic unscheduled work hours on weekdays will be permitted provided that two hours' notice is provided to the COUNTY. Maintenance and cleanup may be performed during hours other than regular working hours.

D. The CONTRACTOR shall reimburse the COUNTY for additional construction management and/or inspection costs incurred as a result of unscheduled work in excess of regular working hours. At the COUNTY 's option, unscheduled work costs may either be deducted from the Contractor's monthly payment request or deducted from the CONTRACTOR 's retainage prior to release of final payment. Construction management/inspection costs shall be as follows: Overtime rates shall be at 1.5 times the prevailing staff rates; and Sunday and holiday rates will be at 2 times the prevailing staff rates.

1.05 COUNTY OCCUPANCY AND LANDFILL OPERATIONS

The CONTRACTOR shall cooperate with the COUNTY during construction operations to minimize conflicts with COUNTY work and facilitate COUNTY usage. The CONTRACTOR shall perform the WORK so as not to interfere with the COUNTY's operations, maintenance, environmental monitoring, and other COUNTY activities at the site.

1.06 SITE CONDITIONS

A. Existing Grades: The existing grades may vary from those indicated on the Plans due to landfill settlement and ongoing filling operations.

B. Existing Features: The Contract Documents require the CONTRACTOR to field verify the location of existing features, see Section 01050, Site Conditions Surveys. Existing features include but may not be limited to the following: stormwater drainage structures and underground pipes, stormwater terraces and swales, leachate collection system cleanouts, sumps, pump stations, electrical panels, forcemain, utilities, roads, drainage culverts, monitoring wells and piezometers, fences, and buildings.

C. The CONTRACTOR shall enforce safety procedures to minimize hazards to workers, the public, and the environment.

1.07 ERRORS AND/OR OMISSIONS IN PLANS AND SPECIFICATIONS

The intent of the Specifications is to outline or indicate the items of work, or both, which cannot be readily shown on the Drawings and, further to indicate the types and qualities of materials. Drawings and specifications shall be considered as being complimentary and items or work mentioned or indicated in one and not in the other shall be included as if mentioned in both. Should Drawings disagree in themselves or with the Specifications the better quality or greater quantity of work or materials shall be estimated upon, and shall be provided.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01016

OCCUPANCY

PART 1 – GENERAL

1.01 PARTIAL OCCUPANCY BY OWNER

A. Whenever, in the opinion of the Engineer, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer, and such usage shall not be held to be in any way an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the resulting Contract. Pending final completion and acceptance of the Work, all necessary repairs and removals, due to defective materials or workmanship or to operations of the Contractor, of any section of the Work so put into use shall be performed by the Contractor at his own expense.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01041

COORDINATION OF WORK

PART 1 – GENERAL

1.01 GENERAL

A. Management of the project shall be through the use of a logical method of construction planning, scheduling, and cost value documentation as further described in the section entitled "Construction Scheduling," of these Specifications.

1.02 EXISTING LANDFILL

A. The existing Dean's Bridge Road Landfill must of necessity remain in operation while new construction is in progress.

B. The Contractor shall coordinate his work with the Owner so that construction will not restrain or hinder operation of the existing Deans Bridge Road Landfill. If, at any time, any portion of the landfill is out of service, the Contractor must obtain approval from the Owner as to the date, time and length of time that portion of the landfill will be out of service.

C. Connections to the existing facilities or alteration of existing facilities will be made at times when the piping or facility involved is not in use or at times, established by the Owner, when use of the piping or facility can be conveniently interrupted for the period of time needed to make the connection or alteration.

D. After having coordinated his work with the Owner, the Contractor shall notify the Engineer of the time, time limits, and methods of each connection or alteration. Engineer shall approve before any work is undertaken on the connections or alterations.

E. Before any roadway or facilities are blocked off, the Owner shall be contacted to coordinate operations for the landfill.

1.03 OTHER UTILITIES

A. The Contractor shall coordinate his operations with all utility companies in or adjacent to the area of his work. The Contractor shall require said utilities to identify their property in the field and provide drawings as necessary to locate their utilities.

1.04 SUBCONTRACTORS

A. Before beginning any work, the Contractor shall coordinate with all subcontractors as to location and method of subcontractor's work. No

payment will be made the Contractor for any work that must be redone due to lack of coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01050
SITE CONDITIONS SURVEY

PART 1 - GENERAL

1.01 SUMMARY

A. The CONTRACTOR shall perform, or obtain other professional subcontractors to complete surveys that meet the minimum standards of Chapter 180-7 of the Rules and Regulations of the State of Georgia, to document elevations, grades, locations, maintain survey control during construction, and perform related field engineering as specified in the Contract Documents.

B. Throughout this Section, all references to "SURVEYOR" shall mean a professional land surveyor licensed in the State of Georgia.

C. The CONTRACTOR shall provide civil, structural or other professional engineering services specified or required to execute the CONTRACTOR'S construction methods.

1.02 SURVEY REFERENCE POINTS

A. CONTRACTOR shall locate survey reference points prior to starting WORK and CONTRACTOR shall protect and preserve all permanent survey reference points during construction.

a) CONTRACTOR shall make no changes or relocate any survey reference point without prior written notice to the ENGINEER.

b) CONTRACTOR shall report to the ENGINEER when any survey reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

c) CONTRACTOR, at no additional cost to the OWNER, shall replace and re-survey reference points that have been lost or destroyed. The replaced survey reference point shall be surveyed by a registered professional land surveyor licensed in the State of Georgia. Replacement will be based on original survey control.

B. Prior to any WORK, the CONTRACTOR shall immediately notify the ENGINEER and OWNER of any discrepancies with the survey reference points from the coordinates and elevations provided.

1.03 RECORD DRAWINGS (AS-BUILT DRAWINGS)

A. All survey record documents, submitted to the ENGINEER for progress review, do not require the signature of a Professional Land Surveyor; however, a final record drawing set shall be signed and sealed by a professional land surveyor licensed in the State of Georgia.

B. Submitted record documents shall include the following:

a) As stages of the WORK are completed, CONTRACTOR will submit site surveys, signed and sealed by a professional land surveyor licensed in the State of Georgia. The Record Drawing information shall be submitted on 24-inch by 36-inch sheets, as well as AutoCAD Drawing files (compatible with AutoCAD r18 or later version). Five original signed and sealed hard copies (by a professional land surveyor licensed in the State of Georgia) with the AutoCAD drawing files, shall be submitted.

b) AutoCAD Drawing file requirements: Contour lines shall be continuous, unbroken polylines with a width of zero and an elevation (z-coordinate) assigned according to the elevation of the contour line. All spot elevations shall have horizontal controls with vertical z-coordinates. Contours shall be at one-foot intervals, with index contours at every fifth interval. Objects in the Record Drawings shall be drawn to scale. Unless otherwise stated, all surveys shall be at a scale of 1" = 50'.

c) Survey information (north, the grid, and the coordinates) is referenced to the East Zone of the Georgia State Plane Coordinate System, NAD 83, 2001 Adjustment. The elevations are to the National Geodetic Vertical Datum of 1929 (NGVD1929).

d) All submitted Record Drawings shall have survey control monuments shown on the Record Drawings for the purposes of orientation, both horizontally and vertically.

e) If multiple sheets are required for the Record Drawings, each sheet shall include match lines as required.

C. The CONTRACTOR understands and agrees that existing elevations and contours, which may be shown on the Contract Drawings, are solely for the ENGINEER'S information. Actual quantities of soils and other materials required to complete the Work are the CONTRACTOR'S responsibility. The CONTRACTOR shall determine existing elevations for the purpose of conducting the WORK as required by the Contract Documents. The CONTRACTOR is responsible to notify the OWNER and the ENGINEER in writing of any and all discrepancies prior to beginning WORK.

1.04 SUBMITTALS

A. The CONTRACTOR shall submit the name and address of the registered professional land surveyor licensed in the State of Georgia to the ENGINEER prior any work for record purposes only.

B. Upon request of the ENGINEER, the CONTRACTOR shall submit documentation signed by the licensed surveyor in the State of Georgia,

certifying that elevations and locations of improvements are in conformance with the Contract Documents, or if not in conformance, certify as to variances from the Contract Documents.

C. The CONTRACTOR shall provide and submit to the ENGINEER for approval, a signed and sealed drawings, representing the horizontal and vertical limits, as follows:

1. Preconstruction Survey: Prior to performing any earthwork, a preconstruction survey of the site must be provided to the ENGINEER for review. The preconstruction survey shall include:

a) Contractor shall survey the existing top of 60-MIL Geomembrane on a 50 foot by 50 foot grid, at a minimum, and at all grade breaks. Contractor shall provide the survey data to the ENGINEER for review and approval of the Protective Cover Sand Grading plan.

b) Survey of the existing conditions within the limits of construction of the Phase 3 FSP limits within cell 3B2, including stormwater diversion structures, and 25 feet beyond the limits of construction.

c) The survey shall be collected on a 50 foot by 50 foot grid, at a minimum, and note all above grade structures, piping, and stormwater features which may or will be impacted by the work and shall include the areal extent of existing sod that must be removed in order to enable the expansion and closure work to proceed.

d) The preconstruction survey shall include proposed location of the leachate forcemain pipe and connection points to existing forcemain system, and Cell 3B2 Phase 3 FSP rain tarp tie-ins and anchor trench locations.

e) Existing bottom anchor trenches for liner tie-in shall be staked and marked every 25 feet.

2. Leachate Collection System Tie-in Survey: Following completion of the preconstruction survey, required site clearing, grubbing, and stripping, the Contractor shall submit a survey consisting of tie-in locations and existing anchor trench limits to the Engineer for review, in order to verify locations, slope and grades.

a) The Contractor will provide survey locations of all pipe tie-ins to Leachate Collection System and anchor trench limits along the toe of Cells 3B1 and 3A.

3. LCRS / Protective Cover Survey: Following completion the Leachate Collection System Tie-in Survey, the Contractor will begin installation of the Leachate Collection and Removal System (LCRS) and Protective Drainage

Cover for Phase 3 FSP of Cell 3B2. The LCRS will be surveyed when complete, but before Protective Drainage Cover is placed, to determine LCRS is constructed to design slope. The Protective Drainage Cover will be surveyed when completed, to determine if the cover is constructed to design slope and thickness.

a) A topographic survey of the installed HDPE LCRS pipes and appurtenances. Pipe invert elevations and locations shall be noted, at a minimum, every 50 linear feet along each pipe and at each change in pipe size, type, direction and elevation.

b) The Protective Drainage Cover for Phase 3 FSP in Cell 3B2 shall be surveyed on a 50 foot by 50 foot grid, at a minimum, and as necessary so as to provide an accurate representation of the contour topography. A minimum of 24 inches, measured perpendicular to the slope, is required above the geosynthetic liner system in the Phase 3 FSP area in Cell 3B2.

5. Final Survey: The final survey will include:

a) All features of the project installed as part of the construction project and all existing features within the limits of construction.

b) The final survey will include, but is not limited to, the protective cover grades, stormwater structures, piping, modified sections of the stormwater ditch beside the southeast edge of Cell 3B2, LFG components, limits of liner, underground piping, forcemain, connections to existing Leachate Collection System, Leachate Pump Station, edge of liner posts, electrical connections to existing power grid, berms and access roads, sod and/or seeding limits, and all other features related to the Phase 3 FSP Protective Cover Construction in Cell 3B2.

6. Record Drawings - The CONTRACTOR shall provide and submit to the ENGINEER, for approval, signed and sealed Record Drawing surveys for all WORK (to include any areas outside the limits of construction disturbed by the CONTRACTOR) as follows:

a) The CONTRACTOR shall, throughout the project, maintain a redline set of construction drawings noting deviations or actual installed conditions for the Protective Cover Construction for Phase 3 in Cell 3B2. As part of Final Completion, the CONTRACTOR must submit a complete set of final Record Drawings based on the redlines maintained throughout the project which identify the actual constructed conditions. Record drawings shall use the Construction Drawings as a base and show changes by cloud and strikethrough in electronic format (AutoCAD r18 or later version). Record drawings shall incorporate the surveys listed above and any other changes made

to the project components into the set in order to create a single Record Drawing Set for the project.

b) Three draft copies of the completed Record Drawings, in both hardcopy and AutoCAD format, shall be submitted for review at substantial completion.

c) Five signed and sealed certified sets of final approved by ENGINEER Record Drawings and AutoCAD files shall be submitted for final acceptance.

7. Substantial completion cannot be granted until a draft set of Record Drawings in both hardcopy and AutoCAD file formats are submitted to the OWNER and ENGINEER for review.

8. Final completion cannot be granted until the certified Record Drawings signed and sealed by a Georgia licensed Professional Engineer or Land Surveyor and AutoCAD files for the Record Drawings are submitted to and approved by the OWNER and ENGINEER.

9. Partial Surveys of Work: It is understood that the Contractor may elect to construct the Protective Cover for Phase 3 FSP in Cell 3B2 at different time intervals and survey each section separately. Partial surveys must be submitted to the Engineer to determine that the section the Contractor is requesting to continue working in meets the design requirements. The Contractor may not continue work until the partial survey is approved. Partial surveys are not required to be signed and sealed at the time of submittal, however, the partial surveys used to compile the complete survey for each of the surveys listed above, must not deviate from the partial survey submitted and the complete survey must be certified for submittal. Payment for surveys will not be made until the complete, certified survey is submitted and approved. However, partial surveys may be used for payment of work items such as soil and piping upon review, agreement, and approval by the Owner, Engineer, and CQA Representative.

PART 2 - PRODUCTS (Not Used) PART

3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

A. The CONTRACTOR shall retain the services of a registered land surveyor licensed in the State of Georgia to identify existing control points and maintain survey control during construction.

B. The CONTRACTOR shall identify all survey reference points.

C. The CONTRACTOR shall provide civil, structural or other professional engineering services specified or required to execute the CONTRACTOR'S construction methods.

D. The CONTRACTOR shall be responsible for the preservation of all benchmarks, stakes, and marks. If any benchmarks, stakes, or marks are disturbed by the CONTRACTOR, the CONTRACTOR shall not proceed with any WORK until such points, marks, lines and elevations as may be necessary for the prosecution of the WORK have been established.

E. The accuracy of any method of staking shall be the responsibility of the CONTRACTOR. All engineering for vertical and horizontal control shall be the responsibility of the CONTRACTOR.

F. The surveyors shall maintain a complete, accurate log of all control and survey WORK as it progresses. This log shall be available for periodic review by the ENGINEER.

G. Grade elevations and locations will be required periodically during the prosecution of the WORK. The CONTRACTOR'S Georgia licensed land surveyor will provide and maintain as-built notes and a finished Record Drawing updated as construction is completed. Record Drawings reflecting elevations and location information shall be submitted to the ENGINEER.

H. All surveys shall be topographic surveys that meet the minimum standards of Chapter 180-7 of the Rules and Regulations of the State of Georgia. Surveys shall include (but are not limited to) grading, elevations, structure locations, pipe inverts, piping, and other permanent structures.

I. The topographic information collected shall be taken on a 50 foot by 50 foot grid (or as specified for the identified area), at a minimum, one point directly above the previous, as necessary to provide an accurate representation of the contour topography (i.e., spot elevations, grade breaks, ditches, mounds, etc.) and the thickness of the material placement from the previous. For ditches, and LCRS trenches, spot elevations shall be taken, at a minimum, every 50 linear feet to include, at a minimum, the centerline of the ditch/trench, the toe and top of ditch/trench slopes, and any grade breaks.

J. The CONTRACTOR shall survey the limits of the installed geosynthetic materials, anchor trench turn-down point, at the specified interval for the PROJECT around the perimeter and place markers delineating the limits of geomembrane every 100 feet along the anchor trench.

K. The elevation and grades shall be within an accuracy of 0.2 feet vertical and 0.5 feet horizontal as shown in the Contract Documents. Unless otherwise stated, all surveys shall be at a scale of 1" = 50', with contours at one-foot intervals.

L. For thickness verifications, no minor tolerances are acceptable. The thicknesses indicated on Contract Drawings are minimum thickness and cannot be less that the dimensions shown on the drawings.

END OF SECTION

SECTION 01051

GRADES, LINES AND LEVELS

PART 1 – GENERAL

1.01 DESCRIPTION

A. All work under the resulting Contract shall be constructed in accordance with the lines and grades on the plans or as given by the Engineer or Owner. The full responsibility for holding to alignment and grade shall rest upon the Contractor.

B. The Contractor will provide bench marks and stake the center of pipelines. The Contractor will be responsible for setting offsets from these points and all other layout and staking.

C. The Contractor shall safeguard all points, stakes, grade marks, bench marks, and monuments established on the work, shall bear the cost of re-establishing same if disturbed, and shall assume the entire expense of rectifying work improperly constructed due to failure to maintain and protect such established points, stakes, and marks.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Permits and Responsibilities

1. The Contractor shall, without any expense to the Owner, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable federal, state, and municipal laws, codes, and regulations, in connection with the execution of the Work. He shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others. He shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01070
ABBREVIATIONS AND DEFINITIONS

PART 1 - GENERAL

1.01 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or other published data of various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS AND ACRONYMS

AAMA	American Architectural Manufacturer's Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AHAM	Association of Home Appliance Manufacturer's
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute

AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
BF	Blind Flange
CBM	Certified Ballast Manufacturer's Association
CEMA	Conveyors Equipment Manufacturer's Association
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DCDMA	Diamond Core Drill Manufacturer's Association
EIA	Electronic Industries Association
EPA	United States Environmental Protection Agency
ETL	Electrical Testing Laboratories, Inc.
FSP	Fill Sequence Plan
GDOT	Georgia Department of Transportation
HDPE	High Density Polyethylene
HVAC	Heating, Ventilation, Air Conditioning
ICBO	International Conference of Building Officials
IE	Invert Elevation
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
IOS	International Organization for Standardization
ITE	Institute of Traffic Engineers
JEC	Joint Electrical Council
LFG	Landfill Gas
LLDPE	Linear Low-Density Polyethylene
MBMA	Metal Building Manufacturer's Association
MSW	Municipal Solid Waste
MPTA	Mechanical Power Transmission Association
NAAM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electric Code (Now NFPA)
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association

NPDES	National Pollutant Discharge Elimination System
NWMA	National Woodwork Manufacturers Association (Now NWWDA)
OSHA	United States Occupational Safety and Health Administration
PCA	Portland Cement Association
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
RFI	Request for Information
RIS	Redwood Inspection Service
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SMA	Screen Manufacturer's Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPR	Simplified Practice Recommendation
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SWANA	Solid Waste Association of North America
TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories
USDOT	United States Department of Transportation
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute
WWPA	Western Wood Products Association

1.03 DEFINITIONS

A. Wherever used in the Contract Documents the following terms 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 Contract between OWNER and CONTRACTOR covering the WORK to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

3. Application for Payment - The form accepted by ENGINEER which is to be used by CONTRACTOR 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 the bidder submitted on the prescribed form setting forth the prices for the WORK to be performed.

6. Bidding Documents - The Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. Bidding Requirements - Advertisement or Invitation to Bid, Instructions to Bidders, and the Bid Form.

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. Contract Documents - 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, the General Conditions, the Supplementary Conditions, the Specifications and the Contract 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 pursuant to the General Terms and Conditions on or after the Effective Date of the Agreement, Shop Drawing submittals and all reports and drawings referred to in Section 01300 Contractor Submittals.

11. Contract Price - The monies payable by OWNER to CONTRACTOR for completion of the WORK in accordance with the Contract Documents as stated in the Agreement.

12. Contract Times - The numbers of days or the dates stated in the Agreement:

- To achieve Substantial Completion and

- To complete the WORK so that it is ready for Final Payment as evidenced by ENGINEER'S written recommendation of Final Payment.

13. CONTRACTOR - The person, firm or corporation with whom OWNER has entered into the Agreement.

14. Contract Drawings - The Contract Drawings which show the scope, extent and character of the WORK to be furnished and performed by the CONTRACTOR and which have been prepared or approved by the ENGINEER and are referred to in the Contract Documents. Shop Drawings are not Contract Drawings as so defined.

15. Defective - An adjective which 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.

16. 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.

17. ENGINEER - The person, firm or corporation named as such in the Agreement.

18. ENGINEER'S Consultant - A person, firm or corporation having a contract with ENGINEER to furnish services as ENGINEER'S independent professional associate or consultant with respect to the Project.

19. OWNER'S REPRESENTATIVE - A person, firm or corporation having a contract with ENGINEER to furnish services as ENGINEER'S independent professional associate or consultant with respect to the Project.

20. Field Order - A written order issued by the ENGINEER which orders minor changes in the WORK, but which does not involve a change in the Contract Price or the Contract Times.

21. General Requirements - Sections of Division 1 of the Specifications.

22. 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.

23. Laws and/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.

24. Liens - Liens, charges, security interests or encumbrances upon real property or personal property.

25. 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.

26. Minor Changes/Variations in WORK - Authorized minor variations in the WORK from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or Contract Time and is compatible with the designed concept of the complete project.

27. Notice of Award - The written notice provided by the OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

28. Notice to Proceed - A written notice provided by the OWNER to CONTRACTOR (with a copy to the ENGINEER) fixing the date on which the Contract Time will commence and on which CONTRACTOR shall start to perform CONTRACTOR'S obligations under the Contract Documents.

29. OWNER - The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the WORK is to be provided.

30. 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.

31. PCBs - Polychlorinated biphenyls.

32. 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 Wastes and crude oils.

33. Project - The total construction of which the WORK to be provided under the Contract Documents may be the whole, or part as indicated elsewhere in the Contract Documents.

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

35. CONSTRUCTION QUALITY ASSURANCE (CQA) REPRESENTATIVE - Construction Quality Assurance (CQA) shall be the responsibility of the OWNER and CQA CONSULTANT who will act as the OWNER'S representative. The CQA CONSULTANT is a party independent of the CONTRACTOR(S), Geosynthetic Manufacturer and/or Installer, and is responsible for field testing, observing, and documenting activities related to the construction and/or permit documents and the CQA Plan. The CQA CONSULTANT will provide a full-time CONSTRUCTION QUALITY ASSURANCE (CQA) REPRESENTATIVE who will observe construction activities. For this project, the ENGINEER will also serve as the CQA CONSULTANT.

36. 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.

37. 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.

38. Specifications - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the WORK and certain administrative details applicable thereto.

39. Subcontractor - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the WORK at the site.

40. Substantial Completion - The WORK (or a specified part thereof) has progressed to the point where, in the opinion of the ENGINEER as evidenced by ENGINEER'S definitive Certificate of Substantial Completion, it is sufficiently complete in accordance with the Contract Documents so that the WORK (or specified part) can be utilized for the purposes for which it is intended; or if no such Certificate is issued, when the WORK is complete and ready for Final Payment as evidenced

by ENGINEER'S written recommendation of Final Payment. The terms "substantially complete" and "substantially completed" as applied to all or part of the WORK refer to Substantial Completion thereof.

41. Supplementary Conditions - The part of the Contract Documents which amends or supplements the General Conditions.

42. 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.

43. Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

44. Unit Price Work - WORK to be paid for on the basis of unit prices.

45. WORK - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. WORK includes, and is the result of, performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

46. Work Change Directive - A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by the OWNER and recommended by the ENGINEER, ordering an addition, deletion or revision in the WORK, or responding to differing or unforeseen physical conditions under which the WORK is to be performed. A Work Change Directive will not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed 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.

47. Written Amendment - A written Amendment of the Contract Documents, signed by OWNER/ENGINEER 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.

48. Products - Is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR'S stock of previously purchased products.

49. Materials - Products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of WORK.

50. Equipment - Products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, etc.).

B. Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms which are self-explanatory and have recognized meanings in the construction industry.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01080

APPLICABLE CODES AND STANDARDS

PART 1 – GENERAL

1.01 GENERAL

A. All materials, equipment, fabrication, and installation practices shall comply with the latest edition of the following applicable Codes and standards, except in those cases where the Contractor's quality standards establish more stringent quality requirements, as determined by the Engineer.

1. Pressure Piping and Tubing
ANSI (American National Standards Institute)
API (American Petroleum Institute)
ASME (American Society of Mechanical Engineers)
AWWA (American Water Works Association)
NSF (National Sanitation Foundation)

2. Materials
AASHTO (American Association of State Highway and Transportation Officials)
ANSI (American National Standards Institute)
ASTM (American Society for Testing and Materials)

3. Painting and Surface Preparation
NACE (National Association of Corrosion Engineers)
SSPC (Steel Structures Painting Council)

4. Gear Reducers and Bearings
AFBMA (Anti-friction Bearing Manufacturers Association)
AGMA (American Gear Manufacturers Association)

5. Ventilating Fans
AMCA (Air Moving and Conditioning Association)
PFMA (Power Fan Manufacturers Association)

6. Electrical and Instrumentation
EIA (Electronic Industries Association)
IEEE (Institute of Electrical and Electronic Engineers)
IPC (Institute of Printed Circuits)
IPCEA (Insulated Power Cable Engineers Association)
ISA (Instrument Society of America)
NEMA (National Electrical Manufacturers Association)
NFPA (National Fire Protection Association)
UL (Underwriter’s Laboratories)

7. Aluminum
   AA (Aluminum Association)
   AAMA (Architectural Aluminum Manufacturers Association)

8. Steel

   AISC (American Institute of Steel Construction)

9. Concrete
   ACI (American Concrete Institute)

10. Welding
    ASME (American Society of Mechanical Engineers)
    AWS (American Welding Society)

11. Safety
    OSHA (Occupational Safety and Health Act)

12. General Building Construction
    FM (Factory Mutual Fire Insurance Company)
    NFPA (National Fire Protection Association)
    SBC (SBCC Standard Building Code)

13. Subgrades and Pavement
    SSRBC (Standard Specifications for Road and Bridge Construction, Georgia Department of Transportation)

14. Ductwork and Sheet Metal Work
    SMACNA (Sheet Metal and Air Conditioning Contractors National Association)

15. Plumbing
    AGA (American Gas Association)
    NSF (National Sanitation Foundation)
    PDI (Plumbing Drainage Institute)
    SPC (SBCC Standard Plumbing Code)

16. Refrigeration, Heating, and Air Conditioning
    ARI (American Refrigeration Institute)
    ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers)

17. Pressure Vessels
    ASME (American Society of Mechanical Engineers)

In addition, all work shall comply with the applicable requirements of local codes, utilities, and other authorities having jurisdiction.

B. All material and equipment, for which a UL Standard, an AGA approval, or an ASME requirement is established, shall be so approved and labeled or stamped. Label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Owner may request meetings with the Contractor at any time on matters pertaining to the progress of Work being carried out under the resulting Contract. It will be the responsibility of the Contractor to supply whatever information is requested by the Owner concerning the project throughout its duration. Generally, progress meetings shall be held weekly at the Deans Bridge Road Landfill between the Owner, Engineer, and Contractor. Subcontractors shall not attend progress meetings unless otherwise requested by the Owner or Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01201

PRECONSTRUCTION CONFERENCE

PART 1 – GENERAL

1.01 DESCRIPTION

A. After award of Bid and prior to beginning construction, a conference will be held with representatives of the Contractor, Owner, Engineer and the affected utility companies to discuss schedules and utility conflicts in the Project. This conference is intended to establish lines of communication between the parties involved. Time and place of preconstruction conference will be determined by the Owner and Engineer after the bid has been awarded.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULING

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contractor shall submit to the Engineer for approval construction planning, scheduling, and cost value documentation pertaining to the project as detailed herein and shall update same throughout the project as required.

1.02 SUBMITTAL PROCEDURES

A. Within ten (10) calendar days of Notice to Proceed, the Contractor shall submit the products required by this section of the Specifications to the Engineer for approval.

B. Within five (5) working days following receipt of same, the Engineer shall arrange for a meeting with the Contractor so as to familiarize the Engineer with the Contractor's proposed construction plans and schedules.

C. Within five (5) working days following the Engineer's review, the Contractor shall resubmit a corrected copy of those documents requiring revision.

D. Within five (5) working days following his receipt of the adequately revised documents, the Engineer will approve same for use on the project.

E. Once approved, the Contractor shall submit four (4) copies of the construction scheduling documents to the Engineer for use on the project.

F. The Contractor shall update the work schedules at least monthly and indicate those activities whose completion dates are in jeopardy because of activities behind schedule.

G. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule.

H. The Owner may require the Contractor to modify any portions of the work schedule that become infeasible because of activities behind schedule or for any other valid reason. Any such modification will be at the Contractor's expense unless the modification is required to accommodate schedule revisions required by the Owner.

1.03 CHANGE ORDERS

Upon execution of a Change Order by the Owner, the approved change shall be reflected in the next submittal by the Contractor.

PART 2 - PRODUCTS

2.01 CONSTRUCTION PROGRESS SCHEDULE

A. The Construction Progress Schedule shall be submitted in a form satisfactory to the Owner showing:

1. Activity Number

2. Activity Description

3. Estimated Activity Duration (Work Days)

4. Activity Start Date (Calendar Dated)

5. Activity Finish Date (Calendar Dated)

6. Activity Cost

of each of the various subdivisions of work required under the Contract Document, Specifications, and Drawings.

B. The progress schedule shall include the anticipated amount of each monthly payment that will become due to the Contractor. This anticipated monthly payment schedule shall distribute the costs of the project more or less evenly over the scheduled project life in a manner acceptable to the Owner and compatible with the Owner's funding arrangements for the project. Re-submittal will be required until anticipated monthly payment schedule is acceptable to Owner. Substantial variation from this schedule of payments will not be permitted.

C. The activity durations shall be depicted in the form of a bar chart and shall be overlaid with graph of the cumulative anticipated monthly payments due the Contractor.

2.02 ESTIMATES

A. The Detailed Estimates shall give a complete and satisfactory breakdown of the contract amount.

B. Periodic Itemized Estimates shall detail work done for the purpose of tabulating partial payments.

2.03 PROJECT INFORMATION

A. Each tabulation shall be prefaced with the following summary data:

1. Project Name

2. Contractor

3. Type of Tabulation (Initial or Updated with revision number)

4. Project Duration

5. Project Scheduled Completion Date

6. Effective or Starting Date of the Schedule

7. If an updated (revised) schedule, the new project completion date and project status

2.04 SCHEDULE MONITORING

A. When specifically requested by the Engineer, the Contractor shall submit to the Engineer a revised schedule for those activities that remain to occur.

B. The revised schedule shall be submitted in the form, sequence, and of the number of copies requested for the initial schedule.

2.05 COST VALUE FOR ACTIVITIES

A. The Contractor shall establish and submit a cost value for each activity in his progress schedule and estimates so that monthly partial payments to the Contractor can be calculated on the basis of work in place.

B. All cost value reports for network activities shall be based upon the close of books as of the 20th day of each month, and the submittal of such costs value for activities shall be submitted to the Engineer for review and approval not later than the 25th day of each month.

C. Costs of materials delivered to the site but not yet incorporated into the Work shall be included as a separate pay item and shall not be included in the cost value of the installation activity for such materials.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 – GENERAL

1.01 DESCRIPTION AND REQUIREMENTS

A. Type of Submittals

1. This Section of the specifications describes the procedures for submittals such as shop drawings, product data, samples and miscellaneous work-related submittals. It does not include the submittals required for administrative work.

B. Submittal Contents

1. The submittal contents required are specified in each section.

C. Definitions

1. Submittals are categorized as follows:

a. Shop Drawings

1) Shop drawings shall include technical data, drawings, diagrams, performance curves, schedules, templates, patterns, reports, calculation, instructions, measurements and similar information as applicable to specific item for which the shop drawing is prepared.

2) Provide newly-prepared information on reproducible sheets with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawing copies without appropriate final "Action" markings by the Engineer to be used in connection with the Work.

b. Product Data

1) Product data includes standard printed information on materials, products and systems, not specially prepared

for this project, other than the designation of selections from among available choices printed therein.

2) Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and special coordination requirements.

c. Samples

1) Samples include both fabricated and unfabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or (where indicated) for more detailed testing and analysis.

2) Provide units identical with final condition of proposed materials or products for the Work. Include "range" samples (not less than 3 units) where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Engineer's selection is required. Prepare samples to match the Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by the Engineer. Engineer will not "test" samples (except as otherwise indicated) for other requirements, which are the exclusive responsibility of the Contractor.

3) Miscellaneous submittals related directly to the Work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

D. Quality Requirements

1. Documents submitted to Engineer that do not conform to specified requirements shall be subject to rejection by Engineer, and upon request by Engineer, Contractor shall resubmit conforming documents. If conforming submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Contractor's (or his Subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve Contractor (or his Subcontractors) from meeting the required schedule for submittal times.

1.02 GENERAL SUBMITTAL REQUIREMENTS

A. Scheduling

1. Where appropriate in various required administrative submittals (listings of products, manufacturers, supplier and subcontractors, and in job progress schedule), show principal work-related submittal requirements and time schedules for coordination and integration of submittal activity with related work in each instance.

2. A list of all shop drawing submittals necessary to complete the project with scheduled submittal dates shall be submitted to the Engineer for review and approval.

B. Coordination of Submittal Times

1. Prepare and transmit each submittal to the Engineer at least fifteen (15) calendar days in advance of performing related work or other applicable activities, so the installation will not be delayed or improperly sequenced by processing times, including non-approval and re-submittal (if required). Coordinate with other submittals, testing, purchasing, delivery and similar sequenced activities. No extension of time will be authorized because of Contractor's failure to transmit submittals to the Engineer in advance of the work.

C. Sequencing Requirements

1. As applicable in each instance, do not proceed with a unit of work until submittal procedures have been sequenced with related units of work, in a manner which will ensure that the action will not need to be later modified or rescinded by reason of a subsequent submittal which should have been processed earlier or concurrently for coordination.

D. Preparation of Submittals

1. Provide permanent marking on each submittal to identify project, date, Contractor, subcontractor, submittal name, submittal number, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for the Engineer's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor's office will be returned "without action." Owner/Engineer bears no responsibilities for delays in work due to such.

E. Transmittal Identification

1. Number transmittals in sequence for each Division of the Specifications. The number after the dash indicates the Section of the Specifications, and the number before the dash is the sequence number of the transmittal (1-15140 would be the first transmittal applicable to Section 15140 of the Specifications, 2-15140 would be the second transmittal for Section 15140, etc.)

2. Identify re-submittals with a letter of the alphabet following the original number, using A for the first re-submittal, B for the second re-submittal, etc. A re-submittal affecting transmittal 1-15140 would then be numbered 1A-15140. The number 1-15140 would then be entered in the space "Previous Transmittal Number," which is left blank except on re-submittals.

1.03 SPECIFIC CATEGORY REQUIREMENTS

A. General

1. Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal.

2. Submittals shall contain:

a. The date of submittal and the dates of any previous submittals.

b. The project title:

c. Contract No.

d. The names of the:

1) Contractor

2) Supplier

3) Manufacturer

e. Identification of the product, with the Specification Section number and equipment tag numbers.

f. Field dimensions, clearly identified as such.

g. Relation to adjacent or critical features of the work or materials.

h. Applicable standards, such as ASTM or Federal Specification numbers.

i. Notification to the Engineer in writing, at time of submittal, of any deviations on the submittals from requirements of the Contract Documents.

j. Identification of revisions on resubmittals.

k. An 8 inch x 3 inch blank space for Contractor and Engineer stamps.

l. Contractor's stamp, initialed or signed, certifying review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

m. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.04 ROUTING OF SUBMITTALS

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable) for preliminary check.

2. Contractor to Engineer for general review or comment.

3. Engineer to Contractor

4. Contractor to Supplier.

1.05 ADDRESS FOR COMMUNICATIONS

Owner:
Augusta ESD
535 Telfair St #100,
Augusta, GA 30901
or
Dean's Bridge Road Landfill
4330 Deans Bridge Rd, Blythe, GA 30805
(706) 592-3200
Contact: Hameed Malik, PhD, P.E.

Engineer:
SCS Engineers
3175 Satellite Blvd., Bldg. 600, Suite 100
Duluth, GA 30096
(678) 319-9849
Contact: Shashank Patel, P.E.

1.06 SUBMITTAL COPIES REQUIRED

A. Shop Drawings, Product Data, and Miscellaneous Submittals

1. All submittals marked "A" or "B" will be distributed as follows:

Engineer	1 copy
Contractor	3 copies
Owner	1 copy
Construction Quality Assurance Consultant	1 copy
Total	6 copies

B. To the above number may be added additional copies as required by the Contractor.

C. The Engineer shall mark all copies of each shop drawing. One will be retained in the Engineer's office, one sent to the Field Inspection office, one will be retained for the Owner and the remaining copies sent to the Contractor for his records and distribution.

D. For non-approval items, such as parts lists and operation or maintenance manuals, 5 copies are required, unless specified otherwise:

Engineer	1 copy
Owner	4 copies
Total	5 copies

E. Samples

1. In accordance with the specifications, the Contractor shall furnish certified samples of materials utilized in the fabrication or production of equipment, materials, and products supplied under these Contract Documents. Cost of all such samples and shipping shall be borne by

the Contractor. The samples shall be tested by a qualified independent testing laboratory selected by the Owner to determine if properties of the materials supplied are in accordance with the requirements of these Specifications and Contract Documents. The Owner shall pay for the laboratory testing of material samples provided by the Contractor. The Contractor shall pay for all retests made necessary by the failure of materials to conform to the requirements of these Specifications and Contract Documents at no cost to the Owner.

1.07 REVIEW OF SUBMITTALS

A. Review Time

1. Allow a minimum of two (2) calendar weeks for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer shall advise the Contractor promptly in writing when it is determined that a submittal being processed must be delayed for coordination. Allow two (2) weeks for reprocessing each submittal. Advise the Engineer on each submittal as to whether processing time is critical to progress of the Work, and whether the Work would be expedited if processing time could be reduced.

B. Engineer's Action

1. Final Unrestricted Release

a. Work may proceed, provided it complies with Contract Documents, when submittal is returned with the following:

Marking: "A" - No Exceptions Taken.

2. Final-But-Restricted Release

a. Work may proceed, provided it complies with notations and corrections on submittal and with Contract Documents, when submittal is returned with the following:

Marking: "B" - Exceptions Taken as Noted.

3. Returned for Re-submittal

a. Do not proceed with Work. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Do not allow submittals with the following marking (or unmarked submittals where a marking is required) to be used in connection with performance of the work.

Marking: "C" - Revise and resubmit.

"D" - Rejected - Does Not Comply with Project Requirements.

b. Only two copies of items marked "C" or "D" will be reviewed and marked. One copy will be retained and the other copy with all remaining unmarked copies will be returned to the contractor for re-submittal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 SITE INVESTIGATION AND CONTROL

A. CONTRACTOR shall verify all dimensions in the field and check field conditions continuously during construction. CONTRACTOR shall be solely responsible for any inaccuracies built into the WORK due to CONTRACTOR'S failure to comply with this requirement.

B. CONTRACTOR shall inspect related and appurtenant WORK and report in writing to OWNER and ENGINEER any conditions which will prevent proper completion of the WORK. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the CONTRACTOR at CONTRACTOR'S sole cost and expense.

1.02 INSPECTION OF THE WORK

A. All WORK performed by the CONTRACTOR shall be inspected by the CONTRACTOR and designated OWNER PROJECT MANAGER and nonconforming WORK shall be noted and promptly corrected. The CONTRACTOR is responsible for the WORK conforming to the Contract Documents.

B. The WORK shall be conducted under the general observation of the ENGINEER and is subject to inspection by representatives of the OWNER acting on behalf of the OWNER to ensure compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The ENGINEER or any inspector(s) shall be permitted access to all parts of the WORK, including plants where materials or equipment are manufactured or fabricated.

C. The presence of the ENGINEER or any inspector(s), however, shall not relieve the CONTRACTOR of the responsibility for the proper execution of the WORK in accordance with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the ENGINEER or any inspector(s). Inspection of WORK, later determined to be nonconforming shall not be cause or excuse for acceptance of the nonconforming WORK. The acceptance of nonconforming WORK shall be approved by the OWNER when adequate compensation is offered and it is in the OWNER'S best interest.

D. All materials and articles furnished by the CONTRACTOR shall be subject to inspection, and no materials or articles shall be used in the WORK until they

have been inspected and accepted by the ENGINEER or other designated representative. No WORK shall be backfilled, buried, cast in concrete, hidden, or otherwise covered until it has been inspected. Any WORK so covered in the absence of inspection shall be subject to uncovering at the CONTRACTOR'S expense. Where uninspected WORK cannot be uncovered, such as in concrete cast over reinforcing steel, all such WORK shall be subject to demolition, removal, and reconstruction under proper inspection and no additional payment will be allowed.

1.03 TIME OF INSPECTION AND TESTS

A. Any samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. CONTRACTOR shall furnish and prepare all required test specimens at CONTRACTOR'S own expense. Whenever the CONTRACTOR is ready to backfill, bury, cast in concrete, hide, or otherwise cover any WORK under this Contract, the ENGINEER shall be notified not less than 24 hours in advance to request inspection before beginning any such WORK of covering. Failure of the CONTRACTOR to notify the ENGINEER at least 24 hours in advance of any such inspections shall be reasonable cause for the ENGINEER to order a sufficient delay in the CONTRACTOR'S schedule to allow time for such inspection, any remedial, or corrective work required, and all costs of such delays, including its impact on other portions of the WORK, shall be borne by the CONTRACTOR.

1.04 SAMPLING AND TESTING

A. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered. However, the OWNER reserves the right to use any generally-accepted system of inspection which, in the opinion of the ENGINEER, will ensure the OWNER that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the ENGINEER shall reserve the right to make independent investigations and tests as specified in the following paragraph and, upon failure of any portion of the WORK to meet any of the qualitative requirements of the Contract Documents, shall be

reasonable cause for the ENGINEER to require the removal or correction and reconstruction of any such WORK.

D. In addition to any other inspection or quality assurance provisions that may be specified, the ENGINEER shall have the right to independently select, test, and analyze, at the expense of the OWNER, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the CONTRACTOR to determine compliance with the applicable specifications for the materials so tested or analyzed provided that wherever any portion of the WORK is discovered, as a result of such independent testing or investigation by the ENGINEER, which fails to meet the requirements of the Contract Documents, all costs of such independent inspection and investigation and all costs of removal, correction, reconstruction, or repair of any such WORK shall be borne by the CONTRACTOR.

1.05 RIGHT OF REJECTION

A. The ENGINEER or designated representative, acting for the OWNER, shall have the right at all times and places to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the WORK at the site. If the ENGINEER or designated representative, through an oversight or otherwise, has accepted materials or WORK which is defective or which is contrary to the Contract Documents, such material, no matter in what stage or condition of manufacture, delivery, or erection, may be rejected.

B. CONTRACTOR shall promptly remove or replace rejected articles or materials from the site of the WORK after notification of rejection.

C. All costs of removal and replacement of rejected articles or materials, as specified herein, shall be borne by the CONTRACTOR.

D. Failure to promptly remove and replace rejected work shall be considered a breach of this Specification and the OWNER may after 7 days notice, terminate the CONTRACTOR'S right to proceed with the affected work and remove and replace the WORK and issue a back charge to cover the cost of the WORK.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 QUALITY CONTROL PLAN

A. The CONTRACTOR shall prepare and submit a Quality Control Plan to the ENGINEER for the WORK contained in the Contract Documents prior to

beginning WORK. The Quality Control Plan will indicate the actions, documentation, and responsible party or parties that will assure compliance with the Technical Specifications and Contract Documents and quality requirements for inspections and testing that must be implemented. The Quality Control Plan will contain a checklist of quality control related activities applicable to various construction activities for scheduling and implementation purposes.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 – GENERAL

1.01 TEMPORARY LIGHT

A. The Contractor shall provide temporary lighting facilities for the proper execution and inspection of the Work. These facilities shall be installed and maintained by the Contractor and shall be located in such a manner as to result in the least interference with work upon the project site and existing facilities.

1.02 TEMPORARY POWER

A. The Contractor shall provide temporary power facilities required for the proper execution and inspection of the Work. These facilities shall be installed and maintained by the Contractor, and shall be located in such a manner as to result in the least interference with work upon the project site and existing facilities. Temporary power facilities shall remain in place after completion of construction until final acceptance of the Work. After final acceptance of the Work, the Contractor shall remove temporary power facilities.

1.03 TEMPORARY HEATING

A. Concrete Curing

1. When the mean daily temperature of the atmosphere is less than 40˚F, the temperature of concrete shall be maintained between 50˚F and 70˚F for two days following placement. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. The Contractor shall provide temporary heat for proper execution of the Work.

1.04 TEMPORARY WATER

A. The Contractor shall make the necessary arrangements for securing and transporting all water required in the construction, including water required for mixing of concrete, sprinkling, testing, flushing, flooding or jetting and including any temporary pipeline or equipment which may be necessary to make use of such water.

1.05 POTABLE WATER

A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, Engineers and the Owner who are associated with the Work.

1.06 TEMPORARY TELEPHONE SERVICE

A. The Contractor shall provide telephone service, including long distance, for the duration of the project, at the Contractor's and the Engineer's field offices.

1.07 SANITARY FACILITIES

A. The Contractor shall provide sufficient sanitary facilities in proximity to the areas of work for his employees and those employees of his subcontractors. The Contractor will be responsible for continual maintenance and servicing of these facilities.

1.08 FIRST-AID FACILITIES

A. The Contractor shall maintain at a well-known place at the job site, all articles necessary for giving first-aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the job site. In no case, shall employees be permitted to work at a job site before the employer has made a standing arrangement (verified in writing to the Owner within ten (10) calendar days of the Notice to Proceed) for removal of injured persons to a hospital or a doctor's care.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01540

JOB SITE SECURITY

PART 1 – GENERAL

1.01 BARRICADES AND LIGHTS

A. The Contractor shall furnish and erect such barricades, fences, lights, and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction.

B. The Contractor will be held responsible for all damage to the Work due to failure of barricades, signs, and lights to protect it and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at his cost and expense. The Contractor's responsibility for the maintenance of barricades, signs, and lights shall not cease until the project has been accepted by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Contractor shall limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control.

1.02 PROTECTION OF ADJACENT PROPERTY

A. The bidders shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the work site that may be damaged by their operations. The successful Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from his operations.

B. Dust, Fumes, Spray, or Spills

1. Contractor shall protect all existing facilities (indoors or out) from damage by the above hazards (indoors or out).

2. Contractor shall protect motors, bearings, electrical gear, instrumentation, and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01590

FIELD OFFICES

PART 1 - GENERAL

1.01 ENGINEER'S FIELD OFFICE

A. The Contractor shall provide, equip and maintain an Engineer's office space (prefabricated building or mobile trailer), properly weatherproofed, skirted, and adequately anchored against 100 mile per hour gusts and winds. The office building shall be located near the project site and shall be in the vicinity of the Contractor's offices and buildings.

B. The office shall contain a minimum of 300 square feet of floor space.

C. Walls, ceilings, and floors shall be adequately insulated.

D. Interior finishes shall be manufacturer's standard, subject to approval.

E. The office building shall be adequately wired for electricity in accordance with applicable Codes to handle the total lighting, air conditioning, and other loads. Lighting fixtures, in adequate numbers, shall be installed to give an illumination of 150 foot candles average and minimum glare. Fluorescent lamp fixtures with minimum 45 degrees shielding will be required.

F. The building shall contain 110-volt convenience outlets, and 220-volt grounded wall outlets.

G. Contractor shall install and maintain air conditioning and heating combination unit to maintain 78˚F inside in winter with outside air temperature of 20˚F and 72˚F inside in summer with the outside air temperature of 100˚F.

H. Telephone jacks shall be installed.

I. Awnings over windows and entrance stoops are required.

J. Venetian type blinds shall be installed on all windows.

K. Windows and outside entrance doors shall be properly screened.

L. Acoustical tile ceiling shall be installed.

M. Outside door shall have a lock.

N. Indoor bathroom with water and temporary sewer shall be installed and maintained.

O. Furnishings

1. The Contractor shall provide and maintain the following furniture and furnishings for the Engineer's office facilities:

   a. One 8-foot double desk with two 2-drawer metal file pedestals and two pencil drawers.

   b. Two executive swivel chairs on castors.

   c. Six side chairs.

   d. Telephone service with long distance for duration of project.

   e. Fax machine with service contract and long distance service for duration of project.

   f. Photo copier with service contract for duration of project.

   g. Bottled water dispenser with refills for duration of project.

   h. 5-foot folding table.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01610

TRANSPORTATION AND HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide transportation of all equipment, materials, and products furnished under these Contract Documents to the site of the Work. In addition, the Contractor shall provide preparation for shipment and storage, unloading, handling and re-handling, short-term storage, extended storage, storage facilities, maintenance and protection during storage, preparation for installation, and all other work and incidental items necessary or convenient to the Contractor for the satisfactory execution and completion of the Work.

1.02 TRANSPORTATION

A. All equipment shall be suitably boxed, crated, or otherwise protected during transportation.

B. All equipment shall be shipped and delivered in the largest assembled sections practical or permitted by carrier regulations to minimize the number of field connections.

C. The Contractor shall be responsible for ensuring that the equipment is assembled and transported in such a manner so as to clear buildings, power lines, bridges, and similar structures encountered during shipment or delivery to the site of the work.

D. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

E. Small items and appurtenances such as gauges, valves, switches, instruments, and probes which could be damaged during shipment shall be removed from the equipment prior to shipment and packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

F. Temporary shipping braces and supports shall be painted orange or yellow for easy identification.

1.03 HANDLING

A. All equipment, materials, and products shall be carefully handled to prevent damage or excessive deflections during unloading or

transportation. All equipment, materials, and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the Work.

B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

C. Under no circumstances shall equipment or products such as pipe, structural steel, casting, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Items such as nonmetallic pipe, nonmetallic conduit, flagpoles, and lighting poles shall be handled using nonmetallic slings or straps.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01620

STORAGE AND PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Equipment shall be received, inspected, unloaded, handled, stored, maintained, and protected by the Contractor in a suitable location on or off site, if necessary, until such time as installation is required.

1.02 STORAGE

A. The Contractor shall be responsible for providing satisfactory storage facilities which are acceptable to the Engineer. In the event that satisfactory storage facilities cannot be provided on site, satisfactory warehouse facilities, acceptable to the Engineer, will be provided by the Contractor for such time until the equipment, materials, and products can be accommodated at the site.

B. Equipment, materials, and products which are stored in a satisfactory warehouse acceptable to the Engineer will be eligible for progress payments as though they had been delivered to the job site.

C. The Contractor shall be responsible for the maintenance and protection of all equipment, materials, and products placed in storage and shall bear all costs of storage, preparation for transportation, transportation, re-handling, and preparation for installation.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Engineer, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.

F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 EXTENDED STORAGE

A. In the event that certain items of major equipment such as air compressors, pumps, and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants, and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01700

CONTRACT COMPLETION, START-UP AND CLOSEOUT

PART 1 - GENERAL

1.01 COMPLETION PROCEDURES

A. Substantial Completion shall be considered achieved when the Contractor has demonstrated that all final grades are met, all areas are stabilized, seeded and sodded as specified, stormwater conveyance systems are constructed as specified in the design, geosynthetic liner system installed in accordance with the Contract Documents and Specifications, leachate collection system and all other items of WORK, as described in the Contract Documents, are fully operational.

B. When the Contractor believes Substantial Completion has been achieved, Contractor shall request, in writing, to the Engineer that Substantial Completion be recognized as having been achieved and request that the OWNER issue a Certificate of Substantial Completion. The Contractor shall also forward a copy of this request to the Owner. Prior to making such a request, the Contractor must have:

1. Completed all Work necessary for the safe, proper and complete use or operation of the facility as intended. At a minimum, this will include completion of all Work in the Contract Documents and Specifications necessary for the project to function as designed.

2. Prepared a Contractor -generated punch list for submission with the request for issuance of a Certificate of Substantial Completion.

3. Submitted and received acceptance of accurate Record Drawings for all WORK completed to date.

4. Submitted and received acceptance of all specified warranties, guaranties, and operation and maintenance manuals.

5. Complete all required vendor training, testing, and where required, start-up.

6. Deliver all required spare parts (as applicable).

C. Upon receipt of the request from the Contractor, the ENGINEER and designated representatives shall review the request, the WORK and the above requirements to determine whether the Contractor has achieved Substantial Completion. If this review fails to support Substantial Completion, the ENGINEER shall so notify the Contractor in writing citing the reasons for

rejection. If the ENGINEER determines the Contractor has reached Substantial Completion, the following procedures will be followed:

1. The Engineer will review the Work and the Contractor's punch list to assure all deficiencies are noted on a final punch list.

2. The Engineer will schedule and conduct a pre-final walk-through of the system with the Owner's representatives, the Contractor, and others, for the purpose of formally reviewing the Work, and the final punch list. A copy of the final punch list will be provided to all participants and any additional items noted during the walk-through will be added to the list.

3. Upon completion of the pre-final walk-through the Engineer shall prepare a request to the Owner requesting they establish the date for Substantial Completion as the date of the walk-through, provided the walk-through has verified that the construction is in fact Substantially Complete. Upon approval of this request by the Owner, the construction will be considered Substantially Complete.

D. Final Completion will be deemed to have occurred when all WORK is completed in accordance with the Contract Documents including the following:

1. All final punch list items have been corrected, signed off by the Contractor and the Engineer, and demonstrated to the OWNER during the final walk-through.

2. All updates to the Record Drawings have been submitted to, and accepted by, the Engineer including.

    a. Site surveys shall cover all areas of disturbance, including borrow areas after excavation and areas that are re-graded, and shall be submitted on 24-inch by 36-inch sheets signed and sealed by a professional land surveyor licensed in the State of Georgia and as an AutoCAD drawing file (AutoCAD r18 or later version). Five original signed and sealed hard copies (by a professional land surveyor licensed in the State of Georgia) and AutoCAD drawing files as required in Section 01050.

    b. The Project Record Documents and those documents required for regulatory submittals shall be submitted on 24-inch by 36-inch sheets signed and sealed by a professional land surveyor licensed in the State of Georgia and as an AutoCAD drawing file (AutoCAD r18 or later version). Five original signed and sealed hard copies (by a professional land surveyor licensed in the state of Georgia) with the AutoCAD drawing files as required in Section 01050.

3. The Contractor has submitted, and the Engineer has approved, five copies of the Certification Report associated with video inspection and jet cleaning services conducted with the CCTV of the newly installed Leachate Collection and Removal System pipes that documents there are no breaks, separations, belly's, etc. in the newly installed pipes.

4. The Contractor has submitted, and the Engineer has approved, five operation and maintenance manual copies which include the schematic and wiring diagrams with the bill of materials, manufacturer's maintenance literature, etc., bound in three ring binders for the Leachate Collection and Removal System control panel and associated equipment.

5. Demobilization and site cleanup are complete.

6. The Engineer has issued a Certificate of Final Completion.

7. All facilities have been properly demonstrated to be functioning as required and vendor training for major equipment components has been performed with the Owner.

8. Seeded and sodded areas are established and growing.

E. Beneficial Occupancy will normally not occur before Substantial Completion but can occur for a discrete element of a project when desired by the Owner. When Beneficial Occupancy is requested, the same procedure specified above will be used except no notice or request will be forwarded to Owner. Upon completion of the procedure, the OWNER will accept occupancy of that element of Work.

1.02 START-UP PROCEDURES

A. Contractor is responsible for the complete test, checkout, and start-up preparation of the project. The Contractor shall verify these activities through daily inspection reports, test records, on-site vendor certifications, and by other appropriate means.

1. Component test and check out is the verification that each component of the Work is in compliance with the Contract Documents, and is ready to perform its intended function.

2. Start-up preparation is preparing the entire project to be placed into service.

B. Contractor shall conduct all test, check out, and start-up requirements specified in the Contract Documents and provide documentation of same to the Engineer prior to start-up. Where vendor on-site inspections are required prior to or during start-up, the Contractor shall require each vendor to provide

a written statement that the installation and check out is complete and proper and that the item(s) are ready for start-up.

1.03 CLOSE-OUT PROCEDURE

A. Engineer and Contractor shall meet and resolve all outstanding issues including, but not limited to:

1. Claims and adjustments for time or costs.

2. Outstanding, unused allowances.

3. Procedures for handling warranty issues.

B. A Final Change Order shall be processed if required. Final payment and close out procedures shall comply with all requirements of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01710

CLEANUP

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section covers general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the project unless otherwise shown on the Drawings or specified elsewhere in these specifications.

1.02 HAZARD CONTROL

A. The Contractor shall store volatile wastes in covered metal containers and remove from premises daily.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site shall not be allowed.

D. Disposal of volatile wastes into sanitary or storm sewers shall not be allowed.

1.03 DISPOSAL OF SURPLUS MATERIALS

A. Unless otherwise shown on the Drawings, specified or directed, the Contractor shall dispose of all surplus excavated materials and materials and equipment from demolition, legally off the site, and shall provide his own suitable, off-site spoil area, or Contractor may provide a suitable spoil area on a site designated by the Owner.

B. The Owner shall have the opportunity to inspect any equipment or materials removed prior to disposal by the Contractor. If said equipment and/or materials are determined to be salvageable by the Owner, the Contractor shall transport said equipment and material to a building or area designated by the Owner.

1.04 FINAL CLEANING

A. The Contractor shall:

1. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

2. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.

3. Employ experienced workmen or professional cleaners for final cleaning.

4. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.

5. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.

6. Repair, patch, and touch up marred surfaces to specified finish to match adjacent surfaces.

7. Broom clean paved surfaces; rake clean other surfaces of grounds.

8. Clean screens on air intake vents.

9. Upon completion of the Work, remove from the site all plant, material, tools and equipment belonging to him, and leave the site with an appearance acceptable to the Engineer.

10. Thoroughly clean all equipment and materials installed by him and shall deliver over such materials and equipment in a bright, clean, polished and new-appearing condition.

11. Restore Landscape Damage:

    a. Any landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Engineer will decide what method of restoration shall be used.

12. Perform Post-Construction Cleanup or Obliteration

    a. The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall maintain at the site for the Owner one record copy of each of the following:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change Orders and other Modifications to the Contract
   5. Engineer Field Orders or Written Instructions
   6. Approved Shop Drawings, Product Data and Samples
   7. Field Test Records

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Contractor shall store documents and samples in Contractor's field office separate from documents used for construction. Additionally, Contractor shall:
   1. Provide files and racks for storage of documents.
   2. Provide locked cabinet or secure storage space for storage of samples.

B. Contractor shall maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

C. Contractor shall make documents and samples available at all times for inspection by the Engineer and Owner.

1.03 MARKING

A. Contractor shall mark with red erasable pencil and, where feasible, use additional colors.

1.04 RECORDING

A. Contractor shall label each document "PROJECT RECORD" in neat large printed letters.

B. Contractor shall record information concurrently with construction progress. Do not conceal any work until required information is recorded.

C. Drawings

   1. Contractor shall legibly mark to record actual construction:

a. Depths of various elements of foundation in relation to finished grade.

b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

c. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

d. Field changes of dimensions and detail.

e. Changes made by Field Order or by Change Order.

f. Details not on original contract drawings.

2. Specifications and Addenda

a. Contractor shall 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.

1.05 SUBMITTALS

A. At Contract close-out, Contractor shall deliver Record Documents to the Engineer for the Owner.

B. Contractor shall accompany submittals with transmittal letters 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

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 PROJECT MAINTENANCE AND WARRANTY

A. Maintain and keep in good repair the improvements covered by these drawings and specifications during the life of the contract.

B. Indemnify the Owner against any repairs which may become necessary to any part of the Work performed and to items of equipment and systems procured for or furnished under the resulting Contract, arising from defective workmanship or materials used therein, for a period of one (1) year after acceptance from the final date of final resolution of the Owner accepting work.

C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the one-year warranty described above, the affected unit shall be disassembled, inspected, and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new 12-month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failures shall be interpreted to mean two (2) or more successive failures of the same kind in the same item or failures of the same kind in two (2) or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear, or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures, or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over- or under-lubrication, and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one-year warranty. Should multiple failures occur in a given time, all products of the same size and type shall be disassembled, inspected, modified or replaced, as necessary and re-warranted for one (1) year.

E. The Contractor shall, at his own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals or shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by him. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the contract.

G. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

H. In the event the Contractor fails to proceed to remedy the defects of which he has been notified within fifteen (15) days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the drawings and specifications, and to hold the Contractor and the sureties on his bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at his home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability with the law of the place of construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02077
GEOSYNTHETIC CLAY LINER (GCL)

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The CONTRACTOR shall furnish all labor, transportation, materials, supervision, administration, management, quality control, and installation equipment necessary for the manufacturing, delivery, unloading, on-site handling, storage, installation, and CQC testing of the Geosynthetic Clay Liner (GCL) as part of the PROJECT as shown on the CONTRACT DRAWINGS and as specified herein.

B. All material shall conform to the following requirements and shall be of new stock of the highest grade available, free from defects, and recently manufactured.

C. All WORK shall be in strict accordance with the SPECIFICATIONS, CONTRACT DRAWINGS, conformance with the MANUFACTURER'S recommendations, and with current industry standards.

1.2 APPLICABLE STANDARDS OR REFERENCES

A. The following American Society of Testing and Materials (ASTM) test methods shall be incorporated into this SPECIFICATION in their entirety, subject to the indicated test modifications.

- ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- ASTM D4643 Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
- ASTM D5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- ASTM D5261 Standard Test Method for Measuring Mass Per Unit Area of Geotextiles
- ASTM D5321 Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
- ASTM D5887 Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter
- ASTM D5888 Standard Guide for Storage and Handling of Geosynthetic Clay Liners
- ASTM D5889 Standard Practice for Quality Control of Geosynthetic Clay Liners

- ASTM D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners
- ASTM D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners
- ASTM D5993 Standard Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners
- ASTM D6102 Standard Guide for Installation of Geosynthetic Clay Liners
- ASTM D6243 Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method
- ASTM D6496 Standard Test Method for Determining Average Bonding Peel Strength Between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners
- ASTM D6766 Evaluation of Hydraulic Properties of GCLs permeated with Potentially Incompatible Liquids
- ASTM D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners
- ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials, GRI Test Method GCL-2 Geosynthetic Research Institute - Permeability of Geosynthetic Clay Liners

1.3 QUALIFICATIONS

A. GCL MANUFACTURER Qualifications

1. Qualified GCL MANUFACTURERS shall be a company, corporation, or firm regularly engaged in the development and manufacture of GCL's with a history of successful production of GCL's for a minimum period of 3 years . The GCL MANUFACTURER must have produced at least 10,000,000 SF of GCL. The CONTRACTOR shall submit MANUFACTURER written information as follows:

a. Corporate background and information.

b. Manufacturing capabilities including:

1. Information on plant size, equipment, qualified personnel, number of shifts per day, and capacity per shift.

2. Daily production quantity with sufficient production capacity available to meet the demands of the PROJECT schedule for this CONTRACT.

3. Quality control procedures (manual) for manufacturing.

4. List of material properties including certified test results, to which GCL material samples are attached.

B. GCL INSTALLER Qualifications

1. The GCL INSTALLER must either have installed at least 1,000,000 SF of GCL, or must provide to the ENGINEER satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the GCL will be installed satisfactory. The CONTRACTOR shall submit 3 GCL INSTALLER project references with written information as follows:

a. Name of location of project and date of installation.

b. Contact name and phone number for each project.

c. GCL type and surface area installed.

1.4 CONSTRUCTION QUALITY CONTROL/QUALITY ASSURANCE

A. Construction Quality Control (CQC) shall be performed by the GCL INSTALLER. The GCL INSTALLER'S responsibilities shall include, but not be limited to:

1. Supervise all GCL storing, handling, and installation activities.

2. Perform and document Quality Control testing as specified herein.

3. Certify GCL installation as meeting requirements of the CONTRACT DOCUMENTS.

B. Construction Quality Assurance (CQA) will be performed by a designated CQA CONSULTANT retained by the OWNER. The CQA CONSULTANT, or his CONSTRUCTION QUALITY ASSURANCE REPRESENTATIVE (CQAR), shall observe and inspect the GCL installation activities and conduct CQA testing at a random frequency and location. The CQA CONSULTANT shall submit a final report, signed and sealed by a professional engineer licensed in the State of Georgia, certifying the test results.

C. Based upon review of the CQC and CQA final reports, the ENGINEER will provide certification to the regulatory agencies that the GCL was installed in accordance with the CONTRACT DOCUMENTS.

D. The CONTRACTOR shall schedule WORK to provide sufficient time as required to complete CQC and CQA testing and documentation prior to placing any overlying layers above the GCL and shall keep the CQC and CQA CONSULTANT'S laboratory informed of the construction progress to provide sufficient time for laboratory testing.

1.5 SUBMITTALS

A. GCL MANUFACTURER'S Qualifications.

B. GCL INSTALLER'S Qualifications.

C. MANUFACTURER Construction Quality Assurance Manual.

D. GCL Installation Plan as submitted by the INSTALLER for approval at least 14 calendar days prior to delivery of the GCL materials to the site. Do not allow vehicles in direct contact with the deployed GCL.

E. Prior to GCL installation, the GCL INSTALLER shall submit a Certification of Subsurface Acceptability signed by the GCL INSTALLER and the CQA CONSULTANT.

F. Prior to GCL installation, the CONTRACTOR shall supply the ENGINEER survey data that clearly indicates the grades and elevations meet the CONTRACT DOCUMENTS.

G. The GCL shall be tested for the parameters and requirements listed on TABLE 02077-1 GCL MANUFACTURING QUALITY CONTROL TESTING to evaluate stress deformation characteristics. This testing shall be performed by the MANUFACTURER or the MANUFACTURER'S certified testing laboratory. Samples which do not satisfy the SPECIFICATIONS shall be cause to reject applicable rolls. If a GCL sample fails to meet SPECIFICATIONS, subsequent tests shall be performed at random on additional GCL samples produced from the same batch to determine whether all rolls produced from the same batch shall be regarded as unsatisfactory and therefore rejected. This additional testing, at the MANUFACTURER'S discretion and expense, may be performed to more closely identify the rolls that do not comply with the SPECIFICATIONS.

H. The tests specified on TABLE 02077-1 GCL MANUFACTURING QUALITY CONTROL TESTING shall be performed by the MANUFACTURER or MANUFACTURER'S testing laboratory for the material to be delivered and installed on this PROJECT. Samples shall be taken across the entire width of the rolls. The averaged test results of the GCL samples shall meet or exceed the SPECIFICATIONS. Certifications of the test results obtained shall be provided to the ENGINEER and recorded on the MANUFACTURER Quality Assurance/Manufacturer Quality Control (MQA/MQC) Certificates.

I. The MANUFACTURER shall provide the ENGINEER with the MANUFACTURER MQA/MQC Certifications for each shipment of GCL. The MQA/MQC Certifications shall be signed by a responsible party employed by the MANUFACTURER such as the MQA/MQC Manager, Production Manager, or Technical Services Manager. The MQA/MQC Certifications shall include:

1. GCL lot and roll numbers (with corresponding shipping information).

2. The results of MQA/MQC testing performed by the MANUFACTURER. At a minimum, the tests specified on TABLE 02077-1 GCL MANUFACTURING QUALITY CONTROL TESTING shall be performed by the MANUFACTURER.

TABLE 02077-1 GCL MANUFACTURING QUALITY CONTROL TESTING

TEST METHOD / PROPERTY	SPECIFIED VALUE	FREQUENCY (MINIMUM)
ASTM D6768 Tensile Strength	23 lb/in	50,000 SF
ASTM D6496 Peel Strength	2.1 lb/in	50,000 SF
ASTM D5887 GRI GCL-2 Index Flux and calculated hydraulic conductivity (using tap water)	< 5 x 10-9 cm/sec	50,000 SF
ASTM D5993 Mass Per Unit Area	0.75 psf (at 0% moisture)	50,000 SF

J. The CONTRACTOR shall submit to the ENGINEER a physical sample of the GCL used in the final construction. The sample shall be labeled with the MANUFACTURER'S name, product identification, lot number, and roll number.

K. The MANUFACTURER shall provide, in writing, the proper size equipment, loading, unloading, and handling procedures for all products delivered to the PROJECT.

L. The MANUFACTURER shall provide proper storage procedures for keeping the GCL from being damaged or pre-hydrated by weather or outdoor exposure.

M. The date of shipment of GCL from the MANUFACTURER. A minimum of 30 calendar days shall be provided to the ENGINEER so as to provide sufficient time to perform conformance sampling and receive laboratory test results prior to material shipment.

N. Direct Shear Test Results (Interface Shear Resistance) - The CONTRACTOR shall provide Direct Shear Test Results tests demonstrating compliance with this Section.

O. Direct Shear Test Results (Internal Shear Resistance) - The CONTRACTOR shall provide Direct Shear Test Results tests demonstrating compliance with this Section.

P. The CONTRACTOR shall provide permeability and compatibility tests using leachate and groundwater from the existing landfill demonstrating compliance with this Section.

Q. Provide MANUFACTURER'S extended warranty or guarantee, with the OWNER named as beneficiary, in writing for the following listed below:

1. Unless otherwise stated in this SPECIFICATION, the CONTRACTOR shall guarantee the materials of all products supplied on a non-prorated basis as a part of this WORK for a minimum period of 15 years following Final Acceptance by the OWNER. The CONTRACTOR shall repair or replace, at no additional expense to the OWNER or ENGINEER, any defective materials or products that fail to meet the installation requirements due to damage created by the CONTRACTOR during unloading, on-site handling, or storage. Repair or replacement of such defective material and/or products shall be completed within 30 calendar days of notification by the OWNER.

2. Unless otherwise stated in this SPECIFICATION, the CONTRACTOR shall guarantee the workmanship of all services supplied as part of this WORK for a minimum period of 15 years following acceptance by the OWNER. The CONTRACTOR shall repair or replace, at no additional expense to the OWNER or ENGINEER, any defective WORK that fails to meet the design requirements. Repair or replacement of such defective WORK shall be completed within 30 calendar days of notification by the OWNER.

3. Warranty conditions proposed by the MANUFACTURER/INSTALLER concerning limits of liability will be evaluated upon receipt and must be acceptable to the OWNER prior to installation of the GCL. Proposed Warranty Conditions shall be submitted to the ENGINEER within 21 calendar days after award of the CONTRACT for review and acceptance.

PART 2 - PRODUCTS

1.1 GCL

A. The GCL shall be reinforced and comprised of new, first-quality products designed and manufactured specifically for the purpose intended. The GCL shall be a factory manufactured hydraulic barrier consisting of sodium bentonite clay supported by geotextiles that are held together by needling. The GCL shall have the properties necessary to achieve compliance with the requirements in this SPECIFICATION.

B. For general information purposes only, the GCL shall be:

- CETCO Bentomat ST
- BentoLiner NWL-35 as manufactured by GSE
- ENGINEER approved equal

C. The GCL shall be manufactured so that bentonite shall be continuously contained throughout the GCL and to support geotextile so that no displacement of bentonite occurs when material is unrolled, moved, cut, torn, or punctured. Encapsulating geotextile materials shall protect bentonite and be sufficiently

porous to allow bentonite flow-through to create positive bentonite-to-bentonite seal at seams.

D. The GCL shall be produced free of holes, blisters, or contamination by foreign matter. Rolls manufactured with inclusions, bubbles, or not complying with the SPECIFICATIONS shall be rejected and not delivered to the PROJECT site.

E. Panels of bentonite and encapsulating geotextiles manufactured shall perform as a continuous lining. The finished GCL shall have the physical properties listed in TABLE 02077-3 FINISHED GCL PROPERTIES.

TABLE 02077-3 FINISHED GCL PROPERTIES

TEST METHOD / PROPERTY	SPECIFIED VALUE
ASTM D5993 Mass Per Unit Area	0.75 psf (at 0% moisture)
ASTM D5261 Non-woven Cover Geotextile Weight	6 oz/SY
ASTM D6768 Tensile Strength	23 lb/in
ASTM D5887 Index Flux and calculated hydraulic conductivity at 10 psi effective confining stress	$<5x10^{-9}$ cm/sec
ASTM D5891 Fluid Loss, max. when hydrated for 24 hours at 200 psf and sheared at 200 psf normal stress	18 ml
ASTM D6496 Peel strength min. average	From manufacturers standard specifications sheet
Finished GCL roll width	16 Feet
Finished GCL roll length	150 Feet

1.2 ACCESSORY BENTONITE

A. Any accessory bentonite used for sealing seams, penetrations, or repairs, shall be the same granular bentonite as used in the production of the GCL itself with the properties listed in TABLE 02077-2 ACCESSORY BENTONITE.

TABLE 02077-2 ACCESSORY BENTONITE

TEST METHOD / PROPERTY	SPECIFIED VALUE
ASTM D5890 Bentonite Swell Index (tap water)	> 24 mL/2g
ASTM D5891 Bentonite Fluid Loss (tap water)	< 18 mL
ASTM D4643 Bentonite Moisture Content	< 12%

1.3 CQA CONFORMANCE TESTING

A. In-Plant Conformance Sample Testing Services - The OWNER'S REPRESENTATIVE and CQA CONSULTANT have qualified personnel to collect conformance samples directly at the following facilities.

B. The CONTRACTOR shall inform, in writing, the ENGINEER 14 calendar days prior to the actual date of shipment of material to the site.

C. Conformance sample(s) of the GCL will be collected by the OWNER'S REPRESENTATIVE or CQA CONSULTANT prior to shipment to the site. Conformance sample(s) of the GCL will be tested by the CQA CONSULTANT prior to shipment to the site. If the material is shipped to the PROJECT and does not meet the SPECIFICATIONS, then all cost associated with collecting, testing, and shipping samples from the PROJECT will be the CONTRACTOR'S responsibility.

D. Conformance Sample Test Frequency - The GCL shall be randomly sampled by the OWNER'S REPRESENTATIVE prior to delivery of material to the PROJECT site. The initial conformance testing shall be at the OWNER'S expense. The initial conformance tests shall include those listed in TABLE 02077-4 GCL CONFORMANCE TESTING.

TABLE 02077-4 GCL CONFORMANCE TESTING

TEST METHOD / PROPERTY	SPECIFIED VALUE	FREQUENCY (MINIMUM)
ASTM D5993 Mass Per Unit Area	0.75 lb/SF	1 per 50,000 SF
ASTM D5890 Bentonite Swell Index	> 24 mL/2g	1 per 50 Tonnes
ASTM D5887 Permeability at 10 psi effective confining stress	< 5 x 10-9 cm/sec	1 per 50,000 SF
ASTM D5261 Non-woven Cover Geotextile Weight	6 oz/SY	1 per 100,000 SF
ASTM D6496 Peel Strength	As per manufacturers specification sheet	1 per 50,000 SF
ASTM D5891 Fluid Loss, max. when hydrated for 24 hours at 200 psf and sheared at 200 psf normal stress	18 ml	1 per 100,000 lbs

E. Samples which do not meet the SPECIFICATIONS shall be cause to reject applicable rolls.

PART 3 - EXECUTION

3.1 EQUIPMENT

A. It is the CONTRACTOR'S responsibility to provide all labor and materials for protection of the product during the period of time prior to installation of overlying soils. The CONTRACTOR'S protection method is subject to the approval of the ENGINEER.

3.2 SHIPPING AND HANDLING

A. The MANUFACTURER typically assumes responsibility for initial loading and shipping of the geocomposite. Unloading, on-site handling, and storage shall be the responsibility of the CONTRACTOR.

B. A visual inspection of each roll should be made as it is unloaded to identify if any packaging has been damaged. Rolls with damaged packaging should be repaired prior to being placed in storage.

C. The CONTRACTOR shall contact the MANUFACTURER prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment to be utilized.

D. The CONTRACTOR assumes all liability with regards to shipping, transport and unloading of the geocomposite required to complete the WORK. The OWNER shall not be responsible for damaged, lost or miss-stocked shipments, or mishandled or damaged materials.

3.3 LABELING AND PACKING

A. Each GCL roll shall be individually packaged in moisture resistant plastic sleeves and protected to prevent damage during shipment. The cardboard cores shall be sufficiently strong to resist collapse during transit and handling.

B. Prior to shipment, the MANUFACTURER shall label each roll, both on the GCL roll and on the surface of the plastic protective sleeve. Labels shall be resistant to fading and moisture degradation to ensure legibility at the time of the installation. Each package shall be prominently identified in the same manner as the product within and showing the date of shipment. At a minimum each roll label shall identify the following characteristics:

1. Product identification information (MANUFACTURER name and address, brand name, product code).

2. Product lot number and individual roll number.

3. Date of fabrication.

4. Roll length and width.

5. Total roll weight.

6. Proper direction of unrolling and/or unfolding to facilitate layout and positioning in field.

C. All GCL rolls shall be shipped and stored in packaging furnished at the manufacturing facility that is resistant to degradation by ultraviolet (UV) light, is moisture resistant, and prevents exposure to precipitation, mud, dirt, dust, puncture, or other damaging conditions.

3.4 STORAGE, STOCKPILING, AND STAGING

A. The MANUFACTURER shall identify, in writing, the proper equipment and methods for loading, shipping, and unloading materials.

B. The MANUFACTURER shall provide, in writing, the proper storage procedures for the products delivered to the PROJECT site.

C. Storage of the GCL rolls shall be the responsibility of the CONTRACTOR. The materials shall be unloaded by the CONTRACTOR in areas designated by the OWNER. The CONTRACTOR shall provide the proper equipment and labor necessary to unload the material upon delivery to the PROJECT. The materials shall not be stored or unloaded in areas that will impair the operations of the landfill facility or be deleterious to the materials.

D. Each GCL roll shall be visually inspected by the CONTRACTOR and CQA CONSULTANT when unloaded to determine if any packaging or material has been damaged during transit.

E. Rolls of GCL exhibiting damage shall be marked and set aside for closer examination during deployment.

F. Do not remove the plastic wrapping until deployment. Minor rips or tears in the plastic packaging shall be repaired with moisture resistant tape prior to being placed in storage to prevent moisture damage.

G. GCL rolls delivered to the PROJECT site shall be only those indicated on GCL MQA/MQC Certificates.

H. All GCL rolls shall be stored and maintained dry in a flat location area away from high-traffic areas but sufficiently close to the WORK area to minimize handling.

I. The presence of free-flowing water within the GCL packaging will require that roll to be set aside for further examination to ascertain the extent of damage. Free-flowing water within the GCL packaging shall be cause for rejection of that roll by the ENGINEER.

J. GCL shall be stored no higher than three rolls high or limited to the height at which the lifting apparatus may be safely handled by installation personnel. Stacks or tiers of rolls should be situated in a manner that prevents sliding or rolling by “choking” the bottom layer of rolls. Stacks shall not be higher than 3

rolls high. Outdoor storage shall not exceed 6 months.

K. Rolls shall not be stacked on uneven or discontinuous surfaces in order to prevent bending, deformation, damage to the GCL or cause difficulty inserting the core pipe.

L. Rolls should be stored in a manner that prevents sliding or rolling from the stacks. This may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls.

M. All stored GCL rolls must be covered with a plastic sheet or tarpaulin until their installation to provide extra protection for material stored outdoors.

N. Bagged bentonite material shall be stored and tarped next to the GCL rolls unless other more protective measures are available. Bags shall be stored on pallets or other suitably dry surface which will prevent undue prehydration until installation.

3.5 GCL SUBGRADE PREPARATION

A. The CONTRACTOR shall use extreme care and hand excavate as necessary to prepare areas for installation of GCL in areas that contain existing geomembrane liner. Any damage to the existing geomembrane liner resulting from the CONTRACTOR'S operations shall be repaired by the CONTRACTOR to original conditions or replaced with new materials at no additional cost to the OWNER. Repairs shall be as directed by the ENGINEER with approved materials.

B. The surface to be lined with GCL shall be free of all rocks (greater than 1/4-inch in any dimension), sticks (greater than 1/4-inch in diameter), roots, grass, refuse, sharp objects, or debris of any kind. The surface shall provide a firm, unyielding foundation for the GCL with no sudden, sharp, or abrupt changes or breaks in grade. No standing water or excessive moisture shall be allowed.

C. The area upon which the GCL material will be installed shall be inspected by the CQAR and certified by the CONTRACTOR and GCL INSTALLER to be in accordance with the requirements of this SPECIFICATION.

D. It shall be the INSTALLER'S responsibility to indicate to the ENGINEER any change in the condition of the area to be lined with GCL that could cause the area to be out of compliance with any of the requirements of the SPECIFICATION'S rendering the GCL unacceptable for deployment.

E. Refer to Section 02220 Excavation, Backfill, Fill, and Grading.

3.6 DEPLOYMENT

A. The product shall be installed in accordance with the MANUFACTURER'S recommendations and the CONTRACT DOCUMENTS and SPECIFICATIONS. In case of a conflict between these documents, the more stringent requirements shall apply. Any deviations from these procedures must be reviewed and accepted by the ENGINEER prior to construction.

B. The use of equipment capable of freely suspending the GCL roll is required. A spreader bar and core pipe are also required for supporting the roll and allowing it to unroll freely. The core pipe and spreader bar shall not bend or flex excessively when a full roll is lifted.

C. Deployment should proceed from the highest elevation to the lowest. Anchor the GCL securely and deploy it down the slope in a controlled manner.

D. Deployment on flat areas shall be conducted in the same manner as that for the slopes, however, care should be taken to minimize "dragging" the GCL. A slip-sheet may be used to facilitate positioning of the liner while ensuring the GCL is not damaged from underlying sources.

E. Panels shall be placed free of tension or stress yet without wrinkles or folds. It is not permissible to stretch the GCL in order to fit a designated area.

F. Panels shall not be dragged into position except where necessary to obtain the correct overlap for adjacent panels.

G. Panels shall not be placed during adverse weather conditions, including rain, high wind, or any other weather conditions which might be deleterious to the materials or the installation. GCL shall be "dry" when installed and "dry" when covered with overlying materials. The CONTRACTOR, GCL INSTALLER, CQAR and OWNER will coordinate closely prior to installation of the GCL to ensure no adverse weather conditions occur.

H. The CONTRACTOR shall unwrap and install only as much GCL in one working day as can be covered. In no case shall the GCL be exposed to the elements at the end of the day.

I. Cover as soon as possible to protect the GCL from hydration, environmental effects, and damage.

J. Remove and replace panels hydrated or partially hydrated without overlying material cover.

K. Minimize cutting GCL. Whenever possible, overlap instead of cutting material. If cutting is required, cut GCL with a cutter or other approved device. Seal all cut edges, as recommended by the MANUFACTURER, to prevent loss of bentonite. Protect adjacent materials from potential damage due to cutting of GCL.

3.7 GCL PANEL SEAMING

A. All GCL seams shall be formed in accordance with the MANUFACTURER'S recommendations.

B. A 6-inch lap line and a 9-inch match line shall be imprinted on both edges of the upper geotextile component of the GCL to assist in installation overlap quality control. Lines shall be printed as continuous dashes in easily observable non-toxic ink.

C. A minimum 6-inch overlap should exist at longitudinal seam locations and at least 12 inches at panel ends. The lap line and match lines printed on the panels shall be used to assist in obtaining this overlap. The edges of the GCL panels should be adjusted to smooth out any wrinkles, creases, or "fishmouths" in order to maximize contact with the underlying existing sideslope geomembrane liner and panel.

D. All GCL seams shall be formed by executing a bentonite-enhanced overlap to ensure that a continuous seal is achieved between panels. After the overlying panel is placed, its edge shall be pulled back to expose the overlap zone. Any soil or debris present in the overlap zone or entrapped in the geotextiles shall be removed. A fillet of granular bentonite shall then be poured in a continuous manner along the overlap zone at a rate of at least one-quarter pound per lineal foot to ensure that a continuous seal is achieved between panels.

E. On gently sloping areas where seams may be placed across the slope, overlaps should be "shingled" so as to prevent flow into the seam.

3.8 GCL DAMAGE REPAIR

A. Prior to cover material placement, damage to the GCL shall be identified and repaired by the INSTALLER at no additional cost to the OWNER. Damage is defined as cuts, rips, or tears in the geotextiles, delamination of geotextiles, displaced panel, or hydrated areas in the GCL.

B. Rips or tears on flat and sloped surfaces may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch cut from unused GCL over the damage (damaged material may be left in place), with a minimum overlap of 12 inches on all edges. Accessory bentonite shall then be placed between the patch edges and the repaired material at a rate of one- half pound per lineal foot of edge spread in a continuous 6-inch fillet, and the patch shall be placed over the area. An epoxy-based adhesive shall be used to keep the patch in position during backfill operations.

C. Displaced panels shall be adjusted to the correct position and orientation. The adjusted panel shall then be inspected for any geotextile damage or bentonite loss. Damage shall be repaired by the above procedure.

D. If the GCL is prematurely hydrated, the INSTALLER shall notify the CQAR for a site-specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design.

E. Ensure all defects and defect corrective actions (panel rejected, patch installed, etc.) are recorded, and corrective actions are performed in accordance with this SPECIFICATION.

3.9 DETAIL WORK

A. Detail WORK, defined as the WORK necessary to seal the geomembrane liner to pipe penetrations, foundation walls, drainage structures, spillways, and other appurtenances, shall be performed as recommended by the GCL MANUFACTURER. Recommended installation details shall be provided by the INSTALLER in the Installation Plan.

3.10 PLACEMENT OF OVERLYING MATERIALS

A. During placement of overlying materials (geomembrane, geocomposite, etc.) upon the GCL, precautions shall be taken to prevent damaging the GCL. Unrolling the geomembrane can be accomplished through the use of lightweight, rubber- tired equipment such as a 4-wheel all-terrain vehicle (ATV). No vehicles larger than an ATV are allowed in direct contact with the GCL. This vehicle can be driven directly on the GCL, provided the ATV makes no sudden stops, starts, or turns.

B. The GCL should not be covered before observation and acceptance by the CQAR.

C. Placement of geomembrane over the GCL by the CONTRACTOR shall be conducted in accordance with the requirements included in Section 02776 High Density Polyethylene (HDPE) Geomembrane Liner and the CONTRACT DRAWINGS.

END OF SECTION

SECTION 02105

CONSTRUCTION STAKING

PART 1 - GENERAL

1.01 SCOPE

A. Construction staking shall include all the surveying work required to lay out the work and control the location of the finished construction.

B. The Contractor shall include the survey shots on the existing 60-MIL HDPE geomembrane as part of pre-construction survey submittal. Contractor shall include the northing, easting, elevation, certification grid ID/point name along with the site plan of the proposed certification grid.

C. Measurement of quantities for payment purposes which are different from plan dimensions is included in the work.

1.02 QUALITY ASSURANCE

A. The Contractor shall provide proposed certification grid (50-foot grid) for engineers' review and approval prior to surveying and staking.

B. The Contractor shall furnish documentation prepared by an Owner-approved licensed surveyor confirming that staking is being done to the lines and grades shown in the Contract Documents.

C. Certification of building base grade and building corner locations is required prior to acceptance by the Owner and transfer to the Contractor.

D. Confirmation of the tree removal plan is required from Engineer prior to actual tree removal operations. The tree removal plan shall consist of tagging trees to be removed for construction. Tree removal shall be kept to an absolute minimum to accomplish the scope of work. Tree protection shall be employed by the Contractor on all trees not to be removed. The Contractor shall employ any procedure he deems sufficient to protect trees that will not be removed. Active and/or passive tree protection fencing shall be employed by the Contractor where the Engineer deems it necessary.

1.03 JOB CONDITIONS

A. A topographic survey is included in the drawings; however, the topographic information shown is believed to be reasonably correct. It shall be the Contractor's responsibility to determine any major differences which would affect the project.

B. The Owner will furnish sufficient monuments and bench marks at the site to allow a system of construction staking to be done with reasonable accuracy.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish and use surveying equipment and supplies maintained in good working order.

PART 3 - EXECUTION

3.01 FINAL GRADES

A. "Blue Tops" shall be installed to control final paving subgrade.

3.02 UTILITIES

A. Staking of utilities shall be done in accordance with generally accepted practice for the type of utility involved.

B. Storm drain lines and drainage structure bases shall be correctly located to yield the drainage structure top locations and orientations shown on the plan drawings.

3.03 AS-BUILT PLANS

A. As-built plans of all construction shall be provided by the Contractor.

B. As-built plans of construction to be dedicated to the Owner shall be prepared and furnished in a form that is acceptable to the receiving agency.

C. As-built plans shall be on a 50-foot grid and at all break points within the construction area and shall be submitted to the Engineer for approval.

END OF SECTION

SECTION 02115

TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.01 SCOPE OF THE WORK

A. Erosion control shall be employed during the construction period and shall include all necessary temporary measures required to prevent soil erosion from the site until permanent erosion control and finished surfaces are installed.

B. Erosion control measures shall be considered incidental to all construction involving land disturbing activities.

C. Additional erosion control devices or measures other than those shown on the plans may be required to control erosion. It is the Contractor's responsibility to control erosion throughout the project as directed by the Engineer at no additional cost to the Owner.

1.02 QUALITY ASSURANCE

A. The Contractor shall comply with applicable codes, rules, ordinances, regulations, and laws of local, municipal, state or federal authorities having jurisdiction over the project.

B. Work on public streets rights-of-way shall comply with the Georgia DOT Standard Specifications for Construction of Roads and Bridges.

C. Erosion control measures for construction shall conform to Project Drawings, these Specifications, and the "Manual for Erosion and Sediment Control of Georgia," published by the State Soil and Water Conservation Committee of Georgia.

PART 2 - PRODUCTS

2.01 SLOPE DRAINS

A. Slope drains shall be flexible plastic pipe of a manufacturer for the intended purpose.

2.02 FILTER CLOTH

1. Filter cloth for silt fences shall be a pervious sheet of synthetic polymer filaments forming a stable network so that fibers retain their relative positions. Filter cloth shall be of the type recommended by its

manufacturer for the intended application. The filter cloth shall meet or exceed Silt Fence Type C per GDOT 881.2.07.

B. Silt fence shall be constructed in accordance with the details shown on the drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. Temporary erosion control shall be directed toward and have the purpose of controlling soil erosion at its potential source. Downstream sediment entrapment measures shall be employed, but only as a backup to primary control at the source.

B. A continuing program of installation and maintenance of sediment control shall be employed during the construction period.

3.02 TEMPORARY EROSION CONTROL DURING CONSTRUCTION

A. Temporary erosion control during construction shall be employed until such time as permanent paving, planting, and restoration of natural areas is effective in control of erosion from the site.

B. Silt Fences

1. Temporary silt fences shall be located at all points where surface water can leave the construction area if the source area is subject to soil erosion. This applies to locations determined by the Engineer to need silt fence during the phasing of construction.

2. Silt fences shall be constructed to remove sediments from flowing water through filtration and sedimentation. Silt fences shall be constructed in accordance with the details shown on the drawings.

3. Silt fences shall be arranged to create ponding behind them. Provision shall be made for removing accumulated sediments and maintaining ponding capacity.

4. Silt fences shall be removed and the area restored when permanent erosion control is effective.

C. Grading Operations

1. Grading operations shall be scheduled so that the ground surface will be disturbed for the shortest possible time before permanent construction is installed. Large areas shall be maintained as flat as possible to minimize soil transport through surface flow.

2. Wherever steeper slopes or abrupt changes in grade are required, a diversion or berm shall be constructed at the top of the slope to cause

the surface water to flow along the diversion to a control point to be transported downslope in a slope drain. In no case shall surface water be allowed to flow uncontrolled down slopes.

D. Slope Drains

1. Temporary slope drains shall be provided to convey surface water down slopes. Slope drains shall be provided with an apron at their tops to anchor them and properly direct water into them. Stone or rubble shall be placed at slope drain outlets to prevent scour at these points.

E. Storm Drainage System

1. As much of the permanent storm drainage system as is practicable shall be initially installed and surface water diverted into the system. The remainder of the storm drainage system shall be installed as soon as conditions will allow.

2. Temporary sediment barriers shall be maintained around drainage structures until final subgrade preparation is begun.

F. Ground Cover

1. All exposed soils shall be protected by application of ground cover.

2. Ground cover may consist of any effective erosion preventative treatment such as straw or other mulches, temporary seeding, etc.

3. All grassing or planting operations shall include mulching as stabilization until ground cover by planting is effective.

3.03 SILT FENCE ALTERNATE (IN LOCATIONS APPROVED BY ENGINEER ONLY)

Filtrexx FilterSocks are sediment-trapping devices using composted materials applied with a pneumatic blower device or equivalent. Filtrexx FilterSocks are to be used in any area requiring sediment or erosion control where runoff is in the form of sheet flow or in areas that silt fence is normally considered acceptable. Filtrexx FilterSocks and silt fence are considered approved (Sd1) equivalents as per the "Manual for Erosion and Sediment Control in Georgia". The use of Filtrexx FilterSocks apply to areas of high sheet erosion, on steep slopes up to and exceeding a 2:1 slope, around inlets, and in other disturbed areas of construction sites requiring sediment control. Filtrexx FilterSocks may also be used in sensitive environmental areas, where migration of aquatic life, including turtles, salamanders and other aquatic life is impeded by the use of silt fence. It is possible to drive over Filtrexx FilterSocks during construction, but not recommended. If this occurs, these areas should be immediately repaired by manually moving back into place, if disturbed. Continued heavy construction traffic will reduce the effectiveness of the Socks and replacement of the Socks may be necessary as directed by the Engineer.

A. Description:

This work shall consist of furnishing, installing, maintaining and dispersing (if needed) a water permeable compost filter sock (Filtrexx FilterSocks) to contain soil erosion and sediment by removing soil particles from water moving off site into adjacent waterways or storm water drainage systems.

B. 2.0 Compost Products

Compost used for Filtrexx FilterSocks shall be weed free and derived from a well decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC (Testing Methods for the Examination of Composting and Compost) guidelines for laboratory procedures:

1. PH - 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost."

2. Particle size - 99% passing a 2" sieve and a minimum of 70% greater than the 3/8" sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification". (In the field, the product commonly requested is between 1/2” and 2" particle size.)

3. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.

4. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.

5. A sample shall be submitted to the engineer for approval prior to being used and must comply with all local, state and federal regulations.

C. Construction:

1. Filtrexx FilterSocks will be placed at locations indicated on plans as directed by the Engineer. Socks should be installed parallel to the base of the slope or other affected area. In extreme conditions (i.e., 2:1 slopes), a second Sock shall be constructed at the top of the slope. (See Sock size indications in the drainage area chart below)

2. If the FilterSocks to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.

3. Filtrexx FilterSocks are not to be used for indirect flow situations or in runoff channels.

4. Place FilterSocks on level contours to assist in dissipating flow into sheet flow rather than concentrated flows. Do not construct Socks that concentrate runoff or channel water. Sheet flow of water should be perpendicular to the FilterSock at impact and relatively unconcentrated.

5. When possible, place FilterSocks at a 5’ or greater distance away from the toe of the slopes in order for the water coming from the slopes to maximize space available for sediment deposit (see cad drawings attached). When this 5' distance is not available due to construction restrictions, a second FilterSock may be required (see drainage area chart below).

6. In order to prevent water flowing around the ends of FilterSocks, the ends of the FilterSock must be constructed pointing upslope so the ends are at a higher elevation.

7. For permanent areas, seeded FilterSocks allow vegetation to be established directly in the sock and immediately in front and back of the sock at a distance of 5 feet. Vegetation on and around the FilterSocks will assist in slowing down water for filtration. The option of adding vegetation will be at the discretion of the Engineer. No other soil amendments or fertilizer are required for vegetation establishment.

8. Sheet flow and runoff should not exceed height of berm capacity in most storm events. If overflow of the berm is a possibility, larger Socks should be constructed, or other possible sediment control tools may be used. Alternatively, a second berm may be constructed or used in combination with compost blankets to prevent sediment from moving.

Drainage Area Chart
Filtrexx FilterSock – Maximum Drainage Area
Based on Slope and Slope Length

Slope		Slope Length (linear feet)	FilterSock Required (Height x Width)
0%-2%	Flatter than 50:1	250	12-inch Diameter
2%-10%	50:1-10:1	125	12-inch Diameter

10%-20%	10:1-5:1	100	12-inch Diameter
20%-33%	5:1-3:1	50	18-Inch Diameter
>50%	>2:1	25	18-Inch Diameter

D. Maintenance:

1. The Contractor shall maintain the FilterSock in a functional condition at all times and it shall be routinely inspected to make sure it holds its shape and is producing adequate flow through.
2. Where the Sock requires repair, it will be routinely repaired.
3. The Contractor shall remove sediments collected at the base of the Sock when sediments reach 1/3 of the exposed height of the Sock, or as directed by the Engineer.
4. If ponding becomes excessive, Socks should be dispersed and reconstructed. For purposes of longer-term sediment control objectives, Socks can be seeded at the time of installation to create an additional vegetative filtering component.
5. The FilterSocks will be dispersed on site when no longer required, as determined by the Engineer. The Socks may be dispersed with a loader, rake, bulldozer or other device to be incorporated in the soil or left on top of the soil for final seeding to occur. The mesh netting material will be disposed of in normal trash container or removed by the Contractor.

E. Method of measurement:

Bid items shall show measurement as 'Filtrexx FilterSocks' per linear foot, installed.

F. Performance:

1. Contractor is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.
2. Where the FilterSock deteriorates or fails, it will be repaired or replaced with a more effective alternative.

G. Application guidelines:

1. Filtrexx FilterSocks for silt fence replacement shall either be made on site or delivered to the jobsite using Filtrexx FilterSock materials in a 3 or 5 mil continuous, tubular, HDPE 3/8" knitted mesh netting material, filled with compost passing the above specifications for compost products as outlined in 2.0.

2. Filtrexx FilterSocks netting materials are available only from Filtrexx International, LLC and are the only Certified mesh materials accepted in creating Filtrexx products on site or as delivered to the job site. Standard Filtrexx color coding systems include Yellow and Black (8"), Orange and Black (12"), or Red and Black (18") striped mesh netting with 3/8" mesh openings for inlet protection. Other colors are only acceptable as approved by both the Engineer and Filtrexx International, LLC.

3. Contractor is required to be a certified Filtrexx Installer as determined by Fi1trexx International, LLC (440-926-8041) or visit website at Fi1trexx.com). A copy of Contractor's current certification shall be included with the bid documents.

H. Available Vendors

Filtrexx FilterSocks and installation may be purchased from the following company:

Georgia Mulch & Erosion Solutions
482 Hannah Road
Newnan, GA 30263
770-252-1176
770-252-8838 (Fax)

3.04 CLEANUP AND REMOVAL

A. At the time that permanent erosion control is effective, temporary devices and their accumulated sediments shall be removed.

END OF SECTION

SECTION 02220
EXCAVATION, BACKFILL, FILL, AND GRADING OF LINER BASE AND PROTECTIVE COVER SANDS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The CONTRACTOR shall furnish all labor, transportation, materials, supervision, administration, management, quality control, and installation equipment necessary for excavating, trenching, transporting, stockpiling, placing, backfilling, compacting, grading, disposing of materials, field testing, and quality control/quality assurance laboratory services required for the construction and appurtenances necessary as part of the PROJECT as shown on the CONTRACT DRAWINGS and as specified herein.

B. Excavated soil that does not contain waste, as determined by the ENGINEER, may be reused and incorporated into the project if it meets the requirements of this Section.

C. All WORK shall be in strict accordance with the SPECIFICATIONS, CONTRACT DRAWINGS, conformance with the MANUFACTURER'S recommendations, and with current industry standards.

D. Upon identification, the CONTRACTOR shall notify the ENGINEER in writing if the site conditions encountered during construction differ from that indicated on the Contract Drawings. Notification by the CONTRATOR shall include an explicit description of the differences.

E. The CONTRACTOR shall be responsible for controlling stormwater runoff from the adjacent landfill slopes through the use of berms, dikes, swales, or other acceptable methods as determined by the CONTRACTOR to direct stormwater away from construction areas to areas where the CONTRACTOR shall remove stormwater through the use of temporary pumps or other means and methods as determined by the CONTRACTOR.

F. Any damage to the existing utilities, systems and facilities indicated to remain in place shall be repaired as directed by the ENGINEER at the CONTRACTOR'S expense.

1.2 DEFINITIONS

A. Suitable Soil - Soil that meets the requirements as specified in Part 2.

B. Unsuitable Soil - Soil that does not meet the requirements as specified in Part 2.

C. General Fill/Compacted Liner Base - Suitable soil that is placed back into the project area and compacted after unsuitable soils are excavated and removed. General Fill shall be compacted to meet the specified requirements contained within this Section.

D. Structural Fill - Soil that is called out in specific locations for the project which are required as opposed to General Fill. The Structural Fill shall be compacted to meet the specified requirements contained within this Section.

E. CQA CONSULTANT - Construction Quality Assurance (CQA) will be performed by a designated CQA CONSULTANT retained by the OWNER. The CQA CONSULTANT, or his CQA REPRESENTATIVE, shall observe and inspect all geotechnical activities and conduct CQA testing at a random frequency and location.

1.3 PROJECT CONDITIONS

A. Existing project conditions are shown on the Contract Drawings or otherwise described herein.

B. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the required excavation to determine the exact location of all existing structures, utilities, etc.

C. Structures shall be supported and protected from damage by the CONTRACTOR. If structures are broken or damaged, the CONTRACTOR shall restore structures, utilities, etc. to their original condition at no additional cost to the OWNER. Repair of damaged features or structures shall be approved by the ENGINEER and OWNER.

1.4 SUBMITTALS

A. Excavation Plan

1. Excavation may be made without sheeting and bracing within the limitations and requirements of the governmental agencies having jurisdiction. Failure of the ENGINEER or CQA REPRESENTATIVE to order the use of bracing or sheeting and shoring or direct changes to systems in place, shall not in any way or to any extent relieve the CONTRACTOR of any responsibility concerning the condition of excavations or of his obligations under the Contract. The CONTRACTOR shall be responsible for the condition of all excavations. All slides and caves shall be removed without extra compensation, at whatever time and under whatever circumstances that they may occur.

2. All excavation shall comply with the applicable requirements as stated in the following:

   a. OSHA excavation safety standards 29 CFR, 1926-650, subpart P.

b. State (Georgia Code of Ordinances, Chapter 5 – Building and Construction, Article 5.9 Trenching) and County construction safety regulations.

3. The Excavation Plan shall include temporary controls for stormwater runoff and erosion control in full conformance with all existing permits. The CONTRACTOR is responsible for directing, controlling, and managing stormwater runoff from all areas surrounding the construction including runoff from the landfill slopes.

4. The CONTRACTOR shall be responsible for vehicle traffic safety and shall coordinate with the OWNER to determine site-specific safety concerns.

5. The CONTRACTOR shall sweep or wash paved roadways which become covered with soil. The CONTRACTOR shall provide all equipment, water, and personnel necessary to clear the paved roads.

6. The Excavation Plan shall include procedures for handling excavated refuse as a result of closure activities, excavation for the landfill gas vent trench, and the drilling of the landfill gas vents. Excavated refuse or soil mixed with refuse is classified as material to be removed and disposed of at the active face of the landfill and not to be used for backfill.

B. Drainage Material and Protective Cover Installation Plan

1. The CONTRACTOR shall provide a detailed Drainage Material and Protective Cover Installation Plan signed by the CONTRACTOR addressing the placement methods of the Leachate Collection and Removal System Trench Gravel, Protective Cover Layer/Drainage Sand Layer to demonstrate that the underlying liner geosynthetic materials will be protected and safeguarded from damage during placement of the overlying materials.

2. The Drainage Material and Protective Cover Installation Plan shall include material types, minimum thickness of each lift of materials during placement, description of thickness markers, methods for measuring material thicknesses, and methods for removing markers. The marker shall be free standing and shall not be sharp or pointed so it cannot damage the geosynthetic liner materials if hit by equipment.

3. The Drainage Material and Protective Cover Installation Plan shall include a method for removing markers without disturbing in-place materials.

C. Borrow Source Materials - Preconstruction Materials Evaluation

1. The CONTRACTOR shall conduct testing listed in Table 02220-2 to determine availability and suitability of off-site borrow material to be used as Drainage Material.

2. For any off-site material borrow sources, the CONTRACTOR shall notify the ENGINEER in writing of the material source for each soil type specified within Part 2 of this Section at least 21 calendar days prior to the date of anticipated use of such material. Notification shall include at a minimum:

    a. Supplier's name

    b. Borrow location

    c. Documentation confirming adequate quantities are available to complete the WORK

    d. A representative sample of the proposed material, consisting of one 5-gallon, sealed container

    e. Test results as required within Part 2 of this Section

3. The CONTRACTOR shall submit to the ENGINEER laboratory test results for each soil type specified within Part 2 of this Section at least 21 calendar days prior to the date of anticipated use of such material. Materials shall not be incorporated into the project until approved by the ENGINEER.

4. The CONTRACTOR shall submit Material Source Certificates of Compliance signed by the CONTRACTOR for each of the proposed materials, General Fill, Structural Fill, Drainage Sand Layer, Leachate Collection and Removal System Trench Gravel from each of the proposed sources to the ENGINEER. The Material Source Certificates of Compliance shall include the project title, project location, soil type, source name and description, proposed use, test identification number and laboratory test results.

5. Pre-construction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTORS independent Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

D. Submittal Review

1. The CONTRACTOR shall schedule all WORK to allow at least 30 working days for submittal review and approval by the ENGINEER. There shall be no additional compensation to the CONTRACTOR for any construction delays caused by the CONTRACTOR'S failure to plan, obtain approval or schedule WORK to include all CQA testing.

1.02 SITE ACCESS

A. WORK shall be performed so as to not block or hinder site access, except as authorized by the OWNER.

PART 2 - PRODUCTS

2.01 GENERAL FILL/ COMPACTED LINER BASE

A. General Fill shall be non-organic, free of debris, sticks, roots, stones and sharp materials greater than ½-inch in any dimension. The upper 6 inches of the compacted liner base shall be free of particles greater than 0.25-inches in any dimension. The lower 18 inches of compacted liner base shall be free of stones or other particles greater than three inches in diameter. Compacted liner base shall be free of debris, plant materials, roots or other foreign materials.

B. The compacted liner base material shall have an in-place compacted saturated hydraulic conductivity equal to or less than 1×10^{-7}/ cm/sec, or equal to or less than 1×10^{-5} cm/sec if using a GCL that has a saturated hydraulic conductivity equal to or less than 5×10^{-9} cm/sec, all within the density and moisture content range specified for construction.

C. In the areas where General Fill is placed and compacted to bring the landfill cell bottom to the lines and grades shown on the Contract Drawings for use as Subbase it shall be chemically compatible with the GCL in accordance with ASTM D-6141.

D. General Fill shall be well-graded sand (SW), poorly graded sand (SP), poorly graded sand with clay (SP-SC), poorly graded sand with silt (SP-SM), well graded sand with clay (SW-SC), well graded sand with silt (SW-SM), or clayey sand (SC) as classified by USCS, or other soil as approved by the ENGINEER.

E. Unsuitable General Fill

1. ASTM D-2487 Soil Classification Groups: ML, MH, OH, OL and PT.

2. Soils also include satisfactory soils not maintained within 3 percent of optimum moisture content at the time of compaction.

F. Prior to placement, CONTRACTOR shall provide laboratory test results in accordance with Table 02220-1.

1. Preconstruction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTORS independent CQC Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

TABLE 02220- 1: COMPACTED LINER BASE MATERIAL PROPERTY REQUIREMENTS FOR BORROW SOURCE

ITEM	ASTM	MINIMUM REQUIREMENTS
Water Content	D-2216, D-4643, D-4944, D-4954	1 test per 1,000 cu yd and each change in material type.
Atterberg Limits	D-4318	1 test per 5,000 cu yd and each change in material type.
Sieve Analysis	D-422	1 test per 1,000 cu yd and each change in material type.
Standard Proctor	D-698	1 test per 5,000 cu yd and each change in material type.
Recompacted Hydraulic Conductivity	D-5084	1 test per 10,000 cu yd and each change in material type.

G. During placement, all materials shall be tested by the CQA CONSULTANT in accordance with Table 02220-3.

1. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

2.02 STRUCTURAL FILL

A. Structural Fill soils non-organic, free of debris, sticks, roots, stones and sharp materials greater than ½-inch in any dimension.

B. Structural Fill shall be well-graded sand (SW), poorly graded sand (SP), poorly graded sand with clay (SP-SC), poorly graded sand with silt (SP-SM), well graded sand with clay (SW-SC), well graded sand with silt (SW-SM), or clayey sand (SC) as classified by USCS, or other soil as approved by the ENGINEER.

C. Unsuitable Structural Fill

1. ASTM D2487 Soil Classification Groups: ML, MH, OH, OL and PT.

2. Soils also include satisfactory soils not maintained within 3 percent of optimum moisture content at the time of compaction.

D. Prior to placement, CQC CONSULTANT shall provide laboratory test results in accordance with Table 02220-1.

1. Preconstruction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTORS independent Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

E. During placement, all materials shall be tested by the CQC CONSULTANT in accordance with Table 02220-4.

1. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

2.03 PROTECTIVE COVER LAYER/DRAINAGE SAND LAYER

A. Protective Cover Layer/Drainage Sand shall be non-carbonate, non-organic, free of debris, waste, sticks, roots, organics, or other deleterious materials and stones larger than ¼-inch in any dimension and 2 feet thick.

B. The material shall be sand with a minimum hydraulic conductivity of $1x10^{-2}$ cm/sec (0.001 cm/sec) when placed in accordance with this Section.

C. The leachate collection material calcium carbonate content shall be less than 5 percent by weight.

D. During construction or stockpiling, bulk samples shall be obtained and tested in accordance with Table 02220-2.

TABLE 02220-2 PROTECTIVE COVER/DRAINAGE SAND LAYER TESTING

ITEM	ASTM	MINIMUM REQUIREMENTS
Sieve Analysis	D-422	1,500 CU YD

Hydraulic Conductivity	D-2434	3,000 CU YD
Calcium Carbonate	D-3042	1 per source

E. The above gradations may be modified by the ENGINEER if the Protective Cover Layer/Drainage Sand gradation varies from the gradation curve above but still meets the following:

1. Geotextile requirements.

2. Interface shear strength requirements

F. Prior to placement, CQC CONSULTANT shall provide laboratory test results in accordance with Table 02220-2.

1. Preconstruction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTORS independent Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

2. If the material shall be screened, qualifying samples shall be collected from the screened material. Unscreened material samples do not meet the requirements of this section. Passing results in all above categories shall be required to qualify a source for use.

G. During placement, all materials shall be tested by the CQC CONSULTANT in accordance with Table 02220-1 through 4.

1. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

H. The CONTRACTOR shall supply additional Protective Cover Layer/Drainage Sand material, as required to complete the WORK, which has met the requirements of the Project Specifications and is approved by the ENGINEER. The material shall be stockpiled onsite by the CONTRACTOR in a location as directed by the ENGINEER for future use by the OWNER.

PART 3 - EXECUTION

3.01 PREPARATION

A. The CONTRACTOR is responsible for layout of all excavations and establishment of grades as shown on the Contract Drawings. CONTRACTOR shall replace existing survey markers to original location if disturbed or

destroyed at no additional cost to OWNER. Layout WORK shall be performed by a licensed land surveyor registered in the State of Georgia.

B. Prior to clearing, grubbing and stripping of the project area the CONTRACTOR shall have performed and submitted to the ENGINEER the topographic surveys as required in Survey.

C. The CONTRACTOR shall provide protection as required to prevent damage to existing improvements indicated to remain in place.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. The CONTRACTOR shall provide temporary erosion and sedimentation control methods in accordance with requirements of authorities having jurisdiction, as specified in the Contract Documents and in Section 01568 Temporary Erosion and Sedimentation Control.

B. The CONTRACTOR shall protect excavated/graded areas against action of the elements. Re-establish grades where settlement, washouts, or erosion damage occurs. Any erosion that takes place during the construction of the project shall be repaired by the CONTRACTOR at no additional cost to the OWNER as per the Specifications provided herein.

3.03 CLEARING, GRUBBING, AND STRIPPING

A. Clear areas required for access to the site and execution of the WORK. Clearing and grubbing shall consist of the complete removal and disposal of all trees, brush, stumps, roots, grass, weeds, rubbish and all other obstructions resting on or protruding through the surface of the existing ground and the surface of the areas to be excavated which are understood by generally accepted practice not to be suitable for construction.

B. Clearing and grubbing shall be accomplished in all areas designated for site grading. Areas to be excavated or filled upon shall be stripped of grass and roots to a depth of six (6) inches. Stripped materials suitable for topsoil shall be stockpiled for later use and all other unsuitable material shall be disposed of onsite by the CONTRACTOR.

C. Where clearing, grubbing or excavation is conducted within the area where the bottom liner system will be installed, all stumps, roots and other debris protruding through or appearing at the ground surface shall be removed to a depth of not less than 18 inches below the ground surface and the voids replaced with General Fill and compacted with equipment suitable for the WORK to bring the material to the required density and grade as specified in this Section.

3.04 DEWATERING

A. Water that enters excavations with waste shall be considered leachate and shall not be discharged to the ground or other means that are typical for stormwater. Water determined to be leachate by the ENGINEER shall be pumped into sealed tanks, hauled, and disposed into the existing Leachate Storage Basins located at the south side of the landfill, or as directed by the ENGINEER.

B. The CONTRACTOR shall at all times during construction provide and maintain proper equipment and facilities to remove water entering excavations. CONTRACTOR shall keep such excavations dry so as to obtain a satisfactory foundation condition for all WORK.

C. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottom and soil changes detrimental to stability of subgrades and foundations. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structure as a result of inadequate dewatering or other construction methods shall be removed and replaced by suitable materials as approved by the ENGINEER at the CONTRACTOR'S expense. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

D. The CONTRACTOR shall establish and maintain temporary drainage ditches, diversions outside excavation limits, or other acceptable methods as determined by the CONTRACTOR and approved by the ENGINEER to convey rain water and water removed from excavations to collecting or runoff areas as deemed necessary. The CONTRACTOR shall not use trench excavations as temporary drainage ditches.

E. Disposal of Water Removed by Dewatering

1. Water conveyed away from excavations which has not contacted waste materials shall be discharged to areas within the landfill as approved by the ENGINEER.

2. Dispose of water by procedures approved by the ENGINEER in such a manner as to cause no inconvenience to the OWNER, the ENGINEER, or others involved in WORK about the site.

3.05 DISPOSAL OF WASTE MATERIAL

A. Material that does not contain waste, as determined by the ENGINEER, and meets the project Specifications, may be reused and incorporated into the project. The CONTRACTOR shall be responsible for loading and transporting waste and waste materials not incorporated into the project to the active face of the landfill or other area as directed by the OWNER for disposal. The OWNER will not charge the CONTRACTOR a tipping fee, but the CONTRACTOR shall be responsible for all other costs.

B. At no time shall waste material be stored outside the permitted landfill boundary and in landfill areas with installed intermediate or final cover systems.

C. Exposed waste, or soil containing waste materials, shall not be allowed to remain exposed overnight. At the end of each work day, the CONTRACTOR shall cover exposed waste, or soil containing waste materials, in a temporary or permanent manner by the means of a compacted six-inch earthen cover or tarp suitable for odor control and protection from rain, birds, and other hazards. At no time shall water exposed to waste be allowed to enter the stormwater management system. Water exposed to waste shall be considered leachate and handled accordingly.

3.06 STOCKPILE OF MATERIALS

A. Excavated material shall be transported to stockpile areas designated by the OWNER for material that will be incorporated into the WORK, surplus, or unsuitable materials. No materials shall be removed from the site or disposed of by the CONTRACTOR except as directed by the ENGINEER. Excavated materials may be segregated during excavation and the ENGINEER or CQA REPRESENTATIVE shall direct locations for segregated materials. The CONTRACTOR shall coordinate disposal activities with the ENGINEER to not interfere with on-going landfill operations activities.

B. The CONTRACTOR shall be responsible for vehicle traffic safety and shall coordinate with the ENGINEER to determine site-specific safety concerns.

C. The CONTRACTOR shall sweep or wash paved roadways that become covered with soil. The CONTRACTOR shall provide all equipment, water, and personnel necessary to clear the paved roads. This activity shall be performed at a minimum of once per week or as the OWNER directs.

3.07 EXCAVATION

A. Layout all excavations and establish grades as shown on the Contract Drawings. Replace existing survey markers at original location if disturbed or destroyed. Layout work shall be performed by a licensed land surveyor registered in the State of Florida.

B. The CONTRACTOR shall provide drainage at all times during construction by shaping excavated areas and maintaining ditches and berms. CONTRACTOR will protect graded areas against action of elements and re-establish grades where settlement, washouts, or erosion damage occurs. Damaged areas shall be repaired at no additional cost to the OWNER.

C. The CONTRACTOR shall excavate soil as required to the lines, grades, and elevations indicated on the Contract Drawings as needed to construct the subbase. Excavate unsuitable subgrade soils if encountered to 18 inches

vertically and horizontally around the unsuitable area only within the limits of the bottom liner system area lines and grades shown on the Contract Drawings. Backfill excavated unsuitable subgrade soil with excavated suitable Existing Subgrade Soil or General Fill and compact with equipment suitable for the WORK to bring the material to the required density and grade.

D. If the bottom of any excavation is removed below the limits shown on the Contract Drawings, it shall be backfilled at the CONTRACTOR'S expense with material approved by the ENGINEER at no additional cost to the OWNER.

E. Excavation, backfilling, sampling, and testing shall be performed by the CONTRACTOR'S CQC CONSULTANT only when the CQA REPRESENTATIVE is present. A minimum of 24-hours prior notice shall be given to the ENGINEER and CQA REPRESENTATIVE.

F. All excavations shall conform to the Health and Safety Plan and Excavation Plan submitted by the CONTRACTOR.

3.08 COMPACTED LINER BASE PREPARATION

A. The contractor will be responsible for preparing the subgrade for construction of overlying components according to the approved grades. The soils quality assurance manager will represent to the project manager that:

1. A licensed Georgia Professional Engineer or Land Surveyor has determined that lines and grades are in accordance with Design Plans;

2. There are no areas excessively softened by high water content; and,

3. The subgrade areas, which were unstable under the loading of the compaction equipment, have been corrected by re-compaction or removal and replacement with structural fill.

B. The compacted liner base lifts shall be uniform in thickness and shall not exceed six inches in thickness after compaction. The compaction equipment shall be a sheepsfoot compactor with a peg length that will fully penetrate the loose lifts.

C. All lifts shall be compacted to a minimum of 95% of the maximum dry density, and above the optimum moisture content as determined by ASTM D-698, standard proctor to achieve a maximum hydraulic conductivity of 1×10^{-7} cm/sec (option 1), or 1×10^{-5} cm/sec (option 2- if using GCL with a saturated hydraulic conductivity of equal to or less than 5×10^{-9} cm/sec).

D. Adjustments to the moisture content may be allowed if it is found by laboratory remolded permeabilities that a higher in-place density or change in moisture content is required to maintain a maximum hydraulic conductivity of

1×10^{-7} cm/sec (option 1), or 1×10^{-5} cm/sec (option 2- if using GCL with a saturated hydraulic conductivity of equal to or less than 5×10^{-9} cm/sec).

E. Compaction shall be performed with an appropriately heavy, properly ballasted, penetrating foot compactor.

F. Hand manipulated compaction equipment (vibrating drums or mechanical tampers) shall be used for working in confined areas and adjacent to structures.

G. The daily work area should extend to such a distance necessary to minimize desiccation and crusting of the lift surface. The finished surface should be smooth rolled at the end of the day to promote precipitation runoff.

H. If desiccation, crusting, or sealing by rolling of the lift surface occurs prior to placement of the next lift, the area shall be scarified to a minimum depth of one inch or until sufficiently moist materials are encountered, whichever is greater. Also, the addition of water to surfaces prior to placement of additional clay may be utilized when necessary to maintain uniformly moist soil conditions.

I. In order to control the moisture content and density of the compacted liner base, the soils CQA CONSULTANT will:

1. Conduct in-place density and moisture content tests utilizing the nuclear density gauge and/or drive cylinder methods at a minimum frequency of one test per 10,000 square feet per 6-inch lift of soil and one test per 200 linear feet of permanent sidewall per 6-inch lift of soil. A grid pattern of 100-foot will be established that includes side slopes to locate samples.

2. Conduct a direct or microwave oven moisture content test (ASTM D-2216 or ASTM D -4643) for every ten (10) nuclear moisture content test (ASTM D -3017);

3. Conduct a drive cylinder test (ASTM D -2937) for every twenty-five (25) nuclear density tests (ASTM D -2922);

4. Collect undisturbed samples at a frequency of one test per 40,000 square feet per 6-inch lift of soil liner plus one test per 800 linear feet per 6-inch lift of soil liner on permanent sidewall. Undisturbed samples shall be tested for moisture content (ASTM D -2216), Atterberg limits (ASTM D -4318), unit weight (ASTM D -2922), hydraulic conductivity (ASTM D -5084);

5. All penetrations in the compacted liner base shall be filled with bentonite pellets prior to placement of next lift.

J. If samples fail to meet the requirements, the areas of the compacted liner base from which the samples were obtained shall be reworked and retested until passing results are obtained or the failing material will be removed from the site. The repaired area must be retested to demonstrate compliance with the specifications. Passing tests are required before subsequent lifts of soil liner material may be placed.

K. Placement of the geosynthetics on the completed subbase shall not begin until the "Certificate of Subbase Acceptance" has been co-signed by the INSTALLER along with the CQA REPRESENTATIVE certifying the Subbase Layer was constructed in accordance with the approved Contract Documents and Specifications.

L. Placement of the geosynthetics on the completed subbase shall not begin until the Subgrade / Intermediate Cover / LFG System survey has been submitted by the CONTRACTOR and approved by the ENGINEER. Refer to Section 01050 Site Condition Surveys.

M. Prior to material placement, CQA CONSULTANT shall provide laboratory test results in accordance with Table 02220-1.

1. Preconstruction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTOR'S independent Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

N. During material placement, all materials shall be tested by the CQA CONSULTANT in accordance with Table 02220-3.

1. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

TABLE 02220-3 COMPACTED LINER BASE TESTING REQUIREMENTS

PARAMETER	TEST METHOD	MINIMUM TESTING FREQUENCY
Permeability	ASTM D-5084	1 test per 40,000 SF per lift and 1 test per 800 LF per lift of sidewall
Atterberg Limits	ASTM D-4318	1 test per 40,000 SF per lift and 1 test per 800 LF per lift of sidewall dry density
Density	ASTM D-2922	1 test per 40,000 SF per lift and 1 test per 800 LF per lift of sidewall

Moisture Content	ASTM D-2216	1 test per 40,000 SF per lift and 1 test per 800 LF per lift of sidewall
Sieve Analysis	ASTM D-422	1 test per 1,000 cu yd and each change in material type.

2. The Soils CQA will maintain an on-going sampling and testing program during construction to monitor moisture/density curves so that representative soil data is being used to estimate relative compaction. More frequent compaction curves or one-point moisture/density tests may be performed at the discretion of the soils quality assurance consultant to properly control field compaction operations. The soils quality assurance consultant will visually check liner materials entering the site for color, texture, rocks and foreign debris.

3.09 PLACEMENT OF STRUCTURAL FILL

A. Place designated soil fill materials, excavated Existing Subgrade Soil, Structural Fill, perform grading improvements, compact, and construct embankments to the lines and grades shown on Contract Drawings. Smooth finish surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades. The ENGINEER reserves the right to make adjustments or revisions in lines or grades as the WORK progresses while still achieving the intent of the grading plan.

B. The CONTRACTOR will be responsible for preparing the subgrade for construction of overlying components according to the approved grades. The SOILS QUALITY ASSURANCE MANAGER will represent to the PROJECT MANAGER that:

1. A licensed Georgia professional engineer or land surveyor has determined that lines and grades are in accordance with design plans;

2. There are no areas excessively softened by high water content; and,

3. The subgrade areas, which were unstable under the loading of the compaction equipment, have been corrected by re-compaction or removal and replacement with structural fill.

C. After excavation to subgrade elevation, the contractor shall proof-roll the entire subgrade with loaded, rubber-tired scrapers or equivalent. Unstable areas identified during proof-rolling shall be removed to provide a subgrade sufficiently stable to support the compaction of overlying materials. Removed materials will be replaced with structural fill materials capable of supporting the compaction of overlying materials, and shall be compacted to a maximum 6-inch thick compacted lift at a minimum 95% of maximum dry density determined from ASTM D-698, standard proctor.

In-place density tests on the structural fill and subgrade will be performed by a soils CQA CONSULTANT with a nuclear density meter or a drive cylinder apparatus. The required degree of compaction is a minimum of 95% of the maximum dry density, as determined by ASTM D-698, standard proctor. Table 02220-4 summarizes the minimum testing and frequency requirements for the compacted structural fill:

TABLE 02220-4 STRUCTURAL FILL TESTING

ITEM	TEST METHOD	MINIMUM REQUIREMENT*
Nuclear Density/Moisture	ASTM D-2922	1 test per 10,000 square feet per lift
Density	ASTM D-1556 OR D-2937	Every 25th nuclear density test
Moisture	ASTM D-2216 OR D-4643	Every 10th nuclear moisture test
Atterberg Limits	ASTM D-4318	1 test per 10,000 cu. Yd. Or whenever soil type changes
Sieve Analysis	ASTM D-422	1 test per 10,000 cu. Yd.
Standard Proctor Soil Compaction Curve	ASTM D-698	1 test per 10,000 cu. Yd or whenever soil type changes
Subgrade Elevations		100 ft. Grid interval
*TEST FREQUENCIES RELATED TO SUBGRADE AND STRUCTURAL FILL VOLUME SHALL BE BASED ON IN-PLACE CUBIC YARDS.		

D. The soils CQA CONSULTANT will maintain an on-going sampling and testing program during construction to document that moisture/density curves are representative of the compacted soil. More frequent density tests may be performed at the discretion of the soils quality assurance consultant to properly control field compaction operations.

E. Areas that deflect, pump or rut under this operation shall be reworked by the CONTRACTOR.

F. Within the excavated Existing Subgrade Soil or General Fill area where geosynthetics will be placed, remove any debris, sticks, roots, stones and sharp materials greater than ½-inch in any dimension from the finished subbase surface. Smooth finished subbase surface to remove rutting and tire marks. The CONTRACTOR shall avoid sharp turns, sudden starts or stops, spinning and digging of tracks, or any other operation that could damage the surface.

G. Grade the prepared filled area to the required vertical tolerance. By survey methods, verify that all grades, slopes and elevations conform to specified requirements. Record elevations of each component in accordance with Section 01050 Site Condition Surveys. If there is a discrepancy, immediately

notify the ENGINEER. Do not proceed with installation in an area of discrepancy until the ENGINEER gives approval.

H. Maintain proper drainage during grading operations until final acceptance. Repair any fill or grading materials which may be lost or displaced as a result of natural causes such as storms, squalls, etc., with acceptable material. Repair shall be performed at no additional cost to the OWNER. The additional survey or documentation necessary to conduct the repairs shall be at no additional cost to the OWNER.

I. Maintain the soil moisture within the area which GCL will be placed until covered by GCL and liner materials. The groundwater level shall be maintained during construction as required in Section 02140 Dewatering.

J. Placement within areas intended for geosynthetics installation shall not begin until the "Certificate of Subbase Acceptance" has been co-signed by the INSTALLER along with the CQA REPRESENTATIVE certifying the Subbase Layer was constructed in accordance with the approved Contract Documents and Specifications. Refer to Section 02077 Geosynthetic Clay Liner (GCL).

K. Placement within areas intended for geosynthetics installation shall not begin until the Subgrade / Intermediate Cover / LFG System survey has been submitted by the CONTRACTOR and approved by the ENGINEER. Refer to Section 01050 Site Condition Surveys.

L. Prior to material placement, CQC CONSULTANT shall provide laboratory test results in accordance with Table 02220-1.

1. Preconstruction materials evaluations shall be performed on samples from potential soil borrow sources by the CONTRACTORS independent CQC Laboratory prior to incorporation into construction to ascertain their acceptability as construction materials. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

2. Preconstruction materials evaluations shall be performed on samples from the existing subgrade soil by the CONTRACTORS independent CQC Laboratory prior to incorporation into construction. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

M. During material placement, all materials shall be tested by the CQC CONSULTANT in accordance with Table 02220-4.

1. Testing shall be performed by the Soils CQA Laboratory during the course of the WORK to verify continued material compliance with the Plans and Technical Specifications.

3.10 PLACEMENT OF PROTECTIVE COVER LAYER/DRAINAGE SAND LAYER

A. The Protective Cover Layer/drainage sand layer shall be a minimum two feet thick, meeting the requirements of Table 02220-2. Placement of the Protective Cover Layer/drainage sand layer materials will only occur after the underlying geosynthetic material installations are complete and approved in accordance with the specifications. Placement of Protective Cover Layer/drainage sand layer shall be conducted in accordance with the drainage material installation plan submitted by the contractor.

B. The drainage sand layer shall be placed by light, wide tracked equipment having a maximum of 5 psi on a minimum of 2 feet of protective cover material. Only nominal compaction needs be applied to the drainage layer. Over compaction due to equipment traffic must be avoided. Care must be exercised to eliminate any possibility of damage to the geosynthetics during liner protective cover layer placement. Wrinkles noted in the geosynthetics during drainage layer placement should be relaxed and corrected in accordance with the geomembrane installer's recommendations. Drainage material shall not be placed down the slopes.

C. CONTRACTOR shall not push protective cover sand/drainage material downhill during construction. ALL protective cover sand/drainage material shall be pushed upslope during construction.

D. The CQA CONSULTANT will make a visual observation of the drainage layer material prior to placement. Drainage layer placement shall be monitored throughout each day by the CQA CONSULTANT. Thickness measurements shall be taken on a minimum 100-foot grid by a registered land surveyor in the state of Georgia.

E. Prior to construction, bulk samples shall be obtained for every 1,500 cubic yards of material being placed for a determination of grain size distribution (ASTM D-422) and every 3,000 cubic yards for a determination of hydraulic conductivity (ASTM D-2434), additionally, one sample will be tested for calcium carbonate content (ASTM D-3042).

F. If the borrow source is changed, or a different material from the same borrow source is considered, these materials will be tested at the same frequency as described in (D). Passing results in all above categories shall be required to qualify a source for use. Qualifying samples shall be collected from screened material.

G. Maintain proper drainage during grading operations until final acceptance. Repair any fill or grading materials which may be lost or displaced as a result

of natural causes such as storms, squalls, etc., with acceptable material. Repair shall be performed at no additional cost to the OWNER. The additional survey or documentation necessary to conduct the repairs shall be at no additional cost to the OWNER.

H. By survey methods, verify that all grades, slopes, and elevations conform to specified requirements. Record elevations in accordance with Section 01050 Site Condition Surveys. If there is a discrepancy, immediately notify the ENGINEER. Do not proceed with installation in an area of discrepancy until the ENGINEER gives approval.

I. A Geosynthetic Rain Tarp shall be required on top of the Protective Cover Layer/Drainage Sand Layer as indicated on the Contract Drawings.

3.11 TOLERANCES

A. The CONTRACTOR shall bring final grading to within the tolerances specified in Section 01050 Site Conditions Survey.

3.12 DUST CONTROL

A. The CONTRACTOR shall spray water over the construction area, haul roads, or other places impacted by the CONTRACTOR, in order to limit airborne dust, or as directed by the ENGINEER or OWNER.

B. If due to construction activities the dust reduces the visibility so vehicles and personnel are limited and cause a Health and Safety problem, all construction activities will be stopped immediately until the CONTRACTOR applies water to the construction area, haul roads, or other places being impacted by the CONTRACTOR'S activities.

END OF SECTION

SECTION 02272

GEOTEXTILES

PART 1 - GENERAL

1.1 SCOPE

A. This specification covers nonwoven geotextile fabrics for use in filtered drain applications such as around drainage stone. The geotextile shall serve as a permeable layer allowing water to flow through while retaining the soil.

1.2 SUBMITTALS

A. Technical specifications and samples of the proposed geotextile(s) shall be submitted for approval.

PART 2 - PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. Fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, shall consist of long-chain synthetic polymers. Where the geotextile will be in contact with fresh concrete, polyester fabrics will not be permitted. They shall be formed into a nonwoven network such that the filaments or yams retain dimensional stability relative to each other, including selvedges. The geotextile shall be mildew and rot resistant, resistant to ultraviolet light exposure, insect and rodent resistant and inert to commonly encountered chemicals and hydrocarbons.

B. Geotextiles shall be as stated in the Drawings and Construction Quality Assurance (CQA) Plan. Heat bonded geotextiles will not be permitted.

2.2 SAMPLING AND TESTING

A. The geotextile shall be subject to sampling and testing. Sampling shall be in accordance with ASTM D-4354-89, and testing procedures in accordance with the methods given in the CQA Plan. If the manufacturer's quality control procedures do not include the testing requirements in the CQA Plan, a competent laboratory shall be retained by the manufacturer of the fabric for testing to determine the necessary values. Testing paid for by the manufacturer.

2.3 MANUFACTURER'S CERTIFICATE

A. The manufacturer shall file with the purchaser a certificate stating the name of the manufacturer, the chemical composition of the filaments or yams, and other pertinent information so as to fully describe the geotextile. The manufacturer shall include in the certificate a guarantee stating that the geotextile that is furnished meets the requirements of the specification. The certificate shall be attested to by a person having legal authority to bind the company. Either mismarking or misrepresentation by the manufacturer shall be reason to discontinue acceptance under these

Specifications. Notice sent to the manufacturer by the purchaser regarding the discontinuance of acceptance will be considered to be notice to all wholesalers, jobbers, distributors, agents and other intermediaries handling the manufacturer's product.

2.4 PACKAGING AND IDENTIFICATION

A. The geotextile shall be provided in rolls wrapped with protective covering to protect from mud, dust, dirt, debris, and light. The geotextile shall be free of defects or flaws which affect its physical or chemical properties. Each roll of fabric in the shipment shall be labeled with a number or symbol to identify that production run.

PART 3 - EXECUTION

3.1 SHIPMENT AND STORAGE

A. During periods of shipment and storage, the geotextile shall be kept wrapped until ready for installation. Rolls shall be handled so as not to allow damage due to lifting devices or other equipment. Geotextile shall not be stored directly on the ground. Rolls of geotextile shall be stored under cover, if outside, on racks evenly supporting the roll at least six (6) inches off the ground. Partial rolls shall be labeled as such. Any rolls partially used shall not remain uncovered or unwrapped for over forty-eight (48) hours. Rolls shall be protected from direct sunlight exposure, rain, mud, etc. at all times during storage.

3.2 SUBGRADE PREPARATION

A. Prior to placement of the geotextile, the subgrade shall be prepared in accordance with the plans. The subgrade shall be free of stones or other sharp protruding objects that could penetrate the fabric. Ruts and similar irregularities shall be filled to prevent overstressing the fabric due to voids underneath the fabric. The subgrade shall be prepared such that when the geotextile is installed there shall be intimate contact between the subsoil and the geotextile.

3.3 FABRIC INSTALLATION

A. The geotextile fabric shall be installed as indicated on the Plans. Unless otherwise indicated, geotextile shall be unrolled and placed in the upslope-downslope direction. Unless otherwise indicated, overlaps shall be a minimum of eighteen (18) inches. Soft subgrade may require additional overlap. Ample slack will be provided in the geotextile, since fill placement tends to stretch and tighten the fabric. Excessive wrinkling or folding of the geotextile will not be allowed. If anchorage trenches are indicated on the plans, special care must be taken to ensure the fabric is properly secured, has adequate slack, and will not be pulled from the trench.

B. During and after the installation, in no case shall geotextiles be exposed to sunlight for more than thirty (30) calendar days. If the geotextile is exposed for more than thirty (30) calendar days, it shall be replaced at no cost to the Owner.

C. If, during installation of the geotextile, the fabric becomes torn, contaminated, or clogged by silt from surface runoff or other sources, the damaged fabric shall be removed and replaced at no additional cost to the Owner.

3.4 SEAMING

A. The geotextile installed around the subsurface gravel drain shall be seamed by sewing. At a minimum, the fabric shall be seamed by two (2) rows of butterfly stitches. The seams shall be continuous. Spot sewing will not be permitted. The stitch density shall be a minimum of two stitches per inch. The chain stitch utilized shall be 401 two-thread.

B. The thread type must be polymeric with chemical and ultraviolet light resistant properties equal to or greater than that of the geotextile. The color of the sewing threads should contrast that of the color of the geotextile for ease in visual inspections. The thread tension should be adjusted in the field to be sufficiently tight, but not cutting the geotextile.

END OF SECTION

SECTION 02273

GEOCOMPOSITE

PART 1 - GENERAL

1.1 SCOPE

A. This specification covers drainage geocomposite for use in alternate leachate collection system as part of the base liner system.

1.2 SUBMITTALS

A. Technical specifications and samples of the proposed geocomposite shall be submitted for approval.

PART 2 - PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. Geocomposite shall be as stated in the Drawings and Construction Quality Assurance (CQA) Plan.

2.2 SAMPLING AND TESTING

A. The geocomposite shall be subject to sampling and testing. Sampling shall be in accordance with ASTM D-4354-89, and testing procedures in accordance with the methods given in the CQA Plan. If the manufacturer's quality control procedures do not include the testing requirements in the CQA Plan, a competent laboratory shall be retained by the manufacturer of the fabric for testing to determine the necessary values. Testing paid for by the manufacturer.

2.3 MANUFACTURER'S CERTIFICATE

A. The manufacturer shall file with the purchaser a certificate stating the name of the manufacturer, the chemical composition of the filaments or yams, and other pertinent information so as to fully describe the geotextile. The manufacturer shall include in the certificate a guarantee stating that the geocomposite that is furnished meets the requirements of the specification. The certificate shall be attested to by a person having legal authority to bind the company. Either mismarking or misrepresentation by the manufacturer shall be reason to discontinue acceptance under these Specifications. Notice sent to the manufacturer by the purchaser regarding the discontinuance of acceptance will be considered to be notice to all wholesalers, jobbers, distributors, agents and other intermediaries handling the manufacturer's product.

2.4 PACKAGING AND IDENTIFICATION

A. The geocomposite shall be provided in rolls wrapped with protective covering to protect from mud, dust, dirt, debris, and light. The geocomposite shall be free of

defects or flaws which affect its physical or chemical properties. Each roll of fabric in the shipment shall be labeled with a number or symbol to identify that production run.

PART 3 - EXECUTION

3.1 SHIPMENT AND STORAGE

A. During periods of shipment and storage, the geocomposite shall be kept wrapped until ready for installation. Rolls shall be handled so as not to allow damage due to lifting devices or other equipment. Geocomposite shall not be stored directly on the ground. Rolls of geocomposite shall be stored under cover, if outside, on racks evenly supporting the roll at least six (6) inches off the ground. Partial rolls shall be labeled as such. Any rolls partially used shall not remain uncovered or unwrapped for over forty-eight (48) hours. Rolls shall be protected from direct sunlight exposure, rain, mud, etc. at all times during storage.

3.2 INSTALLATION

A. The geocomposite shall be installed on top of the geomembrane liner as indicated on the Drawings and the CQA Plan.

B. During and after the installation, in no case shall geocomposite be exposed to sunlight for more than thirty (30) calendar days. If the geocomposite is exposed for more than thirty (30) calendar days, it shall be replaced at no cost to the Owner.

C. If, during installation of the geocomposite, the fabric becomes torn, contaminated, or clogged by silt from surface runoff or other sources, the damaged fabric shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

SECTION 02274

GEOSYNTHETIC CLAY LINER (GCL)

PART 4 - GENERAL

4.1 SCOPE

A. This specification covers geosynthetic clay liner (GCL) for use in the base liner system.

4.2 SUBMITTALS

A. Technical specifications and samples of the proposed GCL shall be submitted for approval.

PART 5 - PRODUCTS

5.1 MATERIAL REQUIREMENTS

A. GCL shall be as stated in the Drawings and Construction Quality Assurance (CQA) Plan.

5.2 SAMPLING AND TESTING

A. The GCL shall be subject to sampling and testing. Sampling shall be in accordance with ASTM D-4354-89, and testing procedures in accordance with the methods given in the CQA Plan. If the manufacturer's quality control procedures do not include the testing requirements in the CQA Plan, a competent laboratory shall be retained by the manufacturer of the fabric for testing to determine the necessary values. Testing paid for by the manufacturer.

5.3 MANUFACTURER'S CERTIFICATE

A. The manufacturer shall file with the purchaser a certificate stating the name of the manufacturer, the chemical composition of the filaments or yams, and other pertinent information so as to fully describe the GCL. The manufacturer shall include in the certificate a guarantee stating that the GCL that is furnished meets the requirements of the specification. The certificate shall be attested to by a person having legal authority to bind the company. Either mismarking or misrepresentation by the manufacturer shall be reason to discontinue acceptance under these Specifications. Notice sent to the manufacturer by the purchaser regarding the discontinuance of acceptance will be considered to be notice to all wholesalers, jobbers, distributors, agents and other intermediaries handling the manufacturer's product.

5.4 PACKAGING AND IDENTIFICATION

A. The GCL shall be provided in rolls wrapped with protective covering to protect from mud, dust, dirt, debris, and light. The GCL shall be free of defects or flaws which affect its physical or chemical properties. Each roll of fabric in the shipment shall be labeled with a number or symbol to identify that production run.

PART 6 - EXECUTION

6.1 SHIPMENT AND STORAGE

A. During periods of shipment and storage, the GCL shall be kept wrapped until ready for installation. Rolls shall be handled so as not to allow damage due to lifting devices or other equipment. GCL shall not be stored directly on the ground. Rolls of GCL shall be stored under cover, if outside, on racks evenly supporting the roll at least six (6) inches off the ground. Partial rolls shall be labeled as such. Any rolls partially used shall not remain uncovered or unwrapped overnight. Rolls shall be protected from direct sunlight exposure, rain, mud, etc. at all times during storage.

6.2 SUBGRADE PREPARATION

A. Prior to placement of the GCL, the subgrade shall be prepared in accordance with the plans. The subgrade shall be free of stones or other sharp protruding objects that could penetrate the fabric. Ruts and similar irregularities shall be filled to prevent overstressing the fabric due to voids underneath the fabric. The subgrade shall be prepared such that when the geotextile is installed there shall be intimate contact between the subsoil and the geotextile.

6.3 INSTALLATION

A. The GCL shall be installed as indicated on the Drawings and CQA Plan..

B. During and after the installation, in no case shall GCL be exposed overnight. If the GCL is exposed overnight, it shall be replaced at no cost to the Owner.

C. If, during installation of the GCL, the material becomes torn, contaminated, or clogged by silt from surface runoff or other sources, the damaged material shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

SECTION 02776
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE LINER

PART 1 - GENERAL

1.1 DESCRIPTION

A. The WORK specified in this Section includes the manufacture, fabrication, testing, and installation of 60 mil Textured HDPE Geomembrane Liner. The CONTRACTOR shall furnish all materials, labor, supervision, administration, management, Construction Quality Control (CQC), and equipment necessary for unloading, on-site handling, storage, installation, seaming, repairing, and CQC testing of 60 mil Textured HDPE Geomembrane Liner (textured on both sides) as part of the PROJECT as shown on the CONTRACT DRAWINGS and as specified herein.

B. All materials shall conform to the requirements of this Section and shall be of new stock of the highest grade available, free from defects, and recently manufactured.

C. All WORK shall be performed in strict accordance with the SPECIFICATIONS, CONTRACT DRAWINGS, conformance with the MANUFACTURER'S recommendations, and with current industry standards.

D. Quality Control (QC) testing specified in this Section is the CONTRACTOR'S responsibility and all costs shall be included in the Bid Price. The OWNER is responsible for the Quality Assurance (QA) testing.

E. Throughout this Section, all references to CQA CONSULTANT and the requirement to submit a final report, signed and sealed by a professional engineer, shall mean a professional engineer licensed in the State of Georgia.

F. Throughout this Section, all references to "SURVEYOR" shall mean a professional land surveyor licensed in the State of Georgia.

1.2 CONSTRUCTION QUALITY CONTROL/QUALITY ASSURANCE

A. CQC shall be performed by the geomembrane INSTALLER. The INSTALLER'S responsibilities shall include, but is not limited to the following:

1. Supervise all geomembrane installation activities.

2. Perform and document CQC testing as specified herein.

3. Certify geomembrane materials and installation as meeting requirements of the CONTRACT DOCUMENTS and SPECIFICATIONS.

B. Construction Quality Assurance (CQA) will be performed by a designated CQA CONSULTANT and QA TESTING LABORATORY retained by the OWNER.

C. The CQA CONSULTANT or OWNER'S REPRESENTATIVE shall obtain samples and perform conformance testing of the geomembrane as indicated in this Section.

D. The CQA CONSULTANT, or his Construction Quality Assurance Representative (CQAR), shall observe and monitor the geomembrane installation activities and obtain and perform CQA testing at random frequencies and locations.

E. Based upon review of the CQC and CQA final reports, the CQA CONSULTANT will provide certification to the regulatory agencies the geomembrane was installed in accordance with the SPECIFICATIONS.

F. The CONTRACTOR shall schedule WORK to provide sufficient time as required to complete CQC and CQA field testing and documentation prior to placing any overlying layers above the geomembrane and shall keep the CQA CONSULTANT'S QA TESTING LABORATORY informed of the construction progress to provide sufficient time for laboratory testing.

G. The CQA CONSULTANT shall submit a final report, signed and sealed by a professional engineer licensed in the State of Georgia, certifying the test results.

1.3 SUBMITTALS

A. The CONTRACTOR shall submit in writing to the ENGINEER documentation on the following:

1. MANUFACTURER'S qualifications showing the following:

a. A qualified MANUFACTURER shall be a company, corporation, or firm regularly engaged in the development, manufacture, and a history of successful production of geomembrane. The geomembrane rolls shall be manufactured by a single MANUFACTURER. A company other than a MANUFACTURER may supply the geomembrane, however, the MANUFACTURER of the geomembrane shall be required to submit and meet the requirements of this Section.

b. Verification the MANUFACTURER has successfully supplied geomembrane for a minimum of 6 projects in the United States, during the last 5 years, of similar size and scope totaling to a minimum of 10,000,000 SF of installed geomembrane. Projects shall be considered similar only if the MANUFACTURER had total manufacturing responsibility for geomembrane production and the installed geomembrane has successfully fulfilled its primary function for a minimum of 2 years. The MANUFACTURER shall submit written information as follows:

1) Name and location of project and date of installation.

2) Contact name and phone number for each project.

3) Geomembrane thickness and surface area of geomembrane installed

c. The MANUFACTURER shall submit written information on the following:

1) Information on plant size (square feet of geomembrane produced daily), number of shifts, and capacity of each shift.

2) Daily production quantity shall be sufficient to meet the demands of the schedule for this WORK.

3) QC Program Manual of descriptive documentation for production. The manual shall define sampling procedures, test frequencies, and methods.

4) A statement from the MANUFACTURER indicating the QC measures specified for this WORK will be followed, at a minimum, and the manufactured geomembrane will meet or exceed the product SPECIFICATIONS for this WORK.

2. FABRICATOR'S qualifications showing the following (if a FABRICATOR is used):

a. A Qualified FABRICATOR shall be a company, corporation, or firm regularly engaged in the seaming and fabrication of geomembrane products, under factory-controlled conditions, for the installation of geomembrane under field conditions. The FABRICATOR usually seams together combinations of smaller rolls of geomembrane into larger factory panels for deployment in the field. The geomembrane shall be fabricated by a single FABRICATOR. The FABRICATOR shall submit written information on the following:

1) Information on plant size (square feet of geomembrane fabricated daily), number of shifts, and capacity of each shift.

2) Daily production quantity shall be sufficient to meet the demands of the schedule for this WORK.

3) QC Program Manual of descriptive documentation for fabrication. The manual shall define sampling procedures, test frequencies, methods, and include FABRICATOR'S QC Certificates and Material Certification. The FABRICATOR shall, at a minimum, comply with the QC SPECIFICATIONS for this WORK.

4) A statement from the FABRICATOR indicating the fabrication QC measures specified for this WORK will be followed and the fabricated geomembrane products will meet or exceed the product SPECIFICATIONS for this WORK.

b. The FABRICATOR shall have successfully fabricated geomembrane products for at least 6 projects, during the last 5 years, of similar size and function, totaling a minimum of 10,000,000 SF of installed geomembrane. Projects shall be considered similar only if the

FABRICATOR had total fabrication responsibility for geomembrane production and the installed geomembrane has successfully fulfilled its primary function for a minimum of 2 years. The FABRICATOR shall submit written information as follows:

1) Name and location of project and date of installation.

2) Contact name and phone number for each project.

3) Geomembrane thickness and surface area geomembrane installed.

3. INSTALLER'S qualifications showing the following:

   a. A qualified INSTALLER shall be a company, corporation, or a single INSTALLER. The INSTALLER shall submit written information on the following:

      1) Installed a minimum of 10,000,000 SF of HDPE geomembrane during the last 5 years or otherwise demonstrate they are qualified to perform the WORK.

      2) Worked in a similar capacity on at least 6 projects similar in complexity to the project described in the CONTRACT DOCUMENTS.

      3) A minimum of 1 Field Installation Supervisor(s) for WORK on the PROJECT.

         a) The Field Installation Supervisor qualifications to be assigned to this WORK shall have directly supervised the installation of a minimum of 2,000,000 SF of geomembrane. No geomembrane shall be installed without the presence of the Field Installation Supervisor.

      4) Ability to provide a minimum of 1 Master Seamer(s) for WORK on the PROJECT.

         a) All personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. At least 1 seamer(s) shall have experience seaming a minimum of 10,000,000 SF of geomembrane seams using the same type of seaming apparatus to be used for this WORK. No seaming shall be carried out without the presence of the Master Seamer within the immediate vicinity.

      5) Installation Quality Control testing personnel in the field with a minimum of 400,000 SF of geomembrane Quality Control testing. Only the actual square footage that the personnel have directly performed Quality Control testing on shall be counted as fulfillment of the minimum square footage.

B. The CONTRACTOR shall submit in writing to the ENGINEER for approval, prior to delivery of the geomembrane to the PROJECT site, documentation on the following:

1. Geomembrane Resin - MANUFACTURER QC Certificates demonstrating compliance with Section 2. Any geomembrane manufactured from resin not meeting the SPECIFICATIONS shall be rejected and not be delivered to the PROJECT site.

2. Material Properties Sheet - Geomembrane MANUFACTURER material properties sheet, including at a minimum all properties specified in GRI GM13, including test methods used and QC Certificates.

3. Geomembrane accessories.

4. Extrudate rod resin information.

5. MANUFACTURER QC Certificates - The MANUFACTURER QC Certificates, written on the MANUFACTURER'S company letterhead, for each roll of geomembrane, including roll identification numbers, and the results (listed individually) of QA/QC testing performed by the MANUFACTURER.

6. MQC Test Reports - See Part 2 of this Section for tests and test frequencies to be provided within 48 hours of completion of the test and prior to material shipment.

7. Geomembrane Shipment - Prior to shipment of the geomembrane from the MANUFACTURER to the PROJECT site notice shall be provided so sufficient time is available to perform conformance sampling and receive laboratory test results.

8. Recommended storage, loading, unloading, and handling equipment (include model number or load capacity).

9. Installation Plan - The Plan will include documentation on the following:

    a. Installation layout drawings drawn to scale.

        1) Proposed geomembrane panel layout including field seams and details, panel location, orientation, identification, sequence, and installed square footage of geomembrane.

            a) Approved drawings will be for concept only and actual panel placement will be determined by site conditions.

    b. INSTALLER'S Geosynthetic Field Installation QA/QC Plan.

        1) The INSTALLER shall, at a minimum, comply with the SPECIFICATIONS for this WORK. The QA/QC Field Installation Plan shall provide for

recording all inspection and testing of all WORK to ensure conformance to the applicable CONTRACT DOCUMENTS and SPECIFICATIONS with respect to materials, workmanship, construction, functional performance and identification. If differences exist between the INSTALLER'S QC procedures and the QC procedures specified by the ENGINEER or CQA CONSULTANT the procedures specified for the WORK shall govern installation. The QA/QC Field Installation Plan shall be subject to approval by the ENGINEER and include:

a) Proposed equipment to be driven over geomembrane.

b) Storage and handling (equipment).

c) Panel identification.

d) Panel inspection.

e) Panel layout drawings/shop drawings.

f) Seam identification.

g) Seaming process and equipment.

h) Seaming inspection.

i) Non-destructive test methods (seams, repairs, geomembrane boots).

j) Destructive tests.

k) Laboratory tests.

l) Methods for testing and calibration of field testing equipment.

m) Corrective actions (i.e., addition of geomembrane, reduction of geomembrane, topography changes).

n) Procedures for development of Record Drawings.

o) Weather contingencies.

p) Record keeping.

q) Description of welding equipment, techniques, and materials.

r) Complete set of forms used to record installation QA/QC data.

s) If the INSTALLER proposes to conduct seaming operations outside of the approved conditions as specified herein (i.e., outside the

weather parameters or night operations), written information and supporting data verifying seam quality can be maintained shall be submitted to the ENGINEER for review and approval. Alternate seaming operations will not be allowed without prior approval from the ENGINEER.

t) Resumes of key geomembrane installation personnel (Field Installation Supervisor, Master Seamer, and QC personnel shall be clearly identified).

u) Proposed INSTALLER's warranty (workmanship).

v) A statement from the INSTALLER stating the installation QC measures specified for this WORK will be followed and the installed geomembrane products will meet or exceed the SPECIFICATIONS for this WORK.

10. Direct Shear Test (Interface Shear Resistance) - Direct Shear Test results demonstrating compliance with Section 2.

C. The CONTRACTOR shall submit in writing to the ENGINEER for approval, prior to geomembrane installation, documentation on the following:

1. Survey Drawings - The CONTRACTOR shall supply the ENGINEER signed and sealed survey drawings by a SURVEYOR that clearly indicates the grades and elevations meet the CONTRACT DOCUMENTS and SPECIFICATIONS.

2. Certificate of Subgrade Acceptance - Certifying the Subgrade was constructed in accordance with the approved CONTRACT DOCUMENTS and SPECIFICATIONS. The acceptance certificate shall be co-signed by the CONTRACTOR along with the INSTALLER and reviewed and approved by the ENGINEER prior to the installation of the geomembrane.

D. The CONTRACTOR/INSTALLER will submit the following to the ENGINEER upon completion of geomembrane installation:

1. Certificate stating the geomembrane has been installed in accordance with the CONTRACT DOCUMENTS and SPECIFICATIONS.

2. Material and installation warranties.

3. Daily Log - Including the daily record that summarizes panels deployed, seams completed, seam testing, seam repair, personnel on site, weather conditions, and equipment on site.

4. Panel Log - Provides geomembrane roll number used and subgrade acceptance for each panel deployed.

5. Seam Testing Log - A complete record of all non-destructive and destructive

testing performed as part of the INSTALLER'S QC program.

6. Seam/Repair Log - Provides a complete record of all repairs and vacuum box testing of repairs made to defective seams and panels.

7. Record Drawings - A panel layout drawing reflecting as-built conditions and related installation details (i.e., panel layout, penetrations, boots, connections, seam type) of the actual geomembrane lining system. The panel layout Record Drawings shall:

   a. Be at the same scale as the CONTRACT DRAWINGS and use applicable drafting standards including a border identifying the INSTALLER, OWNER, PROJECT name and drawing name.

   b. Indicate the installed field panel and seam numbering, configuration and dimensions, geomembrane penetrations, and berms. The CONTRACTOR/INSTALLER shall correlate the identification numbers for each roll of material to the installation field panel.

   c. Include the installed area, in square feet, of installed geomembrane.

   d. Include the locations of destructive samples and repairs with the correct corresponding sample number.

1.4 MATERIAL AND INSTALLATION WARRANTY

A. Material shall be warranted, on a pro-rata basis against MANUFACTURER'S defects for a period of 1 years from the date of final acceptance.

B. Installation shall be warranted by the CONTRACTOR against defects in workmanship for a period of 1 years from the date of final acceptance.

C. Warranty conditions proposed by the MANUFACTURER / FABRICATOR / INSTALLER concerning limits of liability will be submitted by the CONTRACTOR and will be evaluated upon receipt and must be acceptable to the OWNER prior to installation of the geomembrane.

1.5 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

B. CQA CONSULTANT - Party, independent from the MANUFACTURER and INSTALLER that is responsible for observing and documenting activities related to QA during the lining system construction.

C. ENGINEER - The person, firm, or corporation named as such in the Agreement.

D. Geomembrane MANUFACTURER - The party responsible for manufacturing the geomembrane rolls.

E. Geomembrane FABRICATOR - The party responsible for fabricating the geomembrane rolls.

F. Geosynthetic QA TESTING LABORATORY - Party, independent from the CONTRACTOR, MANUFACTURER, and INSTALLER responsible for conducting laboratory tests on samples of geosynthetics obtained during manufacturing, usually under the direction of the OWNER and CQA CONSULTANT.

G. INSTALLER - Party responsible for field handling, storing, deploying, seaming, and testing of the geomembrane seams.

H. Panel - Unit area of a geomembrane that will be seamed in the field that is larger than 100 SF.

I. Patch - Unit area of a geomembrane that will be seamed in the field that is less than 100 SF.

J. Subgrade - Soil layer surface which immediately underlies the bottom liner system Clay as shown on the CONTRACT DRAWINGS.

PART 2 - PRODUCTS

2.1 GENERAL

A. For general information purposes only, geomembrane MANUFACTURER'S are the following:

- Solmax GSE
- Agru/America, Inc.
- ENGINEER approved equal

B. The geomembrane for the PROJECT shall conform to the physical properties requirements, at a minimum, as shown in the Construction Quality Assurance (CQA) Plan in the CONTRACT DRAWINGS.

2.2 GEOMEMBRANE

A. Material shall be 60 mil Textured HDPE Geomembrane Liner (textured on both sides) as shown on the CONTRACT DRAWINGS and specified herein.

B. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1% by weight of additives other than carbon black.

2. Geomembrane shall be free of holes, blisters, undispersed raw materials, nicks, and cuts on roll edges or any sign of contamination by foreign matter. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation in accordance with the MANUFACTURER'S recommendations.

3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating the information required in this Section.

2.3 EXTRUDATE ROD OR BEAD

1. Extrudate material shall be made from same type resin as the geomembrane.

2. Additives shall be thoroughly dispersed.

3. Materials shall be free of contamination by moisture or foreign matter.

TABLE 02776-1 EXTRUDATE TESTING

TEST METHOD/PROPERTY	FREQUENCY (MINIMUM)
ASTM D1505 or ASTM D792 Density	1 per batch of resin
ASTM D4218 Carbon Black Content	1 every 50,000 SF

2.4 MANUFACTURING QUALITY CONTROL TESTING

A. Testing during manufacturing shall be accomplished by the MANUFACTURER'S laboratory.

B. The MANUFACTURER shall provide MANUFACTURER'S QC Certificate, written on the MANUFACTURER'S company letterhead, for the raw resin material used to produce each roll of geomembrane.

C. The MANUFACTURER shall provide a statement certifying no recycled polymer and no more than 2% rework (by weight) of the same type of material was added to the resin (product run may be recycled).

D. The frequency of the testing of the resin batches shall be per MANUFACTURER'S QC Plan and the CQA Plan, at a minimum.

A resin lot is defined as 180,000 pounds or less of raw resin material.

E. The MANUFACTURER QA/QC test procedures and results shall be performed at a frequency of material per lot that conforms to the CQA Plan.

TABLE 02776-2 RESIN REQUIREMENTS

TABLE 02776-3 HDPE LINER MANUFACTURING QUALITY CONTROL TESTING

2.5 CQA CONFORMANCE TESTING

A. In-Plant Conformance Sample Testing Services - The OWNER'S REPRESENTATIVE and CQA CONSULTANT have qualified personnel to collect conformance samples directly at the following facilities:

1. Conformance sample(s) of the geomembrane will be collected by the OWNER'S REPRESENTATIVE or CQA CONSULTANT prior to shipment to the PROJECT site.

2. Conformance sample(s) of the geomembrane will be tested by the CQA CONSULTANT prior to shipment to the PROJECT site.

3. The CONTRACTOR shall coordinate with the MANUFACTURER, CQA CONSULTANT, and OWNER to schedule the date of delivery of the geomembrane to the PROJECT site.

4. The CONTRACTOR shall inform, in writing, the ENGINEER and CQA CONSULTANT 14 calendar days prior to the actual date of shipment from the MANUFACTURER. Geomembrane shall not be shipped prior to testing without the ENGINEER'S and CQA CONSULTANT'S approval.

5. Geomembrane products shipped to the PROJECT site without approved conformance test results shall be sampled and tested upon delivery to the PROJECT site by the CQA CONSULTANT. All costs associated with collecting and shipping samples from the PROJECT site will be the CONTRACTOR'S responsibility. The CONTRACTOR shall allow a minimum of 30 calendar days for sampling and testing of geomembrane upon delivery to the PROJECT site prior to installation.

6. Once sampled at the MANUFACTURER'S plant geomembrane products shall not be added or removed from the shipment. Upon addition or removal of products the following conditions shall prevail:

    a. Geomembrane products added shall be sampled for conformance testing at the CONTRACTOR'S expense.

    b. Individual geomembrane products removed from the shipment, which have been previously sampled or tested - Additional samples that have identical lot or batch numbers shall be sampled for conformance testing at the CONTRACTOR'S expense.

B. Conformance Sample Test Frequency - The primary and secondary geomembrane shall be randomly sampled and tested by the OWNER'S REPRESENTATIVE or CQA CONSULTANT. The initial conformance testing shall be at the OWNER'S expense.

1. The initial conformance tests shall include one sample per lot but at a rate of not less than that indicated in the CQA Plan of installed material from consecutively numbered rolls, whichever is smaller. A lot is defined as a group of consecutively numbered rolls manufactured from the same resin batch or production line.

2. Samples shall be taken across the entire width of the rolls and shall not include the first 3 feet if stored outside or damaged. The test results of the geomembrane samples shall meet or exceed the CONTRACT DOCUMENTS and SPECIFICATIONS.

3. Samples that do not satisfy the CONTRACT DOCUMENTS and SPECIFICATIONS shall be cause to reject applicable rolls. If a geomembrane sample fails to meet CONTRACT DOCUMENTS and SPECIFICATIONS, subsequent tests shall be performed at random on additional geomembrane samples produced from

the same resin batch to determine whether all rolls produced from the same batch shall be considered as unsatisfactory and therefore rejected. The additional testing, borne by the CONTRACTOR, may be performed to more closely identify the rolls which do not comply with the SPECIFICATIONS. Rejected rolls will not be installed and shall be removed from the PROJECT site as directed by the ENGINEER or CQA CONSULTANT at no additional cost to the OWNER.

PART 3 - EXECUTION

3.1 MATERIAL PROTECTION

A. It is the CONTRACTOR'S responsibility to provide all labor and materials for protection of the product during the period of time prior to installation of overlying materials. The CONTRACTOR'S protection method is subject to the approval of the ENGINEER.

3.2 MATERIAL LABELING, DELIVERY, STORAGE, AND HANDLING

A. Labeling

1. Each roll of material shall have a MANUFACTURER'S identification label. Each roll shall be labeled to provide product identification adequate for inventory and QC purposes. At a minimum each roll label shall identify the following characteristics per ASTM D4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples:

   a. Product identification information (MANUFACTURER name and address, brand name, product code).

   b. Product lot number and individual roll number.

c. Date of fabrication.

d. Roll length and width

B. Delivery

1. The MANUFACTURER typically assumes responsibility for initial loading and shipping of the geomembrane. Unloading, on-site handling, and storage shall be the responsibility of the CONTRACTOR.

2. Rolls of geomembrane will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading according the MANUFACTURER'S recommendations.

3. A visual inspection of each roll should be made by the CONTRACTOR and CQA CONSULTANT and as it is unloaded to identify to determine if any packaging or material has been damaged during transit. Rolls with damaged packaging should be repaired prior to being placed in storage.

4. Rolls of geomembrane exhibiting damage shall be marked and set aside for closer examination during deployment. Damaged materials will be identified and repaired or rejected at the discretion of the ENGINEER. Materials to be repaired as specified herein.

5. The CONTRACTOR shall contact the MANUFACTURER prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment to be utilized.

6. The CONTRACTOR assumes all liability with regards to shipping, transport, and unloading of the geomembrane required to complete the WORK. The OWNER shall not be responsible for damaged, lost or miss-stocked shipments, or mishandled or damaged materials.

C. Storage

1. The MANUFACTURER shall identify, in writing, the proper equipment and methods for unloading materials and storage procedures for the products delivered to the PROJECT site.

2. Storage of the geomembrane rolls shall be the responsibility of the CONTRACTOR. The materials shall be unloaded by the CONTRACTOR in areas designated by the OWNER. The CONTRACTOR shall provide the proper equipment and labor necessary to unload the material upon delivery to the PROJECT. The materials shall not be stored or unloaded in areas that will impair the operations of the landfill facility or be deleterious to the materials. At a minimum, the storage location for geomembrane material shall provide protection from punctures, abrasions, excessive dirt and moisture, and shall have the following characteristics:

a. Rolls shall be fully supported on pallets or other devices to be prevented from contacting the ground.

b. Water shall be prevented from accumulating beneath the rolls.

c. Rolls shall not be stacked upon one another to the extent that deformation of the core or flattening of the rolls occurs.

d. Outdoor storage should not be allowed to exceed 30 days.

e. Protected from theft and vandalism.

f. Sufficiently close to the WORK area to minimize handling.

D. Handling

1. Each roll of geomembrane delivered to the site shall inspected by the CONTRACTOR, at a minimum, as follows:

a. The CONTRACTOR shall provide transportation, labor, and handling for delivery of the geomembrane to the PROJECT site. Special transportation or handling requirements for the geomembrane shall be provided by the CONTRACTOR.

b. The equipment for transportation, handling, loading, and unloading the geomembrane shall be of sufficient size and capacity to safely and efficiently handle geomembrane materials without damage or personnel injury occurring. The type, size and capacity shall be according to the MANUFACTURER and INSTALLER requirements.

c. The CONTRACTOR shall provide all equipment, labor, unloading, on-site handling, and installation of the geomembrane.

d. Upon delivery to the PROJECT site, the geomembrane material shall be inspected by the CONTRACTOR to confirm that proper labeling, transportation, handling, and storage procedures are followed. Damage to geomembrane rolls caused by the CONTRACTOR during unloading, on-site handling, and installation will be repaired at no additional cost to the OWNER. Rejected materials will be identified and removed from the PROJECT site as directed by the OWNER and CQA CONSULTANT at no additional cost to the OWNER.

3.3 GEOMEMBRANE SUBGRADE

A. Surface to be lined shall be smooth and tested in accordance with Section 02220 Excavation, Backfill, Fill, and Grading for Subgrade Material. The area shall be free of all rocks (greater than 1/2-inch in any dimension), sticks (greater than 1/2-inch in diameter), roots, grass, refuse, sharp objects, or debris of any kind. The surface shall provide a firm, unyielding foundation for the geomembrane with

no sudden, sharp, or abrupt changes or breaks in grade. No standing water or excessive moisture shall be allowed.

B. All areas that have been subject to erosion shall be repaired as required in Section 02220 Excavation, Backfill, Fill, and Grading. The repaired surface for geomembrane placement shall be even with no abrupt changes or breaks in grade. No standing water or excessive moisture shall be allowed.

3.4 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:

1. Gauges showing temperatures in apparatus (extrusion welder) or wedge (wedge welder) shall be present.

2. An adequate number of welding apparati shall be available to avoid delaying WORK.

B. Power source must be capable of providing constant voltage under combined line load.

3.5 DEPLOYMENT

A. The product shall be installed in accordance with the MANUFACTURER'S recommendations and the CONTRACT DOCUMENTS and SPECIFICATIONS. In case of a conflict between these documents, the more stringent requirements shall apply. Any deviations from these procedures must be reviewed and accepted by the ENGINEER prior to construction.

B. All activities by personnel and equipment in the vicinity of the geomembrane during and after geomembrane placement shall be monitored by the CONTRACTOR to insure the geomembrane and geomembrane foundation are not damaged.

C. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval by the ENGINEER and CQA CONSULTANT and shall be determined at the PROJECT site.

D. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas. Field panels shall not be placed if any of following conditions exists: inadequate geomembrane foundation, precipitation, presence of excessive moisture (i.e. fog, dew), ponded water, or presence of excessive winds.

E. Prior to welding, deploy panels in a "shingle" manner, wherein the upgradient panel overlays the downgradient panel.

F. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:

1. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket, etc.).

2. Place ballast (sandbags) on the geomembrane which will not damage geomembrane to prevent wind uplift. The CONTRACTOR shall have sufficient sand bags or other appropriate anchoring materials on site to secure the geomembrane. The CONTRACTOR shall replace or repair all geomembrane damaged (as determined by the ENGINEER) by wind or insufficient anchoring at no additional cost to the OWNER.

3. Personnel walking on the product shall not engage in activities or wear footwear that could damage the material. Smoking shall not be permitted on or near the geosynthetics.

4. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 6 psi.

5. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

G. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material. The geomembrane shall be installed so as to conform to the contours and grade breaks. The geomembrane shall remain in contact with the underlying geosynthetics. Sand bags or excess material, placed during deployment, shall be used to prevent bridging due to temperature or installation procedures. Allowances for additional material due to temperature and installation procedures shall be included in the bid and at no additional cost to the OWNER.

H. "Fishmouths" or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 inches beyond the cut in all directions.

I. If the INSTALLER proposes to conduct seaming operations outside of the approved conditions as specified herein (i.e., outside the weather parameters or night operations), written information and supporting data verifying seam quality can be maintained shall be submitted to the ENGINEER for review and approval 72 hours in advance. Alternate seaming operations will not be allowed without prior approval from the ENGINEER. If during the course of the WORK, the ENGINEER, CQA CONSULTANT, or OWNER decides the WORK is inadequate, the CONTRACTOR shall adjust operations as required or WORK shall ceased. CONTRACT DOCUMENTS and SPECIFICATIONS for placing and seaming the geomembrane shall apply to all WORK conditions.

3.6 FIELD SEAMING

A. Seams shall meet the following requirements:

1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.

2. Minimize number of field seams in corners, odd-shaped geometric locations, and outside corners.

3. Slope seams (panels) shall extend a minimum of 5 feet beyond the grade break into the flat area.

4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the CQA CONSULTANT and INSTALLER.

5. Align seam overlaps consistent with the requirements of the welding equipment being used. The panels of geomembrane have a finished overlap of 3 inches for extrusion welding and 6 inches for fusion welding, but in any event sufficient overlap shall be provided to allow peel tests to be performed on the seam.

B. During welding operations provide at least 1 Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.

2. Clean geomembrane surfaces by disc grinder or equivalent.

3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.

2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.

3. Protect against moisture build-up between sheets.

E. Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.

2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with Subgrade and similar ambient temperature.

3. Minimum of 2 trial welds per day, per welding apparatus, 1 made prior to the start of work and 1 completed at mid-shift (typically after lunch break). Additionally, perform trial welds at any time the welding equipment is shut down and restarted.

4. Cut 1, one-inch wide by 6 inch long test strips from the trial weld.

5. Quantitatively test specimens for peel adhesion and then for shear strength.

6. Trial weld specimens shall pass when the minimum results, as indicated in TABLE 02776-5 MINIMUM PEEL AND SHEAR SEAM STRENGTH VALUES, are achieved in both peel and shear tests.

   a. The break, when peel testing, occurs in the liner material itself not through peel separation (FTB).

   b. The break is ductile.

7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.

8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. Immediately prior to seaming procedures, the seam area shall be completely free of moisture, dirt, or foreign material of any kind. The INSTALLER shall demonstrate acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs

1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.

2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

H. Cold weather installations should follow the guidelines contained in GRI GM9.

3.7 FIELD QUALITY ASSURANCE

A. The MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the OWNER'S CQA Plan. The CQA CONSULTANT / CONTRACTOR shall be responsible for assuring this participation.

B. Welding equipment shall be calibrated prior to each day's welding in accordance with the Installation Plan. The INSTALLER shall record all calibration data for inclusion in the final report. Additional test welds shall be performed for each welding machine every 4 hours, if welder is turned off, prior to starting work, after lunch, or as directed by the CQA CONSULTANT.

3.8 NON-DESTRUCTIVE TESTING

A. Non-destructive testing shall be carried out as the seaming progresses. All seams shall be non-destructively tested in the presence of the CQA CONSULTANT. Insufficient seams shall be labeled, recorded, repaired and re-tested.

1. Vacuum Box Testing - Shall be performed in accordance with ASTM D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

a. Shall be required for all extrusion welds, except for those welds inaccessible to the vacuum box, such as geomembrane boots. Air pressure gauges shall read 0 psi when testing apparatus is not turned on. Pressure gauges not reading 0 psi shall be replaced. Vacuum box apparatus shall be capable of sustaining a vacuum pressure 5 psi (gauge) for 30 seconds while placed on a seam. The following procedures shall be followed:

1) Energize the vacuum pump and reduce the tank pressure to approximately 10 inches of mercury, i.e., 5 psi (gauge). All gauges shall read 0 psi when the vacuum pump is not turned on. Gauges not reading 0 psi shall be replaced.

2) Wet a strip of geomembrane approximately 12 inches by 30 inches (or length of box) with a soapy solution.

3) Place the box over the wetted soapy area.

4) Close the bleed valve and open the vacuum valve.

5) Ensure that a leak tight seal is created.

6) For a period of not less than 30 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles, which would indicate defects in the geomembrane and/or welding.

7) If no bubble appears after 30 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap, and repeat the process.

8) All areas where soap bubbles appear shall be marked and repaired in accordance with this Section.

2. Air Pressure Testing - Shall be performed in accordance with ASTM D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.

a. Testing apparatus shall be capable of generating a minimum pressure of 25 psi. Air pressure gauges shall read 0 psi when testing apparatus is not turned on. Pressure gauges not reading 0 psi shall be replaced. The air channel shall be pressurized from 25 to 30 psi and allowed to stabilize. Once stabilized, the channel pressure shall be sustained for a minimum of 5 minutes. If loss of pressure is more than 2 psi, or the pressure does not stabilize, the seam shall be rejected, the faulty area located and repaired and the seam re-tested. The following procedures shall be followed:

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 fusion weld.

3) Insert a protective cushion between the air pump and the geomembrane.

4) Energize the air pump to a pressure of at least 25 psi, close valve, allow channel pressure to stabilize, and sustain channel pressure for approximately 5 minutes.

5) If loss of pressure is more than 2 psi or does not stabilize, locate faulty area and repair.

6) After a seam has passed a pressure test, release pressure at the end of seam that is opposite the air pump and pressure gauge assembly to ensure that the seam is continuous and has been completely tested. The seal shall be repaired in accordance with this Section.

B. The CQA CONSULTANT shall include all results from the destructive and non-destructive seam tests into the final report.

3.9 DESTRUCTIVE TESTING

A. Performed by the CQA CONSULTANT with assistance from the INSTALLER.

B. Location and Frequency of Testing

1. Installed geomembrane shall be tested at a rate of one test per 500 linear

feet of welded seam at locations selected by the CQA CONSULTANT.

2. Test locations will be determined after seaming.

C. Sampling procedures are performed as follows:

1. INSTALLER shall cut samples at locations designated by the CQA CONSULTANT as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.

2. The CQA CONSULTANT will number each sample and the location will be noted on the installation as-built.

3. The CONTRACTOR shall remove the sample with the seam centered lengthwise, approximately 12 inches wide across the seam by 48 inches long, and test a portion of the geomembrane seam in accordance with the CQA Plan. The location shall be recorded, repaired, and tested. The repair of the destructive seam samples shall be at no additional cost to the OWNER. The CQA CONSULTANT shall distribute the samples as follows:

   a. A 12 inch by 18 inch portion to the CQA CONSULTANT for Third Party Laboratory Quality Assurance testing.

   b. A 12 inch by 18 inch portion shall be retained by the INSTALLER for field testing.

   c. A 12 inch by 18 inch portion to the OWNER for archive storage.

4. Testing performed on each sample shall include geomembrane peel adhesion and seam strength per the CQA Plan.

5. Ten 1-inch wide strips shall be cut from the CONTRACTOR portion of the sample and these shall be tested in the field by the INSTALLER.

6. Field Testing - The ten 1-inch wide strips shall be tested by the CONTRACTOR in the field using a tensiometer, 5 for peel and 5 for shear, and shall meet the SPECIFICATIONS. If any field test sample fails to pass, then the procedures outlined in this Section shall be followed.

7. Laboratory Testing - Testing by the CQA CONSULTANT will include seam strength and peel adhesion per the CQA Plan. The CQA CONSULTANT will provide test results to the CONTRACTOR no more than 24 hours after the samples are received at the laboratory. The only exception shall be weekends or official holidays when the laboratories are closed. Arrangements to schedule testing of destructive samples on weekends and holidays shall be approved by the CQA CONSULTANT 24 hours in advance. Additional costs for lab work on holidays or weekends shall be at no additional expense to the OWNER and shall be paid by the CONTRACTOR.

8. Procedures for Destructive Test Failure - The following procedures shall apply

whenever a sample fails the destructive test, whether the test is conducted by the CQA CONSULTANT'S laboratory or by field tensiometer. The geomembrane INSTALLER shall have two options, the cost of which shall be at no additional expense to the OWNER:

a. The geomembrane INSTALLER can reconstruct the seam between any two passed test locations.

b. The geomembrane INSTALLER can trace the welding path to an intermediate location at 10 feet, minimum, from the location of the failed test in each direction, and take a specimen for an additional field test at each location. If these additional specimens pass the test, then full laboratory destructive samples shall be taken. These additional tests shall be at the expense of the CONTRACTOR. If these laboratory samples pass the test, then the seam shall be reconstructed between these locations. If either sample fails, then the process shall be repeated to establish the zone in which the seam should be reconstructed. In any case, all acceptable seams must be bounded by two locations from which samples passing laboratory destructive tests have been taken. In cases exceeding 150 feet of reconstructed seam, a sample taken from within the reconstructed zone must pass destructive testing. Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and/or welding apparatus or welded during the same time shift. Such additional testing shall be at the CONTRACTOR'S expense.

3.10 REPAIR PROCEDURES

A. All seams and non-seam areas of the geomembrane shall be inspected by the INSTALLER and CQA CONSULTANT for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be brushed, blown, or washed by the CONTRACTOR if the amount of dust, mud or debris inhibits inspection. The CQA CONSULTANT shall decide if cleaning of the geomembrane is needed to facilitate inspection. The INSTALLER shall be responsible for repair of defective areas at no additional expense to the OWNER.

B. Agreement upon the appropriate repair method shall be decided between CQA CONSULTANT and INSTALLER by using one of the following repair methods:

1. Patching - Patches shall be round or oval in shape made of the same geomembrane and extend a minimum of 6 inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane specified. All patches shall have their top edge beveled with an angle grinder prior to placement on the geomembrane. Patches shall be applied using approved methods only.

2. Abrading and Re-welding - Used to repair short section of a seam.

3. Spot Welding - Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.

4. Capping - Used to repair long lengths of failed seams.

5. Remove the unacceptable seam and replace with new material.

C. The following procedures shall be observed when a repair method is used:

1. All geomembrane surfaces shall be clean and dry at the time of repair.

2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.

3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

D. Repair Verification

1. Each repair shall be non-destructively tested. In addition the CQA CONSULTANT may require a destructive seam sample be obtained from a repaired seam. Repairs that pass the non-destructive and/or destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.

2. Number and log each patch repair (performed by CQA CONSULTANT).

3.11 ANCHOR TRENCH

A. The anchor trench shall be excavated prior to geomembrane installation. No loose soil, roots, rocks, or materials capable of damaging the geomembrane shall be allowed beneath the geomembrane. The anchor trench shall be backfilled and compacted as indicated on the CONTRACT DRAWINGS, and in a manner that prevents any damage to the geomembrane. The geomembrane shall not have sharply folded corners when placed into the anchor trench. The geomembrane shall be welded the entire length of the panel, including through the entire dimension of the trench.

B. The perimeter of the geomembrane shall be identified with edge of liner markers as shown in the CONTRACT DRAWINGS.

3.12 OVERLYING GEOCOMPOSITE (ALTERNATE IF USED)

A. During placement of the geocomposite upon the geomembrane, precautions shall be taken to prevent damage to the geomembrane by restricting heavy equipment traffic. Unrolling the geocomposite can be accomplished through the use of lightweight, rubber-tired equipment such as a 4-wheel all-terrain vehicle (ATV). This vehicle can be driven directly on the geomembrane, provided the ATV makes

no sudden stops, starts, or turns.

B. Geomembrane which is covered prior to approval by the CQA CONSULTANT shall be uncovered at no additional cost to the OWNER.

C. The CONTRACTOR shall schedule his work so as to permit as much time as needed for testing and CQC/CQA documentation before placing the overlying soil layer(s).

D. The CONTRACTOR shall place the overlying geocomposite layer immediately upon approval of the geomembrane by the CQA CONSULTANT to prevent damage, uplift, or degradation of the geomembrane.

3.13 SURVEY CONTROL STAKES

A. Survey stakes in the vicinity of the geomembrane shall be placed with care as not to penetrate the geomembrane liner. Plastic traffic cones, cardboard tubes or other items as approved by the ENGINEER may be used as survey control devices.

3.14 FINAL ACCEPTANCE

A. The CONTRACTOR shall retain ownership and responsibility for the installed geomembrane until final acceptance by the OWNER.

B. Final acceptance of the geomembrane by the OWNER will occur when:

1. All installation activities are completed.

2. All documentation of installation is completed and the INSTALLER'S final report is submitted to and accepted by the ENGINEER.

3. All documents presented in this Section have been submitted to the ENGINEER and approved.

END OF SECTION

SECTION 02941
GEOSYNTHETIC RAIN TARP

PART 1 - GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, supervision, administration, management, quality control, and installation equipment necessary for the unloading, on-site handling, storage, installation and CQC testing of geosynthetic rain tarp as shown on the Contract Drawings and as specified herein.

B. Geosynthetic rain tarp will be purchased by the OWNER and delivered to the Landfill. All geosynthetic rain tarp shall conform to the following requirements and shall be of new stock of the highest grade available, free from defects and recently manufactured.

C. All installation shall be in strict accordance with the Specifications, Contract Drawings, conformance with the MANUFACTURER'S recommendations and with current industry standards.

D. All WORK shall be performed in strict accordance with the lines, grades, cross-sections, and dimensions as shown on the Contract Drawings.

1.02 CQA CONSULTANT SUBMITTALS

A. Submit MANUFACTURER'S test reports and data, specifications, installation instructions, and roll dimensions.

B. Submit copies of evaluation reports provided by the MANUFACTURER demonstrating that properties for the materials comply with Specification requirements.

C. The MANUFACTURER shall warrant, in writing, the material for 5 years on a pro-rata basis. The warranty shall apply to normal use and service in a sanitary landfill environment under exposure to sanitary landfill gas and leachate as well as other exposures which can be anticipated from the intended use.

D. Submit MANUFACTURER'S information regarding UV-resistant sand bag material.

E. ENGINEER'S approval shall be obtained prior to the use of any materials in the project.

1.03 PROTECTION AND STORAGE

A. Each roll of material shall have a MANUFACTURER'S identification label. Each roll shall be labeled to provide product identification adequate for inventory and quality control purposes. The label shall provide, as a minimum, the MANUFACTURER'S name, product identification, lot number, roll number, and roll dimensions. Rolls shall be labeled as per ASTM D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

B. Materials shall be shipped and stored in rolls furnished at the manufacturing facility to prevent exposure of the geosynthetic to ultraviolet light, precipitation, moisture, mud, dirt, dust, puncture, or other damaging conditions.

C. Rolls of material should not be stacked upon one another to the extent that deformation of the core occurs. Outdoor storage shall not exceed six months.

PART 2 - PRODUCTS

2.01 GEOSYNTHETIC RAIN TARP

A. Material shall be a scrim-reinforced polyethylene or a polymer type membrane such as Dura-Skrim 12BBR as manufactured by Raven Industries, PPL-12 Liner/Top Cover as manufactured by Bend Tarp and Liner, Inc., or an ENGINEER'S approved substitution conforming to the following minimum properties:

CHARACTERISTICS	SPECIFICATION
Nominal Thickness	12 mil
Moisture Vapor Transmission	0.36 g/m^2-day or less

B. The material shall be tested by the MANUFACTURER for the compliance with the following properties:

PROPERTY	TEST METHOD
Permeability	ASTM D4491 or ASTM E96
Tensile Strength	ASTM D751
Grab Tensile	ASTM D751
Moisture Vapor Transmission	ASTM E96

PART 3 - EXECUTION

3.01 INSTALLATION

A. The rain tarp shall be installed along the surface of the stormwater diversion berms along the Phase 3 fill in Cell 3B2 in accordance with the Contract Drawings. Ballast, such as sand bags, shall be placed on the rain tarp to

avoid uplift due to wind and spaced at intervals on a 10-foot by 10-foot grid and on a minimum 10-foot spacing along panel overlaps and panel edges. Sand bag material shall be UV-resistant. No equipment shall be allowed to operate on the rain tarp, and any tears or damage to the rain tarp shall be repaired prior to placement. The surface of the rain tarp shall be kept relatively clean and free of debris during installation.

B. Sheets shall be joined in accordance with the MANUFACTURER'S recommendations.

C. The CONTRACTOR shall place all cover materials in such a manner to prevent damage to the materials, slippage of the underlying layers, and excessive tensile stresses in the materials.

3.02 REPAIRS

A. Rain tarp damaged during placement or before final acceptance shall be replaced or repaired at the CONTRACTOR'S expense in accordance with MANUFACTURER'S recommendation. The CONTRACTOR shall be responsible for the documentation of repairs describing location and type of repair. Repair documentation shall be submitted to the ENGINEER.

PART 4 – STORMWATER

4.01 STORMWATER PUMP & HOUSING

A. A Stormwater Pump will be placed on top of the rain tarp between the base of the stormwater diversion berm and the MSW landfill berm at by the OWNER. The pump and housing will be placed after the rain tarp is installed and will operate on a float system controlled by the pump panel. CONTRACTOR shall install all wiring for the housing and floats, placed per field conditions, at a minimum of 2' below ground until it daylights at the anchor trench to run over the liner to the pump. CONTRACTOR shall protect all wiring by underground conduit from the panel to the breaker boxes. The conduit will be sealed on both ends (at the panel and at the breaker box) to keep liquids and gases from traveling through the conduit. From the breaker boxes to the pump the power cable and float control cable will not be in conduit. Tie the two cables together at 15 foot intervals for the run of the wire using a UV resistant cord.

B. Note that the pump discharge will be a three-inch hose that will discharge into the stormwater fabriform ditch beside the southwest edge of the cell 3B2.

C. All edges of the Stormwater Pump Housing that could come in contact with the rain tarp shall be rounded and smoothed to prevent the housing from causing damage to the rain tarp.

END OF SECTION

DIVISION 15

LEACHATE COLLECTION SYSTEM

SECTION 15060
LEACHATE SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. The WORK specified in this Section includes the installation of the leachate collection and removal system piping, including the perforated and solid wall HDPE pipes and fittings, HDPE forcemains, HDPE slope riser pipes, HDPE LFG horizontal collectors, gravel for the leachate collection system, and related hardware as shown on the Contract Drawings and as specified herein.

1.02 PROJECT CONDITIONS

A. Existing project conditions are shown on the Drawings or otherwise described herein.

B. Site information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the required excavation to determine the exact location of all structures, utilities, etc.

C. Structures shall be supported and protected from damage by the CONTRACTOR. If structures are broken or damaged, CONTRACTOR shall restore structures, utilities, etc. to their original condition at no additional cost to the OWNER. Repair of damaged features or structures shall be approved by the ENGINEER and OWNER.

D. OWNER. Repair of damaged features or structures shall be approved by the ENGINEER and OWNER.

1.03 SUBMITTALS

A. All product data shall be submitted, to the ENGINEER for approval, at least 14 calendar days prior to installation.

B. Names of the pipe, pipe fitting, and valve suppliers, certificates of compliance on materials to be furnished, and manufacturer's recommendations for storage, handling, installation, inspection, and repair of each type of pipe and pipe fitting to be furnished.

C. Manufacturer's certification that the High-Density Polyethylene (HDPE) pipe was manufactured from resins in compliance with these Specifications. The certificate shall state the specific resin, its source and the specific information required by ASTM D1248.

D. The HDPE pipe manufacturer shall provide certification that stress regression

testing has been performed on the specific 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. The manufacturer must warrant the pipe to be free from defects in material and workmanship in accordance with ASTM D3350 and F714.

E. Manufacturer and model information for HDPE elbows and fittings in accordance with Part 2 of this Section.

F. Layout drawings (minimum scale 1 inch = 10 feet) with information indicating:

a. Schedule and details of elbows and fittings.

b. Back-up rings and related hardware.

c. Perforation pattern(s), as applicable, size.

d. Invert or centerline elevations of pipe crossings.

e. Acknowledgment of bury depth and location requirements.

f. Line slopes.

G. Schedule of interconnections to existing piping and method of connection.

H. Test report indicating test results on all piping systems, corrective actions, and date and time of test.

I. Results of sieve analysis and calcium carbonate test for stone backfill.

J. Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS (LANDFILL GAS SYSTEM, FORCEMAINS, LEACHATE COLLECTION/DETECTION, AND LEACHATE COLLECTION/DETECTION RISERS)

A. Polyethylene pipe resins shall be high performance, high molecular weight, High Density Polyethylene (HDPE) conforming to ASTM D1248, ASTM D2513, and ASTM D3350 (Cell Classification PE 445474C, with material designation of PE 4710). The pipe and fittings shall be manufactured with a minimum of 2 percent carbon black to withstand outdoor exposure without loss of properties. All HDPE pipe shall meet the requirements of ASTM F714.

B. Each pipe shall be continuously marked in accordance with AWWA C906 with durable printing including the manufacturer's name or trademark, nominal size, material code (i.e., PE 4710), pressure class, plant identification, production date, and Standard Dimension Rating (SDR). Pipe SDR ratings shall be as indicated on the Contract Drawings.

C. All HDPE pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same manufacturer's specification as the raw material. The pipe shall be homogenous throughout and free of visible cracks, holes, foreign inclusions, or other deleterious defects and shall be identical in color, density, melt index and other physical properties.

D. Pipe and perforations shall be of sizes as shown on in the Contract Drawings. The CONTRACTOR may not alter hole patterns or spacing. Pipe shall be furnished in standard laying lengths.

E. Pipe shall be furnished perforated or non-perforated as specified and in the locations shown on the Contract Drawings.

F. Fittings: All HDPE fittings, including reducing tees, cross tees, and elbows shall be factory molded and/or fabricated with butt fusion. All fittings 12 inches and small shall be molded, unless otherwise approved by the ENGINEER. All fittings shall meet the requirements of ASTM D3261 and F714. HDPE shall be manufactured by injection molding or a combination of extrusion and machining from HDPE pipe conforming to this Section. The fittings shall be fully pressure rated and provide a working pressure equal to that of the pipe with an included 2.5 safety factor. The fittings shall be manufactured from the same type and cell classification as the pipe itself. The fittings shall be homogenous throughout and free from cracks, holes, foreign inclusions, voids, or other injurious defects.

G. The gravel used for the leachate collection system shall be non-calcareous with a calcium content of less than 5% by weight. The gravel shall have a gradation that complies with the requirements for No. 57 aggregate as specified in the Georgia Department of Transportation's, Standard Specifications for Road and Bridge Construction (Current Edition), or other materials as approved by the Engineer. The Construction Quality Representative shall be provided a representative sample of material for Quality Assurance Testing. Certified gradation analysis shall be provided by the gravel supplier.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The installation of HDPE pipe and fittings shall be strictly in accordance with the manufacturer's technical data and printed instructions, at locations shown on the Contract Drawings and as specified herein. All heat fusion joints shall be done by factory qualified fusion technicians.

B. The CONTRACTOR shall use accepted industry practice in unloading and stockpiling material. HDPE pipe shall never be dumped or dropped from a truck bed. HDPE pipe shall be lifted and placed on the ground, or rolled down ramps. HDPE pipe and other materials shall never be dragged along the ground.

C. The CONTRACTOR shall stockpile material only in areas authorized by the ENGINEER. Material stockpiled in an unauthorized area shall be moved by CONTRACTOR at no cost to the OWNER. CONTRACTOR shall stockpile material to insure even and complete support for the material to prevent crimping, marring, crushing, piercing, or other damage. Maximum stacking height shall be limited to 6 feet. CONTRACTOR supplied material which is damaged shall be replaced at no additional cost to the OWNER.

D. rial to insure even and complete support for the material to prevent crimping, marring, crushing, piercing, or other damage. Maximum stacking height shall be limited to 6 feet. CONTRACTOR supplied material which is damaged shall be replaced at no additional cost to the OWNER.

E. HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will over stress or buckle the HDPE piping or impose excessive stress on the joints.

F. ess on the joints.

G. Pipe shall be laid to line and grade, and with bedding and backfill material as shown on the Drawings.

H. When laying is not in progress (including break times) the open ends of the pipe shall be closed by fabricated plugs, or by other approved means. All plugs shall be outside diameter fitting plugs. No plugs will be allowed that require insertion of the plug into the pipe. Any sediment or other contaminants allowed to enter pipe by failure to place cap over end shall be removed at CONTRACTOR'S expense.

I. It may be necessary to provide slightly longer length of HDPE pipe when connections are to be made between two fixed points or structures to compensate for contraction of the pipe in a cooler trench bottom. The additional pipe length requirements shall be in accordance with the HDPE pipe manufacturer instructions.

J. 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.

K. Sections of pipe with cuts, scratches or gouges deeper than recommended as acceptable by manufacturer shall be replaced at CONTRACTOR'S expense.

L. HDPE pipes joined using mechanical couplings:

1. Mechanical joints shall be made in accordance with manufacturer's recommendations. CONTRACTOR will provide coupling equipment and trained operator.

2. HDPE pipe coupling equipment shall be of the size and nature to adequately join all HDPE pipe sizes and fittings necessary to complete the project.

3. Before coupling HDPE pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed.

4. At the end of each day, all open ends of joined pipe shall be capped or otherwise covered to prevent entry by animals or debris.

M. HDPE pipes joined using fusion welding:

1. Fusion joints shall be made in accordance with manufacturer's recommendations. CONTRACTOR shall provide fusion equipment and trained operator(s). CONTRACTOR shall provide at least one trained supervisor who has at least one year of experience in the use of a fusion procedure.

2. HDPE pipe fusion equipment shall be of the size and nature to adequately join all HDPE pipe sizes and fittings necessary to complete the project.

3. Before fusing HDPE pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed.

4. At the end of each day, all open ends of joined pipe shall be capped or otherwise covered to prevent entry by animals or debris.

N. HDPE pipe installation:

1. Lengths of fused pipe (4 inches in diameter or greater) to be handled as one section shall not exceed 400 feet.

2. HDPE pipe shall be allowed sufficient time to adjust to foundation soil temperature prior to any testing, segment tie-ins, and/or backfilling.

3. The stub-ends, with stainless steel back-up ring, shall be fusion welded to the pipe as shown on the Contract Drawings. Field fabricated bends

conforming to the contours and grades of the cell shall be fabricated in the field.

O. The ENGINEER shall be notified prior to any pipe being fused and installed. The ENGINEER will inspect the following items at this time:

1. All mechanical and butt-fusion joints.
2. Pipe integrity.
3. Pipe foundation for rocks and foreign material.
4. Proper trench or foundation slope.
5. Trench or foundation contour to ensure the pipe will have uniform and continuous support.

CONTRACTOR must correct any irregularities found by the ENGINEER during this inspection before lowering the pipe into the trench or otherwise covering the pipe.

P. Damaged pipe that results in a reduction of the wall thickness beyond 10 percent shall be cut out and discarded. Damaged pipe shall be repaired according to manufacturer's recommendation, and at no additional cost to the OWNER.

Q. Protection of the Geomembrane:

1. During installation of geotextile, rock, or pipe, no equipment shall be used that may damage the geomembrane.
2. Areas of the geomembrane that will be exposed to traffic or other activities shall be protected by geotextiles, additional geomembrane, or other suitable materials. Any portion of the liner which becomes damaged or shows signs of excessive wear shall be replaced at no additional cost to the OWNER.

3.02 CONNECTIONS WITH EXISTING SYSTEM

A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.

B. Perform connections with existing piping at time and under conditions, which will east interfere with service by such operations.

C. Undertake connections in fashion, which will disturb system as little as possible.

D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent facilities.

3.03 SEGMENT TESTING

A. The HDPE forcemain shall be subjected to pressure tests as described herein to detect any leaks in the piping. Testing shall be performed below grade (inside the trench). The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.

B. Polyethylene piping shall be butt welded together into testing segments. Segments shall be connected to a testing apparatus on one end and fitted with fusion-welded caps on all openings.

C. The segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.

D. The test must be performed during a period when the pipe segment will be out of direct sunlight; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations. No testing will be allowed during the middle of the day or when pipe segments are exposed to sunlight.

E. The test pressure for HDPE forcemain shall be 100 psig with a maximum of 5 percent loss.

F. Pressure drop during the test shall not exceed five percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure. (See Section 3.04 for test failures). The ENGINEER shall sign off on a test form to indicate test compliance.

G. The ENGINEER shall be notified prior to commencement of the testing procedure and shall be present during the test.

H. All equipment for this testing procedure, including an adequately sized air compressor, fittings, caps/pipe plugs, etc., shall be furnished by the CONTRACTOR. Other necessary equipment includes a flange adaptor with a steel or brass blind flange. Tapped and threaded into the blind flange will be a temperature gauge with a scale of 0 to 100 degrees C with 1-deg. intervals, a pressure gauge with a scale that spans the test pressure range with increments equal to 0.1 percent of the test pressure, an appropriate valve to facilitate an air compressor hose, and a ball valve to release pipe pressure at completion of test. Pipe reducers shall be utilized to adapt test flange to size of pipe being tested.

3.04 TEST FAILURE

A. The following steps shall be performed when a pipe segment fails the one percent/one hour test described in Part 3.03 F, above.

1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.

2. All blocked risers and capped ends shall be inspected for leaks.

3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.

C. After all leaks are repaired, a retest shall be performed in accordance with Part 3.03.

3.05 TEST REPORTING

A. Each test (pass or failure) shall be reported in writing on a form approved by the ENGINEER.

B. If failure occurs, CONTRACTOR shall note the following:

1. Location of failure segment.

2. Nature of leaks.

3. Repairs performed.

4. Results of test

END OF SECTION